The Contribution of Children's Self-Regulation and Classroom Quality to Children's Adaptive Behaviors in the Kindergarten Classroom

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In this study, the authors examined the extent to which children's self-regulation upon kindergarten entrance and classroom quality in kindergarten contributed to children's adaptive classroom behavior. Children's self-regulation was assessed using a direct assessment upon entrance into kindergarten. Classroom quality was measured on the basis of multiple classroom observations during the kindergarten year. Children's adaptive classroom behavior in kindergarten was assessed through teacher report and classroom observations: Teachers rated children's cognitive and behavioral self-control and work habits during the spring of the kindergarten year; observers rated children's engagement and measured off-task behavior at 2-month intervals from November to May. Hierarchical linear models revealed that children's self-regulation upon school entry in a direct assessment related to teachers' report of behavioral self-control, cognitive self-control, and work habits in the spring of the kindergarten year. Classroom quality, particularly teachers' effective classroom management, was linked to children's greater behavioral and cognitive self-control, children's higher behavioral engagement, and less time spent off-task in the classroom. Classroom quality did not moderate the relation between children's self-regulation upon school entry and children's adaptive classroom behaviors in kindergarten. The discussion considers the implications of classroom management for supporting children's early development of behavioral skills that are important in school settings.

Keywords: adaptive classroom behavior, classroom quality, self-regulation, self-control, engagement

American kindergarten classrooms have become increasingly rigorous over the past decade. School accountability demands ushered in by the *No Child Left Behind* legislation shifted the focus of kindergarten away from children's social and emotional skills and toward the enhancement of children's academic skills (S. L. Kagan & Kauerz, 2007). Consider current state learning standards for kindergarten-age children: Achievements in language, cognition, and general knowledge prevail over children's positive approach toward learning, competent relationship development, socioemotional skills, and physical development (Scott-Little, Kagan, & Frelow, 2006). The shift toward academic rigor has important implications for the development of young children and the definition of what constitutes school readiness and adaptive kindergarten behaviors (Graue, 2006).

Existing research states that children's behavioral adaptation to the classroom environment is critically important. Even in the earliest years of school, children's ability to persist at work, stay on task, attend to learning goals, and participate actively in learning has been associated with increased academic success in school (DiPerna, Lei, & Reid, 2007; Ladd, Birch, & Buhs, 1999). Adaptive classroom behaviors have been linked to achievement in kindergarten, even after controlling for IQ and sociodemographic factors (Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003; McClelland, Morrison, & Holmes, 2000). Further, adaptive behaviors evident during the kindergarten year have been associated with gains in achievement through the sixth grade (McClelland, Acock, & Morrison, 2006). Yet, children are quite variable in the degree to which they meet the demands of the kindergarten classroom (Rimm-Kaufman, Pianta, & Cox, 2000). The degree and source of variability is important in efforts designed to improve children's adaptive classroom behavior (i.e., early self-control, work habits, and engagement), which set the stage for later growth and development.

In the present study, we use a multimethod approach to identify the extent to which children's self-regulation upon the transition to

school, the nature of social and instructional interactions of the child's classroom, and/or their combination predict children's adaptive classroom behavior. In the present work, we acknowledge a principle in developmental psychology stating that children's behaviors need to be understood in relation to their incentive events or conditions (J. Kagan, 1998). Thus, knowing the child's self-regulatory ability in a laboratory-like condition offers limited insight into how children will behave in the classroom. Measuring the social and instructional interactions present in the classroom expands our understanding of the way in which classroom conditions socialize children who come to school with a variety of self-regulatory skills. Further, we advance existing work by choosing a sample composed of children from a rural, primarily low-income region. Young children raised in rural environments tend to have less access to enriching resources and live in more isolated environments (Brody & Flor, 1998); perhaps for those reasons, they show greater problems with school transition than children from suburban areas (Rimm-Kaufman et al., 2000).

Potential Contributors to Children's Adaptive Classroom Behaviors

Adaptive classroom behaviors are hypothesized to reflect children's internal capacity and strengths as well as the presence of external supports that help them meet challenges associated with the kindergarten classroom (Bronson, 2000). There exists some research that implicates family processes, early childhood experiences, sociodemographic factors, and biologically based child attributes as just a few of the predictors of children's ability to show adaptive classroom behaviors (Blair, 2002; McClelland et al., 2000; National Institute of Child Health and Human Development Early Child Care Research Network [NICHD–ECCRN], 2003; Rimm-Kaufman & Kagan, 2005). In contrast, the research that examines the contribution of classroom processes is much more limited. There are a few studies that describe how classroom quality (e.g., class size, the nature of teacher–child interactions) predicts children's classroom behavior (Finn & Pannozzo, 2004; Mashburn et al., 2008; Pianta, La Paro, Payne, Cox, & Bradley, 2002). There is some research examining how child attributes and classroom environment combine to contribute to children's behavior (e.g., Downer, Rimm-Kaufman & Pianta, 2007; Gazelle, 2006; Hamre & Pianta, 2005; Rimm-Kaufman et al., 2002). In the present work, we extend existing research by examining how child attributes and classroom environments contribute individually and synergistically to children's adaptive classroom behaviors. By using a mix of methods—including direct assessment, teacher report, and classroom observation—we offer a nuanced view of these potential contributors.

Self-Regulation

Children's self-regulation upon school entry stands out as a critically important skill to ensure children's school functioning (Blair, 2002; Raver, 2002). There has been growing interest in the construct of self-regulation, and the literature suggests considerable disagreement about its definitions and constituent elements (Kochanska, Aksan, Prisco, & Adams, 2008; McClelland et al., 2007). Self-regulation refers to children's ability to manage their emotions, focus their attention, and inhibit some behaviors while

activating others (Blair & Razza, 2007; Smith-Donald, Raver, Hayes, & Richardson, 2007). As children approach school entrance age, children's self-regulatory ability reflects children's cognitive capacity as well (Calkins & Howse, 2004).

In this study, we focus on the broad construct of *self-regulation* that incorporates a set of related skills involving emotion, attention, behavior, and cognition that, in combination, are likely to be important in the kindergarten classroom and, in theory, can be influenced by classroom socialization processes. To operationalize self-regulation upon school entry, we consider children's performance on tasks requiring the inhibition of a dominant response and the display of a subdominant response. Children were asked to perform such tasks in situations that activate emotions to a greater or lesser extent, in essence, providing a test of self-regulation that captures in the interrelation among emotion, attention, behavior, and cognition. This test measures self-regulation in a very simple and laboratory-like context—a one-on-one situation with a research assistant.

Tasks used to measure self-regulation were selected because of their hypothesized link to ecologically valid experiences in kindergarten classrooms. Teachers make frequent requests of children and ask children to follow a series of steps in sequence. For example, teachers routinely make requests, such as "get your papers, put them in your folder, and put your folder in your backpack." Self-regulation is implicated as children inhibit their dominant response (to keep working) and display a subdominant response (put away their work), thus showing conscious control of thought and action (Zelazo & Mueller, 2002). Such self-regulatory processes resemble those required in a pencil tapping task requiring that children respond counterintuitively.

Some classroom demands implicate emotional control as well as attentional, behavioral, and cognitive control. Children need to wait their turn so their peers get opportunities to engage in desired activities, resist working on an engaging activity because it is time to switch to a new one, and raise their hands when they have answers rather than just call out. Children can demonstrate their ability to self-regulate in conditions that activate emotions by following an adult's instruction to sort interesting toys (instead of playing with them) and by resisting peeking during a gift wrap task (Murray & Kochanska, 2002). The contribution of self-regulation on classroom behaviors needs to be considered in relation to other factors and processes in children's lives, turning our attention toward child and family characteristics.

Child and Family Characteristics

Children's gender, preschool experience, and family sociodemographic risk have been shown to predict children's adaptive classroom behaviors. Boys are typically less ready for kindergarten (McWayne, Fantuzzo, & McDermott, 2004; Ready, LoGerfo, Burkam, & Lee, 2005) and show more difficulty negotiating the transition to kindergarten than girls (NICHD–ECCRN, 2003). Exposure to high-quality child care or preschool experiences is likely to be beneficial (Magnuson, Rhum, & Waldfogel, 2007) in relation to adaptive classroom behaviors. However, there are also well-established links between the amount of time in early child care and problems upon the transition to school (NICHD–ECCRN, 2003), suggesting that the direction of the link may not be so clear. Finally, family risk factors (single marital status, low mother

education, and low income) form a constellation of risks that result in less availability of social and economic resources to young children and higher levels of emotional and behavioral problems (e.g., Bradley & Corwyn, 2000; Morales & Guerra, 2006), reducing the likelihood that children will show adaptive classroom behaviors in kindergarten.

To understand contributors to adaptive classroom behaviors, in the present analyses we consider gender, preschool experience, and family sociodemographic risk because of existing research linking them to school adjustment. To further explain adaptive classroom behaviors, we also consider the role of classroom quality as a socializing condition in children's lives.

Classroom Quality

Classroom quality, particularly the nature of teachers' interactions toward children, is hypothesized to support children's display adaptive classroom behavior in kindergarten. Recent research on classroom quality differentiates classroom quality into three categories: emotional support, classroom management, and instructional support (Hamre & Pianta, 2007). High-quality classrooms offer *emotional support* to children; teachers are familiar with the needs of the children in their classroom, show sensitivity toward children in an individualized manner, modify lessons and activities to fit the emotional and academic needs of their classroom, and facilitate positive interactions among peers (Brophy, 1999). High-quality classrooms are *well-managed*; teachers use proactive approaches to discipline, establish stable routines in the classroom, monitor students carefully to keep them involved in academic work, and provide hands-on activities that are inherently interesting to children (Emmer & Stough, 2001). High-quality classrooms offer children *instructional support* for learning; teachers provide scaffolding and support, establish episodes of joint attention with children, create opportunities for conceptual development, and offer appropriate questioning and feedback (La Paro, Pianta & Stuhlman, 2004; Pianta, La Paro, & Hamre, 2007).

Not all facets of classroom quality are equally likely to contribute to the development of adaptive classroom behavior in school during the kindergarten year. Although the facets tend to be interrelated—that is, teachers who are high in one facet of classroom quality (e.g., emotional support) tend to be high in the others (e.g., instructional support; Hamre & Pianta, 2007)—the degree to which a teacher offers a child emotional support, manages the classroom effectively, or provides high levels of instructional quality may differentially influence children's adaptive classroom behavior. Theoretically, children learn the behaviors that are taught and modeled (Thompson, 1994). Thus, it is logical that strong emotional support will promote relational functioning, high-quality classroom management will promote children's internal management of their own behavior (e.g., self-control, positive work habits, engagement), and high-quality instructional support will enhance achievement. However, the following synthesis of recent literature suggests that the links between facets of classroom quality and children's outcomes are not necessarily so direct, providing rationale for the present investigation.

Emotional quality has been linked to adaptive classroom behaviors, particularly children's engagement. For example, preschool teachers who behaved responsively toward children in their classroom had more highly engaged children than did the less respon-

sive, more directive teachers (McWilliam, Scarborough, & Kim, 2003). Teachers who were controlling (e.g., frequently observed redirecting children; seldom elaborating on, acknowledging, or praising children's behaviors) had less actively engaged children (de Kruif, McWilliam, Ridley, & Wakely, 2000).

Well-managed classrooms have also been linked to first graders' learning of cooperation, prosocial behaviors, and self-regulatory skills (Donohue, Perry, & Weinstein, 2003)—behavioral skills that resemble adaptive classroom behaviors. Likewise, students in middle childhood in well-organized classrooms with predictable routines develop better goal-setting skills (Brody, Dorsey, Forehand, & Armistead, 2002). Reengaging children who appear off task is an integral part of classroom management (Finn, Pannozzo, & Voelkl, 1995), exemplifying one process by which quality of classroom management may enhance children's adaptive classroom behavior.

High quality of instructional support is also likely to be related to children's adaptive classroom behavior. Existing work describes the way in which high quality of instructional support is linked to greater behavioral engagement in first-grade literacy activities. Specifically, teachers who scaffold; encourage choice, autonomy, and creativity; and engage children in one-on-one interactions were more likely to have students who showed greater engagement in first-grade literacy activities (Bogner, Raphael, & Pressley, 2002). Similarly, third-grade teachers who provided cognitively challenging tasks and asked challenging questions were more likely to support children's engagement in the task of learning (Dolezal, Welsh, Pressley, & Vincent, 2003).

Existing research thus indicates that high-quality emotional support, classroom management, and instruction facilitate children's adaptive classroom behavior. Of the three facets of classroom quality, high-quality classroom management is most explicit in its goal of supporting children's self-control, positive work habits, and engagement in learning. Importantly, no research has tested all three facets of classroom quality together to identify their relative contributions to adaptive classroom behavior. We expect high-quality classroom management will prevail as the key contributor to children's adaptive classroom behavior.

Classroom Quality as a Potential Moderator

Although some research describes links between classroom quality and adaptive classroom behavior, classroom quality may not be equally important for all children. Some children come to school with the skills needed to adapt to the classroom, whereas others rely more on exogenous social supports. One question raised in the present research is whether supportive classroom processes are more important for some children than others, depending on their self-regulation upon school entry. This focus addresses the need for research identifying differential contribution of school-based processes (Gutman, Sameroff, & Cole, 2003; Rutter & Maughan, 2002).

Most work indicates that classroom processes matter more for children at risk for school failure (on the basis of their child attributes) than for their counterparts who are not at risk. For example, teachers' sensitive and responsive interactions are more important for reducing off task behaviors and negative classroom behaviors for bold children than for shy children (Rimm-Kaufman et al., 2002), and high-quality emotional and instructional interac-

tions are more important for children with behavioral, attentional, academic, and social problems than those who are not at risk in predicting achievement gains (Hamre & Pianta, 2005). Although there is some research suggesting that high-quality classroom processes (e.g., classroom quality, positive teacher–child relationships) contribute equally to children's engagement for most children, in this work we do not differentiate children on the basis of behavioral attributes. Instead, we define risk in terms of gender, ethnic background, or socioeconomic status (Hughes & Kwok, 2007; Pianta et al., 2002).

The Present Study

In the present study, we extend existing work by examining pressing questions about adaptive kindergarten behavior in a sample of children often neglected in typical samples—rural children from working class and poor family backgrounds. Three research questions were addressed. First, to what extent does children's self-regulation early in the school year (measured with a direct assessment) relate to children's adaptive classroom behaviors (e.g., self-control and positive work habits reported by the teacher in the spring of the year and engagement in learning as observed in the classroom by a research assistant throughout the school year)? We hypothesized that self-regulation at school entry would predict later adaptive classroom behaviors. Second, to what extent does observed classroom quality (i.e., emotional support, classroom management, and instructional support) contribute to children's adaptive classroom behavior in kindergarten? We predicted that higher levels of classroom quality, particularly better classroom management, would be associated with better adaptive classroom behavior. Third, to what extent does classroom quality serve as a moderator of the relation between children's fall behavioral self-regulation and children's adaptive classroom behavior during the kindergarten year? We expected that high-quality classroom processes would be more strongly predictive of adaptive classroom behavior for children with lower self-regulation upon kindergarten entry.

Method

Participants

Child participants were recruited to participate between April and September prior to their entrance into kindergarten at one of seven rural elementary schools in four rural districts in one mid-Atlantic state. The schools served children from primarily poor and working class families. Initial recruitment occurred in person at the children's school during kindergarten registration, and follow-up recruitment took place at fall open house sessions. Families were invited to participate if they met the following criteria: (a) they enrolled their child in kindergarten prior to August of the kindergarten year, and (b) they attended either the kindergarten registration or open house. Parents of 333 children signed consents, representing roughly 60% of the children enrolled in kindergarten that fall. Between 4 and 5 children per classroom were selected at random from this larger pool of recruited children, resulting in the sample of 172 kindergarten children. Chi-square analyses showed that selected and nonselected children did not differ on gender,

parent marital status, income, or maternal educational attainment, according to parent questionnaire information.

Participants were 172 children (80 girls and 92 boys) who were 4.70–6.24 years of age ($M = 5.41$ years [$SD = 0.34$]) in August of the kindergarten year. Of the participants, 144 were Caucasian, 23 were African American, and 5 were other. The families of the child participants reported a range of annual incomes, with the lowest less than $15,000 (19 families) and the highest more than $100,000 (10 families). The modal family income ranged from $15,000 to $29,999 (39 families). A high school education was the modal level of education for both mothers and fathers; 101 mothers and 92 fathers had obtained a high school degree. In terms of mothers' marital status, 130 reported being married; 42 were single/never married or divorced/separated. Most of the children ($n = 103$; 60%) did not attend preschool; a figure comparable with national samples of rural children (Provasnik et al., 2007).

Thirty-six kindergarten teachers participated; the teachers had, on average, 18.1 years of teaching experience (range = 1–37 years). Almost all teachers ($n = 31$) had full certification and licensure. All teachers held bachelor's degrees, and 11 held both bachelor's and master's degrees. Of the teachers, 35 were Caucasian, and 1 was Hispanic.

Procedures

Parents completed a short sociodemographic questionnaire upon recruitment. Research assistants assessed each child's self-regulation during the first 5 weeks of school in a 15-min direct assessment in a quiet room at the school.

Five 15-min classroom observations were conducted over a 7-month period (November through May) during each child's kindergarten year to assess classroom quality and children's engagement. Three observation windows were established. Two 15-min observations were conducted during the first observation window (between October and January); two observations were conducted during the second observation window (between January and March); and one observation was conducted during the third observation window (between March and May). All observations were conducted within the first 2.50 hr of the school day. Child observation periods were spaced over the course of the morning so that no single child was observed for two consecutive 15-min periods. The 4–5 children in each classroom were observed in a different order at each classroom observation. The observations resulted in a total of 75 min of observation time per child. Because of the nested data structure—there were 4 and 5 children per classroom—each teacher was observed between 300 and 375 min.

Research assistants who were blind to the objectives of the study conducted systematic classroom observations of teachers and children. Two research assistants coded a single classroom simultaneously; one assistant coded the classroom-level codes, and the other assistant coded child-level codes. Assistants alternated roles between each child observation period to minimize the extent to which observations from the first observation period would carry over to the second.

Teachers completed questionnaires about children's behavioral and cognitive self-control and work habits in May of the kindergarten year, after they were well-acquainted with the children.

Measures

Independent variables assessed included the following: (a) sociodemographic characteristics of the child and family, (b) child self-regulation, and (c) classroom quality. Children's adaptive classroom behaviors (e.g., self-control, positive work habits, and behavioral engagement) were assessed as dependent variables.

Sociodemographic Characteristics

Parent sociodemographic questionnaires were used to determine gender, preschool experience, and sociodemographic risk. *Gender* was coded as 1 for male. *Preschool experience* was reduced to a dichotomous variable, representing whether children went to preschool at 4 years of age (yes = 1). If children were with a parent, relative, or friend, they were considered not to have attended preschool. If children attended a public or private prekindergarten, group child care outside of the home, or Head Start, they were considered to have gone to preschool.

Three questions were singled out as indicators of *sociodemographic risk*: single parent status, income less than $30,000, and high school education or less. Indicators were selected on the basis of the relation of these indicators to detrimental outcomes (e.g., Bradley & Corwyn, 2002). The income level cutoff was set because of its equivalence to the eligibility cutoff for free/reduced lunch for a three-person family for the local community. Each response was assigned a score of 1 if the risk factor was present and 0 if the risk factor was not present. A mean of the three values was computed, resulting in a risk score ranging from 0 to 1 ($M = .43$, $SD = .34$). This approach is consistent with previous work indicating that multiple, cumulative risks were more predictive of problems than individual risk factors (Sameroff, 2000).

Child Self-Regulation

Four subtests from the Preschool Self-Regulation Assessment (Smith-Donald et al., 2007) were used to assess self-regulation: Balance Beam, Pencil Tap, Toy Sort, and Gift Wrap tasks. The Toy Sort and Gift Wrap task were modified slightly from the Preschool Self-Regulation Assessment to ensure sufficient variability in slightly older children.

In the Balance Beam task, children were asked to walk on a 6-foot piece of masking tape and pretend it was a balance beam. After walking it the first time, children were asked to walk on the tape as slowly as possible during two successive trials. The research assistant recorded the amount of time in seconds for each trial and calculated a difference score (Time 3 − Time 1), in which higher scores reflected higher self-regulation in a situation activating little emotion.

For the Pencil Tap, children were taught a pencil tapping game that tested the child's ability to resist a dominant response in favor of a nondominant response in a situation activating little emotion. The research assistant instructed the children to tap their pencil on the table once when she tapped her pencil twice and vice versa. Children were given three practice trials before engaging in the test. Total number *incorrect* (of sixteen trials) was recorded and used in the analyses. Low scores reflected high self-regulation.

The Toy Sort test was designed to test self-regulation in a situation activating an emotional response. Children were asked to sort extremely attractive and tempting toys (e.g., toy phones with buttons that make sounds and emit light, friction drive cars) of like kinds into bins without playing with them over a 2-min period. The amount of time until the child played with the toy was recorded (with 120 s meaning that the child did not play with the toys). Higher scores reflected higher self-regulation.

The Gift Wrap test, designed to assess self-regulation in a situation activating emotions, was administered last. The research assistant told the children that she had a present for them but needed to wrap it first. The research assistant turned around the child's chair 180° from the table, told the child not to look, and "wrapped the present" noisily for 60 s, constituting Phase 1. The amount of time until the child peeked was coded (and 60 s was recorded if the child did not look at the present). After the present was wrapped, the research assistant turned the child around and asked the child to sit without opening the present for a moment while she "tidied up," constituting Phase 2. The research assistant timed 60 s and recorded the number of seconds elapsed until the child touched the present. A score of 60 s was assigned if the child did not touch the present. Higher scores reflected higher self-regulation.

Extensive piloting was conducted to ensure sufficient variability in a sample of children making the transition to kindergarten. Toys used for the Toy Sort were deemed more appealing and tempting (according to pilot tests) than those in Smith-Donald et al.'s (2007) study, so the measure could tap self-regulation in a situation activating emotion in slightly older children. The Gift Wrap portion was adapted in line with Cameron and Morrison (2007); children were placed at a 180° position rather than 90° position away from the table to strengthen coding reliability.

Tests for reliability was conducted on 10 children, and intercoder reliability was very high (intraclass correlation [ICC] = .99). There were no systematic differences in reliability between tests. In addition, weekly videotaped drift assessments were conducted to assess reliability. Concurrent validity has been established for the measure (Smith-Donald et al., 2007).

Each subtest resulted in one score except Gift Wrap, which resulted in two scores (one for Phase 1, the "no peeking" phase; one for Phase 2, a "waiting" phase). A one-factor confirmatory factor model was used to estimate a composite score for self-regulation. The factor was composed of the five scores from the four subtests previously described. The censored nature of the data was considered for Pencil Tap, Toy Sort, and both Gift Wrap phases. Pencil Tap was censored from below (26% participants had no errors), Toy Sort was censored from above (77% did not play with the toys), and both Gift Wrap measures were censored from above (88% and 82% did not peek in Phases 1 and 2, respectively). The absolute values of the factor loadings ranged from .06 to .83. The loadings for the Balance Beam task was low (.06), and this subtest was dropped. A new confirmatory factor analysis was conducted without the Balance Beam task. The factor loadings were −.34 for incorrect responses on the Pencil Tap, .82 for correct Toy Sort, .75 for success at Gift Wrap (Phase 1), and .53 for success at Gift Wrap (Phase 2). The estimated factor scores generated from the confirmatory factor analysis were used as the fall self-regulatory score.

Classroom Quality

The Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2007) was used to measure global classroom quality. Ten rating scales from the CLASS were used: Positive Climate, Negative Climate, Teacher Sensitivity, Regard for Student Perspectives, Behavior Management, Productivity, Instructional Learning Formats, Concept Development, Quality of Feedback, and Language Modeling. Each dimension was rated on a 7-point Likert scale in accordance with a prepared manual. To assist observers in rating, we included indicators of the dimensions and examples of teacher behavior and classrooms specific to the dimension and the grade level for the low (1–2), midrange (3–5), and high (6–7) ratings.

Mean levels of each of the 10 dimensions of classroom quality were calculated for each teacher across observation windows. The 10 dimensions were reduced to three factors (emotional support, classroom management, and instructional support) on the basis of a priori decision and the theoretically based recommendations (Pianta, La Paro, & Hamre, 2007). Factor analyses were conducted and confirmed the three-factor structure. Each factor scores was computed as means of the relevant dimensions, as described below.

Four dimensions corresponded to aspects of emotional support for learning ($\alpha = .93$). Positive climate referred to a positive emotional tone in the classroom, including enthusiasm, enjoyment, and respect among teachers and children. Negative climate (reversed for analysis) reflected teachers' displays of anger, sarcasm, aggression, and/or harshness. Teacher sensitivity rated the extent to which the teacher provided comfort, reassurance, and encouragement with respect to children's academic and social functioning. Regard for students' perspectives referred to whether the teachers' choice of classroom activities demonstrated emphasis on students' point of view, motivation, and interests.

Three dimensions were used to assess classroom management ($\alpha = .87$). Behavior management reflected the teachers' abilities to use effective methods to prevent and redirect children's misbehavior. Productivity referred to the degree to which the teacher managed instructional time and routines so that appropriate opportunities were available for children to learn. Instructional learning formats referred to how teachers use materials and activities to facilitate learning opportunities.

Three dimensions were assessed in relation to instructional support for learning ($\alpha = .94$). Concept development reflected the teachers' strategies to promote children's higher order thinking skills. Quality of feedback referred to the quality of verbal evaluation provided to children about their work, ideas, and comments—for example, the degree to which the teachers' comments were specific and focused on learning. Language modeling referred to the extent to which teachers fostered, facilitated, modeled, and encouraged students' use of language.

CLASS training occurred during a 2-day small group, interactive session. Reliability for the CLASS was established with video footage prior to data collection and reestablished at three points during the coding. For initial training, the research assistant watched and coded five 10-min segments gathered in a variety of elementary school classrooms. Ratings compared with a gold standard, prepared by the instrument's authors. To be considered reliable, each research assistant's responses had to be within 1 scale point of the gold standard on 80% of the responses. Reliability exceeded these levels prior to data collection. We conducted drift tests using three 10-min segments at three points throughout data collection; the research assistants met or exceeded reliability criteria.

Adaptive Classroom Behaviors

Two teacher-report measures and two observationally based classroom measures were used to measure adaptive classroom behavior. Teachers rated children on the Children's Self-Control Scale (Humphrey, 1982) to assess cognitive and behavioral control and the Mock Report Card (Pierce, Hamm, & Vandell, 1999) to assess positive work habits. Observationally based classroom measures included a measure of the duration of time spent engaged and a rating of engagement using the Observed Child Engagement Scale (Rimm-Kaufman, 2005).

Children's self-control scale. Teachers reported on children's self-control (i.e., behavioral self-control, cognitive self-control) using a 15-item measure based on a 5-point Likert scale. The 5 questions measuring behavioral self-control ask whether the child talks out of turn (reversed), gets into fights with other children (reversed), and disrupts others when they are doing things (reversed). The 10 questions assessing cognitive self-control query whether the child sticks to what he or she is doing, even during lengthy unpleasant tasks; whether the child anticipates the consequences of his/her actions; and whether the child works toward goals. Composite scores were created by averaging the teacher ratings corresponding to each construct, and alpha values for behavioral and cognitive self-control were .91 and .92, respectively, on the basis of the present sample. This measure was validated with observational data of children in classrooms and showed moderate to high correlations for each construct (Humphrey, 1982).

Mock Report Card. Teachers reported on six questions about children's work habits and rated them on a 5-point scale ranging from 1 (*very poor*) to 5 (*very good*). Ratings were averaged to create a composite score. Questions included "follows classroom procedures," "works well independently," and "uses time wisely" ($\alpha = .95$). The Mock Report Card has been shown to be highly correlated ($r = .68$) to scores on the Social Skills Rating Scale (Gresham & Elliott, 1990), suggesting validity (Belsky et al., 2007).

Time spent engaged. The amount of time spent engaged versus off task was measured in the classrooms, resulting in an assessment of *time off task*. The behavioral codes were adapted from the NICHD–ECCRN (2005) Classroom Observation Scale and were described extensively in a coding manual (Rimm-Kaufman, 2005). To gather data, observers conducted live coding in the kindergarten classrooms for 10-min segments (at the start of each 15-min observation period) using a custom designed computer program. Coders noted start and stopping time of engaged and off-task behaviors. Only off-task behaviors were used in analyses because engaged and off-task behaviors were mutually exclusive. Tests for reliability were ICC = .97 on the basis of 23 observations that were coded for 10-min. Time off task was averaged across intervals, and resulting calculations showed seconds off task per 10-min (600-s) interval.

Global ratings of engagement. The Observed Child Engagement Scale (Rimm-Kaufman, 2005) was adapted from the NICHD–ECCRN (2005) Classroom Observation Scale on the basis of extensive pilot observations. Ratings were based on a 15-min observation period (10 min of observation time following 5 min of coding). The scales included eight dimensions, including compliance, engagement, self-reliance, negative affect, attention, peer cooperation, disruptive behavior, and positive affect. Each dimension of engagement was rated on a scale ranging from 1 to 7. Tests for reliability were conducted on the basis of 20 segments that were 15 min in duration prior to data collection, resulting in ICC = .89. Tests for coder drift were conducted monthly; the high standard for reliability level was maintained for the entire coding period.

A factor analysis was conducted for the eight dimensions. Two factors emerged, one of which was central to the present study. This factor, referred to as *engagement in learning*, was computed as the mean of compliance, engagement, self-reliance, disruptive behavior (reversed), and attention (α = .91). The correlation between observed engagement in learning and amount of time observed engaged was .74 ($p < .001$), indicating validity.

Data Analysis

Analyses examined the contribution of self-regulatory ability, facets of classroom quality, and their interaction on children's adaptive kindergarten behaviors. Preliminary analyses were conducted followed by hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002) to test the research questions. Means, standard deviations, and correlations were conducted on all composite variables. We computed ICCs using HLM (Raudenbush & Bryk, 2002) with HLM 6.0 software. ICCs were calculated for the five outcome variables. ICCs were evaluated to determine the proportion of variance attributable to classroom- or child-level variance to evaluate the necessity of modeling the nested data structure (children within teachers). ICC values exceeded .10 and were significant in three of the five cases necessitating the use of HLM. For the other two cases (cognitive self-control, work habits), HLM was used for consistency and because it best represented the structure of the data.

HLM analyses examined the contribution of child-level characteristics (e.g., gender, preschool enrollment at 4 years of age, family sociodemographic risk, and performance on direct assessment of self-regulatory battery) and classroom-level quality (e.g., classroom emotional support, management, and instructional support) on children's adaptive classroom behaviors. See the Appendix for HLM equations corresponding to the first two research questions.

Each of the models included the three facets of classroom quality simultaneously allowing analyses to detect the contribution of one aspect of classroom quality while controlling for the others (e.g., examining classroom management while controlling for emotional and instructional support). The decision to look at facets of classroom quality as opposed to examining classroom quality more globally was integral to the aims of the article. Concerns about multicollinearity arose. Because traditional multicollinearity tests cannot be conducted on HLM models, comparable tests were conducted on ordinary least square regression models and revealed Variance Inflation Factor within the acceptable range (values less

than 3). To preface interpretation, overlapping variance among facets of classroom quality makes it harder, not easier, for any one facet of classroom quality to predict outcomes.

Additional HLM analyses were conducted to address the third research question examining the extent to which types of classroom quality serve as a moderator of the relation between children's self-regulation and their adaptive classroom behavior. Each analysis included the child-level characteristics and classroom-level indicators of quality described in the first HLM model, plus an interaction between behavioral self-regulatory ability and one domain of classroom quality (i.e., Self-Regulatory Ability × Emotional Support; Self-Regulatory Ability × Classroom Management; or Self-Regulatory Ability × Instructional Support). Each interaction was tested separately because of concerns about multicollinearity, an approach resulting in 18 separate HLM analyses. Bonferroni adjustments were applied to reduce the likelihood of Type 1 error (resulting in an adjusted criteria value of .003).

Sources of missing data were analyzed and handled in accordance with best practices (McCartney, Burchinal, & Bub, 2006). Of the 172 children, only 2 children were missing data on sociodemographic characteristics (scale nonresponse), 9 children were missing scores for one of the five self-regulation tasks (item nonresponse), no teachers were missing classroom quality data, no children were missing data for children's classroom behavioral engagement. In relation to children's adaptive classroom behaviors, teacher report data were missing for 16 children (scale nonresponse for seven teachers). Analyses showed no systematic explanations for missing data; children with missing data did not differ on sociodemographic characteristics and/or self-regulation from those with no missing data, and teachers with missing teacher-report data did not differ in demographic characteristics or quality from those who did report on children. Full information maximum likelihood was used for the factor analysis computing the self-regulation value. Listwise deletion was used in the HLM analyses because of the low quantity (<10%) of child-level missing data.

Two approaches were used to approximate an effect size. First, an effect size (interpretable as Cohen's *d*; Cohen, 1988) was computed for each predictor by taking the unstandardized beta for the variable of interest, multiplying it by its own standard deviation, and dividing the product by the standard deviation of the outcome. (This approach does not partition the variance into Level-1 and Level-2 components; therefore, caution needs to be exercised when comparing effect sizes for predictors on different levels.) Second, we computed the percentage of variance explained at each level. This approach takes into account the nested structure of the data but did not provide predictor-specific effect sizes (Raudenbush & Bryk, 2002). To compute the percentage of variance explained at the child-level, we subtracted the residual variance (from the final model) from the total variance (from the unconditional model) and then divided by the total variance (from the unconditional model). Likewise, the percentage of variance explained was computed at the classroom level. For the classroom level, the residual variance (from the final model) was subtracted from the total variance (from a model with Level-1 predictors only) and then divided by the total variance (from a model with Level-1 predictors only).

Results

Descriptive Statistics

Means and standard deviations for all child-level variables are presented in Table 1. The Pencil Tap, Toy Sort, and both Gift Wrap phase tests correlated significantly with the self-regulation composite, with a range from .42 to .85 (in absolute values). (Some of the correlations appear low because of the censored nature of the data.) Children showed slightly higher self-regulation than a norming sample of somewhat younger urban preschoolers (mean age = 5.04 years; Smith-Donald et al., 2007). Correlations between pairs of child-level predictors revealed one significant correlation; children with more sociodemographic risk had lower self-regulation ($r = -.17$). (See Table 1.)

Classroom quality was in the moderate to high range for emotional support and classroom management, and low to moderate range for instructional support. Compared with national norms of over 4,000 classrooms (Hamre, Pianta, Mashburn, & Downer, 2009), means of the present sample were comparable for emotional support (4.81 vs. $M = 4.99$, $SD = 0.81$), classroom management (4.23 vs. $M = 4.11$, $SD = 1.01$), and instructional support (3.03 vs. $M = 3.13$, $SD = 1.09$). The three facets of classroom quality were correlated, ranging from .67 to .78, suggesting that they represent measures of different constructs that tend to be highly related.

Children showed sufficient variability in all of the outcome measures. On average, children were rated toward the middle to high end of the scale for behavioral self-control (3.77 out of 5), cognitive self-control (3.72 out of a possible 5), and positive work habits (3.69 out of a possible 5). Children, on average, spent slightly less than 1 min off task (51.76 s) out of a total of 10 min and were rated at the middle to high range (5.34 out of a total of 7) on engagement in learning. The various outcomes were correlated with one another, with absolute values ranging from .36 to .85. Within-rater correlations were higher than between-raters associations.

Contribution of Early Self-Regulation

Results from HLM analyses show that children with better early self-regulation assessed in early fall were reported by their teachers as showing more behavioral self-control ($t = 2.06$, $p < .05$), more cognitive self-control ($t = 2.59$, $p < .05$), and better work habits ($t = 3.09$, $p < .01$) in the spring of the kindergarten year. Thus, children showing a one standard deviation advantage in self-regulation upon school entry were rated .19 points higher on behavioral self control, .18 points higher on cognitive self-control, and .24 points higher on work habits, on average. Effect sizes ranged from .18 to .24, suggesting small associations between early self-regulation and adaptive classroom behaviors. Surprisingly, there was no relation between children's self-regulation in the fall and their observed classroom engagement (time off task, observed engagement in learning).

The child demographic variables also predicted adaptive classroom behaviors. Boys performed worse than girls on all measures of adaptive classroom behaviors: behavioral self-control ($t = -2.25$, $p < .05$), cognitive self-control ($t = -4.66$, $p < .001$), positive work habits ($t = -4.19$, $p < .001$), time off task ($t = 2.80$, $p < .01$), and engagement in learning ($t = -5.24$, $p < .001$).

Further, children who were enrolled in preschool performed better on all measures of adaptive classroom behaviors: behavioral self-control ($t = 4.02$, $p < .001$), cognitive self-control ($t = 2.17$, $p < .05$), positive work habits ($t = 2.52$, $p < .05$), time off task ($t = -2.18$, $p < .05$), and engagement in learning ($t = 3.33$, $p < .01$). According to their teachers, children exposed to more sociodemographic risk were lower in cognitive self-control ($t = -1.99$, $p < .05$) and had lower levels of observed engagement in learning ($t = -2.26$, $p < .05$); however, no other associations between sociodemographic risk and outcomes were evident. Results from the HLM analyses are depicted in Table 2. Predictors explained between 9% and 24% of the child-level variance in children's adaptive behaviors.

Classroom Quality as Predictors

Classroom quality predicted all five categories of adaptive classroom behaviors. The most consistent pattern emerged for classroom management: Children enrolled in classrooms with higher quality classroom management were reported by their teachers as higher in behavioral self-control ($t = 3.00$, $p < .01$), cognitive self-control ($t = 3.76$, $p < .001$), and positive work habits ($t = 2.81$, $p < .01$). Further, these children in classrooms with higher classroom management were observed showing less time off task ($t = -3.52$, $p < .01$) and were rated as more engaged in learning ($t = 4.28$, $p < .001$) than their counterparts enrolled in classrooms with lower quality classroom management. Effect sizes ranged from .22 to .49. To make the findings concrete, a 1-point difference in classroom management corresponded to a .32-point gain in behavioral self-control, .24-point gain in cognitive self control, and .22-point gain in positive work habits. Further, on average, a 1-point difference in classroom management related to 21.76 fewer seconds spent off task during a typical 10-min period and a rating that was .40 higher in engagement. The fact that each model identified classroom management as significant (controlling for emotional and instructional support) suggests the unique portions of classroom management link to children's outcomes.

One other classroom quality factor contributed to children's adaptive classroom behaviors. Counter to expectation, children in classrooms with more instructional support for learning were reported by their teachers as showing lower levels of cognitive self-control ($t = -3.02$, $p < .01$) and work habits ($t = -2.55$, $p < .05$). Effect sizes were .26 and .24, respectively. Models explained 18%–98% of the classroom-level variance and were strongest in predicting cognitive self-control and engagement in learning. (See Table 2.)

Classroom Quality as a Moderator

To consider classroom processes as moderators of the relation between children's early self-regulatory ability and self-control or engagement, we computed interactions between children's self-regulation and components of classroom quality in separate HLM models. Interactions were entered into each model individually to prevent multicollinearity problems. Only one marginally significant interaction emerged, and it was no longer significant after applying the Bonferroni procedure, suggesting that it was likely due to chance.

Table 1

Descriptive Statistics and Correlations for All Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
M	0.54	0.39	0.43	0.00	7.08	3.28	96.46	55.84	54.12	4.81	4.23	3.03	3.77	3.72	3.69	51.76	5.34
SD	0.50	0.49	0.34	0.72	7.51	4.18	44.60	12.57	13.99	0.93	1.03	0.88	1.04	0.75	1.01	45.79	0.85
Minimum	0.00	0.00	0.00	−1.82	−5.44	0.00	0.00	1.00	3.00	1.92	1.97	1.60	1.20	1.90	1.33	0.00	2.72
Maximum	1.00	1.00	1.00	0.70	51.31	16.00	120.00	60.00	60.00	6.25	5.94	5.13	5.00	5.00	5.00	209.00	6.84
1. Gender (male children = 1)	—																
2. Enrolled in Preschool (yes = 1)	−.03	—															
3. Sociodemographic risk	−.01	−.05	—														
4. Self-regulation composite	−.06	.04	−.17*	—													
5. Balance Beam (Time 3 – Time 1)	−.09	.01	−.04	−.03	—												
6. Pencil Tap (number incorrect)	.08	.02	.23**	−.42**	−.12	—											
7. Toy Sort (seconds before touching)	.01	.04	−.07	.85**	−.02	−.24**	—										
8. Gift Wrap 1 (seconds before looking)	−.14	−.03	.06	.60**	.02	−.20**	.35**	—									
9. Gift Wrap 2 (seconds before touching)	−.09	.19*	−.12	.43**	−.23**	.04	.17*	.18*	—								
10. CLASS: Emotional support	.03	.07	−.05	.00	.05	.02	−.03	.12	−.15	—							
11. CLASS: Classroom management	−.01	.05	−.04	.01	.00	−.02	.02	.01	−.07	.67**	—						
12. CLASS: Instructional support	−.03	.13	−.07	−.07	−.04	.08	−.07	−.02	−.06	.78**	.68**	—					
13. Behavioral self-control	−.14	.29**	−.07	.21**	.08	−.16*	.18*	.04	.14	.12	.25**	.10	—				
14. Cognitive self-control	−.31**	.16*	−.17*	.30**	.15	−.40**	.25**	.00	.10	−.02	.15	−.03	.68**	—			
15. Positive work habits	−.31**	.19*	−.18*	.30**	.15	−.32**	.25**	.01	.13	−.06	.07	−.06	.58**	.85**	—		
16. Time off task	.19*	−.12	.07	−.03	−.07	.08	−.03	−.01	−.03	−.15*	−.35**	−.18*	−.38**	−.36**	−.36**	—	
17. Engagement in learning	−.33**	.20*	−.16	.15*	.18	−.22**	.10	.07	.07	.05	.27**	.08	.55**	.57**	.54**	−.74**	—

Note. CLASS = Classroom Assessment Scoring System.
* *p* < .05. ** *p* < .01.

Table 2
Results from the HLM Analyses Examining the Contribution of Child Characteristics and Classroom Quality to Children's Adjustment to Kindergarten

Variance type	Behavioral self-control	Cognitive self-control	Positive work habits	Time off task	Engagement in learning
Classroom variance	0.20	0.02	<0.01	518.92	0.10
Child variance	0.89	0.55	1.02	1,593.29	0.62
Total variance	1.09	0.57	1.02	2,112.21	0.72
ICC	.19	.03	.00	.25	.14
p	.001	.29	.42	<.001	.003

Fixed effects	Behavioral self-control			Cognitive self-control			Positive work habits			Time off task			Engagement in learning		
	Coefficient	df	t-ratio	Coefficient	df	t-ratio	Coefficient	df	t-ratio	Coefficient	df	t-ratio	Coefficient	df	t-ratio
Intercept	3.75	30	20.33***	4.01	30	36.15***	4.03	30	27.26***	44.17	32	7.52***	5.66	32	52.18***
Gender (1 = male children)	-0.29	148	-2.25*	-0.44	148	-4.66***	-0.61	148	-4.19***	14.07	159	2.80**	-0.48	159	-5.24***
Enrolled in Prekindergarten (1 = yes)	0.57	148	4.02***	0.22	148	2.17*	0.37	148	2.52*	-14.07	159	-2.18*	0.35	159	3.33***
Sociodemographic risk	-0.10	148	-0.37	-0.29	148	-1.99*	-0.39	148	-1.86	7.73	159	0.99	-0.34	159	-2.26*
Self-regulation battery composite	0.26	148	2.06*	0.25	148	2.59*	0.34	148	3.09**	5.03	159	1.24	0.02	159	0.20
CLASS: Emotional support	0.06	30	0.40	-0.04	30	-0.58	-0.05	30	-0.57	4.80	32	1.01	-0.13	32	-1.58
CLASS: Classroom management	0.32	30	3.00**	0.24	30	3.76***	0.22	30	2.81**	-21.76	32	-3.52**	0.40	32	4.28***
CLASS: Instructional support	-0.25	30	-1.47	-0.22	30	-3.02**	-0.28	30	-2.55*	4.38	32	0.56	-0.17	32	-1.48

Random effects	Behavioral self-control			Cognitive self-control			Positive work habits			Time off task			Engagement in learning		
	Variance	df	χ²	Variance	df	χ²	Variance	df	χ²	Variance	df	χ²	Variance	df	χ²
Intercept	0.16	30	57.93**	<0.01	30	25.33	<0.01	30	27.64	305.18	32	61.65**	0.03	32	39.62*
Level-1 effects	0.77			0.45			0.80			1,449.52			0.47		
% child-level variance explained		13			20			21			9			24	
% classroom-level variance explained		18			98			93			47			70	

Note. HLM = hierarchical linear modeling; ICC = intraclass correlation; CLASS = Classroom Assessment Scoring System.
* p < .05. ** p < .01. *** p < .001.

Discussion

In this study, we examined children's self-regulation and the classroom environment as predictors of adaptive classroom behavior. First, children's self-regulation upon the transition to kindergarten was associated with teachers' report of children's behavioral self-control, cognitive self-control, and work habits later in the school year. In contrast, self-regulation at school transition did not relate to children's observed engagement in learning during kindergarten.

Second, classroom quality emerged as a predictor of teacher reported and observed adaptive kindergarten behavior. Children in classrooms with better management practices (i.e., higher productivity, more proactive approaches to classroom management, and more varied approaches to instruction) were reported by their teachers as showing better behavioral and cognitive self-control in the spring of the kindergarten year and were observed as more engaged in the kindergarten classroom throughout the school year. Classroom management emerged as a salient predictor for all five outcomes measuring adaptive classroom behavior and thus constituted the most systematic finding. The contribution of classroom quality was evident in relation to two other outcomes: Children who experienced higher levels of instructional support were rated by teachers as lower in cognitive self-control and lower in positive work habits, even after controlling for fall levels of self-regulation, sociodemographic characteristics, and other facets of classroom quality.

Third, and somewhat surprisingly, classroom quality did not moderate the relation between children's self-regulation and self-control, work habits, and engagement. Thus, classroom management, on average, appeared to make comparable contributions for all children sampled. Taken together, the three main findings offer insight into the degree to which 5- and 6-year-old children's self-regulation contributes to their ability to meet the developmental demands associated with the transition to kindergarten. Further, the findings offer perspective into the ways in which classroom social processes bolster or undermine the development of self-control, positive work habits, and engagement in learning. Results extend existing work because they offer a multifaceted view of classroom quality, focus on children developing in rural environs, and do not rely exclusively on teacher-report data. Further, findings have implications for applied research striving to identify supports and interventions for young children (Kusché & Greenberg, 1994; Lillard, 2007; Rimm-Kaufman & Chiu, 2007).

Children's Early Self-Regulation and School Adjustment

This study revealed that children with better behavioral self-regulation upon the transition into kindergarten were perceived by their teachers as showing higher levels of behavioral and cognitive self-control and positive work habits later in the school year. The findings point to the robustness of the self-regulation construct from direct assessment to teacher report of children's behavior in a classroom context. There are both self-regulatory and relationally oriented interpretations to this finding. Higher self-regulation skills appeared to ease children's adjustment to the demands of the kindergarten classroom and contributed to later self-control, consistent with recent theory pointing to the salience of such skills for school readiness (Blair, 2002; Raver, 2002). Further, it is possible

that children who show early self-regulatory skills elicited positive reactions from teachers more readily, and thus, teachers rated them more positively (Eisenhower, Baker, & Blacher, 2007).

Notably, the link between children's fall self-regulatory ability and adaptive classroom behaviors were evident for teacher-report but not observationally based measures. Most likely, the contribution of early self-regulation was small compared with the influence of the classroom setting measured concurrently. Alternatively, it may take more than 50 min of observing a child to fully capture the contribution of early self-regulatory ability, and thus, teacher reports were more sensitive to early self-regulation than observation. Another explanation is that the self-regulation battery did not place precisely the same demands on children as the classroom environment, and thus, different child behaviors emerged—an idea consistent with the principle that children's behaviors need to be understood in relation to their local conditions (J. Kagan, 1998; Rimm-Kaufman, La Paro, Downer, & Pianta, 2005).

Specific child characteristics and prior experiences (i.e., gender, preschool experience, and sociodemographic risk) related to children's developing self-control and engagement. Boys were reported by teachers as showing less behavioral and cognitive self-control and less positive work habits than girls. Boys also spent more time off task in the classroom than girls. This finding is consistent with existing research. For example, girls showed more optimal growth trajectories of self-regulation than boys in middle childhood (Zhou et al., 2007), and girls rated higher in self-regulation (e.g., attentiveness, task persistence, and eagerness to learn) in kindergarten than boys according to a national sample of kindergarten teachers (Xue & Meisels, 2004). Also worth noting, children enrolled in preschool were reported by their teachers as higher in self-control and work habits and were observed to be more engaged. Preschool experience in this sample appears to better prepare children for the expectations and demands of kindergarten—a position consistent with other findings (Magnuson & Waldfogel, 2005) and noteworthy given the rural sample. Further, children with more sociodemographic risk were reported by teachers as showing less cognitive self-control, supporting the importance of early social processes (Bradley & Corwyn, 2000; Morales & Guerra, 2006) in this sample as well as in more commonly studied urban settings.

The Contribution of Classroom Quality

Classroom management, as opposed to the other aspects of classroom quality, appeared to show the strongest link to children's self-control, work habits, and engagement in the classroom. In 5- and 6-year-old children, many aspects of self-control are newly emerging, and young children are highly dependent on the external environment to help support their self-control, work habits, and engagement in learning (Bronson, 2000). A classroom example makes the contribution of high-quality classroom management apparent. It is common for children to do independent seat work in kindergarten. Some children finish before others in these situations. In a well-managed classroom situation, the teacher has established a routine in which children know to get a book to look at/read or work on the next exercise. In a poorly managed classroom, children may not be sure what to do and often, exhibit off task, counterproductive behaviors. As such, a teacher who runs a classroom smoothly creates a set of expecta-

tions that, in turn, become internalized by students over time. This finding is consistent with research on parenting that supports organization, routines, and order as important for the development of self-control and engagement (Bates, Viken, Alexander, Beyers, & Stockton, 2002; Brody & Flor, 1998). Thus, well-managed classroom environments may set the stage for a progression in self-regulatory development from *other* regulation to *self* regulation (Kopp, 1982).

Existing research from preschool and elementary school classrooms further supports the important role teachers play in orienting children to a task, scripting and structuring socially interactive tasks, and organizing the materials in such a way that children are more likely to learn successfully from the work that they are about to undertake (Anderson, Reder, & Simon, 2000; Bohn, Roehrig, & Pressley, 2004; Cameron, Connor, & Morrison, 2005). The present study supports the importance of teachers' role in this regard: When the environment was predictable and managed effectively, children appeared to be more engaged. This finding is problematic given what is typical in American classrooms. Existing research suggests that (a) nearly 40% of preschool environments offer low-quality classroom management (LoCasale-Crouch et al., 2007), (b) low-quality classroom process quality is often the norm for children who are living in poverty (Stipek, 2004), and (c) the typical child is exposed to a whole range of high- and low-quality classroom experiences during childhood (Pianta, Belsky, Houts, & Morrison, 2007).

Two classroom findings warrant special consideration. Children who experienced more instructional support appeared to be rated as *lower* in cognitive self-control (e.g., pays attention to work) and *lower* in positive work habits (e.g., follows classroom procedures). These findings ran counter to the hypothesis. One explanation is that teachers who offer more instructional support for children hold higher expectations for children and, thus, rate children in their classrooms lower on measures of cognitive self-control and positive work habits. An alternative explanation is that teachers who offer more instructional support place more academic demands on children. These high demands require children to show higher levels of cognitive self-regulation and work habits and, thus, offer more opportunities for children to fail to exhibit these behaviors.

Taken together, classroom quality related to children's emergence of self-control, work habits, and engagement in the 1st year of school. It is useful to put these findings in the context of other research describing the contribution of environmental influences on children's development. Meta-analytic work points to the instability of children's social and academic skills during the early years of school (La Paro & Pianta, 2000). Longitudinal research suggests that roughly 50% of children are moderately or highly variable between 5 and 10 years of age in their behavioral persistence and attention toward a challenging direct assessment task (Zhou et al., 2007). Twin research points to the strong role that maternal warmth and supportive behavior play in task persistence during the kindergarten and first-grade year (Deater-Deckard, Petrill, Thompson, & DeThorne, 2006). Such studies contend that self-regulation is pliable and subject to change in early and midchildhood. Most likely, children are exposed to environmental influences, including classroom experiences, which foster or hinder the development of self-regulatory skills. Although the study design does not allow causal inferences, the findings do implicate the importance of high-quality classroom management, even after controlling for the other aspects of classroom quality.

Classroom Quality as a Moderator

Classroom quality did not moderate the relation between children's attributes and engagement in school. High levels of classroom management may be equally consequential for children high and low in self-regulation. We offer two explanations. First and most likely, the ages of 5–6 years are developmentally important ages for the emergence of self-control, positive work habits, and engagement. Thus, high-quality classroom experiences may be particularly critical during this period for virtually *all* children in relation to their school adjustment (Bronson, 2000). Second, it is possible that classroom quality is equivalently important in relation to children's adaptive classroom behaviors but protective in other unmeasured areas, such as self-directedness or planfulness, that involve more sophisticated forms of self-regulation, such as metacognition and the development of motivational styles (Calkins & Howse, 2004; Garcia & Pintrich, 1994). Although more research is required to understand the lack of moderation, findings position good quality classroom management as a set of classroom social processes that hold potential to build skill strengths during the early years of school.

Limitations

Two limitations deserve mention. First, in the present study we do not fully consider the bidirectional nature of interactions between children's and teachers' behavior. Theoretically, having a large number of children with low self-regulatory skills would likely hamper teachers' efforts to manage their classrooms effectively. Only 4–5 children were selected per classroom, so it is difficult to adequately model such bidirectional influences. Second, this article was based on a small sample of rural schools, and thus, there is a limit to the extent to which we can generalize across demographically variable regions. We maintain that such smaller studies are very important. The processes guiding development in urban and rural schools might be the same or different; only by conducting research in both settings can we discover developmental similarities and differences. In designing the study, we selected a set of schools to represent rural schools enrolling working class and poor children, roughly similar to 10% of the U.S. child population (Provasnik et al., 2007). Thus, findings are most likely to generalize to children living in such environments.

Implications

It is worth situating the present findings within the larger scope of school readiness. Traditionally, school readiness has been conceptualized from the perspective of the child. A child's competency and the degree to which a child achieves specific preacademic, social, and emotional benchmarks have been considered important indicators of children's preparedness for school (Meisels, 1999). Over the last 10 years—stemming in part from the "Ready Schools" policy initiative of the 1990s—definitions of readiness have shifted toward a more ecological approach of school readiness (Rimm-Kaufman & Pianta, 2000) that considers

the extent to which schools are ready for children and not only whether children are ready for schools (Graue, 2006).

Given a more ecological approach to kindergarten transition, what are the implications of the present study for future research, policy, and practice? The present findings position process features of kindergarten classrooms as important contributors to children's development. Kindergarten classrooms range greatly in their quality and hold potential to alter children's developmental trajectory during the early years of school. Future research that examines the way in which classroom processes and children's self-control, positive work habits, and engagement are potential mediators of the relation between more distal features of schools (e.g., choice of curriculum, choice of classroom management approach, or approach to leadership) and children's achievement is critical to more fully understand early adaptation to the school environment.

Second, the findings speak to the importance of preparing teachers to organize their instruction in ways that promote children's successful self-regulatory skills. Most teacher preparation and professional development efforts offer fragmented versions of classroom management that are not tailored to children's needs or developmental level. Most often, discourse about these approaches occurs within the discipline of education that historically focuses more on curricular issues and educational objectives. The present findings point to a need for interdisciplinary research that focuses not only on the educational goals of schools but a developmentally informed view of children and their developmental needs in identifying ideal practices in early childhood classrooms.

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Appendix

Hierarchical Linear Modeling Equations

Analyses for the first two research questions can be represented by the following equations:

Level-1 Model

$$Y_{ij} = \beta_0 + \beta_1(\text{risk}) + \beta_2(\text{preschool}) + \beta_3(\text{gender}) + \beta_4(\text{self-regulation}) + r$$

Level-2 Model

$$\beta_0 = \gamma_{00} + \gamma_{01}(\text{emotional}) + \gamma_{02}(\text{management}) + \gamma_{03}(\text{instructional}) + u_0$$
$$\beta_1 = \gamma_{10}$$
$$\beta_2 = \gamma_{20}$$
$$\beta_3 = \gamma_{30}$$
$$\beta_4 = \gamma_{40}$$

The Level-1 equation models within-classroom variance based on children's characteristics. Thus, for child i in classroom j, the expected outcome, Y, is equal to a classroom average for that outcome, β_0, plus an effect for his or her risk level, β_1, plus an effect for preschool attendance, β_3, plus an effect for his or her self-regulation ability, β_4, plus error, r. Level-1 residuals were visually inspected to ensure normality for each model. The Level-2 equation models between-classrooms variance using the three (centered) domains of classroom quality as predictors. Thus, the classroom average, β_0, is equal to a grand average, γ_{00}, plus effects for emotional support (γ_{01}), management (γ_{02}), and instructional support (γ_{03}), plus error, u_0. The remaining Level-2 equations explicitly state that all remaining Level-1 predictors were estimated to have fixed effects only.