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Classroom quality at pre-kindergarten and kindergarten and children's social skills and behavior problems☆

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ABSTRACT

Focusing on the continuity in the quality of classroom environments as children transition from preschool into elementary school, this study examined the associations between classroom quality in pre-kindergarten and kindergarten and children's social skills and behavior problems in kindergarten and first grade. Participants included 1175 ethnically-diverse children (43% African American) living in low-wealth rural communities of the United States. Results indicated that children who experienced higher levels of emotional and organizational classroom quality in both pre-kindergarten and kindergarten demonstrated better social skills and fewer behavior problems in both kindergarten and first grade comparing to children who did not experience higher classroom quality. The examination of the first grade results indicated that the emotional and organizational quality of pre-kindergarten classrooms was the strongest predictor of children's first grade social skills and behavior problems. The study results are discussed from theoretical, practical, and policy perspectives.

1. Introduction

Over the past few decades, a growing body of research has shown that higher quality early care and education (ECE) is positively related to children's social–emotional development (Barnett, 2011; Lamb & Ahnert, 2006; NICHD ECCRN, 2006). All studies find that associations with ECE diminish after children leave those settings, but some studies find that the positive associations of higher quality ECE remain significant over time (Belsky et al., 2007; Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010; Peisner-Feinberg et al., 2001; Vandell et al., 2010), and other studies find that these positive associations eventually disappear (Deater-Deckard, Pinkerton, & Scarr, 1996; Lipsey, Hofer, Dong, Farran, & Bilbrey, 2013; Peisner-Feinberg et al., 2001; Puma et al., 2012). One common explanation for these diminishing associations is that children's new social contexts, such as kindergarten classrooms, become more important as children transition from preschool into elementary school. For example, children who need the most support in terms of their socio-emotional skills and who could benefit the most from higher quality ECE often transition into lower quality elementary schools (Currie & Thomas, 2000; Lee & Loeb, 1995), thus potentially tempering with social skills acquired in higher quality preschool classrooms. Another possibility for diminishing links between preschool classroom quality and children's social-emotional skills is that having only one year of higher quality ECE may not provide enough time for children to develop stable positive social–emotional skills (Cunha, Heckman, Lochner, & Masterov, 2006). The primary goal of the present study, thus, was to examine classroom quality during the two consecutive years before and after the transition from preschool settings to elementary school and children's subsequent social and behavioral skills. Using a large sample of children living in low-wealth rural communities, we investigated how classroom quality in

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the year prior to kindergarten (pre-K) and in kindergarten was associated with children's social skills and behavior problems concurrently at the end of kindergarten and one year later in first grade.

1.1. ECE environments and children's social skills and behavior problems

During early childhood, children develop at a rapid rate. Children's experiences and relationships during this period are critical for their future development (Shonkoff & Phillips, 2000). Consistently, interventions and investments during the early years appear to have a much higher rate-of-return than interventions at any other stage of life (Heckman, 2006). Higher quality ECE experiences can bear lasting positive relations with child outcomes, next in magnitude to the relations between family characteristics and child outcomes (for reviews, see Barnett, 2011; Yoshikawa et al., 2013). There is robust evidence that higher quality ECE experiences are related to children's early academic skills (Burchinal, Kainz et al., 2014; Yoshikawa et al., 2013). Early academic achievement, however, is not the sole predictor of life success (Levin, 2012). The well-known experimental Perry preschool project, for example, found few long-lasting intervention effects on later student academic achievement, but participating children did show better general educational and life outcomes (e.g., higher high school graduation rates and employment status and less criminal history; Heckman et al., 2010). Similar results have been found in a longer-term follow-up Head Start evaluation (Garces, Thomas, & Currie, 2000), showing that Head Start children had better general educational outcomes (i.e., high school graduation rates and college attendance) and were less likely to be charged with a crime, compared to their non-Head Start siblings. It has been suggested that improving children's social–emotional skills may serve as an alternative mechanism through which higher quality ECE experiences are associated with better life outcomes (Heckman, 2006).

Several studies have shown that higher quality ECE experiences are linked to fewer child behavior problems and more social skills. For example, recent experimental studies demonstrate that comprehensive social–emotional curricula and professional development that focuses on teachers' responsive interactions can enhance children's social skills, behavior regulation, and emotion understanding (Bierman et al., 2014; Landry et al., 2014). Comparable advantages of high process quality ECE (e.g., teacher–child interactions) for children's social skills and behavior problems are found in observational studies (NICHD ECCRN, 2006; Peisner-Feinberg et al., 2001), with positive behavioral links sometimes extending to adolescence (Vandell et al., 2010).

An often-used reliable and valid tool to assess classroom quality is the Classroom Assessment Scoring system (CLASS; Pianta, La Paro, & Hamre, 2008). Conceptually, the CLASS consists of three domains: Emotional Support, Classroom Organization, and Instructional Support. The Emotional Support and Classroom Organization domains are regarded as most relevant for children's social–emotional functioning. These domains assess the provision of positive teacher–child interactions and proactive organization and management of children's behavior in the classroom, both of which are necessary factors in the successful development of social and behavioral skills (Downer, Sabol, & Hamre, 2010; Hamre et al., 2013).

Studies that have used the CLASS in the pre-K period or in early elementary school years highlight the links between emotionally supportive and well-managed classrooms and children's social skills and behavior problems. For example, high levels of emotional support in the pre-K year were related to increases in children's social competence and to decreases in children's problem behavior at the end of the pre-K year (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Mashburn et al., 2008), and one year later (Curby et al., 2009). Furthermore, high levels of classroom behavioral management and organization were positively associated with the development of children's self-regulation in pre-K (Hamre, Hatfield, Pianta, & Jamil, 2014) and children's behavioral self-control in kindergarten (Rimm-Kaufman et al., 2009). Empirical research shows that early self-regulatory skills are associated with better social skills (Calkins, Gill, Johnson, & Smith, 1999; Diener & Kim, 2004; Fabes et al., 1999; Spinrad et al., 2007) and fewer behavior problems (Eisenberg et al., 2009; Hill, Degnan, Calkins, & Keane, 2006; Spinrad et al., 2007).

In this study we take a domain-specific approach on socialization (Grusec & Davidov, 2010) by focusing specifically on the emotional and organizational aspects of the classroom environment, as they both have been linked to children's social and behavioral skills. However, it has also been hypothesized that children who experience challenging and engaging instructions may show fewer behavior problems (Downer et al., 2010). Therefore, we also examined possible cross-domain links between the quality of instructional support in a classroom and children's social skills and behavior problems.

1.2. Continuity of ECE quality

Despite the relevance of higher quality ECE for child development, follow-up studies of large-scale pre-K programs suggest that the positive associations with higher quality ECE may become smaller over time (Duncan & Magnuson, 2013; Lipsey et al., 2013; Magnuson, Ruhm, & Waldfogel, 2007; Peisner-Feinberg et al., 2001) or even disappear completely (Puma et al., 2012). This is rather discouraging, given that developed countries, including the United States, invest much effort and resources to improve center-based preschool experiences and to enhance children's school success. Yet it is likely that higher quality ECE experiences during the pre-K year do not safeguard children from subsequent low quality elementary school experiences. For example, Head Start children on average attend lower quality elementary schools, and this is especially true for ethnic minority Head Start children (Currie & Thomas, 2000; Lee & Loeb, 1995). When children transition from higher quality pre-K classrooms to lower quality kindergarten classrooms, it is plausible that their initial increases in social skills and reduction in behavior problems are not sustained. As a study of children living in the poorest neighborhoods of Chicago indicated, the quality of children's elementary schools served as a key mediator in the positive relations between pre-K program participation and indicators of adult well-being, such as occupational prestige and low depressive symptoms (Reynolds & Ou, 2011).

The necessity of continuous higher quality early care and education to sustain the further development of social and behavioral skills is in line with the *skill begets skill* hypothesis (Cunha et al., 2006; Heckman, 2006). This framework posits that skills developed earlier in life serve as a basis for the development of more advanced skills (i.e., *self-productivity* of skills). Relatedly, these skills developed as a result of early investments, raise the productivity of later investments (i.e., *complementarity* of skills). The synergistic effect of both the self-productivity of skills and the complementarity of skills are positioned to be the multiplier mechanism through which skill begets skill or abilities begets abilities. In terms of the current study, the successful acquisition of social and behavioral skills in the pre-K year thus should facilitate the possibility of subsequent growth of these skills (self-productivity). At the same time, the context of the kindergarten classroom also has to be conducive to children's social–emotional development for children to keep improving their social skills and reducing their behavior problems (complementarity). Moreover, it is reasonable to expect that children who had higher quality pre-K experiences can transition more

smoothly into elementary school if they experience similarly high levels of classroom quality in kindergarten.

Empirical studies have provided some evidence on the importance of continuity in regards to ECE quality. For example, children were found to demonstrate higher levels of academic skills when they experienced two or more years of higher quality ECE rather than only one (Côté et al., 2013; Li, Farkas, Duncan, Burchinal, & Vandell, 2013). However the importance of ECE continuity in terms of children's social skills and behavior problems remains under-investigated. One cluster-randomized controlled trial found that exposure to a school readiness project in Head Start programs was related to positive social development in kindergarten only among children attending high-quality schools (Zhai, Raver, & Jones, 2012). In contrast, another experimental study on a prosocial and literacy curriculum in Head Start programs found that the effect sizes for children's social competence and attention problems in kindergarten were larger for children attending low-performing schools (i.e., no continuity of higher quality care) compared to children attending high-performing schools in kindergarten (Bierman et al., 2014). A given, speculative, explanation for this counterintuitive result is that the intervention children encountered more at-risk peers, and therefore, teachers rated them as better adjusted relative to their at-risk classmates. However, this does not reconcile why Zhai et al. (2012) found stronger effects when children attended high-quality schools after the intervention. The current study, thus, contributes to the discussion on the importance of the continuity of high-quality ECE as children transition from pre-K to kindergarten.

1.3. Transition from pre-K to kindergarten

Besides the scarcity and inconsistency of evidence on the relation between combined pre-K and kindergarten experiences and children's social–emotional outcomes, there is another important reason to study children's social and behavioral development during the transition to elementary school. In a typical educational setting in the United States, the pre-K to elementary school transition is accompanied by many changes in children's social relationships and their day-to-day routines (Rimm-Kaufman & Pianta, 2000). Children tend to move to more formal settings, and attend classrooms with new peers and often one teacher instead of two. They also have to navigate a new social world in which they are the youngest children in the school and which requires more autonomous functioning. In addition, children experience an increased academic focus and higher teacher expectations for their behavioral skills (e.g., resolving interpersonal conflicts with words and sitting attentively for longer periods of time) with less available support from teachers (Ladd, 2005). These substantial changes lead to the reorganization of children's social and behavioral skills. As a result, the transition to kindergarten is described as a sensitive period during which the child is more susceptible to new environmental experiences and influences (Rimm-Kaufman & Pianta, 2000), especially when children change physical locations. Experiencing an emotionally supportive and well-organized classroom in the pre-K year is important to prepare children for these transition-related challenges. Likewise, having a higher quality environment in kindergarten may be equally necessary to maintain and extend the previously acquired social and behavioral skills to a new setting.

1.4. Children in high risk low-income areas

Consequences of the continuity of higher quality ECE during the transition from pre-K to kindergarten may be particularly salient for children facing challenging home and neighborhood environments (Votruba-Drzal, Coley, Maldonado-Carren, Li-Grining, & Chase-Lansdale, 2010). Currently, over 25% of children in the United States live in a family with an income below the poverty line (income/needs ratios below 1) and nearly 48% of children live in near-poor families (income/needs ratios below 2; National Center for Children in Poverty, 2012). Children living in poverty are more likely to perform poorly on a host of emotional, social, and cognitive outcomes and eventually attain less education and have less prestigious jobs in adulthood (Brooks-Gunn & Duncan, 1997). Moreover, poverty appears to be a more powerful predictor of children's development than single parenthood, maternal education, and other demographic characteristics (Brooks-Gunn & Duncan, 1997).

Families in rural communities in the United States are more likely to live in poverty than their urban counterparts (O'Hare, 2009). In addition, rural communities often deal with social problems such as low educational levels, fewer social support services, and fewer opportunities for upward mobility (Lichter & Johnson, 2007; Tickamyer & Duncan, 1990). Families from poor, rural areas commonly experience irregular employment, such as shift work, part-time, or seasonal work, and parents often have several jobs in order to meet the needs of their family (O'Hare, 2009). Moreover, poor children in rural areas are less likely to have access to quality services that may facilitate their development. In addition, due to geographical isolation and small kin-based communities, the link between family functioning and child development is greater in rural areas than in urban areas, where children are more likely to have access to outside-of-family resources and contexts (Vernon-Feagans, Cox, & The Family Life Project Key Investigators, 2013). The current study used data from the Family Life Project (FLP), a large longitudinal study of ethnically diverse families living in rural areas in the United States. The FLP sample allows us to illuminate the relations between quality of ECE during the transition to elementary school and children's social skills and behavior problems in a group of children living in poor rural communities. As such, we hope that the results of this study can be directly generalized to these children who may need the most help from advancing policy and practice.

1.5. Current study

To date, research suggests that there may be non-trivial links between the quality of ECE experienced in pre-K and kindergarten years and children's social skills and behavior problems. An important question that has been insufficiently addressed is whether these links are stronger when children experience two consecutive years of higher quality ECE as they transition from pre-K to elementary school (i.e., the final pre-K year and kindergarten year) compared to only one year or no years of higher quality ECE experience during this timeframe. In the current study we investigate the associations between the classroom quality that children experienced in pre-K and kindergarten years and children's social skills and behavior problems both at the end of kindergarten and the end of first grade.

Consistent with a domain-specific approach to children's socialization (Grusec & Davidov, 2010), classroom quality was measured as the level of emotional support and classroom organization children experienced in the last year of the pre-K period and in kindergarten. From a theoretical perspective, both high levels of structure and emotional support are required for children's positive social development (Baumrind, 1989; Grusec & Davidov, 2010) and this proposition has been supported by evidence from parenting literature (Cox & Paley, 2003). As such, we combined the Emotional Support and Classroom Organization domains of the CLASS into one scale to fully represent the quality of environment that children need to develop solid social and behavioral skills in school. Additionally, high levels of correlation between the emotional support and classroom organization domain that are often reported in the literature (Hamre et al., 2014; Hatfield, Hestenes, Kintner-Duffy, &

O'Brien, 2013) and that was true in our data as well, would likely lead to concerns about multi-collinearity if those domains were examined separately rather than in combination. Moreover, Hamre et al. (2014) found that several dimensions of the emotional support and classroom organization domain had to be combined into one factor after removing a common responsive teaching factor.

In this study we hypothesized that children who experienced emotionally supportive and organized classrooms during both pre-K and kindergarten years would demonstrate greater social skills and fewer problems, compared to children who experienced emotionally supportive and organized classrooms only in pre-K or only in kindergarten or had no such experiences at all during this timeframe. In addition, we accounted for possible cross-domain links by examining the quality of instructional support during these two years as a potential predictor of children's social skills and behavior problems, as children who experience challenging and engaging instructions may show fewer behavior problems (Downer et al., 2010).

2. Methods

2.1. Study design and participants

Data were drawn from the Family Life Project (FLP), a large multi-site longitudinal study ($N = 1292$) of ethnically diverse families living in rural areas in the United States. Participating families were recruited over a spin of one year (from September 2003 through September 2004) from two geographical areas with high poverty rates, Eastern North Carolina (NC) and Central Pennsylvania (PA). The FLP adopted a developmental epidemiological design with complex sampling procedures to recruit a representative sample of the local population. Eligible families were recruited through maternity wards of local hospitals at the time of giving birth to their child. Eligibility criteria included speaking English as a primary language and having no intent of moving out of the area within the next 3 years. Low-income families in both states and African American families in North Carolina were oversampled to ensure adequate power for longitudinal analyses of families at elevated psychosocial risk. African American families were not oversampled in Pennsylvania because the targeted communities were at least 95% non-African American. For a complete description of the FLP design and sample, see Vernon-Feagans et al. (2013).

The sample for the current study included families and their children who participated in at least one data collection point between 36 months and first grade, in addition to having basic demographics of race, gender, and state, resulting in $n = 1175$. There were no differences between included and excluded families on any demographic characteristics, such as child gender, race, family income-to-needs ratio, state, or maternal level of education. Of the participating families, 43% self-identified as African American and 57% were identified as non-African American. The overwhelming majority of non-African American families were of European American origin, therefore the very few families that self-identified as Native American or Asian American were included into the non-African American category. Of the participating children, about 50% were boys. At 36 months, maternal level of education ranged from less than high school to a graduate degree; with 14% of participating mothers having less than a high school degree or its equivalent, 70% having an intermediate level of education (e.g., high school diploma or some college), and 16% having a bachelor's or a graduate degree. The family income-to-needs ratio was 1.90 ($SD = 1.49$) with a ratio of 1.0 corresponding to the federal poverty threshold for that household size and composition (approximately $22,000 for a family of four in year 2008). For a full description of the sample, see Table 1.

During the pre-K year, 83% ($n = 973$) of the 1175 children attended center-based child care settings (private or state/federal center or preschool), 3% ($n = 37$) of the children attended a different type of child care (e.g., family daycare or babysitter's home), and 14% ($n = 165$) experienced only parental care. Classroom quality was collected for 844 children in the pre-K year. Of these 844 children, 96% ($n = 807$) attended center-based child care settings (private or state/federal center or preschool) and 4% ($n = 37$) attended a different type of child care (e.g., family daycare or babysitter's home). Because the CLASS is designed to assess formal classrooms and not home-based settings, only the scores for 807 children attending center-based child care settings were included in the analytic data set, with the scores for remaining 368 children indicated as missing. In kindergarten, classroom quality data was collected for 1013 children. Nesting of children within the classrooms was small, with the majority (over 85%) of the observed classrooms containing only one or two study children.

2.2. Measures

Data presented in the current study were collected at the 36 months home visit, and the pre-K, kindergarten, and first grade school visits. All visits were conducted by trained research assistants. During the home visits, parents completed questionnaires on demographic characteristics, child characteristics, and child care; and were observed playing with their children. To assess children's classroom quality, certified research assistants visited the study children's child care centers in the fall or winter of the pre-K year, and their kindergarten and first grade classrooms in the fall of that school year. Children's primary/lead teachers completed questionnaires on children's social skills and behavior problems in the spring of kindergarten and first grade.

2.2.1. Classroom quality at pre-K year and at kindergarten

Classrooms of children in center-based child care and classrooms of children in kindergarten were observed with the Classroom Assessment Scoring System (CLASS; Pianta et al., 2008). The CLASS is an observational measure designed to assess classroom quality from pre-K through third grade and consists of ten dimensions organized into three domains: Emotional Support (positive climate, negative climate [reversed], teacher sensitivity, and regard for student perspectives), Classroom Organization (behavioral management, productivity, and instructional learning formats), and Instructional Support (concept development, quality of feedback, and language modeling). Each classroom was rated along these ten dimensions on a 7-point scale, with 1 and 2 representing a low, 3–5 representing a medium and 6 and 7 representing a high score. Internal consistency was good for all three dimensions in both pre-K and K (αs ranging from .78 to .86). The classrooms were observed and live-coded for two 30-min cycles, typically during morning hours of a school day. Observations times were scheduled in coordination with classroom teachers and excluded any outdoor or recess times. All other activities, such as language or other academic instruction, music, art, transitions, and free choice activities, were suitable for coding.

The FLP research assistants completed a formal 3-day training by a certified CLASS trainer and had to pass the TeachStone certification process. The training consisted of in-depth learning of the CLASS dimensions and watching and discussing video clips from actual classrooms. The reliability test consisted of individually coding five 20-min videos. To pass the reliability test, the research assistants had to score within 1 point (on a scale of 1–7 for each dimension) of the master-coded videos for 80% of all dimensions. After receiving certification, the research assistants went through additional training in the field where they double-coded live classroom settings with a master coder and had to score within 1 point

Table 1
Descriptive statistics of the study variables; total sample and by emotional and organizational quality group.

	Total sample			Higher EO PK&K $n = 305$ (39%)	Higher EO PK only $n = 150$ (19%)	Higher EO K only $n = 205$ (26%)	No higher EO PK&K $n = 120$ (15%)
	n	*M* (*SD*)	Range	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Gender, boy %	1175	50.4	–	45.6	51.3	53.2	54.1
Race, African American %	1175	43.1	–	42.6	46.0	45.9	45.0
State, PA %	1175	39.8	–	39.0	44.0	43.4	47.5
Maternal education, years	1163	12.94 (1.98)	7.00–20.00	13.24 (2.06)	13.04 (1.78)	13.16 (2.14)	12.81 (1.76)
INR, 36 m	1163	1.90 (1.49)	0.00–12.56	1.94 (1.48)	2.00 (1.78)	1.88 (1.24)	1.94 (1.49)
Positive parenting, 36 m	1055	2.88 (0.72)	1.00–4.60	2.89 (0.72)	2.81 (0.73)	2.89 (0.69)	2.90 (0.76)
Mean SDQ, 36 m	1093	0.61 (0.27)	0.00–1.40	0.61 (0.27)	0.62 (0.27)	0.60 (0.26)	0.63 (0.24)
Higher IS PK&K %	780	15.9	–	23.6	14.0	11.2	6.7
Higher IS PK only %	780	16.3	–	17.0	35.3	4.9	10.0
Higher IS K only %	780	35.5	–	36.1	13.3	56.1	26.7
No higher IS PK&K %	780	32.3	–	23.3	37.3	27.8	56.7
Mean EO, G1	1011	5.15 (0.78)	1.77–6.71	5.28 (0.74)	5.00 (0.80)	5.24 (0.74)	4.90 (0.80)
TOCA-R aggressive, K[a]	985	1.90 (0.96)	1.00–5.80	1.70 (0.79)	1.96 (1.03)	2.05 (1.03)	2.19 (1.12)
TOCA-R aggressive, G1	931	1.91 (0.99)	1.00–5.80	1.70 (0.78)	2.04 (1.18)	1.98 (1.05)	2.16 (1.15)
SDQ conduct problems, K[b]	984	0.26 (0.40)	0.00–2.00	0.18 (0.32)	0.31 (0.43)	0.34 (0.46)	0.35 (0.47)
SDQ conduct problems, G1	929	0.28 (0.41)	0.00–1.80	0.19 (0.32)	0.31 (0.48)	0.33 (0.45)	0.37 (0.48)
SCS prosocial behavior, K[a]	985	4.33 (1.15)	1.00–6.00	4.57 (1.09)	4.20 (1.16)	4.27 (1.19)	4.00 (1.16)
SCS prosocial behavior, G1	931	4.27 (1.18)	1.00–6.00	4.51 (1.15)	4.22 (1.21)	4.16 (1.20)	4.00 (1.23)
SDQ peer problems, R, K	984	1.70 (0.33)	0.40–2.00	1.75 (0.30)	1.67 (0.33)	1.67 (0.36)	1.66 (0.34)
SDQ peer problems, R, G1	929	1.68 (0.33)	0.40–2.00	1.70 (0.31)	1.67 (0.33)	1.66 (0.34)	1.65 (0.36)
SDQ prosocial behavior, K	982	1.54 (0.47)	0.00–2.00	1.64 (0.40)	1.49 (0.51)	1.51 (0.50)	1.35 (0.52)
SDQ prosocial behavior, G1	929	1.52 (0.49)	0.00–2.00	1.60(0.45)	1.48 (0.53)	1.49 (0.51)	1.39 (0.54)

Note: EO = emotional and organizational classroom quality as measured through the emotional support and classroom organization domains of the CLASS. IS = instructional classroom quality as measured through the instructional support domain of the CLASS; PA = Pennsylvania, INR = income-to-needs ratio, PK = pre-kindergarten, K = kindergarten; G1 = grade 1; R = reversed.

[a] The items of the TOCA-R and SCS subscales are assessed on a 1 (almost never) to 6 (almost always) scale.

[b] The items of the SDQ subscales are assessed on a 0 (never) to 2 (always) scale.

of the master coder on 80% of all dimensions. All research assistants had to complete annual re-certification process to maintain accuracy of coding.

To concisely represent the characteristics of high-quality classrooms that support the development children's social and behavior skills, we averaged the scores on the *Emotional Support* domain ($M = 5.35$, $SD = 0.69$ at pre-K; $M = 5.20$, $SD = 0.84$ at K) and the *Classroom Organization* domain ($M = 4.82$, $SD = 0.83$ at pre-K; $M = 5.09$, $SD = 0.87$ at K) for both pre-K and K classrooms. As mentioned before, combining these two domains of the CLASS better represents the characteristics of high-quality classrooms that promote the development of children's social skills and the reduction of behavior problems, compared to, for example, classrooms who score only high on emotional support. Moreover, consistent with other studies using the CLASS, the correlation between these two domains was .68 at pre-K and .72 at Kindergarten, making it very difficult to examine the independent contribution of each domain in this sample. In comparison, the correlation of both emotional support and classroom organization with instructional support were respectively .47 and .54 at pre-K and .41 and .42 at Kindergarten. Thus, combining the emotional support and classroom organization scales into one analytic variable provided the most efficient means to address our questions about the characteristics of classrooms that support the development of children's social and behavioral skills.

After averaging the emotional support and classroom organization domains, we dichotomized the mean scores, so that a score of 5 or higher represented a *higher quality* emotional and organizational classroom environment. Our label of *higher quality* corresponds with upper-middle score descriptions in the CLASS manual (Pianta et al., 2008). Moreover, a cut-off of 5 for emotional support and classroom organization was also used and identified in prior studies investigating threshold effects of higher quality ECE environments (Burchinal et al., 2010; Burchinal, Vernon-Feagans et al., 2014). In total, 59% of the observed pre-K year center-based classrooms and 65% of the observed kindergarten classrooms within our sample were classified as having a higher quality emotional and organizational environment.

Next, children with available data about the quality of their classroom experiences during both the pre-K (PK) and kindergarten (K) years ($n = 780$) were categorized into one of four ECE quality groups (coded as 0/1 variables) according to their emotional (E) and organizational (O) classroom experiences over these two years: *Higher EO PK&K* group (39%); *Higher EO PK only* group (19%); *Higher EO K only* group (26%); and *No higher EO PK&K* group (15%). When missing data on one or both years of classroom quality prevented us from categorizing children into quality groups, these data cells were left missing and were addressed as a part of our overall strategy on missing data, as described in the preliminary analysis section. Additionally, the mean comparisons in terms of child's 36 months social skills and key contextual variables revealed no significant difference among the four groups of children.

Similarly, for the *Instructional Support* domain we first dichotomized the observed domain scores, so that a score of 3 or higher represented a *higher quality* instructional classroom environment. This cut-off score was chosen based on the distributions of scores on the instructional support domain, where the means and standard deviations were 2.59 ($SD = 0.95$) at pre-K and 2.99 ($SD = 0.91$) at K. Moreover, a cut-off of 3 on instructional support was also successfully used in prior studies investigating threshold effects of high-quality ECE environments (Burchinal et al., 2010; Burchinal, Vernon-Feagans et al., 2014). In total, 32% of the observed pre-K year center-based classrooms and 50% of the observed kindergarten classrooms within our sample were classified as having a higher quality instructional support (IS) classroom environment. Next, we created four ECE quality groups (coded as 0/1) according to children's instructional support experiences: *Higher IS PK&K* group (16%); *Higher IS PK only* group (16%); *Higher IS K only* group (36%); and *No higher IS PK&K* group (32%).

2.2.2. Child social skills and behavior problems

To measure children's social skills and behavior problems, both kindergarten and first grade teachers of each study child completed the following three measures in the spring of that school year: the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), the Teacher Observation of Child Adaptation-Revised (TOCA-R; Wertheimer-Larsson, Kellam, & Wheeler, 1991), and an adapted version of the Social Competence Scale (Conduct Problems Prevention Research Group, 1995). Some of the overlapping items within these measures were omitted to reduce the burden on teachers filling out questionnaires.

Children's *social skills* were defined as socially valued behaviors that promote child social adjustment, strengthen interpersonal relationships, and create cohesion. To assess child social skills we used the Prosocial Behaviors subscale of the SCS (four items, $\alpha = .89$ and .89 for K and first grade respectively; sample item "Resolves problems with other children on his or her own"); the reversed Peer Problems subscale of the SDQ (five items, $\alpha = .66$ and .65 for K and first grade respectively; sample item "Rather solitary, prefers to play alone"); and the Prosocial Behavior subscale of the SDQ (five items, $\alpha = .85$ and .86 for K and first grade respectively; sample item "Helpful if someone is hurt, upset or feeling ill"). To assess child *behavior problems*, we used the Conduct Problems subscale of the SDQ (five items $\alpha = .81$ and .82 for kindergarten and first grade respectively; sample item "Often lies or cheats") and the Aggressive Oppositional subscale of the TOCA-R (five items, $\alpha = .86$ and .87 for kindergarten and first grade respectively; sample item "Knowingly breaks rules").

2.3. Covariates

To account for pre-existing differences among children who were and were not enrolled in higher quality pre-K and K classrooms, we included a list of covariates drawn from the prior wave of data collection at 36 months of age. Most importantly, we included the 36-month assessments of children's social and behavioral skills (measured through parental report of the SDQ, as only a small number of children were also assessed by their ECE teachers) to account for pre-existing differences in children's social skills and behavior problems Other covariates included child race (African American = 1), gender (boy = 1), family's income-to-needs ratio, state of residence (Pennsylvania = 1), years of mother's education, and a positive parenting composite score. Positive parenting was rated by trained observers during semi-structured mother-child interactions on 5-point Likert-type scales (1 = not at all characteristic, 5 = highly characteristic) along the following dimensions: sensitivity, detachment (reverse-coded), positive regard, animation, and stimulation of development (see Mills-Koonce et al., 2011 for details). Finally, we controlled for the emotional support and classroom organization quality (mean) at first grade when predicting first grade social skills and behavior problems.

3. Results

3.1. Preliminary analysis

Descriptive statistics of all study variables for the total sample and by ECE quality groups are presented in Table 1. Zero-order correlations among covariates and indicator variables for child outcomes are presented in Table 2. Log transformations were performed on both the SDQ Conduct Problems subscale and TOCA-R Aggressive-Oppositional subscale at both pre-K and kindergarten to adjust for the positively skewed distributions (values > 1).

Missing data for the covariates ranged between 0% and 10%. The ECE quality categories were missing for 19% of the children, and another 15% of the children were ineligible for this data collection because they were not in center-based care. Analysis of missing data showed that children with data on the ECE quality categories did not differ significantly from children with no data on the ECE quality categories on any covariates except maternal education level. Children with no quality data had mothers with a slightly lower educational level (12.6 vs. 13.1 years, $t(1161) = 4.07$, $p < .001$). Teacher-reported missing data was about 18%. In kindergarten, children with missing data did not differ significantly from children with no missing data on any variable except state of residence (PA = 4.9% vs. NC = 11.2%, χ^2 [1,1175] = 8.19, $p < .01$). In first grade, children with missing data did not differ significantly on any variable compared to children with no missing data. A Full Information Maximum Likelihood (FIML) estimator was used in all analyses to address possible biases in model estimation due to missing data (Enders, 2010).

3.2. Measurement model: Children's social skills and behavior problems

A Confirmatory Factor Analysis (CFA) was conducted in Mplus 7.11 (Muthén & Muthén, 2013) to estimate two latent factors in both kindergarten and first grade to reduce the number of outcome variables and to have a stronger measure of children's social skills and behavior problems. To be able to compare the standardized regression coefficients of the latent factors at both kindergarten and first grade on the predictor variables, factor loadings of each indicator variable in kindergarten and in first grade were constrained to be equal.

A two-factor model for children's social skills and behavior problems indicated good model fit ($\chi^2 = 41.26$, $df = 25$, $p = .022$, CFI = 1.00, RMSEA = .03, SRMR = .02). The correlation between the two latent factors was −.89 for the kindergarten outcomes and −.87 for the first grade outcomes. Next, we ran a one factor-model with the same constraints. This one-factor model did not reach adequate model fit ($\chi^2 = 339.99$, $df = 31$, $p < .001$, CFI = .95, RMSEA = .10, SRMR = .04). A Chi-square difference test also confirmed that a two-factor model rather than a one-factor model fit the data better ($\Delta\chi^2 = 298.73$, $\Delta df = 6$, $p < .001$). Thus, the analysis was continued with the two-factor model. The exact standardized factor loadings for each indicator variable are presented in the online supplementary material. Higher ratings on the latent factors for behavior problems represent higher levels of behavior problems, and higher ratings on the latent factors for social skills represent greater social skills.

3.3. Structural model: Main effects of emotional and organizational quality groups

In the next step, the measurement model was extended by inclusion of the covariates and main predictor of interest—the emotional and organizational classroom quality (*Higher EO PK&K*, *Higher EO PK only*, and *Higher EO K only*; *No higher EO PK&K* group was the contrasting group). In addition, we also examined the relation with the instructional classroom quality (*Higher IS PK&K*, *Higher IS PK only*, and *Higher IS K only*; *No higher IS PK&K* group was the contrasting group). Residual variances among the covariates were freely estimated. In addition, concurrent emotional and organizational classroom quality was included as a covariate when predicting children's first grade social skills and behavior problems. This model allowed us to examine whether having one or two years of higher emotional and organizational classroom quality (represented through *Higher EO PK only*, *Higher EO K only*, or *Higher EO PK&K*) was a more significant predictor of children's social skills and behavior problems than having no experience of higher emotional and organizational classroom quality in pre-K and kindergarten.

Table 2
Correlations among covariates and indicator variables of child outcomes in kindergarten and first grade.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Gender (boy)	–															
2.	Race (African American)	.00	–														
3.	State (PA)	.07*	−.62**	–													
4.	Maternal education, years	.02	−.23**	.17**	–												
5.	INR, 36 m	.04	−.33**	.22**	.59**	–											
6.	Positive parenting, 36 m	−.04	−.37**	.29**	.42**	.39**	–										
7.	Mean SDQ, 36 m	.05	.23**	−.15**	−.32**	−.31**	−.38**	–									
8.	TOCA-R aggressive, K	.10**	.15**	−.08*	−.14**	−.19**	−.16**	.21**	–								
9.	TOCA-R aggressive, G1	.19**	.19**	−.07*	−.14**	−.15**	−.17**	.18**	.58**	–							
10.	SDQ conduct problems, K	.08*	.16**	−.05	−.13**	−.16**	−.16**	.19**	.81**	.55**	–						
11.	SDQ conduct problems, G1	.15**	.21**	−.06	−.14**	−.16**	−.18**	.18**	.53**	.85**	.55**	–					
12.	SCS prosocial behavior, K	−10**	−.10**	−.01	.14**	.13**	.15**	−.22**	−.68**	−.46**	−.67**	−.44**	–				
13.	SCS prosocial behavior, G1	−.19**	−.19**	.06	.19**	.17**	.31**	−.24**	−.46**	−.71**	−.44**	−.67**	.46**	–			
14.	SDQ peer problems, R, K	.00	−.09**	−.04	.15**	.14**	.15**	−.22**	−.45**	−.29**	−.48**	−.27**	.52**	.28**	–		
15.	SDQ peer problems, R, G1	−.07*	−.09**	−.02	.15**	.13**	.16**	−.19**	−.26**	−.46**	−.26**	−.46**	.25**	.53**	.24**	–	
16.	SDQ prosocial behavior, K	−.12**	−.10**	−.03	.16**	.12**	.21**	−.21**	−.67**	−.44**	−.69**	−.43**	.72**	.43**	.53**	.29**	–
17.	SDQ prosocial behavior, G1	−.19**	−.18**	.05	.18**	.15**	.22**	−.22**	−.42**	−.67**	−.41**	−.69**	.37**	.76**	.23**	.55**	.42**

Note. PA = Pennsylvania, INR = income-to-needs ratio, K = kindergarten, G1 = grade 1, R = reversed.
* $p < .05$.
** $p < .01$.

Similarly, this model allowed us to determine whether having one or two years of higher instructional classroom quality experience (represented through *Higher IS PK only*, *Higher IS K only*, or *Higher IS PK&K*) was a more significant predictor of children's social skills and behavior problems than having no experience of higher instructional classroom quality in pre-K and kindergarten. The tested model represented the data reasonably well ($\chi^2 = 535.5$, $df = 142$, $p < .001$, CFI = 0.94, RMSEA = 0.05, SRMR = 0.05). The standardized regression coefficients, standard errors, and significances of all variables included in the model are presented in Table 3.

The results of this model showed that children who experienced two years of higher emotional and organizational classroom quality (*Higher EO PK&K* group) showed greater social skills and fewer behavior problems by the end of kindergarten ($\beta = .25$, $p < .001$ and $\beta = -.21$, $p < .001$, respectively) and by the end of first grade ($\beta = .14$, $p = 0.015$ and $\beta = -.16$, $p = 0.004$, respectively) compared to children who did not experience higher emotional and organizational classroom quality at both pre-K and kindergarten (*No higher EO PK&K* group). There were no significant differences in social skills and behavior problems at kindergarten and first grade between children who experienced only one year of higher emotional and organizational classroom quality (*Higher EO PK only* or *Higher EO K only* groups) and children without higher emotional and organizational classroom quality at pre-K and kindergarten (*No higher EO PK&K* group).

The links between instructional classroom quality and children's social skills and behavior problems were not significant. Children who experienced one or two years of higher instructional quality in their classroom (*Higher IS PK&K, Higher IS PK only,* or *Higher IS K only* groups) did not differ in terms of their behavioral problems and

Table 3
Standardized regression coefficients predicting children's social skills and behavior problems in kindergarten and first grade.

	Behavior problems Kindergarten		Social Skills Kindergarten		Behavior problems Grade 1		Social skills Grade 1	
	β	SE	β	SE	β	SE	β	SE
Control variables								
Gender (boy)	.09**	.03	−.09**	.03	.18***	.03	−.19***	.03
Race (African American)	.12**	.05	−.11*	.05	.20***	.05	−.17***	.05
State (PA)	.05	.04	−.14**	.04	.09*	.04	−.10*	.04
Mean SDQ, 36 m	.16***	.04	−.21***	.04	.13**	.04	−.17***	.04
Maternal education, years	.00	.04	.05	.04	−.02	.04	.08	.04
INR, 36 m	−.09	.04	.03	.05	−.05	.05	.00	.05
Positive parenting, 36 m	−.06	.04	.07	.04	−.06	.04	.07	.04
Concurrent EO quality, grade 1	–	–	–	–	−.03	.03	.08*	.03
Instructional quality experience								
Higher IS PK&K vs. no higher IS PK&K	.04	.04	−.02	.04	.01	.05	.03	.04
Higher IS PK only vs. no higher IS PK&K	−.02	.04	.02	.04	.02	.04	.03	.04
Higher IS K only vs. no higher IS PK&K	−.06	.05	.01	.05	−.01	.05	.05	.05
Emotional and org. quality experience								
Higher EO PK&K vs. no higher EO PK&K	−.21***	.06	.25***	.06	−.16**	.06	.14*	.06
Higher EO PK only vs. no higher EO PK&K	−.05	.05	.08	.05	−.06	.05	.06	.05
Higher EO K only vs. no higher EO PK&K	.00	.05	.09	.05	−.04	.06	.03	.05
Emotional and org. quality experience—follow-up								
Higher EO PK only vs. higher EO PK&K	.11**	.04	−.13**	.04	.08	.04	−.05	.04
Higher EO K only vs. higher EO PK&K	.19***	.04	−.14**	.04	.11**	.04	−.10*	.04

Note: PA = Pennsylvania; INR = income-to-needs ratio; PK = pre-kindergarten; K = kindergarten; IS = instructional classroom quality; EO = emotional and organizational classroom quality.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

social skills from children who did not experience higher instructional classroom quality at pre-K and kindergarten (*No higher IS PK&K* group).

3.3.1. Follow-up analysis comparing Higher EO PK&K to other quality groups

To directly compare kindergarten and first grade outcomes for children who experienced one vs. two years of higher emotional and organizational classroom quality, we ran a follow-up model with *Higher EO PK&K* as the contrasting group. The model fit was identical to that of the main structural model, as the only thing that differed in the follow-up model was the contrasting group. The results of this follow-up model, presented in the final rows of Table 3, indicated that by the end of the kindergarten year, children who experienced two years of higher emotional and organizational classroom quality had greater social skills and fewer behavior problems compared to children with only one year of higher emotional and organizational classroom quality (*Higher EO PK only* and *Higher EO K only*). By the end of the first grade, children with two years of higher emotional and organizational classroom quality still demonstrated greater social skills and fewer behavior problems than children with higher emotional and organizational classroom quality in kindergarten only (*Higher EO K only* group). However, when the children with two years of higher emotional and organizational classroom quality were compared to children with higher classroom quality in pre-K only (*Higher EO PK only* group), there were no differences in children's social skills and behaviors problems by the end of first grade.

Because there were no initial differences in children's social skills and behavior problems either in kindergarten or in first grade in relation to the instructional classroom quality experienced in pre-K and kindergarten classrooms, we did not run a follow-up model with a different contrasting group for the instructional quality categories.

4. Discussion

Providing children with a higher quality center-based preschool experience is an important topic for policy and practice. The United States and other developed countries are investing large sums of money to provide high-quality pre-K experiences to children living in poor areas to improve their chances in later life. This might be particularly important for children living in poor rural areas, since their families often deal with specific social problems, such as fewer opportunities for upward mobility and less access to social support services (Lichter & Johnson, 2007; Tickamyer & Duncan, 1990). Moreover, the transition into kindergarten is likely to be a challenging experience to most children, poor or not, and research should look more closely at provision of high quality education environments during the early elementary years (Rimm-Kaufman & Pianta, 2000). However, in the current political and economic climate, more research evidence is needed to allocate the limited monetary resources and to maximize benefits for all children. This study of a large ethnically diverse sample of children living in low-income rural communities in the United States contributes to this research literature by suggesting that children who experience higher emotional and organizational quality of classroom during the pre-K and kindergarten years had higher levels of social skills and lower levels of behavior problems at the end of kindergarten and in first grade.

This study extends the current literature by examining the extent to which experiencing relatively high-quality emotional support and classroom organization before and during the transition to kindergarten is related to children's social skills and behavior problems in early elementary school. This is an important issue in light of evidence that children's social and behavioral adjustment during the first year of school lays the foundation for their future school trajectories (Ray & Smith, 2010). Prior research indicated that emotionally responsive and organized pre-K classroom teachers improved children's social skills and reduced behavior problems in smaller experimental studies (Bierman et al., 2014; Heckman et al., 2010). This conclusion was also supported in larger observational studies (NICHD ECCRN, 2006; Peisner-Feinberg et al., 2001). However, one experimental study indicated that these mean differences between the intervention and control group were maintained during the elementary school years only if the child attended a high-performing school (Zhai et al., 2012), while another experimental study of a pro-social and literacy curriculum found that intervention effects were strongest for children entering schools with low student achievement (Bierman et al., 2014). The current study extends this literature by carefully examining in a large diverse sample of children the contributions of the observed level of emotional support and classroom organization (instead of school achievement scores) in both the year before and during the transition to elementary school in relation to the child's social skills and behavior problems during that transition year (i.e., kindergarten) and the following year (i.e., the first grade). In this study we combined the Emotional Support and Classroom Organization domains of the CLASS to fully represent the quality of environment that children need to develop solid social and behavioral skills in school. The kindergarten findings of this study clearly suggested that teacher emotional support and classroom management in both pre-K and kindergarten promoted children's social and behavioral skills during the kindergarten year, which is consistent with conclusions from prior studies that examined this question for only one year of classroom quality experiences. The first-grade findings of this study, however, indicated that it is presumably the pre-K experience that drives the longer-term associations.

The inconsistency between the findings from kindergarten and first-grade in this study could be related to several factors. First, it is not surprising that children's social skills and behavior problems in kindergarten are related to the emotional support and classroom management skills of the kindergarten teacher. Among factors that tend to influence child development, the concurrent experiences are typically expected to have the strongest associations (Baltes, Lindenberger, & Staudinger, 2006). Second, it is possible that teachers who are more supportive in interactions with children and provide more proactive classroom management also understand children's social development better and thus might rate children more compassionately. Also, it is likely that children's overall behavior and teacher's perception of children's behavior are related to the overall school quality and the overall school climate (Pianta & Stuhlman, 2004). Nevertheless, the finding that ratings of children's social skills and behavior problems in first grade by a different teacher were not different for children experiencing either an emotionally supportive and organized classroom in both pre-K and kindergarten or only a more emotionally supportive and organized classroom in pre-K, appears to suggest that it is pre-K experiences that have longer-term links to children's social and emotional development. This finding is in line with studies indicating that children's early experiences are particularly critical for their further social and emotional development (Shonkoff & Phillips, 2000), and that interventions and investments during the early years have a higher rate-of-return than interventions at other stages of life (Heckman, 2006).

The current study also extends the current literature by examining a large diverse sample of children living in poor rural communities in a study that focused on observing both the home and school experiences of the children from birth. As discussed before, the elevated risk of psychosocial problems for children living in poverty is likely to be amplified in rural communities by

additional challenges such as limited social support services, limited opportunities for upward mobility, and greater dependence on family and kin (Brooks-Gunn & Duncan, 1997; Lichter & Johnson, 2007; O'Hare, 2009; Tickamyer & Duncan, 1990). This heightened risk stresses the importance of our finding that the social and behavioral skills of disadvantaged children can potentially be bolstered by spending two consecutive years in higher quality ECE. Recent statistics show, however, that many eligible children, particularly in rural areas, are not enrolled in higher quality ECE, such as Head Start centers (Pew Charitable Trusts, 2013). Nevertheless, our study found that more than half of the children in our sample who qualify for Head Start and who attend center-based care, attended a high-quality pre-K classroom in terms of emotional support and classroom organization.

These findings also might suggest that the heavy investment in ECE by the U.S. federal and state governments is beneficial for the social and emotional development of children, and low-income children in particular. Recent focus on improving and ensuring quality in these programs indicates that many Head Start and pre-K programs meet the criteria used in this study to define higher quality pre-K experiences in terms of teacher emotional support and classroom organization. For example, the most recent evaluation of Head Start, the Family and Child Experiences Survey (FACES), revealed mean CLASS scores of 4.7 on Classroom Organization and 5.3 on Emotional Support, and the pre-K program in North Carolina, one of the states included in this study, revealed mean CLASS scores of 5.2 on Classroom Organization and 5.8 on Emotional Support. Hopefully, these findings suggest that continuous investments into ECE quality may be providing these low-income children with experiences that promote their social skills in a manner that assists them in the transition to elementary school.

Contrary to the theoretical proposition that children who experience engaging and stimulating instructions may show fewer behavior problems (Downer et al., 2010), no evidence for cross-domain influences emerged in this study. Our findings are consistent with a domain specific perspective on child socialization (Grusec & Davidov, 2010) and appear to emphasize the importance of early emotional support and classroom organization for the development of children's social and behavioral skills, particularly during the time of transition to elementary school, when increased demands are placed on children's social–emotional skills.

The results of the current study should be interpreted in light of several limitations. First, the findings reported here are correlational in nature and no causal inferences can be made. To account for potential selection bias, we included a number of child- and family-level covariates, including children's initial social and behavioral functioning. The pre-K and kindergarten quality groups were not reliably different on these factors suggesting that pre-existing differences on these observable variables were minimal. That, however, cannot guarantee that selection bias was eliminated. Second, although we were mainly interested in classroom process quality, it could be that there were differences between public and private pre-K settings which are not included in the current models. Future studies could take this into account, for example by investigating how CLASS scores differ by center type. Third, through the dichotomization of classroom quality scores and creation of quality of experience groups, some additional measurement error was introduced into the models. The decision to do so, however, is explained by the fact that through the dichotomization and subsequent creation of groups incorporating two years of emotional and organizational, as well as instructional classroom quality, it was possible to look at the *continuity* of higher quality ECE. Through continuous interactions we would be asking about higher or lower quality experiences in each year instead of the continuity of higher quality ECE. In addition, both a recent meta-analysis (Burchinal, Kainz et al., 2014) and studies investigating threshold effects of higher quality ECE using pre-determined cut-offs (Burchinal et al., 2010; Burchinal, Vernon-Feagans et al., 2014) suggest that the variance at the high ends of the CLASS domains is more meaningful than the variance at the low ends (i.e., classroom quality only has an association with children's outcomes after reaching a certain threshold). As such, quality groups representing higher emotional and organizational classroom quality (mean $\geqq 5$) and higher instructional classroom quality ($\geqq 3$) are likely to be more strongly associated with children's outcomes than continuous scales. Another limitation of the current study is that the significant associations were relatively small in size. The magnitude of the findings is consistent with most recent ECE studies using measures of process quality such as the CLASS (Burchinal, Magnuson, Powell, & Soliday Hong, 2015).

The current study also has some strengths. First, to our knowledge, it is the first study to investigate the relation between different combinations of observed emotional and organizational classroom quality in pre-K and kindergarten (i.e., studying the transition from pre-K to elementary school) and children's social skills and behavior problems in the first two years of elementary school. Second, this study also examined possible cross-domain links with instructional characteristics of the classroom in both the pre-K and kindergarten years, and controlled for classroom quality at first grade when examining social skills and behavior problems in first grade. As in most recent ECE studies, the inclusion of the child's initial skills on the outcome and family and classroom contextual variables increases confidence in the observed associations, while not eliminating concerns about selection bias. While this is now the standard within ECE studies, most of the earlier studies of ECE experiences and social–emotional development did not use pre-test types of scores as covariates to reduce potential bias (Burchinal et al., 2015).

The public debate over the quality and availability of center-based pre-kindergarten experiences is going to continue. The results of this study indicate that children living in low-wealth rural communities who had access to higher quality pre-kindergarten experiences showed better social–emotional functioning comparing to children who did not have such experiences. This study, along with the extensive ECE literature, supports continued investment in high-quality ECE for vulnerable children.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.ecresq.2016.01.005.

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