Title
Early Care and Education Classrooms as Ecological Systems: Predictors and Implications of Classroom Quality Profiles

Author
Boyle, Kelly Erin

Publication Date
2013

Peer reviewed|Thesis/dissertation

Early Care and Education Classrooms as Ecological Systems:

Predictors and Implications of Classroom Quality Profiles

By

Kelly Erin Boyle

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Education

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Anne Cunningham, Chair
Professor Susan Holloway
Professor David Kirp

Fall 2013

Early Care and Education Classrooms as Ecological Systems: Predictors and Implications of Classroom Quality Profiles

by Kelly Erin Boyle

Abstract

Early Care and Education Classrooms as Ecological Systems:

Predictors and Implications of Classroom Quality Profiles

by

Kelly Erin Boyle

Doctor of Philosophy in Education

University of California, Berkeley

Professor Anne Cunningham, Chair

Early care and education quality is a complex, multi-faceted construct consisting of multiple dimensions, such as: 1) emotional climate, 2) instructional supports, 3) learning formats, 4) assessment practices, and 5) support for families (e.g., Bulotsky-Shearer, Wen, Faria, Hahs-Vaughn, & Korfmacher, 2012; Copple & Bredekamp, 2009; LoCasale-Crouch, et al., 2007). Each of these dimensions represents separate but interrelated aspects of classroom quality that exist as part of an ecological system. Individual teachers may vary widely in the levels of support they provide across domains (Curby, Rimm-Kaufman, & Ponitz, 2009). The present study used profile analysis to identify distinct patterns of quality across multiple dimensions in a national sample of early care and education settings (N = 283 classrooms). Five distinct profiles emerged, which were differentially related to teacher/program background characteristics such as teacher education, beliefs, self-efficacy, salary, and program type. Profile membership was also predictive of child outcomes (N = 2,604) at the end of the preschool and kindergarten year. For academic outcomes, the most optimal gains were seen in the profile with high levels of quality overall, particularly in the area of instructional supports. For social–emotional outcomes, this profile was statistically similar to other profiles with above average levels of quality in emotional climate and support for families. These findings are discussed within the context of implications for policy and practice.

Keywords: early care and education, preschool, classroom quality, profile analysis, policy

Early Care and Education Classrooms as Ecological Systems: Predictors and Implications of Classroom Quality Profiles

High-quality early care and education can positively affect children's cognitive, academic, and social skills, which in turn can translate into better outcomes in elementary school, adolescence, and adulthood (Karoly et al., 2005; Lamb & Ahnert, 2006; Vandell, 2004). However, experts in research and practice concur that early care and education quality is a complex, multifaceted construct and that multiple dimensions of quality are important for children's learning and development (Bulotsky-Shearer, Wen, Faria, Hahs-Vaughn, & Korfmacher, 2012; Copple & Bredekamp, 2008; LoCasale-Crouch et al., 2007). For example, emotional climate, instructional supports, learning formats, assessment practices, and support for families are all aspects of a classroom environment that have been positively linked to child outcomes (Fuligni, Howes, Huang, Hong, & Lara-Cinisomo, 2012; Halgunseth, Peterson, Stark, & Moodie, 2009; Hyson et al., 2011; Mashburn et al., 2008; VanDerHeyden, Snyder, Broussard, & Ramsdell, 2008). Traditionally the effects of each of these dimensions have been examined in isolation, for example investigating how variability in emotional climate relates to children's developing social skills (Hyson et al., 2011) or how different levels of family–school involvement contribute to children's emergent literacy skills (Arnold, Zeljo, Doctoroff, & Ortiz, 2008). However, it is important to recognize that all of these aspects co-exist as part of an ecological system within a classroom and that children experience all of these dimensions of quality simultaneously (Curby, Rimm-Kaufman, & Ponitz, 2009; LoCasale-Crouch et al., 2007). Furthermore, given that these dimensions of quality differ in important ways and each represents a unique aspect of classroom functioning, it should be acknowledged that individual teachers may vary widely in the levels of support they provide across domains. That is, a classroom cannot necessarily be described as uniformly "supportive" or "unsupportive," but rather there may be different combinations of levels of support across these individual domains of quality (Curby et al., 2009).

The present study seeks to contribute to an emerging body of research using profile analysis to identify distinct patterns of quality across multiple dimensions in a national sample of early childhood education settings (Bulotsky-Shearer et al., 2012; Curby, Rimm-Kaufman, & Ponitz, 2009; LoCasale-Crouch et al., 2007). The study will also examine whether profiles differ with regard to teacher, classroom, and program characteristics and whether profile membership differentially predicts child outcomes across a range of school readiness domains. Identifying and exploring the implications of unique profiles of quality within early childhood education settings allows for a richer understanding of the current landscape of early childhood education quality and may have important implications for professional development, program improvement, and policy initiatives.

An Ecological Understanding of Early Childhood Education Quality

One way to conceptualize early childhood education quality is through the lens of a developmental ecological framework, which asserts that children's development unfolds as a function of the collective influence of a multitude of environmental and contextual factors (Bronfenbrenner & Morris, 2006). At the most comprehensive level, an ecological model considers the simultaneous effects of an interconnected web of nested systems including individual characteristics (e.g., child characteristics), proximal sources of influence (e.g., home, school), distal factors (e.g., community resources, local, state, and federal policies), and the processes that occur at the intersections between these systems. However, it is widely accepted that children's development and learning is most directly affected by their most immediate

experiences, such as those that occur in the microsystem contexts of home and school (Bronfenbrenner & Morris, 2006; Pianta et al., 2005).

It is also evident that even within a microsystem setting such as a classroom, there are further layers of context that affect children's development with varying levels of influence. For example, as the body of literature examining early childhood education quality has developed, two distinct areas of quality have emerged: structural quality and process quality. *Structural quality* represents features of program infrastructure or design such as the adult–child ratio; class size; and teacher background characteristics such as education, training, and experience (Lamb & Ahnert, 2006; Vandell, 2004). *Process quality* reflects the actual experiences that children have in the classroom, particularly in regard to teacher–child interactions. This includes the sensitivity and responsiveness of the teacher, classroom management and organization, and the nature and quality of instruction offered to support children's learning (Curby et al., 2009).

Although the research supporting a direct relationship between features of structural quality and child outcomes is somewhat inconsistent, there is stronger evidence that structural characteristics are predictive of levels of process quality, which in turn is a significant predictor of child outcomes. Structural characteristics may potentiate high-quality interactions in the classroom, but do not necessarily guarantee them (Lamb & Ahnert, 2006). For instance, teachers who have smaller class sizes and lower child–teacher ratios are more likely to engage in responsive, warm, supportive, and socially stimulating behavior (NICHD Early Child Care Research Network [NICHD ECCRN], 2000), perhaps because they spend less time managing large numbers of children. This is consistent with an ecological framework, suggesting that the greatest effects on children's development and learning derive from the most proximal-level interactions and transactions among teachers, children, and materials (Bronfenbrenner & Morris, 2006; Pianta et al., 2005). The current study seeks to examine the concurrent influence of multiple facets of process quality that occur within the ecological setting of an early childhood education classroom. The study will also extend previous research by examining structural aspects of quality as predictors of different patterns of process quality.

Profile Analysis-Based Approaches to Conceptualizing Quality

Consistent with the recognition that various dimensions of quality exist as parts of an interrelated ecological context rather than as isolated variables, researchers are beginning to employ alternate theoretical and statistical approaches to identify variation within young children's learning environments. For example, some recent studies have used profile analysis to identify structural patterns among several multidimensional constructs simultaneously (Bulotsky-Shearer et al., 2012; Curby et al., 2009; LoCasale-Crouch et al., 2007). That is, instead of using a variable-centered approach in which single dimensions of quality are considered individually as predictors of child outcomes, profile analysis identifies subgroups of teachers or classrooms that display similar patterns of strengths and weaknesses across multiple dimensions of quality (LoCasale-Crouch et al., 2007).

Variable-centered versus profile analysis. Traditionally, early care and education quality has been examined using a variable-centered approach, which has provided valuable information regarding the identification of characteristics of early care and education classrooms that are important for promoting children's development and learning (Bulotsky-Shearer et al., 2012). However, this approach is limited to reflecting variation in single areas of functioning at a time and may obscure higher order interactions among various dimensions of quality. Profile analysis can build on the important foundational work conducted in variable-centered studies by

using the key dimensions of quality identified by variable-centered research and examining their collective influence on children's development and learning.

Profile analysis techniques (e.g., cluster analysis, latent profile analysis) empirically uncover core profiles or integrated sets of scores, thereby providing descriptions across multiple dimensions of quality simultaneously. These multivariate methods have several advantages. First, from a theoretical perspective, this approach is consistent with a developmental ecological framework in that it acknowledges that classrooms are complex, ecological systems in which multiple factors are influencing children's development and learning through co-actional processes (Bulotsky-Shearer et al., 2012). Second, from a practical perspective, profile analysis approaches reflect configurations of intra-individual variation, capturing patterns of high and low supports provided by different teachers. This more comprehensive approach more accurately reflects the actual experiences of children in the classroom and more fully captures the teacher as an individual (Curby et al., 2009; LoCasale-Crouch et al., 2007). This may have important implications for policy and professional development efforts, recognizing that teachers with different patterns of relative strengths and weaknesses may have differential effects on child outcomes and may benefit from different types or levels of professional development support. Third, from a statistical perspective, profile analysis approaches provide a method of examining relationships among quality and child outcomes without the concerns about multicollinearity that often arise with variable-centered approaches (Curby et al., 2009). Although aspects of early care and education classroom quality are frequently theoretically and empirically related, they are often pitted against each other in variable-centered approaches in order to explain unique variance in an outcome, thus sometimes underestimating the true effect of a variable if some of its contribution to the outcome variable is shared with another variable. Profile analysis removes the need for variables to be in competition with each other and allow for both unique and shared aspects of variance to be considered (Curby et al., 2009).

Previous research using profile analysis. LoCasale-Crouch et al. (2007) used cluster analysis techniques to identify profiles of quality in over 700 classrooms across three domains of quality: *emotional support* (e.g., positive climate, teacher–child relationships), *organizational support* (e.g., classroom management, use of appropriate learning formats), and *instructional support* (e.g., quality of learning opportunities) as measured by the *Classroom Assessment Scoring System* (Pianta, La Paro, & Hamre, 2008). Analyses revealed five distinct classroom profiles: *Profile 1* (15% of classrooms): high emotional, organizational, and instructional support; *Profile 2* (17% of classrooms): moderate emotional/organizational support and high instructional support; *Profile 3* (31% of classrooms): moderate emotional/organizational support and mediocre instructional support; *Profile 4* (18%): mediocre emotional support and low organizational/instructional support; and *Profile 5* (19%): low emotional, organizational, and instructional support. Classrooms in the higher quality profiles (i.e., Profiles 1 and 2) tended to have teachers with more experience teaching preschool, more Caucasian teachers, smaller class sizes, and lower child-teacher ratios. The higher quality classrooms also tended to have lower proportions of minority children and children living in poverty, as well as serve families with higher levels of maternal education. In contrast, classrooms in the lowest quality profile tended to reflect teacher and program characteristics often associated with fewer resources (e.g., higher child-teacher ratios, longer program days, more programs receiving Head Start funding, more African American teachers, more minority children, more children living in poverty, and lower maternal education among families served). No clear patterns emerged in terms of teacher age, education, certification, or wages.

A follow-up study (Curby et al., 2009) examined the relationship of the five quality profiles to child outcomes, as measured by gains in receptive vocabulary and mathematics problem solving ability over the course of the preschool year and social skills as rated by the child's kindergarten teacher. In regard to academic outcomes, children in classrooms categorized as Profile 2 (moderate emotional and organizational support and high instructional support) experienced the greatest gains. This was counter to the researchers' initial hypothesis that Profile 1 classrooms (high in emotional, organizational, and instructional support) would produce the largest gains. However, further analysis revealed that although both Profile 1 and Profile 2 had high levels of instructional support, they differed in specific dimensions within this domain. Namely, Profile 2 had higher levels of *concept development* quality, a dimension measuring how teachers promote higher-order thinking and cognition. Consistent with expectations, children in classrooms categorized as Profile 5 (low emotional, organizational, and instructional support) made the smallest amounts of gains. In respect to social–emotional outcomes, children in classrooms rated as Profile 1 (high emotional, organizational, and instructional support) were most likely to be rated by their kindergarten teachers the following year as being more socially competent. These findings suggest that although children may be able to make gains in academic areas when instructional support is high and only moderate levels of emotional and organizational support are present, in order for children to make the greatest gains in social competence, levels of quality must be high in all areas.

A separate research effort examined profiles of classroom quality and family involvement in a national sample of Head Start classrooms (Bulotsky-Shearer et al., 2012). This study identified six distinct patterns of *parent school involvement* (e.g., participating in school activities and events, volunteering in child's classroom), *parent home involvement* (e.g., home literacy activities, visits to libraries or museums, teaching about numbers), and *classroom quality* (e.g., appropriateness of the learning environment, teacher–child interactions, classroom climate). Profiles 1 through 3 were characterized by low and slightly above average levels of classroom quality paired with varying levels of parent home and school involvement: *Profile 1* (9% of children): low parent school/home involvement, very low classroom quality; *Profile 2* (5% of children): high parent school involvement, very low classroom quality; *Profile 3* (2% of children): high parent home involvement, very low classroom quality. Profiles 4 through 6 were characterized by average to above-average levels of classroom quality paired with varying levels of parent home and school involvement: *Profile 4* (48% of children): low parent school/home involvement, above average classroom quality; *Profile 5* (24% of children): high parent school involvement, above average classroom quality; *Profile 6* (13% of children): high parent school/home involvement, above average classroom quality.

In general, profiles with higher parent involvement at home and school were associated with higher parental education and a two-parent household. Specifically, in profiles with greater parent–school involvement, parents were less likely to be working and more likely to be from language-minority families. Profile membership was not significantly related to family income, parental depression, or parental locus of control. In terms of classroom quality, convergent findings were observed with the results of LoCasale-Crouch et al. (2007). For example, profiles with lower levels of classroom quality had higher child-teacher ratios and a greater percentage of minority children relative to profiles of higher classroom quality. Furthermore, there were no significant differences among profiles in terms of teacher characteristics, such as education level or professional trainings attended.

In terms of child outcomes, compared to children in conditions of low parent involvement and low classroom quality (Profile 1), children who experienced *either* high levels of home involvement (Profile 3, high parent monthly involvement, low classroom quality) or above average classroom quality (Profiles 4–6, above average classroom quality, varying levels of parent involvement) tended to demonstrate higher levels of academic outcomes. Furthermore, although higher classroom quality (Profiles 4–6) was associated with positive academic outcomes, variation was seen within these three profiles with respect to variability in parent involvement. For example, when compared to Profile 4, children in Profiles 5 and 6 (who experienced similar levels of classroom quality, but relatively higher parent home and school involvement) demonstrated significantly higher receptive vocabulary and mathematics skills. With respect to social skills, children in classrooms with above average classroom quality (Profiles 4–6) showed significantly higher social skills relative to those children in the lowest quality profile (Profile 1). It is important to note that despite lower levels of parent home and school involvement in Profile 4, children's social development did not appear to be significantly compromised. Overall, child outcomes tended to be higher when children experienced high-quality interactions in both the home and classroom settings. However, it appears that even if children's experiences are less than ideal in one of these domains, high-quality experiences in the classroom *or* high levels of parental involvement can function as protective factors.

Similar findings were also detected in a study using profile analysis to examine quality in first grade classrooms using the *CLASS* assessment system (Stuhlman & Pianta, 2009). Four profiles were identified: *Profile 1* (23%): overall high quality; *Profile 2* (31%): positive emotional climate, lower academic demand; *Profile 3* (28%): mediocre; *Profile 4* (17%): overall low quality. Few structural differences were found between profile types—class size, presence of a teacher's aide, teacher credentials, and teacher years of experience were all similar across profiles. In contrast to the studies previously discussed, some effects for teacher education were observed: teachers in the high emotional quality, low academic demand classrooms had higher levels of education than those in mediocre quality classrooms. Several differences were noted in child and family characteristics across profile types. Children whose preschool achievement scores were lowest, who were from poor or working-poor families, and who were of non-white ethnicity were about twice as likely to attend school in a classroom in the low overall quality profile than the high overall quality profile. Furthermore, teachers in low overall quality classrooms reported more challenges preparing children for success, more barriers to family involvement, and more students below grade level in reading than did teachers in any other profiles.

These previous studies offer a novel approach of conceptualizing early childhood classroom quality through an ecological approach using profile analysis. The information obtained from considering children's learning environments from multiple perspectives simultaneously has potential implications for practitioners, researchers, and policymakers. For example, it is notable that Curby et al. (2009) found that children can still achieve positive gains in academic areas such as literacy and math with moderate levels of organizational and emotional support, provided instructional support is of a high enough level. However, if we are also to consider children's social–emotional development as an important programmatic goal, then support should be high in all three areas. The current study seeks to build on these studies by investigating whether initial findings can be replicated and extended in a broader sample (i.e., Head Start, public preschool, and child care) and including important dimensions of children's

learning environments that are often omitted from discussions about quality such as assessment practices, support for families, and learning formats.

Dimensions of Early Childhood Education Quality.

The dimensions of quality included in the current study will include 1) emotional climate, 2) instructional supports, 3) learning formats, 4) assessment practices, and 5) support for families. These dimensions are similar to those used in previous studies; for example emotional climate and instructional supports align to subscales of the *CLASS* used in the LoCasale-Crouch et al. (2007) and Curby et al., 2009 studies, and the inclusion of a support for families dimension is similar to the constructs measured by Bulotsky-Shearer et al. (2012). However, the current study also includes other aspects of quality such as assessment practices and learning formats that research suggests are also important for children's learning and development (Fuligni et al., 2012; National Research Council, 2008). This is consistent with other comprehensive models of preschool learning environments, such as that put forth by Connor et al., 2009, which, in addition to home environment, social–emotional climate, and classroom management, also includes teachers' use of assessment to inform instruction, the context of instruction (i.e., whole class, large group, small group, individual), and who is managing the child's attention during the activity (i.e., teacher-managed, self-managed, teacher/child-managed, peer-managed).

Furthermore, the dimensions of quality used in the current study align well with the guidelines put forth by the National Association for the Education of Young Children (NAEYC) describing "developmentally appropriate practices" in working with preschool-aged children (Copple & Bredekamp, 2008). Indeed, the NAEYC guidelines are organized into the following dimensions: 1) Creating a caring community of learners (i.e., emotional climate), 2) Teaching to enhance development and learning (i.e., learning formats), 3) Planning curriculum to achieve important goals (i.e., instructional supports), 4) Assessing children's development and learning (i.e., assessment practices), and 5) Establishing reciprocal relationships with families (i.e., support for families). The alignment between the dimensions proposed in the current study and conceptualizations of quality employed in both the research literature and practical guidelines available to teachers means that results of the current study may have implications for practitioners, researchers, and policymakers. The following sections describe each dimension of quality to be used in profile analysis in detail and summarize previous research linking each dimension to child development and learning outcomes.

Emotional climate. Research suggests that responsive and supportive early childhood educator behaviors and interactions can help facilitate young children's emotion regulation, social competence, and behavioral functioning (Hyson et al., 2011). Specifically, high-quality emotional support includes supports for children's social understanding; guidance around peer interactions and conflict resolution skills; assistance identifying, interpreting, and regulating emotions; encouragement of children's independence and decision making; and appropriate responses to children's behavior problems (Hyson et al., 2011). Additionally, in an emotionally supportive classroom, teachers are sensitive to and respond to children's needs, value children's perspectives, provide children with choices, are not overly controlling, and are generally more focused on the needs of students than their own agendas (Curby et al., 2009). There is evidence that emotionally supportive classrooms are associated with greater levels of children's self-reliance, engagement (NICHD Early Child Care Research Network, 2003) and social competence (Mashburn et al., 2008). Positive classroom climate has also been found to predict mathematics and reading achievement in kindergarteners (NICHD Early Child Care Research Network & Duncan, 2003; Pianta, La Paro, Payne, Cox, & Bradley, 2002).

Instructional supports. When teachers deliver high-quality instruction, they are responsive and offer feedback to children; focus on expanding understanding, rather than rote learning; and encourage children to build on current knowledge and understanding (Curby et al., 2009). In addition to these general features of effective instruction, extensive research has also identified content specific instructional practices in early care and education settings that promote child outcomes. For example, research demonstrates that high-quality emergent literacy instruction involves rich conversational interactions and planned interactive reading experiences (Justice, Mashburn, Hamre, & Pianta, 2008; McGee & Schickedanz, 2007); meaningful opportunities for children to attend to, manipulate, and experiment with the sounds of speech (Cunningham, 1990; Phillips, Clancy-Menchetti, & Lonigan, 2008); and exposure to and active engagement with print-rich environments (Justice & Kaderavek, 2004; McGinty, Breit-Smith, Fan, Justice, & Kadervek, 2011; Vukelich, 1990). In general, higher levels of instructional support have been associated with improved academic outcomes (Mashburn et al., 2008; Pianta et al., 2002) as well as social competence and observed on-task behavior (Pianta et al., 2002).

Learning formats. In addition to the actual content and frequency of learning opportunities, research and theory both suggest that it is also important to consider how children's daily experiences are structured. For example, the activity settings of different group sizes and the extent to which activities are teacher- or child-directed may be an important aspect of classroom quality. Research and theory suggest that children's play is a fundamental mechanism of development, particularly when children are actively engaged in exploring their environment (both physical and social) and involved in constructing their own knowledge (Piaget, 1952; Singer, Golinkoff, & Hirsh-Pasek, 2006; Vygotsky, 1967). However, in addition to child-directed play and exploration, children also benefit from more structured interactions with supportive adults who scaffold and extend their learning (Vygotsky, 1978). Indeed, research suggests that children seem to benefit from a balance of child-directed (e.g., free play) and teacher-guided (e.g., structured activities) experiences. Fuligni et al. (2012) found that a "Structured-Balanced" pattern of activities in which children spent relatively equal proportions of their day engaged in child-directed free-choice activities and teacher-guided small-and whole-group activities was associated with more opportunities to engage in language and math activities and more positive child language outcomes when compared to a "High Free Choice" pattern. Similarly, Chien et al. (2010) found that children who spent the greatest proportion of time in free-play with relatively few teacher-guided activities showed the smallest amount of gains across the preschool year in language, literacy, math and social competence. Furthermore, when children are participating in teacher-guided activities, experts recommend the use of small groups and, when possible, one-on-one interactions with children in order to maximize a teachers' ability to be responsive to children and provide individualized attention to children (Wasik, 2008). Some research suggests that teachers who spend greater amounts of time in whole group activities score lower on measures of process quality (Early et al., 2010) and children who experience more small group and individualized instruction show more positive outcomes (Chien et al., 2010; Morrow, 1987; Piasta & Wagner, 2010). Thus, a high-quality preschool classroom environment provides a balance between child-directed activities and teacher-guided activities that allow for scaffolding, individualization, and responsiveness.

Assessment practices. According to the National Research Council (2008), one of the foremost purposes of child assessment in the early childhood classroom is to guide instructional decisions. *Formative assessment* is the process of gathering information about children's developmental progress from several sources (e.g., observation notes, samples of children's

work) and using this data to design future learning experiences that will help move the child toward the next steps in development. Based on the information that teachers collect and synthesize, they are better able to make intentional choices in their teaching and appropriately plan and scaffold children's learning experiences in a way that is tailored to each child's current developmental level and instructional needs. Research indicates that with appropriate supports and training, teachers' ratings of children using the methods described above can be as valid as standardized tests administered to children (Meisels, Bickel, Nicholson, Xue, & Atkins-Burnett, 2001). Studies also suggest that formative assessment practices can improve teachers' abilities to integrate the curriculum into their classroom (Khattri, Reeve, & Kane, 1998), improve the quality of instruction (Koretz, Stecher, Klein, & McCaffrey, 1994), and promote greater awareness of and emphasis on individual growth and development (Aschbacher, 1992). Furthermore, research suggests that children in classrooms where teachers modify activities to children's individual needs experience more optimal outcomes (Lambert, Abbott-Shim, & McCarty, 2002) and that the effects of an ongoing formative assessment system coupled with differentiated instruction may be particularly strong for children who enter preschool with initial low levels of skills (VanDerHeyden et al., 2008).

Support for families. Partnerships between early care and education programs and families are another critical ingredient to a high-quality learning experience for young children. Indeed, research indicates that strong family–program connections are linked to greater academic motivation, grade promotion, and social–emotional skill development for young children across diverse ethnic and socioeconomic backgrounds (Christenson, 2000; McWayne, Hampton, Fantuzzo, Cohen, & Sekino, 2004). This is consistent with a developmental ecological perspective, which identifies the home and school environments as two of the most important sources of influence on young children and suggests that positive, meaningful interactions between the two systems can have beneficial effects on children's development (Bronfenbrenner & Morris, 2006; Xu & Filler, 2008). Bromer et al. (2011) propose that when early care and education programs engage in "family-sensitive caregiving," families experience better outcomes such as continuity of care, increased social support, stress reduction, and better work performance. In turn, these outcomes may translate into positive child outcomes through mechanisms such as providing models of positive adult relationships; buffering children from effects of parental stress, depression, and isolation; developing new parenting skills; and potential economic benefits if parents are better able to attend and perform at work. In order to create strong school–family partnerships, it is crucial that early childhood education programs engage families through offering multiple supportive resources, which might include creating a welcoming environment; conducting home visits; promoting respectful, two-way communication with all families; and involving families in decision-making processes (Halgunseth et al., 2009). It is important to acknowledge that family–school partnerships are reciprocal relationships that are also dependent on resources contributed by the family, such as communication with teachers, participation in the early childhood education program (e.g., volunteering, attending meetings or events), and creating a home environment that reinforces and complements classroom experiences (Halgunseth et al., 2009). However, for the purposes of this study, the focus will be on the ability of programs to effectively support families and cultivate positive family–school relationships.

The Current Study

The current study will extend previous research in a number of ways. First, the current study will continue building the emerging body of work using profile analysis as a novel way of

examining early care and education quality, recognizing that children experience multi-faceted learning environments that vary across a number of dimensions. Second, whereas previous samples were constrained to single populations of teachers and children (i.e., LoCasale-Crouch et al., 2007 and Curby et al., 2009 limited their sample to state preschool programs and Bulotsky-Shearer et al., 2012 examined only Head Start programs), the current study will include teachers and children participating in a variety of program types including state preschool, Head Start, and private child care programs, which is more representative of the current early care and education landscape that includes a variety of program types. Third, the current study uses a developmental ecological perspective, previous empirical research on early care and education quality, and the "Developmentally Appropriate Practice" guidelines from the National Association for the Education of Young Children to inform the identification of key dimensions of quality to be used in profile analysis. The resulting set of dimensions represents a novel, comprehensive combination of factors by which to examine early care and education quality. These dimensions consist of: 1) emotional climate, 2) instructional supports, 3) learning formats, 4) assessment practices, and 5) support for families. Finally, the current study will examine the effects of profile membership on a wide range of school readiness outcomes including children's growth in language and literacy, mathematics, approaches to learning, and social skills. This is consistent with research that emphasizes the importance of conceptualizing school readiness as a multi-faceted construct that encompasses multiple domains of development and learning (Halle, Hair, Wandner, & Chien, 2012; McWayne, Hahs-Vaughn, Cheung, & Wright, 2011).

Research objectives. The current study aims to replicate and extend previous research by identifying profiles describing quality across multiple dimensions in a national sample of early care and education settings. Specific objectives of the current study include:

1) Identify profiles describing quality across multiple dimensions (i.e., emotional climate, instructional supports, learning formats, assessment practices, support for families) in a national sample of early childhood education settings (RO1)
2) Determine whether profiles differ with regard to teacher characteristics (e.g., age, education, experience, salary, beliefs, self-efficacy) and program characteristics (e.g., program type, length of day, child–adult ratio; RO2)
3) Examine the effects of profile membership on a range of child outcomes (i.e., growth in language and literacy, mathematics, approaches to learning, and social competence; RO3).

Hypotheses. Specific hypotheses were formulated to align to each of the three major research objectives. Regarding *profile identification* (RO1), it is expected that three to six distinct profiles will be identified, consistent with previous studies focused on profile identification within a preschool sample (i.e., LoCasale-Crouch et al., 2007; Bulotsky-Shearer et al., 2012). Further, it is predicted that the distribution of profiles in the sample will mirror those of previous research (i.e., LoCasale-Crouch et al., Bulotsky-Shearer et al.), with relatively small proportions of classrooms (15–20%) in the profiles with uniformly high or uniformly low levels of quality, and the majority of classrooms in profiles with mixed levels of quality.

With regard to *determining predictors of profile membership* (RO2), previous studies have detected associations between profile membership and some teacher/program characteristics (Bulotsky-Shearer et al., 2012; LoCasale-Crouch et al., 2007). If these results are replicated, it is predicted that profiles with higher overall levels of quality will be associated with teachers with more preschool teaching experience, a greater number of Caucasian teachers than expected, shorter program days, and lower adult–child ratios. Although previous studies (both

variable-centered and profile analysis-based) have not found consistent relationships between classroom quality and teacher education (Bulotsky-Shearer et al., 2012; Early et al., 2007; LoCasale-Crouch et al., 2007; Tout, Zaslow, & Berry, 2006), it is possible that the inclusion of a wider range of quality variables may produce different results. For example, few studies have examined assessment practices and their relationship to teacher qualifications. It is possible that teachers with more education may have more training in using formative assessments (or that preschool programs that use formative assessment are more likely to hire and train teachers with higher qualifications). Thus, it is predicted that in the current study, teacher education will be related to profile membership, with teachers with higher degrees in profiles of higher overall quality.

Regarding the third research objective, *evaluating profiles as predictors of child outcomes* (RO3), more specific hypotheses will be put forth once profiles have been identified. However, it is possible that some general patterns will emerge. First, consistent with the findings of other studies that have engaged in profile analysis (i.e., Bulotsky-Shearer et al., 2012; Curby et al., 2009; LoCasale-Crouch et al., 2007), it is predicted that one profile will emerge with high overall levels of quality. Further, it is hypothesized that the most favorable child outcomes in all domains will occur when quality is high on *all* dimensions. This hypothesis will be referred to as the "all good things go together" hypothesis (Phillips & Howes, 1987). Once profiles have been identified (and if a uniformly high quality profile emerges), specific comparisons will be formulated in order to test this hypothesis.

Second, some previous research (Curby et al., 2009; Mashburn et al., 2008) has found that the strongest predictors of specific child outcomes are the most closely related domains of quality (e.g., emotional climate predicts social–emotional outcomes, instructional quality predicts academic outcomes). Therefore, profiles with different patterns of relative strengths may be associated with more favorable child outcomes depending on the outcome of interest. Within this hypothesis, it would be expected that the performance of children in a profile on a given outcome would depend solely on the level of quality of the corresponding classroom dimension relative to other profiles, regardless of other quality dimensions. This hypothesis will be referred to as the "domain specificity hypothesis." It should be noted that this hypothesis is not necessarily mutually exclusive with the "all good things go together" hypothesis. Again, after profiles have been identified, these hypotheses will be revisited with greater specificity, selecting specific profiles to compare in order to explore these hypotheses.

Method

Participants

The participants for this study were part of a large national research effort, the Preschool Curriculum Evaluation Research (Preschool Curriculum Evaluation Research Consortium [PCER], 2008) project, which was initiated by the Institute of Education Sciences (IES). Of the original 2,911 children in the PCER sample, 307 were excluded from analyses due to data being unavailable on one or more of the quality dimensions for 16 classrooms, leaving 2,604 children available for the present analyses. For children who were missing data on any demographic or outcome variables, values were estimated using the Expectation Maximization (EM) method (described in greater detail below). This procedure was also used to estimate missing values for teacher background characteristics for the 283 teachers included in the final sample.

Child demographics. At the time of baseline data collection (fall of children's preschool year), the average age of participating children was 4 years, 7 months (*SD* = 3.73 months). Approximately half (48.6%) of the children were female. The majority of children were

identified by parents as African-American non-Hispanic (44.6%) or White non-Hispanic (32.3%); fewer children were identified as Hispanic (15.2%) or other (7.8%). Most children's primary language was English (89.3%). Parent interviews indicated that 7.4 percent of children had a disability.

Of children's primary caregivers, 19.1 percent did not complete high school, 31.8 percent had a high school diploma or GED, 34.1 percent had some educational experiences after high school, and 15.0 percent had a B.A. or higher. The mean household income was $29,700 (*SD* = 22,940, range = 0 – 87,500). Parent report indicated that slightly less than half (47.9%) of children had two parents or caregivers living in the same home.

Teacher demographics. The majority of the preschool teachers in the sample were female (98.2%), with an average age of 40.97 years (SD=10.65, range=19–69). The ethnic representation of the teachers was 53.2 %White non-Hispanic, 33.2% African American non-Hispanic, 7.1% Hispanic, 2.1% Asian/Pacific Islander and 4.3% of other ethnicity. In terms of highest levels of education attained, 18.7% of the sample reported having no college education, 14.1% reported attaining an Associate's degree, 47.0% reported attaining a Bachelor's degree, and 20.1% reported attaining a Master's degree. Of those teachers who did acquire a degree, 6.1% reported majoring in Child Development or Developmental Psychology, 34.2% reported majoring in Early Childhood Education, 24.6% reported majoring in Elementary Education, and 35.1% reported "Other major." Regardless of major, 89.1% of teachers with degrees reported that their education had included six or more college-level courses in early childhood education. On average, teachers had 12.83 years of overall teaching experience (*SD* = 8.57; range = 2–33) and 8.23 years of teaching experience specific to preschool settings (*SD* = 6.55; range = 1–20). Teachers reported an annualized salary of $39,604 (*SD* = 20,272; range = 4,000–118,400). Detailed information regarding teachers' education and experience can be found in Table 1.

Program characteristics. 283 classrooms were represented in the sample, including Head Start (29.0%), public prekindergarten (60.8%), and private child care (10.2%) classrooms. Most of the programs (87.3%) were full-day programs. The average class size was 15.7 children (*SD* = 5.4), with a mean child–adult ratio of 7.5 to 1. A random sampling technique was employed to select participating children, resulting in an average of nine children per classroom (range = 1–21).

Procedure

Data was collected for the PCER project at 18 different geographical sites across the country. Twelve research teams (composed of staff from 12 universities and one foundation) implemented one or two curricula in early care and education settings serving predominantly low-income children. Using a common assessment battery and protocol, two national evaluation teams, Mathematica Policy Research (MPR) and Research Triangle Institute International (RTI) were employed as contractors to collect evaluation data across all sites. Baseline data were collected over 6 to 8 weeks in the fall of children's preschool year. Follow-up data were collected over a similar timeframe in the spring of children's preschool year and again in the spring of the children's kindergarten year. Pre- and post-measures of direct child assessments, parent interviews, teacher interviews, and classroom observations were completed at all project sites. Although the goal of the initial study was to evaluate the effects of various preschool curricula, this was not a focus of the present study. Indeed, results of the PCER project indicated that most curricula did not have an effect on child outcomes (Preschool Curriculum Evaluation Research Consortium, 2008) and other studies have found that fidelity of curriculum implementation does not necessarily translate to high-quality instruction (Justice et al., 2008);

thus, the curriculum used and treatment group status were not factored into current study analyses.

Measures

Data was collected using a variety of measures including (1) standardized child assessments (literacy and language and mathematics outcome measures); (2) teacher ratings of children (ratings of approaches to learning and social competence); (3) teacher interview (teacher demographics, measure of beliefs and self-efficacy); (4) classroom observations (measures of emotional climate, instructional supports, learning formats, and assessment practices); and (5) parent interview (demographic information and measure of perceived support for families). All of these measures, described in detail below, were selected by a panel of experts assembled by IES and are widely used and supported by theory and empirical research.

Dimensions of quality. Measures of quality were collected from classroom observations in the spring of children's preschool year, as well as parent report of perceived levels of support for families in the spring. In order to gain a more nuanced picture of classroom ecologies, instructional support quality was examined as three separate domains—oral language, print knowledge, and mathematics support. Each quality dimension is described in more detail below.

Emotional climate. The *Arnett Caregiver Interaction Scale* (Arnett, 1989) was used to measure teacher–child relationships and a classroom's emotional climate. Observers rated teachers' behavior on 26 items across four scales: Permissiveness (e.g., doesn't exercise much control over children), Detachment (e.g., not interested in children's activities), Positive Interaction (e.g., speaks warmly to children), and Harshness (e.g., seems critical of children). Items are rated on a 4-point Likert scale ranging from "not at all" to "very much." Higher scores on the Positive Interaction subscale items are considered more optimal, whereas lower scores on items from the other three subscales are considered optimal. Therefore, items on the Permissiveness, Harshness, and Detachment scales were reverse-scored before further analysis was conducted. Principal component analyses and tests of reliability revealed that the scale's psychometric properties would be improved if the three items composing the Permissiveness subscale were dropped. Thus, a composite score was created using the 23 items that made up the Positive Interaction, Harshness, and Detachment subscales (M = 73.12, SD = 14.23; range: 27.00–92.00). The final reliability coefficient was estimated to be $\alpha = .95$. For a list of items included in the emotional climate composite, see Appendix A.

Instructional supports. Instructional supports in the areas of oral language, print knowledge, and mathematics were measured using the Teacher Behavior Rating Scale (Landry, Crawford, Gunnewig, & Swank, 2002). For the present study, data were drawn from the following three subscales: Oral Language, Print and Letter Knowledge, and Math Concepts. For each subscale, trained observers rated the quality and quantity of classroom activities provided during the observation period. For example, the math concepts subscale included items such as, *Teacher involves children in organized hands-on activities that support one or more of the math strand concepts (i.e., counting, 1:1 correspondence, sorting, patterning, graphing)*. For this item, observers provided ratings of the quantity of hands-on math activities (*0–1 activities, 2–3 activities, 4+ activities)* as well as the quality of the activities (*Low, Average, High*). Composites for each of the subscales were based on those created by the authors of the instrument (i.e., summing averages of quality and quantity ratings). The oral language subscale had the highest reported mean (M = 3.65, SD = 1.40; range: 0.14–6.00), followed by the print and letter knowledge subscale (M = 2.70, SD = 1.14; range: 0.63–6.00), followed by the math concepts subscale (M = 2.51, SD = 1.09; range: 0.17–5.86). The reliability coefficients for the oral

language, print and letter knowledge, and math concepts subscales were estimated to be α = .94, .85, and .89 respectively. For a list of items included in each subscale, see Appendix A.

Learning formats. In order to assess the use of appropriate learning formats in classrooms, a modified version of the Program Structure subscale of the *Early Childhood Environmental Rating Scale, Revised Edition* (*ECERS–R*; (Harms, Clifford, & Cryer, 1998) was used. Classrooms were rated on scales describing their Schedule, Free Play, and Group Time on a 7-point scale (1 = *inadequate*, 3 = *minimal*, 5 = *good*, 7 = *excellent*). A low score on the *Schedule* scale represents a classroom in which the schedule is either too rigid (leaving no time for individual interests) or too flexible (chaotic, lacking a dependable sequence of events). A high score represents a classroom that demonstrates a balance of structure and flexibility, has a variety of activities (some teacher-directed, some child-initiated), smooth transitions with little wait time, and can include variations in the schedule to meet individual children's needs (e.g., shorter story time for child with short attention span). A low score on the *Free Play* scale corresponds to either too little opportunity for free play or much of the day spent in unsupervised free play. A high score represents a classroom that incorporates free play for a substantial portion of the day with supervision used as an educational interaction (e.g., staff help children think through solutions to conflicts, introduce concepts in relation to play). A low score on the *Group Time* scale corresponds to a classroom in which children are kept together as a whole group for most of the day with very few opportunities for staff to interact with individual children or small groups. A high score represents a classroom in which different groupings provide a change of pace throughout the day and staff engage in educational interaction with small groups and individual children as well as with the whole group. The Schedule, Free Play, and Group Time scales were combined to form the final learning formats dimension. Typically, a fourth scale is included in the *ECERS–R* Program Structure composite, which addresses provisions for children with disabilities. However, given the low number of children with disabilities included in the sample (6.7%) and the focus of the learning formats composite for purposes of this study (i.e., balance between different types of activities and groupings, opportunities for individualizing and differentiated instruction), this scale was omitted from the learning formats composite. The reliability coefficient for the final scale (M = 13.21, SD = 4.65; range: 3.00–21.00) was estimated to be α = .77. For a list of items included in the learning formats composite, see Appendix A.

Assessment practices. Select items from the Individualizing subscale of *The Assessment Profile for Early Childhood Programs: Research Edition II* (Abbott-Shim & Sibley, 1998) were used to provide information regarding teachers' assessment practices in the classroom. Information was gathered regarding teachers' data collection practices (e.g., *portfolio available for each child, system for summarizing child abilities available*) as well as teachers' use of assessment data in a formative manner to plan and differentiate instruction (e.g., *information from system used to group child by need*; *information from assessments used to plan activities*). Six items from this subscale were summed to form a composite (M = 2.92, SD = 2.27; range: 0.00–6.00). The final reliability coefficient was estimated to be α = .86. For a list of items, see Appendix A.

Support for families. Select items from the parent interview conducted in the spring were used to assess the perceived levels of family support across classrooms. This composite included items measuring parental satisfaction with the preschool in terms of being open to parents' ideas, respecting family background, and providing family services (4-point scale ranging from *very dissatisfied* to *very satisfied*). Other items addressed how often parents

perceived that teachers engaged in behaviors such as being open to new information, being supportive of them as a parent, and making them feel welcome as a parent (4-point scale ranging from *never* to *always*). An average for each item was created within each classroom, then the item averages were combined into a sum score such that each classroom had a single support for families score (M = 25.72, SD = 1.54; range: 20.84–28.00). The final reliability coefficient was estimated to be α = .84. See Appendix A for a list of items that were included in this composite.

Background factors. Previous studies of classroom quality profiles have included analyses examining whether certain program and teacher characteristics differentially predict classroom quality profile membership (Bulotsky-Shearer et al., 2012; LoCasale-Crouch et al., 2007). Although these studies have also included measures of classroom composition (e.g., proportion of children in the classroom living in poverty, proportion of children of minority status, mean levels of maternal education for entire classroom), the data used in the current study did not allow for this level of analysis as demographic data was only collected for a select sample of children in each classroom. However, child and family characteristics (e.g., child gender, ethnicity, English-language learner status, parent education level, household income) will be used as covariates in the analyses using child outcomes as the dependent variable.

Program characteristics. Program characteristics that were examined as potential predictors of profile membership included program type (Head Start, public prekindergarten, child care); length of day (full day versus half day); and child–adult ratio (including classroom volunteers).

Teacher characteristics. Individual teacher characteristics will also be examined as predictors of profile membership. Based on precedent from earlier studies (Bulotsky-Shearer et al., 2012; LoCasale-Crouch et al., 2007), variables such as teacher age, years of experience teaching preschool, education, and salary (annualized full-time equivalent salary) will be included. Information for all of these variables was collected via teacher interview in the spring.

In addition to teacher demographic characteristics, a measure of teacher knowledge and beliefs about early childhood education practices will be examined as a potential predictor of profile membership. Previous research has linked greater teacher knowledge about child development and more child-centered beliefs about teacher–child interactions with classroom process quality (Clarke-Stewart, Lowe Vandell, Burchinal, O'Brien, & McCartney, 2002; Pianta et al., 2005). Fifteen items from the *Teacher Beliefs Scale* (Hart et al., 1990) will be used. Teachers responded to items on a 5-point Likert scale (1 = *not important at all*, 5 = *extremely important*). Examples of items include, "*Classroom activities should be responsive to individual differences*," "*Children should know letter sounds before they learn to read*," and "*Teachers should use treats, stickers, or stars to encourage behavior*." The reliability coefficient for the final scale (M = 59.50, SD = 5.56; range: 45.00–72.00) was estimated to be α = .75.

A measure of teacher self-efficacy was also examined as a predictor of profile membership as this construct has previously been linked to preschool classroom quality (Guo, Piasta, Justice, & Kaderavek, 2010; Justice et al., 2008). An abbreviated version of the Teacher Self-Efficacy Scale (TSES; Bandura, 1997) was used to examine teachers' sense of self-efficacy in terms of offering effective instruction and creating a positive classroom climate. The measure used a 5-point Likert scale (1 = *Nothing* to 5 = *A great deal*) and included items such as "*How much can you do to get through to the most challenging children*." The items on the scale were summed then averaged (M = 4.56, SD = 0.55; range: 2.23–5.00). The internal consistency reliability was estimated to be α = .88.

Child and family characteristics. Information regarding child demographics was collected via a parent interview in the fall of children's preschool year. The interview drew primarily from Head Start's Family and Child Experiences Survey (Administration for Children and Families, 2002) and covered a range of topics including child and parent demographics, parent report of children's social and academic skills, family–child activities, and parenting practices. As the focus of the present study was on the classroom environment, only selected background variables were used from this comprehensive measure. Child age and gender were included as control variables for the analyses using child school readiness outcomes as the dependent variable. Additionally, given the research that suggests that contextual risk factors such as minority status, parent education level, household income, and English-language learner status affect children's academic skills (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Garcia & Miller, 2008; Gutman, Sameroff, & Cole, 2003), these variables were also controlled for in analyses using school readiness.

Child outcomes. Measures of school readiness were included across the following domains: oral language, print knowledge, mathematics, approaches to learning, and social competence. Children's preschool spring scores were considered the dependent variables in the models exploring the relationship between profile membership and child outcomes. Children's fall scores on the dependent variable of interest were entered as control variables such that outcomes represent children's growth over the course of the preschool year. Parallel analyses were carried out using children's preschool classroom profile membership to predict kindergarten outcomes on the same school readiness measures in order to examine the longitudinal effects of preschool classroom quality profiles. This approach also has the benefit of using kindergarten teacher ratings for the outcomes of approaches to learning and social competence, thus removing the potential bias that might result as a function of having preschool teachers provide the basis for both classroom quality and child outcome ratings.

Oral language. The *Peabody Picture Vocabulary Test, Third Edition* (Dunn & Dunn, 1997) is a standardized measure of children's receptive vocabulary. The *PPVT-III* is a well-established and widely used measure with estimates of internal consistency, split-half reliability, and test–retest reliability exceeding .85 (Dunn & Dunn, 1997). Standardized scores were used which are normed by the test developers based on child age (Fall Pre-K: M = 87.89, SD = 15.86; Spring Pre-K: M = 92.34, SD = 15.03; Spring K: M = 95.11, SD = 12.82).

Print knowledge. The *Letter–Word Identification* subtest (*WJ-III Letter – Word ID*) of the *Woodcock-Johnson Tests of Achievement, Third Edition* (Woodcock, McGrew, & Mather, 2001) was used to assess children's knowledge of letters and early decoding of words. Estimates of test–retest reliability for this subtest have been reported ranging from 0.87–0.96 (McGrew & Woodcock, 2001). Standardized scores were used in the current study (Fall Pre-K: M = 98.59, SD = 16.21; Spring Pre-K: M = 103.03, SD = 13.81; Spring K: M = 106.74, SD = 13.09).

Mathematics. The Applied Problems subtest (*WJ-III Applied Problems*) of the *Woodcock-Johnson Tests of Achievement, Third Edition* (Woodcock et al., 2001) was used to assess children's ability to solve practical math problems involving counting, adding, and subtracting. The reliability of this subtest is 0.92 (Woodcock, McGrew, & Mather, 2001). Standardized scores were used (Fall Pre-K: M = 93.30, SD = 15.24; Spring Pre-K: M = 95.35, SD = 13.98; Spring K: M = 99.18, SD = 12.74).

Social–emotional development. Children's social–emotional development was measured using the Social Skills scale (*SSRS Social Skills*) of *The Social Skills Rating System–Teacher Form* (Gresham & Elliot, 1990). This is a standardized measure assessing children's

general social competence. The Social Skills scale consists of subtests examining Cooperation, Assertion, and Self-Control. Estimates of internal consistency coefficients range from .83 to .94 (Gresham & Elliot, 1990). Standardized scores were used in the current study (Fall Pre-K: *M* = 100.60, *SD* = 15.80; Spring Pre-K: *M* = 106.20, *SD* = 14.85; Spring K: *M* = 99.06, *SD* = 13.74).

Approaches to learning. The *Preschool Learning Behavior Scale* (McDermott, Green, Francis, & Stott, 2000) is a standardized measure of children's behaviors related to classroom learning. The measure is comprised of 29 items on which teachers rate a child's specific behavior either as *most often applies*, *sometimes applies*, or *does not apply* based on the child's typical behaviors during the prior two months. The *PLBS* is made up of four subscales including Competence Motivation (e.g., curiosity, motivation to understand learning activities), Persistence/Attention (e.g., perseverance when challenged, attention to relevant stimuli), Attitude Toward Learning (e.g., willingness to accept help, ability to deal with frustration), and Effortful Strategy/Flexibility (e.g., approaches to following rules and directions and the effort involved). Internal consistency estimates range from 0.75 to 0.85 across the four scales, and total internal consistency is estimated to be 0.88. Further, the test–retest reliability coefficient for the entire scale is 0.89. (McDermott, Leigh, & Perry, 2002). A comparable version entitled The *Learning Behavior Scale* (McDermott, Green, Fancis, & Stott, 1999), which has similarly strong psychometric properties, was used for children's kindergarten year. (Fall Pre-K: *M* = 100.00, *SD* = 15.01; Spring Pre-K: *M* = 102.92, *SD* = 15.79; Spring K: *M* = 93.63, *SD* = 14.46).

Results

Data Analytic Approach

Given the large sample and wide variety of measures, several preliminary steps were taken to ensure that the data were appropriate for analysis. First, variables were screened for missing values, incorrectly coded scores, and extreme outlier scores. Sixteen classrooms were excluded from analysis due to the fact that classroom observations did not occur during the spring of the preschool year. Three more classrooms were excluded because none of the parents of children selected for the sample completed the support for families measure. An additional 13 classrooms were excluded because the lead teacher had replaced the original classroom teacher and had been the lead teacher for less than two-thirds of the school year (six teachers who replaced another teacher were present for at least two-thirds of the school year and thus were kept in the sample). Therefore, of the original 315 classrooms, a total of 283 remained in the final sample of classrooms used for profile analysis.

Missing data within the remaining classrooms was handled by applying the Expectation Maximization (EM) method to the full dataset including child outcomes, child/family background characteristics, teacher background characteristics, and classroom observation measures. This method assumes a distribution for the partially missing data then imputes values based on the observed relationships among all variables and injects a degree of random error to reflect the uncertainty of imputation. Values are imputed iteratively until successive iterations are sufficiently similar (Acock, 2005; IBM, 2011). A maximum likelihood method of estimation such as EM is preferable to traditional approaches to treating missing data such as listwise deletion, pairwise deletion, and single mean imputation, as these methods often produce biased parameter estimates and standard errors (Acock, 2005). Indeed, using an imputation procedure such as EM does not compromise the integrity of the analyses and, in fact, by including as many cases as possible, the precision of the analyses is increased (Acock, 2005). All following analyses are based on the imputed values.

Given that profile creation can be influenced by extreme outliers (Mooi & Sarstedt, 2011), all variables that contributed to profile creation (i.e., *Caregiver Interaction Scale*; *TBRS* Oral Language, Print Knowledge, and Math Concepts subscales; *ECERS–R* Program Structure subscale; *Assessment Profile;* Support for Families measure) were examined for statistical outliers (i.e., greater than 3.29 standard deviations from the mean). A 95th percentile Winsorization procedure was used in which outliers beyond the 95th percentile (±3.29 *SD*) in a set of scores was replaced by the score for the 95th percentile. Winsorization retains all data and their magnitudes and is more intuitively clear than other procedures, such as common log transformations (Sheskin, 2003). This procedure affected four cases that had perceived support for families values lower than 3.29 *SD* below the mean and one case that had a *Caregiver Interaction Scale* value lower than 3.29 *SD* below the mean.

After final adjustments were made to the dataset, continuous variables were examined to ensure approximately normal distributions and zero-order correlations were conducted among classroom quality variables, child outcomes, and background factor variables (program, teacher, and child/family characteristics) in order to preliminarily explore relationships among variables. See Tables 2–7 for correlation matrices.

In order to merit drawing conclusions from the HLM models run to examine effects of profile membership on child outcomes, it was important to ensure that all statistical assumptions of multiple regression were met. The distributions of the response variables (spring child outcome scores) and errors in each model were examined for normality. Added variable plots suggested linearity between continuous explanatory variables and response variables and scatterplots of residuals and predicted values indicated approximately constant spread, providing evidence that variances were relatively homogenous. In addition to traditional multiple regression assumptions, HLM-specific assumptions were also considered. The Level-2 coefficient variances were examined to ensure normal distribution across the overall model for each outcome model. Further, the residuals for Level-1 and Level-2 variables were examined and it was determined that the random variables across the levels were normally distributed.

Research objective 1: Profile identification. Cluster analysis was conducted following the procedures outlined in Mooi & Sarstedt (2011), which are similar to those used in the LoCasale-Crouch et al. (2007) and Curby et al. (2009) studies. First, the variables selected for inclusion were examined to ensure that they were appropriate for inclusion. It is recommended that the sample size should equal at least 2^m, where *m* equals the number of clustering variables (Mooi & Sarstedt, 2011). The variables selected for clustering numbered seven in total (*Caregiver Interaction Scale*; *TBRS* Oral Language, Print Knowledge, and Math Concepts subscales; *ECERS–R* Program Structure subscale; *Assessment Profile;* Support for Families measure). As the final sample size of 283 exceeded the value of 2^7 (128), this number of clustering variables was deemed appropriate. Next correlations between the variables were examined to ensure that high collinearity (i.e., >.90; Mooi & Sarstedt, 2011) did not exist. As can be seen in Table 2, correlations ranged from .11 to .70. Based on these criteria, all seven original clustering variables were retained for analysis.

The clustering procedure was conducted in two stages as per recommendations set forth by Mooi and Sarstedt (2011). The goal of the first stage was to identify an appropriate number of clusters in which to group the data. This stage employed a hierarchical-agglomerative procedure using a Euclidean distance matrix based on the single linkage method. The dendrogram and scree plot resulting from this analysis revealed a distinct break ("elbow") occurring at a six-cluster solution, which indicates a great increase in distance between clusters

from the previous solution. As the number of clusters prior to the solution where the distinct break occurs is the most probable solution (Mooi & Sarstedt, 2011), a five-cluster solution was determined to be most appropriate.

In the next step, a *k*-means clustering procedure was used to segment the data into five clusters by assigning cases to the clusters based on their minimum distance to the cluster centers (Mooi & Sarstedt, 2011). Group centroids from the previous stage (hierarchical-agglomerative solution) served as the starting seeds for the *k*-means partitioning analysis. The *k*-means procedure was necessary as the hierarchical-agglomerative procedure does not allow classrooms to shift clusters after their original assignment, even though they may fit better in a different profile later in the solution. In contrast, an iterative procedure such as *k*-means allows classrooms to migrate to neighboring clusters and generally results in a "tighter" solution (LoCasale-Crouch et al., 2007). However, a requisite of the *k*-means procedure is that the number of clusters be pre-determined, which is the reason why the hierarchical-agglomerative procedure is used first.

The final solution depicts five clusters, each representing a distinct combination of support across the dimensions of quality. Table 8 shows the mean raw scores for each profile as well as ANOVA pairwise significant differences across profiles. Figure 1 presents a graphic display of the *z*-scores of the five profiles within the current sample. Based on the author's judgment of what the research literature says promotes growth in children's learning and development, profiles are ordered from best to worst, with Profile 1 having the most to offer children and Profile 5 with the least. As per previous studies using profile analysis (i.e., (Bulotsky-Shearer et al., 2012; LoCasale-Crouch et al., 2007), profile names were derived from the patterns of dips and rises that reflect the strengths and weaknesses of each profile relative to the rest of the sample. A descriptive overview of the profiles is provided below.

Profile 1—high instructional support, above average quality overall (prevalence = 12.4%). Classrooms in this profile were characterized by excellent instructional supports (scores > 1 standard deviation [SD] above the sample mean); high levels of emotional climate and learning formats (>0.5 SD above the mean); and moderate levels of assessment practices and support for families (<0.5 SD above the mean, though still positive). These classrooms offered children high-quality learning opportunities in oral language, print knowledge, and mathematics. Teachers also engaged in positive interactions with children (the highest levels of emotional climate were found in this profile, though not significantly different from Profile 2). Although teachers provided above average learning formats and assessment practices, they were not as high as those seen in Profile 2. Given teachers' emphasis on instructional practices in Profile 1, it is possible that these classrooms engaged in more structured, whole-class activities, with less time spent in small-group or one-on-one settings that would allow for more formative assessment. Indeed, pairwise contrasts indicated that compared to classrooms in Profile 2, classrooms in Profile 1 scored lower on individual *ECERS–R* items evaluating Group Time ($M_{Profile1}$ = 5.97; $M_{Profile2}$ = 6.13, t(1) = 2.09, p = .12) and Free-Play practices ($M_{Profile1}$ = 5.60; $M_{Profile2}$ = 5.92, t(1) = 2.97, p = .09). However, overall, classrooms in Profile 1 offered very high-quality early care and education experiences, with particular strength in instructional support.

Profile 2—high individualizing, above average quality overall (prevalence = 25.1%). Within this profile, classrooms demonstrated high levels of emotional climate, instructional supports in the areas of literacy and language, learning formats, and assessment practices (>0.5 SD above the sample mean). Support for families and instructional supports in the area of math

concepts were in the moderate range (<0.5 SD above the mean). It should be noted that although this profile is similar to Profile 1 in many ways (e.g., comparable levels of emotional climate and support for families), classrooms in Profile 2 were not as strong in instructional supports, particularly math concepts. However, relative to the rest of the profiles (including Profile 1), Profile 2 was strongest in learning formats and assessment practices, indicating that teachers in these profiles provide learning opportunities that address children's unique developmental needs and incorporate a balance of structured and play-based learning opportunities. Children in this profile likely spent minimal time in whole-group instruction and more time in small-group and one-on-one settings, allowing teachers to engage in high-quality formative assessment practices and provide individualized and differentiated instruction based on children's unique needs and strengths. Given this profile's strength in teaching practices that emphasize individualization and assessment, results pertaining to this profile will be of interest when considering program and policy initiatives that require teachers to engage in assessment practices, often as part of accountability measures.

Profile 3—relationship-focused, below average individualization and instructional support (prevalence = 30.4%). Classrooms in this profile were characterized by moderate levels of emotional climate and support for families (<0.5 SD above the mean), but mediocre levels of instructional supports, learning formats, and assessment practices (<0.5 SD below the mean). It should be noted that classrooms in this profile demonstrated the highest level of support for families relative to other profiles. Although most dimensions were below average in Profile 3, it is notable that the two dimensions that were relative strengths within this profile were emotional climate and support for families, suggesting that teachers in this profile were relatively adept at cultivating relationships with children and their families. In addition to displaying positive teacher–child interactions, parents perceived teachers in this profile to be open to parents' ideas, respectful of family background, and supportive and welcoming in their interactions with families.

Given that Profile 3 is the most variable in terms of overall quality (i.e., above average on some dimensions and below average on others), it will be interesting to see whether this profile's relative strengths in the area of relationship-based care compensate for some of the weaknesses evident in this profile in the areas of individualization and instructional supports. It should be noted that this was the most prevalent profile within the sample. This is consistent with previous research that suggests that most preschool classrooms have moderate levels of emotion support, but typically low levels of instructional support (M. Burchinal, Vandergrift, Pianta, & Mashburn, 2010a; Pianta et al., 2005); thus, in some ways, Profile 3 may be thought of as a "typical" preschool classroom. Further, within the last 25 years, there has been a shift in the field of early childhood to place increased emphasis on promoting more cognitive school readiness skills (i.e., emergent literacy and numeracy), rather than concentrating primarily on providing opportunities for play and social–emotional development (Bishop-Josef & Zigler, 2011). Profile 3, with strengths in relationship-based dimensions and relative weaknesses in more academic domains might be considered representative of early childhood programs that embody a pre- "academic school readiness movement" perspective in which a greater emphasis is placed on promoting children's social–emotional development relative to instruction related to emergent literacy and numeracy.

Profile 4—low support for families, below average quality overall (prevalence = 11.3%). Within this profile, classrooms were characterized by mediocre levels of emotional climate, learning formats, and assessment practices (< 0.5 SD below the mean); low levels of

instructional supports (>0.5 SD below the mean); and poor support for families (>1 SD below the mean). This profile offered limited amounts of emotional and instructional support and, notably, had the lowest support for families scores of all the profiles. Classrooms in this profile not only lack emotional and instructional support known to positively influence children, but it also appears that opportunities were missed to engage families in meaningful ways that may translate into positive outcomes such as positive approaches to learning and social–emotional development (Christenson, 2000; McWayne et al., 2004). It should be noted that this was the least prevalent profile in the sample.

Profile 5—low positive interactions, below average quality overall, average support for families (prevalence = 20.8%). Classrooms in the final profile demonstrated average levels of support for families ($M_{\text{Sample}} = 25.72$; $M_{\text{Profile5}} = 25.83$); however, all other dimensions fell well below the mean. Assessment practices and instructional supports in the areas of print and letter knowledge and math concepts were in the low range relative to the rest of the sample (>0.5 SD below the mean). Poor levels of quality were observed in the areas of emotional climate, learning formats, and oral language instructional supports (>1 SD below the mean). Indeed, pairwise contrasts indicated teachers in these classrooms demonstrated significantly more harshness ($M_{Profile5} = 2.45$; $M_{Sample} = 1.61$, $t(1) = -15.02$, $p < .001$) and detachment ($M_{Profile5} = 2.40$; $M_{Sample} = 1.61$, $t(1) = -11.41$, $p < .001$) and significantly fewer positive interactions with children ($M_{Profile5} = 1.87$; $M_{Sample} = 2.90$, $t(1) = -17.28$, $p < .001$) than teachers in other profiles. Furthermore, within the Oral Language scale of the *TBRS*, classrooms in Profile 5 scored significantly lower on the frequency of opportunities for children to talk to adults ($M_{Profile5} = 1.10$; $M_{Sample} = 2.07$, $t(1) = 12.18$, $p < .001$) and the frequency of conversations with multiple turns ($M_{Profile5} = 0.66$; $M_{Sample} = 1.68$, $t(1) = 10.98$, $p < .001$). *ECERS–R* subscales indicated low scores in both group time ($M_{Profile5} = 2.46$; $M_{Sample} = 4.42$, $t(1) = 10.54$, $p < .001$) and free play ($M_{Profile5} = 2.97$; $M_{Sample} = 4.82$, $t(1) = 11.80$, $p < .001$), suggesting that children were kept together for most of the day with very few opportunities for staff to interact with individual children or small groups and that children either had too little opportunity for free play or spent much of the time in unsupervised play. Collectively, this pattern of data indicates that a significant weakness of classrooms in Profile 5 was the low levels of positive teacher–child interactions. However, it should be noted that despite these areas of weakness and the overall below average quality within this profile, classrooms in Profile 5 did have average levels of support for families, suggesting a possible strength that could potentially buffer some of the effects of the low levels of support in other areas.

Summary. Consistent with RO1 hypotheses, five distinct profiles were identified within the current sample. This is in keeping with the findings of Stuhlman and Pianta (2009), LoCasale-Crouch et al. (2007), and Bulotsky-Shearer et al. (2012) who identified four, five, and six profiles respectively. Furthermore, the distributions of the profiles across the sample are, in general, similar to those found in these previous studies. For example, the overall highest quality profile in the current study (Profile 1) comprised 12.4% of the total sample, whereas the overall lowest quality profile (Profile 5) comprised 20.8% of the total sample. In comparison, in the LoCasale-Crouch et al. (2007) study, which also identified five profiles, the overall highest quality profile comprised 14.6% of the sample and the overall lowest quality profile comprised 18.8% of the sample. In both studies, these findings indicate that relatively few classrooms offer high levels of quality across multiple dimensions, whereas nearly a fifth of classrooms offer quality that is relatively low across all dimensions.

Research objective 2: Predictors of profile membership. Given that profiles have now been identified, specific hypotheses will now be put forward regarding Research Objective 2: *predictors of profile membership.* Consistent with previous research examining profile membership (Bulotsky-Shearer et al., 2012; LoCasale-Crouch et al., 2007), it is hypothesized that within the current study, profiles with overall higher levels of quality (i.e., Profile 1–*high instructional support, above average quality overall* and Profile 2–*high individualization, above average quality overall*) will have teachers with more experience, a greater proportion of Caucasian teachers, lower adult–child ratios, and shorter program days. Furthermore, although previous research has not found consistent patterns regarding profile membership and teacher education, it is hypothesized that the current study's inclusion of a greater subset of quality factors (e.g., formative assessment, learning formats, support for families) will allow for greater capacity to detect the effects of teacher education. It is predicted that Profiles 1 and 2, with their overall high levels of quality, especially strong in the areas of instructional support and individualization, respectively, will have teachers who have attained higher degrees, specifically in the area of early childhood education. Correspondingly, it is likely that these two profiles also have teachers who scored higher than other profiles on measures of teacher beliefs and self-efficacy. It is possible that teachers in Profile 3–*relationship-focused, below average instructional and individualizing support* may also have relatively higher levels of education, beliefs, and/or self-efficacy given their strengths in emotional climate and support for families. Furthermore, it is possible that teachers in Profile 3 were trained (either through pre-service or in-service) prior to the current "school readiness movement," which places a greater emphasis on school readiness and pre-academic skills. Thus, it might be expected that teachers in Profile 3 might be older than teachers in other profiles and/or have more years of experience (although these variables are not necessarily indicative of when teachers received their training or what the orientation of their training was, more specific data was unavailable in the current dataset).

In order to explore relationships between teacher/program characteristics and profile membership, Analyses of Variance (ANOVAs) were conducted for continuous variables (i.e., teacher age, teacher experience, teacher salary, teacher beliefs and self-efficacy). Chi-square significance tests were conducted for categorical variables (i.e., teacher education, program type, length of day) by creating dummy variables and running separate chi-square analyses for each sub-category (as per procedures outlined in LoCasale-Crouch et al., 2007). Results are presented below, organized by teacher characteristics and program characteristics, and are discussed in the context of previous studies examining the relationship of these variables to classroom quality in general and to studies focusing on profile membership in particular (i.e., LoCasale-Crouch et al., 2007 and Bulotsky-Shearer et al, 2012).

Teacher characteristics.

Teacher age. A one-way ANOVA yielded no significant differences between profile groups in regard to teacher age, $F(4, 278) = 0.90$, $p = .465$. The means and standard deviations of teacher age by profile membership are presented in Table 9. The lack of association between teacher age and profile membership is consistent with the LoCasale-Crouch et al. (2007) study as well as previous research that has failed to find a relationship with age and quality (Clarke-Stewart et al., 2002). Although no statistical differences were detected, it is worthwhile to note that Profile 3 had the oldest teachers in the sample, which may lend some support to the hypothesis that teachers in this profile may have been trained prior to the "school readiness movement."

Years of preschool teaching experience. A one-way ANOVA indicated that profile membership was not significantly related to a teacher's number of years of experience teaching preschool, $F(4, 278) = 0.64$, $p = .634$. The means and standard deviations of years of preschool teaching experience by profile membership are presented in Table 9. Similar to the findings in the present study, Bulotsky-Shearer et al. (2012) did not find an association between preschool teaching experience and profile membership. In contrast, LoCasale-Crouch et al. (2007) found that teachers in the two highest quality profiles had significantly more experience teaching preschool than teachers in the profile characterized by mediocre emotional climate and low organizational and instructional quality. It is possible that LoCasale-Crouch et al. were able to detect differences in preschool experience with regard to profile membership due to their more narrow population (i.e., all state-funded prekindergarten classrooms) or the specific variables that were chosen to define profiles (e.g., the current study and the Bulotsky-Shearer study included variables that to some extent depended on family factors rather than focusing exclusively on the behavior of the teacher). It should also be noted that in general, there are mixed findings regarding experience teaching and classroom quality (Howes, Phillips, & Whitebook, 1992; Phillipsen, Burchinal, Howes, & Cryer, 1997; Pianta et al., 2005). Although likely related to differences in teacher age, teachers in Profile 3 also had the greatest number of years of experience within the sample (non-significant), which may support the hypothesis that teachers in this profile were trained prior to the "school readiness movement."

Teacher salary. A one-way ANOVA revealed a trend for significance in differences in teacher salary across profiles, $F(4, 278) = 1.91$, $p = .10$, $\omega^2 = .01$ (small effect size; Kirk, 1996). See Table 9 for means and standard deviations by profile. Post-hoc Tukey HSD analyses indicated a trend for significance in the difference between teachers' salaries in Profile 1–*high instructional support, above average quality overall* (M = \$44,560, SD = 16,681) and Profile 4–*low support for families, below average quality overall* (M = \$31,965, SD = 21,954). This suggests that teachers in profiles with moderate to excellent levels of quality, with particular strengths in instructional support, tend to be paid higher salaries than teachers in profiles with mediocre to poor levels of quality, with a particular weakness in supporting families. This is consistent with other research that has showed a positive relationship between teacher salary and classroom quality (e.g., Phillips, Mekos, Scarr, McCartney, & Abbott–Shim, 2000; Phillipsen et al., 1997; Scarr, Eisenberg, & Deater-Deckard, 1994). It is possible that more qualified teachers are hired to better paying positions, but it is also possible that this difference can be attributed to more systematic factors. For example, programs that cannot afford to pay their teachers as well may face other challenges such as a lack of resources to offer professional development opportunities or these programs may serve a population of families that face a variety of stressors resulting in a higher incidence of children's behavior difficulties or pose greater challenges to engage families in the program.

Teacher beliefs and self-efficacy. A one-way ANOVA examining differences across profiles in teacher belief scores revealed a significant difference among profiles, $F(4, 278) = 6.19$, $p < .001$, $\omega^2 = .11$ (medium effect size; Kirk, 1996). See Table 9 for means and standard deviations across profiles. Specifically, Profile 1–*high instructional support, above average quality overall* (M = 62.84, SD = 4.90) and Profile 2 – *high individualization, above average quality overall* (M = 63.58, SD = 3.82) had significantly higher (i.e., more developmentally appropriate) beliefs than Profile 4 – *poor support for families, below average quality overall* (M = 57.95, SD = 5.61) and Profile 5–*low positive interaction, below average quality overall, average support for families* (M = 57.42, SD = 6.04). This suggests that more developmentally

appropriate beliefs about teaching and child development tend to be associated with levels of quality that are above average in all areas (i.e., Profiles 1 and 2). In contrast, profiles in which most dimensions are below average (i.e., Profiles 4 and 5), teachers tend to endorse expectations about child development that are more unrealistic (e.g., *children should work silently and alone on seatwork*) or agree with pedagogical approaches that are more adult-directed rather than learner-centered (e.g., *children should not be allowed to choose many of their own activities*). Although teachers in Profile 1 had slightly higher belief scores than teachers in Profile 2, this difference was not significant; otherwise teacher beliefs decreased linearly from Profile 2 to Profile 5, which is consistent with previous studies that have found associations between teacher beliefs and overall classroom quality (Clarke-Stewart et al., 2002; Pianta et al., 2005).

A one-way ANOVA also revealed significant differences among profiles with regard to teacher self-efficacy, $F(4, 278) = 3.11$, $p = .016$, $\omega^2 = .03$ (small effect size, Kirk, 1996). See Table 9 for means and standard deviations across profiles. Specifically, teachers in Profile 1–*high instructional support, above average quality overall* ($M = 4.75$, $SD = 0.36$) reported significantly higher self-efficacy than teachers in Profile 5–*low positive interaction, below average quality overall, average support for families* ($M = 4.43$, $SD = 0.59$). Although this is a relatively small effect size, it should be noted that this is consistent with previous research indicating a positive association between teacher self-efficacy and preschool classroom quality. Across profiles, this relationship appeared to be linear in nature, with self-efficacy scores decreasing from Profile 1 to Profile 5, although differences were robust enough to be detected only between Profile 1, where quality was uniformly high, and Profile 5, where profile was uniformly low.

Teacher education. Teachers' education was examined using three different approaches modeled after the main research objectives outlined in the seminal study on the effects of education for early childhood teachers conducted by Early et al. (2007). The relationship between teacher education and profile membership was explored by examining the following predictors of profile membership: 1) highest degree attained (i.e., no degree, AA, BA, MA); 2) highest education level among teachers with ECE major (i.e., of those teachers who majored in child development or early childhood education, comparing those with an AA, BA, or MA); and 3) major among teachers with a bachelor's degree (i.e., among those teachers with a BA, comparing those who majored in ECE or child development, any other education major, and non-education major).

With regard to teachers' highest degree attained, four categories of educational attainment were used in a chi-square analysis: no degree, associate's degree, bachelor's degree, and master's degree (see Table 10 for percentages and pairwise comparisons across profiles). Significant differences were found in the proportions of teachers with no degree across profiles, $\chi^2 (4) = 14.13$, $p = .007$. Specifically, teachers in Profile 1–*high instructional support, above average quality overall* were significantly more likely to have attained a degree than teachers in Profile 3–*relationship-focused, below average instructional and individualizing support*, Profile 4–*low support for families, below average quality overall*, or Profile 5–*low positive interaction, below average quality overall, average support for families* (odds ratios of 7.18, 13.30, and 14.91, respectively). Indeed, 97.1% of the teachers in Profile 1 (all but one) had attained a degree, compared to only 69.5% of teachers in Profile 5, meaning that teachers in Profile 1 were nearly 15 times more likely to have a degree than those in Profile 5. Profile 2–*high individualization, above average quality overall* also had a significantly larger proportion of teachers (85.9%) with a degree than did Profile 5 (odds ratio of 2.68). No significant differences

were found in the proportions of teachers with associate's degrees across profiles, $\chi^2(4) = 2.66$, $p = .616$. In contrast, a significant difference was found in the proportions of teachers with bachelor's degrees across profiles, $\chi^2(4) = 16.33$, $p = .003$. Specifically, teachers in Profile 1 were between three and five times more likely to have attained a bachelor's degree (77.1%) than teachers in Profiles 2, 3, 4, or 5 (odds ratios of 3.47, 4.92, 4.93, and 5.28, respectively). There was a trend in significance for different proportions of teachers with master's degrees across the profiles, $\chi^2(4) = 8.70$, $p = .069$. Specifically, Profile 3 had a greater percentage of teachers with master's degrees (27.9%) than did Profile 4 (9.4%; odds ratio of 3.74).

Among teachers who reported majoring in early childhood education or child development ($N = 93$), the proportion of teachers attaining associate's, bachelor's, and master's degrees were compared across profiles using a chi-square analysis (see Table 10). No significant differences were found among profiles ($\chi^2(8) = 7.24$, $p = .511$), indicating that teacher degree among teachers with an early childhood education or child development major did not predict profile membership.

In order to explore the effect of a teacher's major, teachers whose highest degree was a bachelor's degree ($N = 133$) were split into three groups: 1) teachers who majored in early childhood education or child development; 2) teachers who majored in any type of education other than early childhood or child development, and 3) teachers who majored in anything else (see Table 10). A chi-square analysis did not reveal significant differences between profiles across these three groups, $\chi^2(8) = 5.74$, $p = .676$, suggesting that the specific content and focus of a teacher's education at the bachelor's level is not predictive of profile membership. Originally, parallel analyses were intended at the associate's and master's level, but there was not enough variance in teacher major at these levels to conduct meaningful analyses.

Previous research examining the relationship between teacher education and classroom quality has yielded inconsistent results (e.g., Early et al., 2007; Tout, Zaslow, & Berry, 2006; Weber & Trauten, 2008). However, whereas most previous studies used single indicators of classroom quality as the dependent variable, the current study used a novel approach to address this issue by taking into account a more comprehensive picture of classroom quality. Although many previous studies have failed to find an effect of a bachelor's degree (Fuller, 2011; Tout et al., 2006), results of the current study indicated that teachers in the profile with above average levels of quality across all dimensions and particularly high emotional climate and instructional quality (Profile 1) were three to five times more likely to hold a bachelor's degree than teachers in any other profile. Furthermore, teachers in the two profiles with the highest levels of quality (Profiles 1 and 2) were significantly more likely (up to 15 times more likely) to have attained any college degree than teachers in other profiles. This suggests that differences associated with educational attainment may be particularly apparent when considered within an ecological representation of quality that takes into account multiple indicators of quality. However, it should be noted that these findings may be indicative of other systematic factors (e.g., programs that can afford to hire teachers with bachelor's degrees may have more resources to support high-quality care and education; teachers who have the resources to attend and complete college may tend to engage in classroom behaviors consistent with the values implicit in the current definition of high-quality care and education) rather than a causal relationship between education and a teacher's ability to provide high-quality early care and education across multiple dimensions. It should also be noted that no significant associations were detected between profile membership and major (either highest degree attained in early childhood education or difference between early childhood education major and other majors). This suggests that the

content of teachers' preparation programs is less meaningful in determining a teacher's profile membership than is the attainment of a college degree regardless of major.

Program characteristics.

Child–adult ratio. A one-way ANOVA conducted in order to examine whether profiles differed according to the child–adult ratio of the classroom revealed significant differences across profiles, $F(4, 278) = 6.86$, $p < .001$, $\omega^2 = .07$ (medium effect size; Kirk, 1996; see Table 9 for means and standard deviations across profiles). Specifically, post-hoc Tukey HSD analyses indicated that Profile 2–*high individualization, above average quality overall* ($M = 6.29$, $SD = 2.83$) had significantly lower ratios than Profile 1–*high instructional support, above average quality overall* ($M = 8.17$, $SD = 3.57$) and Profile 5–*low positive interaction, below average quality overall, average support for families* ($M = 9.19$, $SD = 4.75$). Profile 3–*relationship-focused, below average instructional and individualizing support* ($M = 7.19$, $SD = 2.49$) also had significantly lower ratios than Profile 5. These findings are consistent with those of LoCasale-Crouch et al. (2007), who also found that classrooms in profiles with the lower levels of overall quality tended to have higher adult–child ratios. Of particular note in the current study is the fact that Profile 2 had the lowest average child–adult ratio among the profiles. This profile was characterized by the highest levels of quality in the areas of learning formats and assessment practices, suggesting that having more adults in the classroom may facilitate practices such as formative assessment, individualizing instruction, and incorporating more small group activities into the daily routine.

Program type. In order to explore type of program (i.e., public prekindergarten, private child care, Head Start) as a predictor of profile membership, a series of chi-square analyses were conducted (see Table 10). Teachers in Profile 1–*high instructional support, above average quality overall* and Profile 2–*high individualization, above average quality overall* were significantly more likely to teach in public prekindergarten programs than were teachers in Profile 3–*relationship-focused, below average instructional and individualizing support* (odds ratios of 2.75 and 2.02, respectively), Profile 4–*low support for families, below average quality overall* (odds ratios of 7.64 and 5.62 respectively), or Profile 5–*low positive interaction, below average quality overall, average support for families* (odds ratios of 4.14 and 3.05 respectively). Teachers in Profile 3 were also more likely to teach in prekindergarten programs than teachers in Profile 4 (odds ratio of 2.78), $\chi^2(4)$ 23.94, $p < 001$. These findings may be related to the significant differences across profiles seen for teachers' educational attainment as public prekindergarten programs often require teachers to have bachelor's degrees or higher (Barnett, Carolan, Fitzgerald, & Squires, 2012); indeed, in the current sample, 75.2% of teachers with bachelor's degrees taught in public prekindergarten classrooms (21.1% in Head Start programs and 3.8% in child care programs). However, it is unclear whether teachers in prekindergarten programs are more likely to offer more high-quality early care and education because they have attained higher degrees or because programs that can afford to hire bachelor's level teachers may also provide teachers with additional resources and support (Vu, Jeon, & Howes, 2008).

For teachers in child care programs, a contrasting pattern was seen in the distribution across profiles, $\chi^2(4) = 20.64$, $p < .001$. Teachers in Profile 4–*low support for families, below average quality overall* were significantly more likely to teach in child care programs than teachers in Profile 1–*high instructional support, above average quality overall*, Profile 2–*high individualization, above average quality overall*, or Profile 3–*relationship-based, below average instructional and individualizing support* (odds ratios of 13.70, 6.55, and 5.22, respectively). Teachers in Profile 5–*low positive interaction, below average quality overall, average support*

for families were significantly more likely to teach in child care programs than teachers in Profile1 and Profile 2 (odds ratios of 7.14 and 3.42, respectively). Notably, there was not a single child care classroom within Profile 1. This suggests that teachers in child care programs are more likely to be categorized in profiles with lower overall levels of quality. No significant differences were found across profiles for teachers in Head Start programs ($\chi^2(4) = 7.09$, $p = .131$), indicating that Head Start teachers are equally likely to be classified in any of the five profiles.

Length of day. In order to examine whether the length of program day was associated with profile membership, chi-square analyses were conducted comparing half-day to full-day programs. No significant differences were detected among profiles with regard to length of program day, $\chi^2(4) = 4.33$, $p = .364$. In contrast, LoCasale-Crouch et al. (2007) found that profiles with overall lower quality were associated with longer program days. However, the LoCasale-Crouch et al. study looked at length of program day as a continuous variable (number of hours), whereas the current study used the dichotomous data (half-day versus full-day) available within the PCER dataset. It is possible that this more limited approach failed to capture the necessary level of detail to differentiate profile type by length of day.

Summary. In sum, several teacher and program characteristics were found to be associated with profile membership. Specifically, the two profiles with the highest overall levels of quality, Profile 1–*high instructional support, above average quality overall* and Profile 2–*high individualization, above average quality overall*, were more likely than profiles of lower overall quality to contain teachers who possessed a college degree, were more likely to be Caucasian and less likely to be African American, and who had more developmentally appropriate beliefs about child development and teaching. Furthermore, classrooms in Profiles 1 and 2 were more likely to be located in a public prekindergarten program and less likely to be located in a private child care center. Additionally, Profile 1 was distinguished from other profiles in other ways, such as containing teachers with higher salaries and higher self-efficacy than teachers in lower quality profiles (Profiles 4 and 5 respectively). Notably, teachers in Profile 1 were three to five times more likely to have a bachelor's degree than teachers in any other profile. Profile 2 contained classrooms with the lowest adult–child ratios, which may be related to the high degree of individualization seen within this profile. To a lesser extent, Profile 3–*relationship-focused, below average instructional and individualizing support* was distinguished from the lower quality profiles in that Profile 3 had significantly more Caucasian and fewer African American teachers, and lower ratios than Profile 5; and Profile 3 contained significantly more teachers with master's degrees and more classrooms in public prekindergarten programs than Profile 4.

Research objective 3: Differences in child outcomes across profiles. To examine concurrent associations between classroom profile membership and child outcomes, hierarchical linear modeling (HLM) was conducted. HLM allows for the consideration of the nested nature of the data (i.e., children were clustered within classrooms, some of which were clustered within schools). Using HLM allows for the partitioning of variance in outcomes into two sources: child level and classroom level. Separate models were estimated for each of the composite variables of child abilities in the areas of: (1) oral language, (2) print knowledge, (3) mathematics, (4) social competence, and (5) approaches to learning.

First, unconditional models with no predictors were specified in order to estimate the amount of variance at the child and classroom levels. Intraclass correlations indicated that substantial classroom-level variance was evident, accounting for 18% to 32% of variance across the five child outcome variables (PPVT = 23.0%; W-J Letter-Word Identification = 20.0%; W-J

Applied Problems = 18.0%; SSRS Social Skills = 31.8%; PLBS Approaches to Learning = 27.0%). Across all outcomes, the greatest amount of variance was attributable to the child (PPVT = 77.0%; W-J Letter-Word Identification = 80.0%; W-J Applied Problems = 82.0%; SSRS Social Skills = 68.2%; PLBS Approaches to Learning = 73.0%).

The next step was to use HLM analyses to estimate models using child-level and classroom-level variables as predictors of child outcomes. Separate models were run for each child outcome. Child-level predictors (Level 1) included the following child and family demographic variables: child age, gender, ethnicity (dummy coded with White as the reference group), English-language learner status (English as primary language as reference group), maternal education (education beyond high school as reference group), and household income. Additionally, children's fall scores on the dependent variable of interest were entered such that outcomes represent children's growth over the course of the preschool year. Teacher and program demographic variables (Level 2) were also entered to control for between classroom variation in outcomes attributable to: teacher age, teacher ethnicity (White as reference group), teacher experience teaching preschool, teacher education (≥BA as reference group), teacher salary, program type (Public Pre-K as reference group), adult–child ratio, and length of program day (full-day as reference group). Profile membership was entered as a dummy-coded variable. Following the procedures outlined in Curby et al. (2009), a multiple comparisons procedure was used in which the reference group was systematically changed. All variables were grand-mean centered, except for dummy coded profiles (Bulotsky-Shearer et al., 2012; Enders & Tofighi, 2007).

The following equations are the final models for child outcomes. In the Level-1 equation, the child outcome score (*Y*) for a child (*i*) who is in classroom (*j*) is a function of the intercept (β_{0j}; the estimated classroom average score) after adjusting for child and family demographic covariates (β_{1j}, β_{2j}, β_{3j}, β_{4j}, β_{5j}, β_{6j}, β_{7j}, β_{8j}, β_{9j}) and the error term associated with this estimated mean (r_{ij}). In the Level-2 equation, the adjusted average academic outcome for children in each classroom (β_{0j}) is a function of the grand mean score (γ_{00}), the classroom-level means for teacher and program covariates (γ_{01}, γ_{02}, γ_{03}, γ_{04}, γ_{05}, γ_{06}, γ_{07}, γ_{08}, γ_{09}), profile membership (γ_{10}, γ_{11}, γ_{12}, γ_{13}), and the error term associated with this estimated mean (u_{0j}).

Level 1: $\textit{Child outcome} = \beta_{0j} + \beta_{1j}(\textit{Child age}) + \beta_{2j}(\textit{Child male}) + \beta_{3j}(\textit{Child Black}) + \beta_{4j}(\textit{Child Hispanic}) + \beta_{5j}(\textit{Child other}) + \beta_{6j}(\textit{Child English primary language}) + \beta_{7j}(\textit{Child fall outcome score}) + \beta_{8j}(\textit{Family maternal education post-high school}) + \beta_{9j}(\textit{Family household income}) + r_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\textit{Teacher age}) + \gamma_{01}(\textit{Teacher Black}) + \gamma_{02}(\textit{Teacher other}) + \gamma_{03}(\textit{Teacher experience}) + \gamma_{04}(\textit{Teacher} \geq \textit{BA}) + \gamma_{05}(\textit{Teacher salary}) + \gamma_{06}(\textit{Program Head Start}) + \gamma_{07}(\textit{Program child care}) + \gamma_{08}(\textit{Program ratio}) + \gamma_{09}(\textit{Program length of day}) + \gamma_{10}(\textit{membership in Profile 2}) + \gamma_{11}(\textit{membership in Profile 3}) + \gamma_{12}(\textit{membership in Profile 4}) + \gamma_{13}(\textit{membership in Profile 5}) + u_{0j}$

The results of the hierarchical linear regression for children's preschool and kindergarten spring outcome scores are presented in Tables 11 and 13, respectively. Analyses indicated that after controlling for child, family, teacher, and program demographic variables, profile membership significantly predicted child outcome scores in all areas. Tables 11 and 13 (preschool and kindergarten analyses, respectively) show only whether Profiles 2–4 differed from Profile 1 (the reference group). However, the multiple comparisons procedure employed tested for significant differences between each pairwise comparison of profiles (e.g., Profile 2 as the reference group, Profile 3 as the reference group, etc.). Tables 12 and 14 present estimated

means calculated for each profile as well as the results of the pairwise comparisons. Below, general findings from the HLM models are presented for children's spring preschool and kindergarten scores, followed by a more in-depth discussion of planned comparisons of profiles to explore specific hypotheses (i.e., "all good things go together" and "domain specificity" hypotheses).

Children's oral language scores (PPVT).

Preschool spring oral language. After controlling for child- and classroom-level variables, children in Profile 1–*high instructional support, above average quality overall* had significantly higher preschool spring oral language scores than children in Profile 3–*relationship-focused, below average instructional and individualizing support* (β = -1.38, p = .006; d = .10) and Profile 5–*low positive interaction, below average quality overall, average support for families* (β = -1.19, p = .035; d = .09), and a trend for significance was present between Profile 1 and Profile 4–*low support for families, below average quality overall* (β = -1.23, p = .063; d = .11). Children in Profile 2 – *high individualization, above average quality overall* had significantly higher scores than children in Profile 3 (β =-0.90, p = .030; d = .05). This suggests that Profile 1 and Profile 2 offered some substantive advantage in terms of cultivating children's oral language development, likely due to their relatively higher levels of support across most dimensions.

Kindergarten spring oral language. After controlling for background demographic variables, children who had been in a Profile 1 classroom in preschool had significantly higher oral language scores in kindergarten than children in Profile 2 (β =-2.02, p = .003; d = .22), Profile 3 (β =-1.76, p = .007; d = .20), Profile 4 (β =-1.55, p = .031; d = .19), and Profile 5 (β =-1.01, p = .050; d = .17). Classrooms that offer excellent-quality instructional supports in the context of moderate- to high-levels of support in other dimensions are providing children with a solid foundation in oral language development at kindergarten entry that children continue to build upon.

Children's print knowledge scores (WJ-III Letter–Word ID).

Preschool spring print knowledge. After controlling for child- and classroom-level background variables, children in Profile 1–*high instructional support, above average quality overall* had significantly higher preschool print knowledge scores than children in Profile 2–*high individualization, above average quality overall* (β = -3.02, p < .001; d = .16), Profile 3–*relationship-focused, below average instructional and individualizing support* (β = -3.85, p < .001; d = .20), Profile 4–*low support for families, below average quality overall* (β = -4.75, p <.001; d = .32), and Profile 5–*low positive interactions, below average quality overall, average support for families* (β = -3.37, p <.001; d = .19). Overall, this highlights the importance of classrooms with excellent-quality instructional supports alongside moderate- to high-levels of support in other dimensions.

Kindergarten spring print knowledge. After controlling for child- and classroom-level variables, children who were in Profile 4 had *lower* scores than children in Profile 1 (β = 1.93, p = .100; significant at the trend level; d = .18), Profile 2 (β = 2.20, p = .032; d = .18), and Profile 3 (β = 2.11, p = .047; d = .14). Additionally, children in Profile 5 had significantly lower scores than children in Profile 2 (β = 1.92, p =.027; d = .14) and Profile 3 (β = 1.51, p = .081; significant at the trend level; d = .10). Although at the end of the preschool year, significant differences were seen between one of the highest quality profiles (Profile 1) and the other profiles, by the end of kindergarten, it was the effects of the classrooms with the overall lowest quality (Profiles 4 and 5) that were seen. This suggests that children who are in classrooms

characterized by low levels of quality may be at a significant disadvantage during their kindergarten year compared to children who have been in classrooms that provide higher levels of quality in at least some dimensions of quality.

Children's mathematics ability (WJ-III Applied Problems).

Preschool spring mathematics. After controlling for child- and classroom-level background variables, children in Profile 1–*high instructional support, above average quality overall* had significantly higher preschool spring *WJ-III Applied Problems* scores than children in Profile 2–*high individualization, above average quality overall* (β = -1.46, p = .022; d = .10) and children in Profile 5–*low positive interactions, below average quality overall, average support for families* (β = -1.28, p = .054; d = .09). Similar to the other academic outcomes, these findings again highlight the positive effects of classrooms with high overall levels of quality, with particular strengths in the areas of instructional support.

Kindergarten spring mathematics. After controlling for child, family, teacher, and program demographic variables, there was a trend in significance for children in Profile 1 to score higher than children in Profile 5 (β = -1.19, p = .081; d = .12). It is notable that this separation between classrooms in the highest quality profile and the lowest quality profile is still evident at the end of the kindergarten year.

Children's social competence (SSRS Social Skills).

Preschool spring social skills. After controlling for child- and classroom-level background variables, children in Profile 5–*low positive interactions, below average quality overall, average support for families* had significantly *lower* preschool *SSRS Social Skills* scores than children in Profile 1–*high instructional support, above average quality overall* (β = -3.12, p = .002; d = .13), Profile 2–*high individualization, above average quality overall* (β = -2.16, p = .013; d = .09), and Profile 3–*relationship-focused, below average instructional and individualizing support* (β = -2.42, p = .003; d = .10). Furthermore, children in Profile 1 had higher social competence scores than children in Profile 4–*low support for families, below average quality overall* (β = -2.43, p = .040; d = .11). These findings suggest that children in classrooms that have at least above average levels of relationship-based dimensions of quality (i.e., emotional climate and support for families) experience greater development in social competence during preschool that children in classrooms in lower quality profiles, particularly those in classrooms characterized by very low levels of positive teacher–child interactions.

Kindergarten spring social skills. After controlling for child- and classroom-level covariates, there was a trend for children in Profile 3 during their preschool year to be rated as more socially competent than their peers who had been in a Profile 2 classroom (β = -1.81, p = .069; d = .09). This is particularly noteworthy as these ratings were completed by children's kindergarten teachers, thus removing any bias resulting from quality dimensions and child outcomes both being a product of preschool teacher-level variables. Furthermore, although children in Profile 2 experienced higher quality across most dimensions during their preschool year, children in Profile 3 were in classrooms that facilitated significantly higher levels of perceived support for families. It may be that teachers' efforts to involve and support families, coupled with the moderate levels of emotional climate support they offered in the classroom may have had lasting positive effects on children's social competence.

Children's approaches to learning (PLBS and LBS).

Preschool spring approaches to learning. After controlling for child- and classroom-level background variables, children in Profile 4–*low support for families, below average quality overall* had significantly *lower* scores on the *PLBS* than did children in Profile 1–*high*

instructional support, above average quality overall (β = -3.63, *p* = .001; *d* = .20), Profile 2 – *high individualization, above average quality overall* (β = -2.37, *p* = .016; *d* = .11) and Profile 3 – *relationship-focused, below average instructional and individualizing supports* (β = -2.07, *p* = .027; *d* = .10). Further, children in Profile 1 had significantly higher approaches to learning scores than children in Profile 5–*low positive interactions, below average quality overall, average support for families* (β = -2.88, *p* = .023; *d* = .14). Similar to the pattern seen for children's social competence development, it appears that classrooms that have at least above average levels of relationship-based dimensions of quality (i.e., emotional climate and support for families) experience greater growth in approaches to learning than do their peers in classrooms with low levels of overall quality, particularly in the area of support for families.

Kindergarten spring approaches to learning. After controlling for child- and classroom-level covariates, no significant differences were found among profiles for children's *LBS* scores. It is possible that differences among profiles found at the end of the preschool year were attributable to differences in preschool teachers that manifested in both profile membership and ratings of children's approaches to learning (e.g., teachers who offered higher quality interactions across dimensions also tended to rate children as having made more progress over the course of the preschool year). Thus, these differences may have not been evident when kindergarten teachers provided ratings of children's approaches to learning. Alternatively, the lack of differences among profiles at the end of the kindergarten year may be due to the variability in children's post-preschool experience.

Specific profile comparisons. Specific profile comparisons were selected to test study hypotheses. First, in order to evaluate the "all good things go together" hypothesis, child outcomes in all domains for Profile 1 were compared to all other profiles. Second, in order to evaluate the "domain specificity hypothesis," specific profile comparisons were chosen to highlight profiles that were similar in levels of quality in some dimensions, but statistically different on other dimensions, providing a nuanced picture of the effects of quality. Specific hypotheses and results for each comparison are outlined below.

All good things go together hypothesis. According to this hypothesis, Profile 1–*high instructional support, above average quality overall* should have superior child outcomes to all other profiles given its overall high levels of quality. Although Profile 2–*high individualization, above average quality overall* also had high levels of quality in most areas, Profile 1 had higher values overall (although not always statistically significant, e.g., emotional climate) and had the highest values in the sample on many domains that were predicted to have direct links to child outcomes (e.g., emotional climate, oral language, print knowledge, math concepts), thus Profile 1 was chosen to represent the highest overall quality profile. However, given the generally high levels of Profile 2, it was thought to make a good comparison to evaluate whether having the levels of quality in Profile 1 is truly necessary to achieve positive outcomes, or whether dimensions of quality should just be generally high. It is predicted that in general, Profile 1 will have higher child outcomes scores than any other profile.

With regard to child outcomes at the end of the preschool year, this hypothesis was mostly supported. In all child outcome domains, Profile 1 consistently had the highest estimated mean score. Of the 20 possible comparisons with Profile 1 as the reference group (P_1 vs. P_2; P_1 vs. P_3; P_1 vs. P_4; P_1 vs. P_5 × five child outcome domains), Profile 1 had significantly higher child outcome scores in 13 of the comparisons (65%). In contrast, of the 20 possible comparisons with Profile 2–*high individualization, above average quality overall* as the reference group, only two of these comparisons were significant (10%). This suggests that even though Profiles 1 and 2

both had relatively high levels of quality overall, it was only Profile 1 that distinguished itself from the other profiles in a statistically meaningful way.

It should be noted that in the domains of children's social competence and approaches to learning, although Profile 1 produced higher child outcomes than the lowest quality profiles (i.e., Profiles 4 and 5), children's scores in Profile 1 were not significantly different than children's scores in Profiles 2 or 3, suggesting that moderate to high levels of emotional climate and perceived support for families may be sufficient to foster positive child outcomes in these areas. However, it is also worth remarking that the strong emphasis on more academic learning opportunities did not compromise the development of children's social competence or approaches to learning, supporting other research that indicates that fostering children's cognitive *and* social–emotional development are not mutually exclusive goals, provided that there are sufficient levels of support across domains of quality within the classroom (Bishop-Josef & Zigler, 2011).

By the end of children's kindergarten year, the effects of Profile 1 membership seemed to have faded substantially, with only 6 of 20 comparisons reaching significance with Profile 1 as the reference group (30%). However, within the domain of oral language development, children in Profile 1 scored significantly higher than children in all other profiles, suggesting that the effects of experiencing high-quality early care and education across multiple domains of quality may be more robust in this area. It should also be noted that the effects of early care and education quality at the end of children's kindergarten year may not be indicative of the true longitudinal effects over time. For example, some studies have found "sleeper effects" for early care and education experiences that may emerge during the later elementary years, high school, and even adulthood (e.g., Deming, 2009; NICHD Early Child Care Research Network, 2006; Vandell et al., 2010). Furthermore, some studies have shown that the positive long-term effects of early care and education experiences may be moderated by the quality of children's subsequent educational experiences—without a continued trajectory of high-quality educational experiences, the advantages proffered by high-quality early care and education can be undone (Johnson, 2010). Thus, the longitudinal findings of the current study should be interpreted with caution.

Domain specificity hypothesis. Specific profile comparisons were chosen to highlight profiles that were similar in levels of quality in some dimensions, but statistically different on other dimensions, providing a nuanced picture of the effects of quality. Predictions were based on ANOVA results comparing profiles across dimensions of quality; results of these analyses can be found in Table 8. According to the domain specificity hypothesis, it was expected that if one profile scored higher than another on a given measure of quality (e.g., oral language support), then children in that profile would likely score higher on a related outcome measure (e.g., *PPVT*), regardless of other levels of support. However, if children in the profile with higher quality in that dimension do not perform better, it may be that other relative strengths and weaknesses of the profile are contributing to children's scores. Specifically, the following comparisons were examined: Profile 1 versus Profile 2; Profile 3 versus Profile 4; and Profile 4 versus Profile 5. Specific hypotheses and results for each comparison are outlined below.

Profile 1 versus Profile 2. The results of the ANOVA comparing each classroom quality dimension across profiles (see Table 8) indicated that Profile 1–*high instructional support, above average quality overall* was higher than Profile 2–*high individualization, above average quality overall* on the dimensions of oral language, print knowledge, and math concepts instructional support. In contrast, Profile 2 was higher than Profile 1 on the dimensions of learning formats

and assessment practices. The profiles did not differ significantly on measures of emotional climate or support for families. Based on these differences in profiles, it was hypothesized that children in Profile 1 would make more growth on measures of academic outcomes (i.e., *PPVT*; *WJ-III Letter–Word ID*; *WJ-III Applied Problems*) given the relative strengths of Profile 1 in all areas of instructional support, whereas children in Profile 2 might have made more growth in approaches to learning (*PLBS*) given that teachers in Profile 2 emphasized providing learning opportunities that address children's unique developmental needs and incorporating a balance of structured and play-based learning.

Regarding academic outcomes, children in Profile 1 did have significantly higher print knowledge and mathematics scores than children in Profile 2 at the end of the preschool year. However, there were no significant differences between the two profiles in children's oral language scores, despite the significantly higher levels of oral language support offered in Profile 1 classrooms. It is possible that the relative strengths of Profile 2 (i.e., learning formats and assessment practices) compensated for the lower quality of instructional supports in these classrooms. For example, teachers who engage in high-quality formative assessment practices, provide learning opportunities that address children's unique developmental needs, and incorporate a balance of structured and play-based learning opportunities may be fostering children's oral language development in more indirect ways, provided that these practices are coupled with a sufficient level of instructional support quality. However, by the end of kindergarten, children in Profile 1 had surpassed children in Profile 2 (and all other profiles), suggesting in the long-term, classrooms with excellent quality instructional support in conjunction with moderate- to high-quality supporting dimensions may have greater effects on children's oral language development than classrooms that are relatively stronger in assessment and learning formats.

In respect to children's approaches to learning, although classrooms in Profile 2 were characterized by providing activities designed to meet children's individual needs and incorporating a balance between structured and play-based learning experiences, there were no significant differences between Profile 1 and Profile 2 in terms of children's approaches to learning behaviors. It should be noted that approaches to learning may be affected by other aspects of a classroom environment as well. For example, the level of emotional support a teacher provides, perceived support for families, or the quality of instruction itself may affect facets of children's approaches to learning such as motivation, curiosity, persistence, and attitude toward school.

Profile 3 versus Profile 4. The results of the ANOVA comparing each classroom quality dimension across profiles (see Table 8) indicated that Profile 3–*relationship-based, below average instructional and individualizing support* was significantly higher than Profile 4–*low support for families, below average quality overall* on the dimensions of emotional climate, oral language, math concepts, and support for families. There were no significant differences between profiles on the dimensions of print knowledge instructional support, learning formats, nor assessment practices.

Given these comparisons, it was hypothesized that children in Profile 3 would have higher scores on measures of oral language (i.e., *PPVT*), mathematics (i.e., *WJ-III Applied Problems*), and social competence (i.e., *SSRS Social Skills*) than children in Profile 4. However, no significant differences were detected between Profile 3 and Profile 4 in any of these child outcome areas at either preschool or kindergarten. It should be noted that both profiles had relatively low levels of instructional support, learning formats, and assessment practices; it is

possible that there are threshold effects in which classrooms must provide a certain level of quality across these dimensions in order to facilitate meaningful gains in child outcomes. This is consistent with other studies that have detected a minimum level of quality needed to foster significant gains in children's learning (Burchinal, Kainz, & Cai, 2011; Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Vandell et al., 2010). However, it is surprising that the relatively higher levels of emotional climate and support for families in Profile 3 did not produce meaningful differences in children's social competence between the two profiles.

In contrast, despite the low levels of instructional support, learning formats, and assessment practices in Profile 3 (comparable to those in Profile 4), children in these classrooms had significantly higher approaches to learning (preschool) and print knowledge (kindergarten) scores than children in Profile 4. Thus, it is possible that the higher levels of emotional support and support for families provided during the preschool year in Profile 3 may have had compensatory effects on children's learning and development during preschool and kindergarten. For example, although preschool teachers in Profile 3 may not have exhibited exemplary instructional practices, the relationships teachers formed with children and families may have supported children's print knowledge growth in kindergarten, perhaps through pathways such as fostering children's motivation or positive attitudes toward school and learning.

Profile 4 versus Profile 5. The results of the ANOVA comparing each classroom quality dimension across profiles (see Table 8) indicated that Profile 4–*low support for families, below average quality overall* was significantly higher than Profile 5–*low positive interactions, below average quality overall, average support for families* on emotional climate, oral language, and learning formats. Profile 5 was significantly higher than Profile 4 on support for families, and there were no significant differences between profiles on the dimensions of print knowledge, math concepts, nor assessment practices. Based on these comparisons, it was hypothesized that children in Profile 4 would make more progress on measures of social competence and oral language. Counter to these predictions, there were no significant differences between Profile 4 and Profile 5 on these measures. It is possible that the relatively poor levels of support for families in Profile 4 may have negated any beneficial effects from the other dimensions. Alternatively, the relatively low levels of support found in both profiles may fall beneath a certain threshold needed to support child development.

However, children in Profile 4 did outperform children in Profile 5 in mathematics skill in kindergarten. Although it is possible this is due to different experiences of these children during their kindergarten year, it is also possible that the combination of higher levels of support in emotional climate, oral language, and learning formats experienced by children in Profile 4 had some type of positive effect that manifested itself during children's kindergarten year.

Summary. In sum, some support was found for the "all good things go together" hypothesis. At the end of children's preschool year, children in Profile 1 performed better than children in other profiles in all domains, the majority of these comparisons reaching significance. Although Profile 2 also had high levels of quality overall, Profile 1 was the only profile to show enough gains that it was able to show clear separation from other profiles. It should be noted that, in line with the "domain specificity" hypothesis, Profile 1 did have the highest scores in the sample in the areas of oral language, print knowledge, and math concepts instructional support, so it could be that it was these variables alone that influenced the performance of children on the respective related outcomes. Regardless, these findings underscore the importance of providing very high levels of quality in order to produce favorable child outcomes.

Regarding the domain specificity hypothesis, there were mixed findings. In some cases, this hypothesis was supported, for example Profile 1 had higher levels of classroom quality than Profile 2 in the areas of print knowledge and math concepts instructional support. Accordingly, children in Profile 1 scored significantly higher on measures of print knowledge and mathematics at the end of the preschool year. Similarly, Profiles 4 and Profile 5 had similar levels of math concepts instructional support and produced children's scores in mathematics that were also similar. However, several counter examples were also found, suggesting that the association between classroom quality and child outcomes is more complex than a simple input–output relationship. For instance, although classrooms in Profile 1 had higher oral language support than classrooms in Profile 2, children in this profile did not score significantly higher than children in Profile 2. This suggests that some aspects of Profile 2, such as the emphasis on providing learning opportunities that address children's needs and incorporating a balance of structured and play-based activities, may have compensated for the lower Oral Language support scores. Additionally, although Profiles 3 and 4 offered similar levels of instructional and individualizing supports, children in Profile 3 scored higher on approaches to learning in preschool and on print knowledge in kindergarten. It is possible that the relative strengths of emotional climate and support for families found in Profile 3 helped support children's growth in these areas. Thus, there is some support for the use of profile analysis to understand the comprehensive contributions of preschool classroom quality to children's growth on school readiness indicators.

Discussion

Early care and education is receiving increasing attention as a public investment with a high rate of return in terms of improving outcomes for children and families and offering cost-savings to the government and society as a whole (The White House, Office of the Press Secretary, 2013). Indeed, decades of accumulated research indicate that participation in early care and education programs can be associated with better cognitive, language, academic, and social outcomes for children and that the effects of these experiences may persist long after children leave these settings (see Karoly et al., 2005). However, it appears that simply providing early care and education experiences is insufficient to achieve these benefits; rather, a deciding factor in producing positive outcomes is the *quality* of early care and education.

Classroom quality is a complex, multi-faceted construct and it appears that multiple dimensions of a learning environment are important for children's learning and development (Bulotsky-Shearer et al., 2012; Copple & Bredekamp, 2008; LoCasale-Crouch et al., 2007). The current study provided a unique perspective on the complex interplay of specific teacher behaviors by using profile analysis to simultaneously consider multiple aspects of classroom quality through an ecological lens. This approach captured a rich, vivid picture of children's actual experiences in a large, national sample of varied early care and education settings and contributed to our understanding of how multiple dimensions of quality work in concert to predict growth in children's learning and development. The following discussion highlights key findings in terms of understanding how profile membership relates to teacher and program characteristics as well as child outcomes and discusses these findings in the context of current policy initiatives and reforms.

Profile Membership and Teacher/Program Background Characteristics

In terms of teacher and program characteristics, a general pattern was observed in which profiles of higher overall levels of quality differed in distinct ways from profiles with lower overall levels of quality. Specifically, teachers in Profile 1and Profile 2 were more likely than

teachers in profiles of lower overall quality to possess a college degree, have more developmentally appropriate beliefs about child development and teaching, be Caucasian, teach in public prekindergarten programs, and less likely to be African American or teach in child care programs. Additionally, teachers in Profile 1 reported higher salaries and self-efficacy than teachers in lower quality profiles (Profiles 4 and 5 respectively). Of particular note are the differences seen in teacher education between Profile 1 and other profiles—teachers in Profile 1 were up to 15 times more likely to possess a college degree than teachers in other profiles and were three to five times more likely than teachers in any other profile to have attained a bachelor's degree. Profile 2 had the lowest adult–child ratios in the sample, which is likely related to the high level of individualizing support provided in these classrooms. To a lesser extent, Profile 3 was differentiated from the lower quality profiles, containing significantly more Caucasian and fewer African American teachers, and lower ratios than Profile 5 and significantly more teachers with master's degrees and more classrooms in public prekindergarten programs than Profile 4.

In many ways, the patterns seen in the current study are consistent with those found in previous studies examining profile membership and teacher and program demographics. For example, LoCasale-Crouch et al. (2007) found that classrooms in the higher quality profiles tended to have teachers with more experience, more Caucasian teachers, smaller class sizes, lower adult–child ratios, lower proportions of minority children and children living in poverty, as well as serve families with higher levels of maternal education. In contrast, classrooms in the lowest quality profile tended to reflect teacher and program characteristics often associated with socioeconomic inequities and fewer resources (e.g., higher child-teacher ratios, longer program days, more African American teachers, more minority children and children living in poverty, and serving families with lower maternal education). Similarly, Bulotsky-Shearer et al. (2012) found that profiles with lower levels of classroom quality had higher adult–child ratios and a greater percentage of minority children relative to profiles of higher classroom quality.

Collectively, these findings suggest that differences in profile membership are likely related to systemic factors rather than indicative of a direct causal relationship between teacher/program demographic characteristics and levels of classroom quality. For example, in the current study, it is notable that child care classrooms were most likely to be classified in Profiles 4 and 5 and that Profile 1 did not contain *any* child care classrooms. However, both Head Start and public prekindergarten programs are often better funded than child care programs and typically have more human and organizational capacity than private child care programs (Barnett & Ackerman, 2011), meaning that they may have more resources to attract and retain qualified teachers, provide ongoing professional development opportunities, and offer other effective services such as home visiting programs or coaching and consultation services for teachers. Similarly, although the differences in teachers' reported self-efficacy between Profile 1 and Profile 4 could indicate a potential direct relationship between overall quality and self-efficacy, this association could also be due to more systemic factors. For example, teachers in Profile 4 may work with a population of families with whom they have limited contact due to parents' work schedules (e.g., families may have multiple child care arrangements such that teachers in these classrooms have more contact with other providers rather than the parents themselves). This limited connection between teachers and families may affect both the level and quality of perceived support for families as well as a teacher's sense of self-efficacy (e.g., limited feedback from families may influence a teacher's perception of her impact on a child's learning and development or her ability to meaningfully engage with families). Thus, the

differentiation amongst profiles on characteristics such as teacher education, beliefs, self-efficacy, salary, and program type may be indicative of a complex pattern in which an ecology of factors serve to explain both teacher and program differences as well as variations in classroom quality.

Profile Membership and Child Outcomes

With respect to the relationship between profile membership and child outcomes, patterns emerged similar to those noted above for teacher and program characteristics—profiles with high overall levels of quality tended to be differentiated from profiles with overall low levels of quality, with the greatest differences visible between Profile 1 and Profile 5. However, nuances also emerged regarding the less extreme classroom types. General patterns and trends are discussed below, organized by academic (oral language, print knowledge, and mathematics ability) and social–emotional (social competence and approaches to learning) outcomes.

Academic outcomes. With regard to children's academic outcomes, children in Profile 1 fairly consistently made greater gains than children in all other profiles at the end of the preschool year. Furthermore, some of these effects remained through the kindergarten year. In contrast, despite the relatively high levels of support provided across dimensions in Profile 2, children in this profile had few visible advantages in academic outcomes over their peers in profiles of lower quality at the end of preschool, and typically showed smaller gains than children in Profile 1. However, children in Profile 2 showed similar rates of oral language development to children in Profile 1 in preschool, and by the end of kindergarten, children in Profile 2 demonstrated the strongest print knowledge scores in the sample, and were significantly differentiated from children in the two lowest quality profiles. Thus, it appears that although children in classrooms with above average quality overall and strong individualizing supports may experience some benefits relative to other children, overall children in Profile 1 showed clear separation from their peers in other profiles.

It should be noted that effect sizes tended to be small (d = .09 to .32; Cohen, 1988), though this is consistent with findings from other studies (e.g., Curby et al., 2009; d = .19 to .21). In their discussion of the typically small effect sizes found for early care and education quality, NICHD ECCRN and Duncan (2003) note that it is important to consider not only the absolute effect size, but also the practical significance of these effects in terms of relative and contextual effects. For example, the effects of quality are generally about half the size of those of parenting and poverty for cognitive, language, and academic outcomes and are sometimes as large as or larger than the effects of parenting for social-emotional outcomes (NICHD ECCRN, 2006; Peisner-Feinberg et al., 2001). Furthermore, although the absolute effects of quality may be small, these effects may be magnified when considered in a greater contextual framework. For instance, small increases in child outcomes during the early years may translate into larger cumulative effects in their developmental trajectory over time (Mashburn et al., 2008; NICHD ECCRN, 2006). Indeed, in the current study, effect sizes for membership in Profile 1 versus other profiles on children's oral language development nearly doubled from preschool (d = .09 to .11) to kindergarten (d = .17 to .22), suggesting that the initial advantage in oral language development experienced by children in Profile 1 in preschool provided these children with a stronger foundation on which to build future vocabulary skills. This is reminiscent of the "Matthew Effect" noted in reading development in which literacy skills build upon each other in a snowballing fashion and children who start out with stronger initial foundational skills will build their abilities at a faster rate, causing those with weaker skills to fall farther and farther

behind (Stanovich, 1986; Walberg & Tsai, 1983). Thus, advantages experienced by children in Profile 1 may become magnified over time.

Social–emotional outcomes. In contrast to patterns seen within academic outcomes in which children in Profile 1 fairly consistently demonstrated an edge in achievement over their peers in all other profiles, children's growth in social–emotional outcomes was indistinguishable across Profiles 1 through 3, profiles which all had above average levels of relationship-based quality dimensions (i.e., emotional climate and support for families). Children in Profiles 1 through 3 all had statistically higher gains in social competence than children in Profile 5 and statistically higher gains in approaches to learning than children in Profile 4. One possible explanation for these findings relates to threshold effects found in other studies. Indeed, other studies examining early childhood education quality have detected a minimum level of quality needed to produce gains and have found that effect sizes tend to be larger for higher rather than lower levels of quality (Burchinal, Kainz, & Cai, 2011; Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Vandell et al., 2010). This is consistent with results of the current study that suggest that for social–emotional outcomes, a minimum level of quality, particularly in the areas of classroom emotional climate and support for families, may need to be achieved in order for children to make meaningful gains in social competence and approaches to learning. Furthermore, although Profiles 1 through 3 all produced greater gains in social competence than Profile 5 and greater gains in approaches to learning than Profile 4, it was only Profile 1 that was statistically different from both Profiles 4 and 5 on both of these outcomes. This suggests that although there may be a minimum threshold of quality needed for significant social–emotional growth, the magnitude of this difference may be greater for Profile 1, which had the highest levels of quality overall.

Further, these patterns suggest that particularly low levels of positive teacher–child interactions, such as those seen in Profile 5, may negatively affect the development of children's social competence when compared to profiles that have at least above average levels of relationship-based dimensions (i.e., emotional climate and support for families). In comparison, children's approaches to learning seemed to be more greatly affected by especially low levels of support for families, such as those seen in Profile 4, compared to profiles with at least above average levels of relationship-based care (i.e., Profiles 1–3). It is possible that children's social competence is more affected by more proximal microsystem influences, such as direct teacher–child interactions, whereas approaches to learning may be affected by mesosystem-level processes, such as the interaction between school and home. For example, if children are exposed to positive relationships between their family and teacher, they may develop more positive attitudes toward school.

It should be noted that within social–emotional outcomes, only one significant difference was noted at the end of the kindergarten year (children in Profile 3 rated higher than children in Profile 2 on social competence). It is possible that the differences seen in preschool were an effect of bias resulting from preschool teachers serving as the subjects of classroom observation measures and raters of children's skills. For example, teachers who are rated more highly on measures of emotional climate may also be more likely to rate children's social skills more positively. However, it is also possible that any true effects of preschool profile membership on children's social–emotional skills fade during kindergarten as a function of children's variability in experiences and development during the kindergarten year.

Summary. Returning to study hypotheses regarding child outcomes, there was some support for the "all good things go together hypothesis". Profile 1–*high instructional support,*

above average quality overall consistently had the highest estimated mean score in child outcomes and produced significantly higher child outcomes in 13 of 20 comparisons with other profiles. Even though Profile 2–*high individualization, above average quality overall* also had relatively high levels of overall quality, it was only Profile 1 that consistently distinguished itself in a statistically meaningful way. However, within the domain of social–emotional development, Profile 1 was statistically similar to Profiles 2 and 3 in terms of producing gains in children's social competence and approaches to learning, suggesting that the higher levels of quality found in Profile 1 did not necessarily contribute to children's social–emotional development beyond the above average levels of emotional climate and support for families seen in Profiles 2 and 3. However, it is notable that Profile 1 still produced the highest estimated mean scores of social–emotional outcomes and was the only profile consistently higher than Profiles 4 and 5 on these outcomes, suggesting that the stronger levels of quality across the board found in Profile 1 may increase the magnitude of the effects of quality. For instance, when the higher quality profiles were compared to Profile 4 in terms of children's approaches to learning, the effect size of Profile 1 (d = .20) was double that of Profiles 2 and 3 (d = .11 and .10, respectively). These results indicate that in order for children to achieve substantial gains in all areas of school readiness, it is important that they experience high levels of quality in all dimensions of classroom quality.

With regard to the "domain specificity hypothesis," mixed results were found. It should be noted that in many ways, this hypothesis was difficult to test given the nature of the profiles that emerged in the current study. That is, many of the dimensions decreased linearly in quality from Profile 1 to Profile 5 making it difficult to tease apart the relative contributions of specific quality dimensions versus overall quality levels. However, specific profile comparisons were chosen to highlight profiles that were similar in levels of quality in some dimensions but statistically different on other dimensions, in order to explore whether higher levels of quality in a given dimension would be related to theoretically aligned child outcomes (e.g., oral language support and children's *PPVT* scores), or whether the composition of the profile as a whole affected children's gains. In some cases, the domain specificity hypothesis was supported, for example higher levels of print knowledge and math concepts instructional supports in Profile 1 translated into greater gains for children in these areas when compared to Profile 2, despite the fact that both profiles had similar levels of relationship-based support and Profile 2 had higher levels of individualizing support. These findings are similar to research that has found that greater specificity of quality inputs is more strongly associated with aligned child outcomes. For example, Mashburn et al. (2008) and Burchinal et al. (2011) both found that the Instructional Support subscale of the *CLASS* was more closely related to children's reading and mathematics achievement than was the total *CLASS* score. Similarly, scores on the Emotional Support subscale were better predictors of social skills and behavior problems than was the total *CLASS* score.

However, several counter examples to the domain specificity hypothesis were also detected. For instance, although Profiles 3 and 4 had statistically indistinguishable levels of instructional and individualizing support, children in Profile 3 showed more growth in approaches to learning in preschool and in print knowledge in kindergarten. The higher levels of emotional climate and support for families seen in Profile 3 may have helped support children's growth in these areas. Similarly, despite higher levels of oral language support in Profile 1, children in Profile 2 scored equally well on a test of receptive vocabulary at the end of the preschool year. This suggests that the relative strengths of Profile 2, namely high-quality

assessment practices, individualized learning opportunities, and a balance of structured and play-based activities, may support children's oral language development in ways comparable to observable high-quality oral language instruction, provided these practices are coupled with a sufficient level of instructional support quality. An alternative explanation is that although the difference in oral language support between Profiles 1 and 2 was significant, the magnitude of this difference was not large enough to differentially influence children's growth in oral language development.

Future research might compare models using profile membership to predict child outcomes to models using only individual, domain-specific dimensions of quality (e.g., emotional climate to predict social competence) to help further explore the question of whether using profile analysis is a useful mechanism to understand the comprehensive contributions of preschool classroom quality. However, the current study does highlight the fact that children's experiences in early care and education settings vary widely and that the profiles identified in this study captured important aspects of those differences. Moreover, profile membership was able to differentially predict children's growth on school readiness indicators even after controlling for a variety of child, teacher, and program factors.

Implications for Policy and Practice

In his 2013 State of the Union Address, President Barack Obama called on Congress to expand access to high-quality preschool to every child in America and put forth a proposal outlining his Administration's plan to increase access and improve quality of early care and education opportunities (The White House, Office of the Press Secretary, 2013). The current study provides relevant data and insight into many of the elements of the President's early care and education agenda. Thus, the following is a discussion of many key study findings as they relate to aspects of the President's proposal, such as expanding access to preschool; ensuring qualified, well-trained teachers paid comparably to K–12 staff; implementing comprehensive data and assessment systems; aligning and creating partnerships among programs operating under different auspices (i.e., public prekindergarten, Head Start, and private child care programs); and implementing effective evaluation and review of programs. It should be noted that although these issues are currently receiving substantial attention in the national spotlight, these themes have persisted through decades of discussion and research in the field of early care and education. Thus, contributions from the current study provide relevant guidance to inform current policy initiatives as well offer insight into many historically important questions in the field of early care and education.

Expanding access to preschool. Although the current study did not focus on the debate regarding the relative merits and costs of targeted versus universal preschool, results of the present study indicate that classroom quality across multiple dimensions was highly variable within a large, national sample of early care and education programs. Furthermore, levels of quality were differentially related to areas of development and learning that are targeted as key indicators of school readiness in the President's plan. In the current study, Profile 1–*high instructional quality, above average quality overall* was distinguished from other profiles in terms of overall high levels of classroom quality and typically higher child outcomes, with some effects remaining through the kindergarten year. However, it should be noted that just over 10% of the sample fell into this profile, indicating that these high levels of quality and their associated outcomes were relatively rare within this large sample of preschool classrooms. This is similar to other studies that have found a low concentration of classrooms within the highest quality profile (Bulotsky-Shearer et al., 2012; LoCasale-Crouch et al., 2007; Stuhlman & Pianta, 2009).

Collectively, these results suggest that only a small percentage of children are being exposed to levels of preschool classroom quality that are sufficient to foster meaningful gains in key areas of learning and development.

Most profiles had relatively low levels of instructional quality, although higher levels of relationship-based care were more prevalent. This reflects previous research suggesting that in general, early care and education classrooms tend to have moderate levels of emotional support, but low levels of instructional quality. For example, in a large-scale study of early childhood settings, the mean emotional support score (on the *CLASS*, which uses a seven-point scale) was 5.22, whereas the mean instructional support score (also rated from *1* to *7*) was 2.47 (Pianta et al., 2005). Similar results were reported in Burchinal et al. (2010) with mean emotional support and instructional support scores of 5.49 and 2.04, respectively. In the current study, this pattern was typified by Profile 3– *relationship-focused, below average instructional and individualizing support*, which was also the most prevalent profile in the sample. Within the current study, although Profile 3 was indistinguishable from Profiles 1 and 2 in terms of social–emotional outcomes, children in this profile lagged in literacy and language development when compared to peers who had received high levels of instructional support as well as an emotionally supportive climate. This suggests that current levels of quality may be insufficient to support children's learning and development across the multiple domains that are important for school readiness and later success in life.

Of particular concern is the large number of classrooms and children that were in profiles with suboptimal levels of quality across multiple dimensions. Nearly a third of classrooms in the sample were located in profiles that were characterized by low levels of support for families (Profile 4; 11.3%) or positive teacher–child interactions (Profile 5; 20.8%) in conjunction with below average quality overall. Children in these profiles tended to show significantly less growth in school readiness domains when compared to their peers in higher quality profiles. These findings are similar to other studies that showed similar rates of classrooms with uniformly low levels of quality (e.g., 18.8% in the poorest quality profile in LoCasale-Crouch et al., 2007; 23.0% in the overall low quality profile in Stuhlman & Pianta, 2009). Collectively, these results suggest that if resources are focused on expanding access to early care and education without sufficient attention to enhancing current levels of quality, there is a high likelihood that the patterns seen here and in previous studies will replicate, resulting in very few children experiencing the high levels of quality needed to foster development and learning. Furthermore, although the current study was unable to address such issues, previous research has indicated that classrooms with lower quality tend to have higher concentrations of children who are living in poverty, of minority status, have lower levels of maternal education, and score lower on measures of achievement before entering the program (Bulotsky-Shearer et al., 2012; LoCasale-Crouch et al., 2007; Stuhlman & Pianta, 2009). These data suggest that if current levels of quality are replicated, the children who could perhaps benefit most from high-quality early care and education will actually receive the poorest quality experiences, continuing to perpetuate gaps in school readiness that are apparent even at kindergarten entry (West, Denton, & Germino-Hausken, 2000). Acknowledging that expanding access to early care and education is insufficient on its own, the Obama plan emphasizes the importance of "high-quality early learning" experiences. What follows is a discussion of some of the quality improvement initiatives proposed by the Obama Administration in relationship to the findings of the current study.

Qualified, well-trained teachers. Part of President Obama's plan for improving the quality of early care and education calls for "qualified teachers for all preschool classrooms" and "well-trained teachers, who are paid comparably to K–12 staff" (The White House, Office of the Press Secretary, 2013). The issue of teacher qualifications and their effects on early care and education quality and child outcomes has been a topic of study and debate for some time. Increasingly, some advocates are calling for all teachers of 3- and 4-year-olds to have at least a bachelor's degree, and often a specific major or credential in early childhood education (Early et al., 2007; Whitebook & Ryan, 2011). However, at the other end of the spectrum, some argue that the cost of implementing such requirements is disproportionate to the benefits and that more stringent teacher qualification requirements could have negative consequences, such as forcing out current members of the child care workforce, reducing the diversity of the workforce, making child care unaffordable for some families, and putting strain on an already inadequate system of teacher preparation (Whitebook & Ryan, 2011). Much of this debate is fueled by an inconsistent and inconclusive research base that presents contradictory evidence for the effectiveness of teacher qualifications on early childhood education and child outcomes.

Within the current study, some significant effects were found upon examining teacher education and profile membership. Specifically, teachers in Profile 1 were up to 15 times more likely to have a degree than teachers in Profiles 3, 4, or 5; indeed, only one teacher within Profile 1 did *not* have a college degree. Teachers in Profile 2 were also more likely than teachers in Profile 5 to have a degree. This is consistent with some research that indicates that teachers who attend college tend to offer higher quality early care and education than teachers who have a high school diploma or less (Clarke-Stewart et al., 2002; Howes et al., 1992; Phillipsen et al., 1997). Furthermore, teachers in Profile 1 were three to five times more likely to have a bachelor's degree than teachers in any other profile. Previous research on the effects of a bachelor's degree is mixed—some studies show that a bachelor's degree stands apart in predicting quality, but other studies show that lower levels of education with an early childhood specialization can produce similar levels of quality and child outcomes (Tout et al., 2006). However, within the current study, teachers specializing in early childhood education were equally likely to be in any of the profiles, suggesting that the effects of teacher education were not due to knowledge or skills specific to early care and education gained during teachers' pre-service training.

It is notable that Profile 1 showed clear distinction from other profiles in terms of teacher education, particularly when compared to Profile 2, which also showed relatively high levels of quality and shared many teacher and program background characteristics with Profile 1. It appears that the higher levels of quality within Profile 1, particularly in the area of instructional supports, may somehow be linked to teacher qualifications. It is also noteworthy that the current study detected a clear relationship between attainment of a bachelor's degree and classroom quality as many studies have failed to find an effect for a bachelor's degree (Blau, 2000; Early et al., 2007; Howes et al., 1992). It is possible that the simultaneous consideration of multiple dimensions of quality made it possible to detect this effect. However, the pathways through which this association operated are not clear, particularly when the lack of association with teacher's specialization in early childhood is considered, suggesting it is the attainment of a bachelor's degree itself, rather than the content of the teacher education program that drove this relationship.

It is possible that the association between teacher education and the high levels of quality seen in Profile 1 classrooms was due to more ecological factors, such as program characteristics or individual variation in teacher characteristics. For example, as discussed previously,

programs that hire bachelor's-level teachers may also possess greater resources to provide other supports that may affect classroom quality such as ongoing professional development, more highly trained support staff and administrators, and competitive wages and benefits. In the current study, *all* teachers in Profile 1 worked in either public prekindergarten or Head Start classrooms, both of which tend to have more restrictive hiring practices as well as access to more resources (Barnett & Ackerman, 2011). Some studies have demonstrated that the relationship between teacher qualifications and classroom quality diminishes when more extensive covariates are controlled for (Blau, 2000; Phillipsen et al., 1997). Thus, it is possible that differences seen between Profile 1 and other profiles in teacher education may be minimized if analyses were rerun with more background characteristics as covariates.

Another possible explanation is that the association between membership in Profile 1 and the attainment of a bachelor's degree may be due to specific teacher characteristics. For instance, there may be selection effects by which individuals with stronger verbal skills, greater cognitive agility, and social qualities such as persistence may be more likely to engage in stronger classroom practices *as well as* be more likely to have the resources to attend and complete college (Fuller, 2011). In the current study, teachers in Profile 1 were also distinguished from other profiles in their beliefs and self-efficacy. It is possible that teachers who have stronger self-efficacy in general are more likely to attend and achieve within the university system. With regard to beliefs about developmentally appropriate practice, it is possible that this construct represents a set of cultural norms that is implicit in the current definition of "developmentally appropriate practice." Indeed, in her discussion of applying and understanding developmentally appropriate practice, Bredekamp (2011) notes, "The word *appropriate* is a culturally laden term and thus will continue to provoke controversy" (p. 90). It may be that groups that differ by factors such as socioeconomic status or ethnicity also differ in normative practices and beliefs with regard to caring for and educating young children as well as differential rates of attainment of a 4-year college degree.

Although the current study indicates a relationship between teacher education and high levels of classroom quality, particularly in the area of instructional supports, the mechanisms behind this association are not fully understood. Therefore, these results, and implications for policy, should be interpreted with caution. Coupled with inconsistent findings regarding teacher education and quality are the substantial costs associated with mandating standards of educational attainment for early care and education teachers. Programs would have to invest in increasing the education levels of their current workforce and/or allocate resources to attract and retain teachers who have the necessary qualifications. Given the lack of evidence suggesting robust effects of higher teacher qualifications and the high cost of these reforms, it appears that simply mandating higher degrees of education for teachers may not be an efficient mechanism to promote high-quality early childhood education. However, there may be potential avenues of policy reform that may enable the theoretical benefits of greater teacher education to be realized. For example, although no differences in profiles were found with respect to specialization in early childhood education, this may be due to the high variability in the content and quality of early childhood training programs (Whitebook & Ryan, 2011; Zaslow, Tout, Halle, Vick Whittaker, & Lavelle, 2010). Directing resources toward improving the program content, fieldwork experiences, and the supervision and mentoring that teachers receive in their pre-service training programs may increase the likelihood that teacher education could be a meaningful predictor of classroom quality. Furthermore, many experts believe that ongoing, on-the-job professional development efforts may be a more efficient and feasible means of lifting

teachers' knowledge and skills and producing gains in quality (Mashburn et al., 2008; Pianta, Hamre, & Downer, 2011; Zaslow et al., 2010). Indeed, Pianta et al. (2011) summarize evidence that demonstrates that when professional development inputs to teachers are carefully aligned with the process quality features (i.e., teacher–child interactions) associated with specific target child outcomes, these professional development interventions can produce meaningful growth in both teacher skills and child outcomes.

Comprehensive data and assessment systems. Along with President Obama's call for "a plan to implement comprehensive data and assessment systems" (The White House, Office of the Press Secretary, 2013), there is a trend for early childhood assessment and data systems to be implemented at the state-level. For example, teachers in California are required to use the *Desired Results Developmental Profile–Preschool*© instrument, with the assessment results "intended to be used by the teacher to plan curriculum for individual children and groups of children to guide continuous program improvement" (California Department of Education, 2010). The increased emphasis on incorporating child assessments into early care and education programs can also be seen through the Race to the Top—Early Learning Challenge initiative, which gave funding priority to applicants that focused on strengthening the use of assessments (Ackerman & Coley, 2012). Policy measures such as these are consistent with recommendations from organizations such as the National Research Council (2008), which highlights the importance of assessment as an integral piece of a comprehensive system of early care and education. Among broader purposes of early childhood assessment, such as evaluating program effectiveness, such practices can be used to inform instructional decisions by providing teachers and caregivers with information on children's developmental progress and how well they are learning. This use of assessment in a formative capacity enables teachers to understand the learning needs of their students, individualize and differentiate instruction, and plan activities that are designed to foster development and learning in key identified areas.

Within the current study, one profile (Profile 2) was found to represent exemplar practices in the use of formative assessment to monitor children's progress and plan instruction to meet individual children's needs. Although children in this profile did show some advantages over other profiles (e.g., the highest print knowledge scores in kindergarten), overall, children in Profile 2 did not demonstrate visible advantages in academic outcomes over their peers in profiles of lower quality and typically demonstrated smaller gains than children in Profile 1, who experienced lower quality assessment and individualizing practices, but higher quality instructional supports. This suggests that although high-quality assessment and individualizing practices may have the capacity to contribute to children's learning and development, unless they are coupled with instructional supports of the highest quality, they are unlikely to be effective. It should also be noted that Profile 2 had the smallest adult–child ratio within the sample, suggesting that in order for teachers to attain high levels of assessment and individualization practices, appropriate supports should be put in place, such as the presence of multiple adults in the classroom to permit teachers and other trained staff to collect observational data and to work with children both in small groups and individually. This recommendation is consistent with the Obama Administration's proposal that preschool programs across the states meet common and consistent standards for small class sizes and low adult–child ratios (The White House, Office of the Press Secretary, 2013).

Program partnerships and a coordinated mixed-delivery system. The current landscape of early care and education services consists of a fragmented, mixed-delivery system that has been likened to a "patchwork quilt" of different funding streams and regulatory

structures, including community and for-profit child care centers, Head Start, and public prekindergarten programs (Barnett & Ackerman, 2011; Rose, 2007). Each sector has its own merits and advantages. For example, child care is often more accommodating of parents' schedules and location preferences and typically has more teaching staff that share the language and cultural backgrounds of the children served (Barnett & Ackerman, 2011). Head Start programs have a strong focus on the health and social services needs of children and families and emphasizes parent involvement (Barnett & Ackerman, 2011). Public prekindergarten programs offer more continuity for the transition to elementary school and offer significantly more resources to assist children who have educational difficulties or special needs (Barnett & Ackerman, 2011). However, there are also great disparities in resources across program types. For example, although the 2007 reauthorization of Head Start mandated that 50% of teachers have a bachelor's degree by 2013 (U.S. Department of Health and Human Services, 2008), Head Start teachers with a bachelor's degree are paid only 53% of the average public school teacher's salary, making it difficult to recruit and retain well-qualified teachers (National Education Association, 2010; U.S. Department of Health and Human Services, 2009). In addition to low teacher salaries, much of the private child care industry lacks access to the resources of Head Start programs such as a child outcomes framework, a technical assistance system, curriculum, and supervision provided by an education coordinator (Barnett & Ackerman, 2011). In contrast, public prekindergarten teachers experience higher salaries and benefits as well as access to greater opportunities for supervision, support, and professional development (Barnett & Ackerman, 2011).

The findings of the current study may reflect some of these disparities between programs operating under different auspices. For example, teachers in the highest quality profile were four to seven times more likely to teach in a public prekindergarten program than were teachers in the two lowest quality profiles. Conversely, teachers in the two lowest quality profiles were seven to fourteen times more likely to teach in child care programs than teachers in the highest quality profile. Furthermore, it is particularly notable that there were not *any* child care classrooms in Profile 1. It is highly likely that these differences in quality across program type are due to some of the disparities in program resources as noted above. Given the fact that a substantial portion of young children attend private child care programs, it is essential to explore ways of lifting the quality of these types of programs.

In President Obama's early learning agenda, he proposes increased investments for both the federal Head Start program and the Child Care and Development Block Grant (the primary source of federal funding for child care subsidies for low-income working families) as well as a new federal–state partnership that would finance public preschool programs for all low- and moderate-income four-year-old children through a cost-sharing model with states (The White House, Office of the Press Secretary, 2013). It is unclear whether this model would be primarily situated within the public school system, use a mixed-model delivery system, or be left to the discretion of individual states. However, the Administration also proposes the launch of a new Early Head Start–Child Care Partnership program in which Early Head Start grantees will partner with center-based and family child care providers who agree to comply with Early Head Start Program Performance Standards and provide comprehensive, full-day, year-round, high-quality services to low-income children from birth through age three. It is possible that states could also use similar partnership models at the preschool level in order to capitalize on the capacity and strengths child care programs bring, while also making additional resources available to these programs. For example, within New Jersey's Abbott Preschool Program,

school districts contract with private child care and Head Start programs to provide services. All participating providers are held to the same program standards and expectations, but teachers also receive the same professional development and technical assistance (Barnett, Epstein, Friedman, Boyd, & Hustedt, 2008; Frede, Jung, Barnett, Lamy, & Figueras, 2007). Teachers are required to possess a bachelor's degree with certification in early childhood education and are paid at public school scale. The state provided scholarships so teachers who lacked credentials could become certified (Barnett, 2011). Although the levels of quality in many private child care programs were low prior to participation, after several years of implementation the quality within these programs equaled that in public school programs (despite increased quality there as well) and the quality of both sectors was high and producing substantial educational gains for children (Barnett & Ackerman, 2011; Frede et al., 2007; Frede, Jung, Barnett, & Figueras, 2009).

Other innovative solutions to raising the quality of community-based child care programs through resource sharing models are happening within the private sector. For example, the Early Learning Ventures endeavor in Colorado (funded by the David and Laura Merage Foundation) is seeking to help smaller private child care and education businesses (including family child care, faith-based, and center-based programs) by creating centralized operation hubs. These hubs, called Alliances, are community-based networks that help small early childhood programs deliver services in a more streamlined and efficient way. In addition to helping programs share resources such as payroll and benefits management, marketing, mental health screening, and purchasing goods and services (e.g., janitorial and food services), the Alliance hubs also allow programs to invest in professional development services at lower costs due to the economy of scale (Stoney, 2009). This model allows smaller programs to engage in professional development initiatives (including coaching and teacher study groups) in similar ways as their publicly funded counterparts and pass on the benefits of high-quality education and care to the children and families they serve. The findings of the current study suggest that the resources available to teachers and classrooms may contribute to overall quality and outcomes, so public and private efforts such as these would be expected to produce meaningful gains for programs and children.

Effective evaluation and review of programs. Another component of President Obama's proposal is the implementation of "effective evaluation and review of programs" (The White House, Office of the Press Secretary, 2013). An increasingly prevalent approach to monitor and improve the quality of early childhood education programs through policy channels is to implement Quality Rating and Improvement Systems (QRISs). Indeed, the federal Office of Child Care, Department of Health and Human Services has identified the use of QRISs as a strategy to improve the quality of early care and education and has allowed states to use federal dollars to expand QRIS efforts (Administration for Children and Families, US Department of Health and Human Services, 2011). As of 2011, over 25 states had statewide QRISs in place and many others were in the process of developing or piloting programs, for a total of 37 states with QRISs operational or in development (Austin, Whitebook, Connors, & Darrah, 2011). Most QRIS are composed of five main components: (1) quality standards (which often include both structural and process quality variables); (2) a quality monitoring process (many include observation-based ratings and review of program documents); (3) mechanisms to support quality improvement (e.g., providing professional development supports to low-quality programs); (4) financial incentives (e.g., for high-quality programs or for degrees of improvement achieved over time); and (5) means of communicating program quality ratings to parents such that they might make informed decisions as consumers of services (Child Trends, 2010b).

A recent review of the 26 existing QRISs as of 2010 (Child Trends, 2010a) indicated that certain quality categories are included in the majority of QRISs (20 or more), including licensing compliance (26), environment (24), staff qualifications (26), family partnership (24), administration and management (23) and accreditation (21). Although it is encouraging that some of the process features of quality similar to those included in the current study (such as the learning environment, child assessment, and family partnerships) are represented alongside more easily measurable structural features, some concerns emerge regarding the measurement of these important constructs. For example, 23 of the 26 QRISs use the *ECERS–R* as an observational measure of classroom quality. Although the *ECERS* and its revised version have been a standard in the field for more than 30 years, it has been criticized for focusing overly much on the physical environment and materials present in early care and education settings rather than on aspects of the teacher–child interactions that have been shown to be more closely tied to gains in child outcomes (La Paro, Thomason, Lower, Kintner-Duffy, & Cassidy, 2012). In contrast, only two QRISs (Minnesota and Virginia) used the *CLASS*, which has been shown to be more consistently predictive of child outcomes than global measures of quality such as the *ECERS–R* or structural features such as class size, adult–child ratio, teacher education (Mashburn et al., 2008). Furthermore, measures like the *CLASS* offer more in-depth information about a classroom's levels of support in key areas such as instructional, emotional, and organizational supports for learning. The current study indicated that teachers varied widely on these dimensions and showed different patterns of strengths and weaknesses. Obtaining information about teachers' competencies across domains may allow for using these results in a formative manner, providing information about how to best target and tailor quality improvement measures such as professional development. For example, in the current study, teachers in Profile 2 may have benefited more from professional development regarding instructional supports whereas teachers in Profile 1 may have benefited more from training on using individualizing supports.

One benefit to QRISs is the potential to infuse resources into the early care and education system at both the program and teacher level with the direct intention of affecting quality. In many QRIS models, quality ratings determine reimbursement rates for parents receiving subsidies, eligibility for funding or quality improvement supports, and provide critical marketing information released to parents that may affect their choice of whom they give their business (Bryant, Burchinal, & Zaslow, 2011; Zaslow, Tout, & Martinez-Beck, 2010). However, the ways in with QRISs are tied to financial incentives and consequences should be carefully considered. The lowest quality programs may need a disproportionate amount of support to make progress in raising quality, and as noted previously, lower quality programs tend to serve a greater concentration of disadvantaged families (Bulotsky-Shearer et al., 2012; LoCasale-Crouch, 2007; Stuhlman & Pianta, 2009). Two QRISs (Pennsylvania and Ohio) offer greater awards to programs that serve higher densities of vulnerable or high-risk children (Child Trends, 2010a).

Some systems incorporate technical assistance and quality improvement in their QRIS in addition to financial incentives. For example, the Los Angeles Universal Preschool (LAUP) program uses their QRIS to inform their allocation of funding and support resources. Only programs that are rated three stars or higher are eligible to receive LAUP funding, ensuring that only high-quality programs are being funded. However, those programs that fall below the three star mark may receive support for a "quality support coach" who provides guidance and resources to these program to assist them in improving their levels of quality (Mashburn et al., 2008). Additional education and training opportunities are also made available to staff at these

sites, such as scholarships, wage enhancements, and retention bonuses that may help increase educational attainment (through the availability of scholarships such as T.E.A.C.H. Early Childhood®) or decrease high rates of turnover among staff (Child Trends, 2010a). This model is consistent with the findings of the current study and previous research that suggests that only programs achieving levels of quality above a certain threshold produce sizeable gains in child outcomes (e.g., Burchinal et al., 2010; Burchinal et al., 2011; Vandell et al., 2010) and that many classrooms could use targeted support in improving quality across certain dimensions.

Limitations and Future Directions for Research

A number of limitations should be considered in interpreting the results of this study. First, it should be noted that this study was limited by the archival nature of the variables collected for the PCER study, particularly those that measured the primary constructs of interest. For example, the measure of support for families available has not been validated and only select items were used that pertained to the construct of interest; however, the estimate of internal consistency within the sample used was sufficiently high ($\alpha = .84$). Furthermore, this measure was based on parent self-report, which may have introduced bias (e.g., parents who are experiencing high amounts of stress may report low engagement regardless of the program's efforts and practices), and an average across each classroom was used, which may have obscured important within-classroom variation. Some items within the scale may also be more relevant for some families than others. For example, the items addressing a parent's perception of the program's support and respect for a family's culture and background and the program's ability to help the family procure services—such as public assistance, transportation, and job training—may be less applicable for white, middle class families. Finally, this measure demonstrated some constricted variance, such that although the possible range for scores was 7.00 – 28.00, the actual range for the sample was 20.84 – 28.00 ($M = 25.72$, $SD = 1.54$), indicating that the distribution was negatively skewed and that parents generally reported relatively high rates of engagement. Thus, results pertaining to "low" support for families, particularly in regards to Profile 4 ($M = 22.79$, $SD = 1.21$), should be interpreted within this context. However, significant differences in perceived support for families across profiles were found and it is still believed that this measure captured important variability between classrooms that contributed to profile composition and classroom outcomes.

Further concerns regarding constructs of interest pertain to the measure used for learning formats. Although as a whole the *ECERS–R* has reliable and valid properties, the scales lack some degree of nuance that would be helpful in understanding the whole picture of classroom quality. For example, a classroom that receives a score of a low score on the Free Play scale are characterized by "*either* little opportunity for free play *or* much of day spent in unsupervised free play" (Harms et al., 1998). Thus, it is difficult to know whether classrooms in Profile 5 tend to spend more time in over- or under-structured settings. Finally, as mentioned previously, interpretation of children's social–emotional outcomes in preschool is somewhat limited by the fact that preschool teachers served as the raters of these skills as well as the subjects of observation for classroom quality dimensions. Although kindergarten teachers' ratings of children's social–emotional development were also considered as a way to avoid potential bias introduced by this confound, it is possible that children's variable experiences during the kindergarten year may have introduced additional bias, obscuring any true effects. Future studies might use alternative measures of social–emotional competence that are administered by someone other than the child's teacher such as the *Challenging Situations Task* (Denham, Bouril, & Belouad, 1994) or the *Battelle Developmental Inventory* (Newborg, 2005).

With regard to predictors of profile membership, future studies may include covariates to gain further insight into the unique contribution of teacher and program factors to profile membership. For example, controlling for region may help explain the contribution of teacher salary to profile membership, given variation in cost of living. Indeed, as previously mentioned, some studies have found that the relationship between teacher qualifications and classroom quality diminishes when more extensive covariates—such as zip code, state, parent fees, and the proportion of infants/toddlers within the program—are controlled for (Blau, 2000; Phillipsen et al., 1997). Thus, it is possible that significant differences seen between profiles with regard to teacher and program factors may be minimized if analyses were rerun with more background characteristics as covariates.

It would be important for future studies to replicate the findings of the current study in additional samples of early care and education settings, particularly across more recent cohorts as the original data collection for this study took place in 2002 (fall of preschool year) to 2004 (spring of kindergarten year). During the time since this data was collected, important changes have taken place in the field of early care and education, for example the continued expansion of state prekindergarten programs (Barnett, Carolan, Fitzgerald, & Squires, 2012); the reauthorization of Head Start in 2007, which included mandates increasing the number of teachers with college degrees (U.S. Department of Health and Human Services, 2008); the launch of the Race to the Top—Early Learning Challenge Grant program, which challenges states to develop innovative models that improve quality across early care and education settings; and the introduction of new measurement tools such as the *CLASS* (Pianta et al., 2008), which focuses specifically on measuring quality in terms of teacher–child interactions. Future studies could also extend the present study findings by engaging in more longitudinal studies of the effects of preschool classroom quality beyond the kindergarten year as other studies of quality have found significant effects as late as ninth grade, some of which appear to be "sleeper effects" that were not initially present (NICHD Early Child Care Research Network, 2006; Peisner-Feinberg et al., 2001; Vandell et al., 2010). Furthermore, the PCER study was conducted within early care and education settings that predominantly served low-income children. Future research may address whether similar findings can be replicated with children of varying levels of socioeconomic status.

Another limitation is the compromises inherent in examining children's growth in outcomes by controlling for fall scores on child outcomes. By doing so, the present analyses were not able to explore differences that may have emerged due to where children started; it is possible that children who had higher (or lower) levels of initial skill may have been provided differing levels of support by their preschool teachers (Curby et al., 2009). Indeed, other studies have demonstrated the importance of considering child × environment interactions and examining the ways in which child characteristics can interact with the learning opportunities with which children are provided in the classroom. For example, some studies have found that the effectiveness of an instructional strategy is moderated by the initial skill level of the child (Connor, Morrison, & Katch, 2004; Connor, Morrison, & Slominski, 2006; Lonigan, Schatschneider, & Westberg, 2008). Effects of instructional quality can also have differential effects based on other child characteristics, such as self-regulation. For example, one study (which also used the PCER data) found that although instructional quality was positively related to gains in children's emergent literacy development for children with high self-regulation, instructional quality was negatively associated with some child outcomes for children with low self-regulation, suggesting that the task demands of "high-quality" instruction may be too great

for children with low self-regulation, resulting in low levels of engagement for these children (Boyle, 2011). Previous studies of overall early care and education quality have found mixed results regarding moderators such as poverty, maternal depression, or poor parenting affecting the quality–outcomes relationship (Belsky et al., 2007; Burchinal, Peisner-Feinberg, Bryant, & Clifford, 2000; Gormley, Gayer, Phillips, & Dawson, 2005; Peisner-Feinberg et al., 2001; Vandell et al., 2010), thus it would be of interest to see if significant interactions are found among child characteristics and profile membership in relation to child outcomes.

Finally, some limitations of profile analysis as a lens for viewing classroom quality merit discussion. As LoCasale-Crouch et al. (2007) note, "Although cluster analysis provides a way to reduce a large sample size and a complex construct like classroom quality to a manageable and easily interpretable comparison of groups, individual differences of classrooms and their characteristics get lost in the analysis" (p. 14). Additionally, it should be noted that the descriptors of quality dimensions within profiles are based on their position relative to the rest of the sample rather than absolute cut-offs or indicators of quality. For example, although classrooms in Profile 4 demonstrated below average support for families, the mean score of this profile was in fact in the upper-third of the range of possible scores on this scale. Another limitation to the current study is that the profiles that emerged tended to decrease linearly in quality from Profile 1 to Profile 5, particularly on dimensions like instructional support, making it difficult to tease apart the effects of variations in specific dimensions versus differences in the specific compositions of the profiles. Future studies should compare the effect of individual quality dimensions on child outcomes to the effect of profile membership to gauge the relative benefits of using profile analysis as a more comprehensive means of understanding the range of experiences children have in early care and education settings.

Conclusion

This highly descriptive study of classroom quality through an ecological lens provides a rich, nuanced view of the types of experiences children have in early care and education settings and raises important questions about future investments in these types of programs. Although expanding access to the types of early care and education experiences that produce meaningful gains in children's learning and development is a laudable goal, evidence suggests that the current capacity of the field is limited in providing these types of experiences. In the current study, the most optimal gains were seen in the profile with high levels of quality overall, particularly in the area of instructional supports. However, this profile represented just over 10% of the sample, a figure that is congruent with other research suggesting that few children are receiving levels of early care and education that are of high enough quality to make a meaningful difference (Burchinal et al., 2010; Curby et al., 2009; NICHD ECCRN 2002; Pianta, Hamre, & Downer, 2011). Although more children were in classrooms that at least had levels of quality to support some aspects of development, it is clear that in order for children to grow and develop across all areas of school readiness, it is important that they experience high levels of quality across dimensions of classroom functioning. Furthermore, a substantial proportion of children were in classrooms that provided suboptimal levels of care and education across most dimensions. If resources are focused on expanding access to early care and education without attention to lifting current levels of quality, there is a high likelihood that these patterns will be replicated, resulting in very few children receiving the high-quality experiences that are known to positively affect their learning and development. It is likely that the discrepancies in classroom quality evident in the current study are a result of disparities in resources experienced by teachers, programs, and the children and families they serve. In order to allow more children

to access the types of high-quality care known to be effective in promoting positive changes in children's early learning and development, steps need to be taken to increase the organizational and professional capacity of early care and education programs, particularly those with limited resources.

Landmark studies in early care and education, such as the Abecedarian Project (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001) and Perry Preschool (Nores, Barnett, Belfield, & Schweinhart, 2005), have shown us what is possible when children experience high-quality early childhood education. Indeed, these studies have helped spark a rebranding of the early care and education field from a means of promoting workforce development by providing child care to a key mechanism for building the foundation for children's later success. Early childhood educators are no longer seen as glorified babysitters, but rather as cultivators of young minds, promoters of school readiness, and preventers of the achievement gap. Our current expectations for early childhood educators are tremendous. As is noted in *Eager to Learn*:

> Teachers of young children are being asked to promote high levels of achievement among all children, respond sensitively and appropriately to a wide array of diverse student needs, implement complex pedagogy, have a deep understanding of subject-matter disciplines, engage in serious reflection about their practices, and work collaboratively with colleagues and families. (National Research Council, 2001, p. 261)

However, as these authors go on to say, there is a serious mismatch between the expectations placed on the early childhood workforce and the supports granted to be able to realize the immense opportunities of high-quality early care and education. Therefore, future policy efforts should be directed toward lifting early childhood education quality through providing solid foundational supports to programs and staff. The movement to "professionalize" the field of early childhood education should not be focused solely on stricter measures of teacher qualifications, but rather should include reforms of teacher preparation programs and increased levels of compensation to attract and retain high-quality teachers. Similarly, mandating assessment and data collection systems is not sufficient to promote child gains unless teachers are provided with the tools and supports necessary to use formative assessment in a meaningful way coupled with training in how to provide high-quality instructional experiences and a supportive, relationship-based environment for children and families.

This study demonstrated that classroom quality does not necessarily vary evenly across domains of quality and that teachers have relative strengths and weaknesses. Early childhood education staff should receive systematic, ongoing professional development that targets the key domains of process quality addressed in this study and should be tied to classrooms' relative strengths and weaknesses. Finding innovative ways to share resources across programs and break away from the traditional silos created by the current fragmented "nonsystem" of early care and education has the potential to raise quality. Finally, QRISs may be developed that help infuse resources into the early care and education system, providing incentives for high-quality programs and supports for low-quality programs. Efforts like the current study to more thoroughly understand the complex ecological contexts of early care and education settings will help guide our efforts to best support the learning and development of our youngest children during the critical early years. We have seen what is possible if we invest in high-quality early education programs; now our challenge is to make what is possible what is typical.

References

Abbott-Shim, M., & Sibley, A. (1998). *Assessment profile for early childhood programs. research edition II* . Atlanta, GA: Quality Assist.

Ackerman, D. J., & Coley, R. J. (2012). *State pre-K assessment policies: Issues and status*. Princeton, NJ: Educational Testing Service.

Acock, A. C. (2005). Working with missing values. *Journal of Marriage and Family. Special Issue: Theoretical and Methodological Issues in Studying Families, 67*(4), 1012-1028. doi:10.1111/j.1741-3737.2005.00191.x

Administration for Children and Families. (2002). *A descriptive study of Head Start families: FACES technical report I*. Washington, DC: U.S. Department of Health and Human Services.

Administration for Children and Families, US Department of Health and Human Services. (2011). Justification of estimates for appropriations committees . Retrieved 09/29, 2013, from http://www.acf.hhs.gov/programs/olab/budget/2010/sec3j_cc_2010cj.pdf

Arnett, J. (1989). Caregivers in day-care centers: Does training matter? *Journal of Applied Developmental Psychology, 10*, 541-552.

Arnold, D. H., Zeljo, A., Doctoroff, G. L., & Ortiz, C. (2008). Parent involvement in preschool: Predictors and the relation of involvement to preliteracy development. *School Psychology Review, 37*, 74-90.

Aschbacher, P. R. (1992). Issues in performance assessment staff development. *New Directions for Education Reform, 1*(2), 51-62.

Austin, L. J., Whitebook, M., Connors, M., & Darrah, R. (2011). *Staff preparation, reward, and support: Are quality rating and improvement systems addressing all of the key ingredients necessary for change?* Berkeley, CA: Center for the Study of Child Care Employment, University of California at Berkeley.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman.

Barnett, W. S. (2011). Minimum requirements for preschool teacher educational qualifications. In E. F. Zigler, W. S. Gilliam & W. S. Barnett (Eds.), *The pre-K debates: Current controversies and issues* (pp. 48-54). Baltimore: Brookes.

Barnett, W. S., & Ackerman, D. J. (2011). Public schools as the hub of a mixed-delivery system of early care and education. In E. Zigler, W. S. Gilliam & W. S. Barnett (Eds.), *The pre-K debates: Current controversies and issues* (pp. 126-130). Baltimore: Brookes.

Barnett, W. S., Carolan, M. E., Fitzgerald, J., & Squires, J. H. (2012). *The state of preschool 2012: State preschool yearbook*. New Brunswick, NJ: National Institute for Early Education Research.

Barnett, W. S., Epstein, D. J., Friedman, A. H., Boyd, J. S., & Hustedt, J. T. (2008). *The state of preschool 2008: State preschool yearbook*. New Brunswick, NJ: National Institute for Early Education Research.

Belsky, J., Burchinal, M., McCartney, K., Vandell, D. L., Clarke-Stewart, K. A., Owen, M. T., & NICHD Early Child Care Research Network. (2007). Are there long-term effects of early child care? *Child Development, 78*(2), 681-701. doi:10.1111/j.1467-8624.2007.01021.x

Bishop-Josef, S. J., & Zigler, E. (2011). The cognitive/academic emphasis versus the whole child approach: The 50-year-debate. In E. Zigler, W. S. Gilliam & W. S. Barnett (Eds.), *The pre-K debates: Current controversies & issues* (pp. 83-88)

Blau, D. M. (2000). The production of quality in child-care centers: Another look. *Applied Developmental Science, 4*, 136-148. doi:10.1207/S1532480XADS0403_3

Boyle, K. E. (2011). *Child × environment interactions in early literacy development: Examining the intersection between self-regulation and instructional quality*. Unpublished manuscript.

Bredekamp, S. (2011). Understanding and applying developmentally appropriate practice. *Effective practices in early childhood education: Building a foundation* (pp. 68-92). Princeton, NC: Merrill.

Bromer, J., Paulsell, D., Porter, T., Hnely, J. R., Ramsburg, D., Weber, R. B., & Families and Quality Workgroup Members. (2011). Family-sensitive caregiving: A key component of quality in early care and education arrangements. In M. Zaslow, I. Martinez-Beck, K. Tout & T. Halle (Eds.), *Quality measurement in early childhood settings* (pp. 161-190). Baltimore, MD: Paul H. Brookes.

Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In W. Damon, & R. M. Lerner (Eds.), *Theoretical models of human development. volume 1 of handbook of child psychology* (6th ed.,). Hoboken, NJ: Wiley.

Bryant, D., Burchinal, M., & Zaslow, M. (2011). Empirical approaches to strengthening the measurement of quality: Issues in the development and use of quality measures in research and applied settings. In M. Zaslow, I. Martinez-Beck, K. Tout & T. Halle (Eds.), *Measuring quality in early childhood settings.* Baltimore, MD: Brookes.

Bulotsky-Shearer, R. J., Wen, X., Faria, A., Hahs-Vaughn, D. L., & Korfmacher, J. (2012). National profiles of classroom quality and family involvement: A multilevel examination of proximal influences on head start children's school readiness. *Early Childhood Research Quarterly,* doi:http://dx.doi.org/10.1016/j.ecresq.2012.02.001

Burchinal, M., Kainz, K., & Cai, Y. (2011). How well do our measures of quality predict child outcomes? A meta-analysis and coordinated analysis of data from large-scale studies of early childhood settings. In M. Zaslow, I. Martinez-Beck, K. Tout & T. Halle (Eds.), *Quality measurement in early childhood settings* (pp. 11-31)

Burchinal, M. R., Peisner-Feinberg, E., Bryant, D. M., & Clifford, R. (2000). Children's social and cognitive development and child-care quality: Testing for differential associations related to poverty, gender, or ethnicity. *Applied Developmental Science, 4*, 149-165. doi:10.1207/S1532480XADS0403_4

Burchinal, M. R., Peisner-Feinberg, E., Pianta, R., & Howes, C. (2002). Development of academic skills from preschool through second grade: Family and classroom predictors of developmental trajectories. *Journal of School Psychology, 40*, 415-436. doi:10.1016/S0022-4405(02)00107-3

Burchinal, M., Vandergrift, N., Pianta, R., & Mashburn, A. (2010). Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs. *Early Childhood Research Quarterly*, *25*, 166-176. doi:10.1016/j.ecresq.2009.10.004

California Department of Education. (2010). *Desired Results Developmental Profile – Preschool*. Sacramento, CA: California Department of Education, Child Development Division.

Campbell, F. A., Pungello, E. P., Miller-Johnson, S., Burchinal, M., & Ramey, C. T. (2001). The development of cognitive and academic abilities: Growth curves from an early childhood educational experiment. *Developmental Psychology, 37*(231), 242.

Chien, N. C., Howes, C., Burchinal, M., Pianta, R. C., Ritchie, S., Bryant, D. M., Barbarin, O. A. (2010). Children's classroom engagement and school readiness gains in prekindergarten.

Child Development, 81(5), 1534-1549. doi:http://dx.doi.org/10.1111/j.1467-8624.2010.01490.x

Child Trends. (2010a). *Compendium of quality rating systems and evaluations quality rating systems (QRS) assessment project, 2008-2011. Washington, DC.* Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Planning, Research, and Evaluation.

Child Trends. (2010b). Quality rating and improvement systems for early care and education. *Early Childhood Highlights, 1*, 1-4.

Christenson, S. L. (2000). Families and schools: Rights, responsibilities, resources, and relationships. In R. C. Pianta, & M. J. Cox (Eds.), *The transition to kindergarten* (pp. 143-177). Baltimore, MD: Paul H. Brookes Publishing Co.

Clarke-Stewart, K. A., Lowe Vandell, D., Burchinal, M., O'Brien, M., & McCartney, K. (2002). Do regulable features of child-care homes affect children's development? *Early Childhood Research Quarterly, 17*(1), 52-86. doi:http://dx.doi.org/10.1016/S0885-2006(02)00133-3

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Connor, C. M., Morrison, F. J., & Katch, L. E. (2004). Beyond the reading wars: Exploring the effect of child-instruction interactions on growth in early reading. *Scientific Studies of Reading, 8*, 305-336. doi:10.1207/s1532799xssr0804_1

Connor, C. M., Morrison, F. J., & Slominski, L. (2006). Preschool instruction and children's emergent literacy growth. *Journal of Educational Psychology, 98*, 665-689. doi:10.1037/0022-0663.98.4.665

Connor, C. M., Piasta, S. B., Fishman, B., Glasney, S., Schatschneider, C., Crowe, E., Morrison, F. J. (2009). Individualizing student instruction precisely: Effects of child × instruction interactions on first graders' literacy development. *Child Development, 80*, 77-100. doi:10.1111/j.1467-8624.2008.01247.x

Copple, C., & Bredekamp, S. (2008). *Developmentally appropriate practice in early childhood programs* (3rd ed.). Washington, D. C.: National Association for the Education of Young Children.

Cunningham, A. E. (1990). Explicit versus implicit instruction in phonemic awareness. *Journal of Experimental Child Psychology, 50*, 429-444. doi:10.1016/0022-0965(90)90079-N

Curby, T. W., LoCasale-Crouch, J., Konold, T. R., Pianta, R. C., Howes, C., Burchinal, M., Barbarin, O. (2009). The relations of observed pre-K classroom quality profiles to children's achievement and social competence. *Early Education and Development. Special Issue: Data-Based Investigations of the Quality of Preschool and Early Child Care Environments, 20*(2), 346-372.

Curby, T. W., Rimm-Kaufman, S. E., & Ponitz, C. C. (2009). Teacher–child interactions and children's achievement trajectories across kindergarten and first grade. *Journal of Educational Psychology, 101*, 912-925. doi:10.1037/a0016647

Deming, D. (2009). Early childhood intervention and life-cycle skill development: Evidence from Head Start". *American Economic Journal: Applied Economics,* 1(3): 111-34.

Denham, S. A., Bouril, B., & Belouad, F. (1994). Preschoolers' affect and cognition about challenging peer situations. *Child Study Journal, 24*(1), 24.

Dunn, L., & Dunn, L. (1997). *Peabody picture vocabulary test, third edition (PPVT-III).* Circle Pines, MN: American Guidance Service, Inc.

Early, D. M., Maxwell, K. L., Burchinal, M., Bender, R. H., Ebanks, C., Henry, G. T., Zill, N. (2007). Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. *Child Development, 78*(2), 558-580. doi:10.1111/j.1467-8624.2007.01014.x

Early, D. M., Iruka, I. U., Ritchie, S., Barbarin, O. A., Winn, D. C., Crawford, G. M., Pianta, R. C. (2010). How do pre-kindergarteners spend their time? gender, ethnicity, and income as predictors of experiences in pre-kindergarten classrooms. *Early Childhood Research Quarterly, 25*(2), 177-193. doi:http://dx.doi.org/10.1016/j.ecresq.2009.10.003

Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods, 12*(2), 121-138.

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: SAGE Publications.

Frede, E., Jung, K., Barnett, W. S., & Figueras, A. (2009). *The APPLES blossom: Abbott Preschool Program longitudinal effects study (APPLES) preliminary results through 2nd grade interim report.* New Brunswick, NJ: National Institute for Early Education Research.

Frede, E., Jung, K., Barnett, W. S., Lamy, C., & Figueras, A. (2007). *The Abbott Preschool Program longitudinal effects study (APPLES). report to the new jersey department of education.* New Brunswick, NJ: National Institute for Early Education Research.

Fuligni, A. S., Howes, C., Huang, Y., Hong, S. S., & Lara-Cinisomo, S. (2012). Activity settings and daily routines in preschool classrooms: Diverse experiences in early learning settings for low-income children. *Early Childhood Research Quarterly, 27*(2), 198-209. doi:http://dx.doi.org/10.1016/j.ecresq.2011.10.001

Fuller, B. (2011). College credentials and caring: How teacher training could lift young children. In E. F. Zigler, W. S. Gilliam & W. S. Barnett (Eds.), *The pre-K debates: Current controversies and issues* (pp. 57-63)

Garcia, E. E., & Miller, L. S. (2008). Findings and recommendations of the national task force on early childhood education for Hispanics. *Child Development Perspectives, 2*(2), 53-58. doi:10.1111/j.1750-8606.2008.00042.x

Gormley, W. T., Gayer, T., Phillips, D., & Dawson, B. (2005). The effects of universal pre-K on cognitive development. *Developmental Psychology, 41*(6), 872-884. doi:10.1037/0012-1649.41.6.872

Gresham, F. M., & Elliot, S. N. (1990). *Social skills rating system*. Circle Pines, MN: American Guidance Service.

Guo, Y., Piasta, S. B., Justice, L. M., & Kaderavek, J. (2010). Relations among preschool teachers' self-efficacy, classroom quality and children language and literacy gains. *Teaching and Teacher Education, 26*, 1094-1103. doi:10.1016/j.tate.2009.11.005

Gutman, L. M., Sameroff, A. J., & Cole, R. (2003). Academic growth curve trajectories from 1st grade to 12th grade: Effects of multiple social risk factors and preschool child factors. *Developmental Psychology, 39*, 777-790. doi:10.1037/0012-1649.39.4.777

Halgunseth, L. C., Peterson, A., Stark, D. R., & Moodie, S. (2009). *Family engagement, diverse families, and early childhood education programs: An integrated review of the literature.* Washington DC: National Association for the Education of Young Children.

Halle, T. G., Hair, E. C., Wandner, L. D., & Chien, N. C. (2012). Profiles of school readiness among four-year-old head start children. *Early Childhood Research Quarterly,* doi:http://dx.doi.org/10.1016/j.ecresq.2012.04.001

Harms, T., Clifford, R., & Cryer, D. (1998). *Early childhood environment rating Scale—Revised*. New York: Teachers College Press.

Hart, C., Burts, D., Charlesworth, P., Fleege, P., Ickes, M., & Durland, M. (1990). *The teacher belief scale: Preschool version*. Baton Rouge, LA: Louisiana State University, School of Human Ecology.

Howes, C., Phillips, D. A., & Whitebook, M. (1992). Thresholds of quality: Implications for the social development of children in center-based child care . *Child Development, 63*, 449-460. doi:10.1111/j.1467-8624.1992.tb01639.x

Hyson, M., Vick Whittaker, J. E., Zaslow, M., Leong, D., Bodrova, E., Hamre, B. K., & Smith, S. (2011). Measuring the quality of environmental supports for young children's social and emotional competence. In M. Zaslow, I. Martinez-Beck, K. Tout & T. Halle (Eds.), *Quality measurement in early childhood settings* (pp. 105-134). Baltimore, MD: Brookes.

IBM. (2011). *IBM SPSS missing values 20* IBM Corporation.

Johnson, R. (2010). *School quality and the long-run effects of head start.* Working paper. Berkeley, CA: Goldman School of Public Policy. Justice, L. M., & Kaderavek, J. N. (2004). Embedded–Explicit emergent literacy intervention I: Background and description of approach. *Language, Speech, and Hearing Services in Schools, 35*, 201-211. doi:0161–1461/04/3503–0201

Justice, L. M., Mashburn, A. J., Hamre, B. K., & Pianta, R. C. (2008). Quality of language and literacy instruction in preschool classrooms serving at-risk pupils. *Early Childhood Research Quarterly, 23*, 51–68. doi:10.1016/j.ecresq.2007.09.004

Karoly, L. A., Kilburn, M. R., & Cannon, J. S. (2005). *Early childhood interventions: Proven results, future promise.* Arlington, VA: RAND Corporation.

Khattri, N., Reeve, A. L., & Kane, M. B. (1998). *Principles and practices of performance assessment*. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers, Mahwah, NJ.

Koretz, D., Stecher, B., Klein, S., & McCaffrey, D. (1994). The Vermont portfolio assessment program: Findings and implications. *Educational Measurement: Issues and Practice, 13*(3), 5-16. doi:http://dx.doi.org/10.1111/j.1745-3992.1994.tb00443.x

La Paro, K. M., Thomason, A. C., Lower, J. K., Kintner-Duffy, V. L., & Cassidy, D. J. (2012). Examining the definition and measurement of quality in early childhood education: A review of studies using the ECERS-R from 2003 to 2010. *Early Childhood Research & Practice, 14*(1)

Lamb, M., & Ahnert, L. (2006). Nonparental child care: Context, concepts, correlates and consequences. . In W. Damon, R. M. Lerner, K. A. Renninger & I. E. Sigel (Eds.), *Child psychology in practice: Handbook of child psychology* (6th ed., pp. 664-679). New York: Wiley.

Lambert, R., Abbott-Shim, M., & McCarty, F. (2002). The relationship between classroom quality and ratings of the social functioning of head start children. *Early Child Development and Care, 172*(3), 231-245. doi:http://dx.doi.org/10.1080/03004430212130

Landry, S. H., Crawford, A., Gunnewig, S., & Swank, P. R. (2002). *Teacher behavior rating scale*. Unpublished research instrument: Center for Improving the Readiness of Children for Learning and Education, University of Texas Health Science Center at Houston.

LoCasale-Crouch, J., Konold, T., Pianta, R., Howes, C., Burchinal, M., Bryant, D., Barbarin, O. (2007). Observed classroom quality profiles in state-funded pre-kindergarten programs and associations with teacher, program, and classroom characteristics. *Early Childhood Research Quarterly, 22*, 3-17. doi:10.1016/j.ecresq.2006.05.001

Lonigan, C. J., Schatschneider, C., & Westberg, L. (2008). Impact of code-focused interventions on young children's early literacy skills. *Developing early literacy: Report of the national early literacy panel* (pp. 107-151). Washington, DC: National Institute for Literacy.

Mashburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., Howes, C. (2008). Measures of classroom quality in prekindergarten and children's development of academic, language, and social skills. *Child Development, 79*(3), 732-749.

McDermott, P. A., Green, L. F., Fancis, J. M., & Stott, D. H. (1999). *Learning behaviors scale*. Philadelphia: Edumetric and Clinical Science.

McDermott, P. A., Green, L. F., Francis, J. M., & Stott, D. H. (2000). *Preschool learning behaviors scale*. Philadelphia, PA: Edumetric and Clinical Science.

McDermott, P. A., Leigh, N. M., & Perry, M. A. (2002). Development and validation of the preschool learning behaviors scale. *Psychology in the Schools, 39*, 353-365.

McGee, L. M., & Schickedanz, J. A. (2007). Repeated interactive read-alouds in preschool and kindergarten. *The Reading Teacher, 60*, 742–751. doi:10.1598/RT.60.8.4

McGinty, A. S., Breit-Smith, A., Fan, X., Justice, L. M., & Kadervek, J. N. (2011). Does intensity matter? preschoolers' print knowledge development within a classroom-based intervention. *Early Childhood Research Quarterly, 26*, 255-267. doi:10.1016/j.ecresq.2011.02.002

McWayne, C. M., Hahs-Vaughn, D. L., Cheung, K., & Wright, L. E. G. (2011). National profiles of school readiness skills for head start children: An investigation of stability and change. *Early Childhood Research Quarterly*, doi:http://dx.doi.org/10.1016/j.ecresq.2011.10.002

McWayne, C., Hampton, V., Fantuzzo, J., Cohen, H. L., & Sekino, Y. (2004). A multivariate examination of parent involvement and the social and academic competencies of urban kindergarten children. *Psychology in the Schools, 41*(3), 363-377. doi:http://dx.doi.org/10.1002/pits.10163

Meisels, S. J., Bickel, D. D., Nicholson, J., Xue, Y., & Atkins-Burnett, S. (2001). Trusting teachers' judgments: A validity study of a curriculum-embedded performance assessment in kindergarten to grade 3. *American Educational Research Journal, 38*(1), 73-95. doi:http://dx.doi.org/10.3102/00028312038001073

Mooi, E., & Sarstedt, M. (2011). A concise guide to market research: The process, data, and methods using IBM SPSS statistics. (pp. 237-284). Berlin: Springer-Verlag. doi:10.1007/978-3-642-12541-6_9

Morrow, L. M. (1987). The effect of small group story reading on children's questions and comments. In S. McCormick, & J. Zutell (Eds.), *Cognitive and social perspectives for literacy research and instruction: 37th yearbook of the national reading conference* . Chicago: National Reading Conference.

National Education Association. (2010). *Rankings and estimates: Rankings of the states 2009 and estimates of school statistics, 2010*. Washington, DC: National Education Association.

National Research Council. (2001). In Bowman B. T., Donovan M. S. and Burns M. S. (Eds.), *Eager to learn: Educating our preschoolers*. Washington, D.C.: National Academy Press.

National Research Council. (2008). In Snow C. E., Van Hemel S. B. (Eds.), *Early childhood assessment: Why, what, and how*. Washington, DC: National Academies Press.

Newborg, J. (2005). *Battelle Developmental inventory* (2nd ed.). Itasca, IL: Riverside Publishing.

NICHD Early Child Care Research Network. (2003). Social functioning in first grade: Associations with earlier home and child care predictors and with current classroom experiences. *Child Development, 74*, 1639-1662.

NICHD Early Child Care Research Network. (2006). Child care effect sizes for the NICHD study of early child care and youth development. *American Psychologist, 61*, 99-116.

NICHD Early Child Care Research Network [NICHD ECCRN]. (2000). Characteristics and quality of child care for toddlers and preschoolers. *Applied Developmental Sciences, 4*(116), 135.

NICHD Early Child Care Research Network, & Duncan, G. J. (2003). Modeling the impacts of child care quality on children's preschool cognitive development. *Child Development, 74*, 1454–1475.

Nores, M., Barnett, W. S., Belfield, C. R., & Schweinhart, L. J. (2005). Updating the economic impacts of the High/Scope Perry Preschool Program. *Educational Evaluation and Policy Analysis, 27*, 245-262.

Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kagan, S. L., & Yazejian, N. (2001). The relation of preschool child-care quality to children's cognitive and social developmental trajectories through second grade. *Child Development, 72*(5), 1534-1553. doi:10.1111/1467-8624.00364

Phillips, B. M., Clancy-Menchetti, J., & Lonigan, C. J. (2008). Successful phonological awareness instruction with preschool children: Lessons from the classroom. *Topics in Early Childhood Special Education, 28*, 3-17. doi:10.1177/0271121407313813

Phillips, D. A., & Howes, C. (1987). Indicators of quality in child care: Review of research. In D. A. Phillips (Ed), *Quality in child care: What does research tell us?* Research Monograph of the National Association for the Education of Young Children: Vol. 1. Washington, DC: NAEYC.

Phillips, D., Mekos, D., Scarr, S., McCartney, K., & Abbott–Shim, M. (2000). Within and beyond the classroom door: Assessing quality in child care centers . *Early Childhood Research Quarterly, 15*(4), 475-496. doi:10.1016/S0885-2006(01)00077-1

Phillipsen, L., Burchinal, M., Howes, C., & Cryer, D. (1997). The prediction of process quality from structural features of child care. *Early Childhood Research Quarterly, 12*(281), 304. doi:10.1016/S0885-2006(97)90004-1

Piaget, J. (1952). *Play, dreams and imitation in childhood*. New York, NY, US: W W Norton & Co.

Pianta, R. C., Hamre, B. K., & Downer, J. (2011). Aligning measures of quality with professional development goals and goals for children's development. In M. Zaslow, I. Martinez-Beck., K. Tout & T. Halle (Eds.), *Quality measurement in early childhood settings* (pp. 297-315)

Pianta, R. C., Howes, C., Burchinal, M., Bryant, D., Clifford, R., Early, D., & Barbarin, O. (2005). Features of pre-kindergarten programs, classrooms, and teachers: Do they predict observed classroom quality and child-teacher interactions? *Applied Developmental Science, 9*, 144-159. doi:10.1207/s1532480xads0903_2

Pianta, R. C., La Paro, K. M., Payne, C., Cox, M. J., & Bradley, R. (2002). The relation of kindergarten classroom environment to teacher, family, and school characteristics and child outcomes. *Elementary School Journal, 102*, 225-238. doi:10.1086/499701

Pianta, R. C., La Paro, K., & Hamre, B. K. (2008). *Classroom assessment scoring system*. Baltimore: Paul H. Brooks.

Piasta, S. B., & Wagner, R. K. (2010). Developing early literacy skills: A meta-analysis of alphabet learning and instruction. *Reading Research Quarterly, 45*(1), 8-38. doi:http://dx.doi.org/10.1598/RRQ.45.1.2

Preschool Curriculum Evaluation Research Consortium. (2008). *Effects of preschool curriculum programs on school readiness.* (No. NCER 2008-2009). Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education Government Printing Office.

Rose, E. (2007). Where does preschool belong? preschool policy and public education, 1965-present. In C. F. Kaestle, & A. E. Lodewick (Eds.), *To educate a nation: Federal and national strategies of school reform* (pp. 281-303). Lawrence: University of Kansas Press.

Scarr, S., Eisenberg, M., & Deater-Deckard, K. (1994). Measurement of quality in child care centers . *Early Childhood Research Quarterly, 9*(2), 131-151. doi:10.1016/0885-2006(94)90002-7

Sheskin, D. (2003). *The handbook of parametric and nonparametric statistical procedures*. Boca Raton, FL: CRC Press.

Singer, D. G., Golinkoff, R. M., & Hirsh-Pasek, K. (Eds.). (2006). *Play = learning: How play motivates and enhances children's cognitive and social-emotional growth*. New York, NY, US: Oxford University Press.

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21*, 360-407. doi:10.1598/RRQ.21.4.1

Stoney, L. (2009). *Shared services: A new business model to support scale and sustainability in early care and education.* Greenwood Village, CO: Early Learning Ventures.

Stuhlman, M. W., & Pianta, R. C. (2009). Profiles of educational quality in first grade. *The Elementary School Journal, 109*, 323-342. doi:10.1086/593936

The White House, Office of the Press Secretary. (2013). Fact sheet: President Obama's plan for early education for all Americans. Retrieved 09/24, 2013, from http://www.whitehouse.gov/the-press-office/2013/02/13/fact-sheet-president-obama-s-plan-early-education-all-americans

Tout, K., Zaslow, M., & Berry, D. (2006). Quality and qualifications: Links between professional development and quality in early care and education settings. In M. Zaslow, & I. Martinez-Beck (Eds.), *Critical issues in early childhood professional development*. Baltimore, MD: Brookes.

Statutory degree and credentialing requirements for head start teaching staff, ACF-IM-HS-08-12 (2008).

U.S. Department of Health and Human Services. (2009). *2008-09 head start program information report*. Washington, DC: Administration of Children and Families.

Vandell, D. L. (2004). Early child care: The known and the unknown. *Merrill-Palmer Quarterly: Journal of Developmental Psychology. Special Issue: The Maturing of the Human Developmental Sciences: Appraising Past, Present, and Prospective Agendas, 50*, 387-414. doi:10.1353/mpq.2004.0027

Vandell, D. L., Belsky, J., Burchinal, M., Steinberg, L., Vandergrift, N., & NICHD Early Child Care Research Network. (2010). Do effects of early child care extend to age 15 years? Results from the NICHD study of early child care and youth development. *Child Development, 81*(3), 737-756. doi:10.1111/j.1467-8624.2010.01431.x

VanDerHeyden, A. M., Snyder, P. A., Broussard, C., & Ramsdell, K. (2008). Measuring response to early literacy intervention with preschoolers at risk. *Topics in Early Childhood Special Education, 27*(4), 232-249. doi:10.1177/0271121407411240

Vu, J. A., Jeon, H., & Howes, C. (2008). Formal education, credential, or both: Early childhood program classroom practices. *Early Education and Development, 19*(3), 479-504. doi:10.1080/10409280802065379

Vukelich, C. (1990). Where's the paper? Literacy during dramatic play. *Childhood Education, 66*, 205-209. doi:10.1080/00094056.1990.10522520

Vygotsky, L. S. (1967). Play and its role in the mental development of the child. *Soviet Psychology, 5*(3), 6-18.

Vygotsky, L. S. (1978). In Cole M., John-Steiner V., Scribner S. and Souberman E. (Eds.), *Mind in society* (M. Cole, V. John-Steiner, S. Scribner & E. Souberman Trans.). Cambridge, MA: Harvard University Press.

Walberg, H. J., & Tsai, S. (1983). Matthew effects in education. *American Educational Research Journal, 20*, 359-373. doi:10.2307/1162605

Wasik, B. (2008). When fewer is more: Small groups in early childhood classrooms. *Early Childhood Education Journal, 35*(6), 515-521. doi:http://dx.doi.org/10.1007/s10643-008-0245-4

West, J., Denton, K., & Germino-Hausken, E. (2000). *America's kindergartners.* (No. NCES 2000-070). Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Whitebook, M., & Ryan, S. (2011). *Degrees in context: Asking the right questions about preparing skilled and effective teachers of young children.* (No. Preschool Policy Brief, 22). New Brunswick, NJ: National Institute for Early Education Research.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock Johnson Achievement Test – third edition (WJ-III)*. Itasca, IL: Riverside Publishing Company.

Xu, Y., & Filler, J. (2008). Facilitating family involvement and support for inclusive education. *The School Community Journal, 18*(2), 53-71.

Zaslow, M., Tout, K., Halle, T., Vick Whittaker, J., & Lavelle, B. (2010). *Toward the identification of features of effective professional development for early childhood educators.* Washington, D.C.: US. Department of Education. Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service.

Zaslow, M., Tout, K., & Martinez-Beck, I. (2010). *Measuring the quality of early care and education programs at the intersection of research, policy, and practice.* (No. OPRE Research-to- Policy, Research-to-Practice Brief OPRE 2011-10a). Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

Table 1

Teachers' Major, ECE Credits, Experience, and Salary by Highest Educational Degree

	No college *n* = 53 (19.4%)	Associate's *n* = 40 (14.1%)	Bachelor's *n* = 133 (46.9%)	Master's *n* = 57 (20.1%)	Total (% of sample; sample mean)
Major					
Child Development	0.0%	17.5%	3.8%	3.5%	4.9%
Early Childhood Education	0.0%	57.5%	24.1%	40.4%	27.6%
Elementary Education	0.0%	0.0%	33.1%	21.1%	19.8%
Other	0.0%	25.0%	37.6%	35.1%	28.3%
No College	100.0%	0.0%	0.0%	0.0%	19.4%
6+ Units of ECE	0.0%	100.0%	84.2%	93.0%	89.1%
Years of Preschool Experience *Mean* (*SD*)	8.25 (6.80)	10.08 (6.31)	7.16 (6.46)	9.40 (6.39)	8.23 (6.55)
Salary (in thousands) *Mean* (*SD*)	20.64 (7.80)	30.70 (14.15)	41.83 (15.29)	58.29 (23.64)	39.50 (20.27)

Table 2

Bivariate Correlations Among Classroom Quality Dimensions

Measure	*EC*	*OL*	*PK*	*MC*	*LF*	*AP*	*SF*
Emotional Climate (EC)	---	.70**	.38**	.40**	.60**	.33*	.13*
Oral Language Instruction (OL)		---	.61**	.59**	.54**	.32**	.18**
Print Knowledge Instruction (PK)			---	.49**	.41**	.31**	.13*
Math Concepts Instruction (MC)				---	.33**	.22**	.16**
Learning Formats (LF)					---	.39**	.16**
Assessment Practices (AP)						---	.11†
Support for Families (SF)							---

Note. † $p < .10$; * $p < .05$; ** $p < .01$

Table 3

Bivariate Correlations Among Continuous Teacher Background Variables and Classroom Quality Dimensions

Measure	*EC*	*OL*	*PK*	*MC*	*LF*	*AP*	*SF*
Teacher Age	.001	.071	-.014	.091	.030	.052	.050
Years Teaching Preschool	.025	.080	-.017	.146*	.036	.042	.119*
Teacher Salary	.044	.213**	.123*	.254**	.029	-.081	.037
Teacher Beliefs	.371**	.384**	.271**	.257**	.284**	.253**	.148
Teacher Self-Efficacy	.238**	.197**	.096	.144*	.189**	.093	-.024

Note. $^{\dagger}p < .10$; * $p < .05$; ** $p < .01$. *EC* = Emotion Climate; *OL* = Oral Language; *PK* = Print Knowledge; *LF* = Learning Formats; *AP* = Assessment Practices; *SF* = Support for Families.

Table 4

Bivariate Correlations Among Preschool Child Outcomes and Classroom Quality Dimensions

Measure	*EC*	*OL*	*PK*	*MC*	*LF*	*AP*	*SF*
Child Oral Language (*PPVT*)	.056**	.143**	.038	.076**	-.023	-.051**	.009
Child Print Knowledge (*WJ-III – Letter–Word ID*)	-.017	.084**	.154**	.073**	-.043*	-.059**	-.022
Child Math (*WJ-III Applied Problems*)	.022	.071**	-.002	.060**	-.074**	-.127**	-.061**
Child Social Competence (*SSRS*)	.135**	.120**	.082**	.072**	.056**	.024	.055**
Child Approaches to Learning (*PLBS*)	.107**	.146**	.083**	.088**	.057**	-.020	.060**

Note. † $p < .10$; * $p < .05$; ** $p < .01$. *EC* = Emotion Climate; *OL* = Oral Language; *PK* = Print Knowledge; *LF* = Learning Formats; *AP* = Assessment Practices; *SF* = Support for Families.

Table 5

Bivariate Correlations Among Continuous Teacher Background Variables

Measure	Age	Years Exper.	Salary	Beliefs	Self-Efficacy	Adult: Child Ratio
Teacher Age	---	.583**	.232**	.073**	.047*	-.019
Years Teaching Preschool		---	.137**	.065*	.077**	.066**
Teacher Salary			---	.183**	-.029	.121**
Teacher Beliefs				---	.163**	-.245**
Teacher Self-Efficacy					---	-.032

Note. † $p < .10$; * $p < .05$; ** $p < .01$.

Table 6

Bivariate Correlations Among Child Outcomes and Teacher/Program Background Variables

Measure	*Age*	*Years Exper.*	*Salary*	*Beliefs*	*Self-Efficacy*	*Adult: Child Ratio*
Child Oral Language (*PPVT*)	-.027	-.010	.045*	.063*	.044*	.092**
Child Print Knowledge (*WJ-III – Letter – Word ID*)	.010	-.032	.128**	-.057*	.013	.153**
Child Math (*WJ-III Applied Problems*)	-.024	-.034	.064**	.018	.035	.140**
Child Social Competence (*SSRS Social Skills*)	-.055**	.027	.055**	.124**	.133**	.069**
Child Approaches to Learning (*PLBS*)	.015	.114**	.092**	.092**	.127**	.093**

Note. † $p < .10$; * $p < .05$; ** $p < .01$.

Table 7

Bivariate Correlations Among Preschool Child Outcomes

Measure	*PPVT*	*LWID*	*AP*	*SSRS*	*PLBS*
Child Oral Language (*PPVT*)	---	.386**	.628**	.244**	.250**
Child Print Knowledge (*WJ-III Letter –Word ID*)		---	.538**	.194**	.265**
Child Math (*WJ-III Applied Problems*)			---	.283**	.312**
Child Social Competence (*SSRS Social Skills*)				---	.719**
Child Approaches to Learning (*PLBS*)					---

Note. † $p < .10$; * $p < .05$; ** $p < .01$.

Table 8

Profile Mean Scores (SD) of Classroom Quality Dimensions and Comparisons Across Profiles

Measure	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Total Sample
N	35	71	86	32	59	283
Emotional Climate	85.29[a]	81.53[a]	77.13[b]	69.09[c]	52.11[d]	73.12
	(5.00)	(6.15)	(6.67)	(12.15)	(11.07)	(14.23)
Oral Language Instruction	5.33[a]	4.66[b]	3.54[c]	2.72[d]	2.13[e]	3.65
	(0.65)	(0.81)	(0.96)	(1.01)	(0.91)	(1.40)
Print Knowledge Instruction	4.23[a]	3.36[b]	2.20[c]	1.96[c]	2.09[c]	2.70
	(1.03)	(0.84)	(0.73)	(0.74)	(0.83)	(1.14)
Math Concepts Instruction	4.54[a]	2.62[b]	2.27[c]	1.84[d]	1.90[d]	2.51
	(0.78)	(0.78)	(0.68)	(0.71)	(0.70)	(1.09)
Learning Formats	16.00[b]	17.55[a]	12.83[c]	11.09[c]	8.05[d]	13.21
	(3.49)	(2.73)	(3.37)	(3.39)	(2.92)	(4.65)
Assessment Practices	4.54[b]	2.62[a]	2.27[c]	1.84[c,d]	1.90[d]	2.51
	(0.78)	(0.78)	(0.68)	(0.71)	(0.70)	(1.09)
Support for Families	26.16[a,b]	25.84[b]	26.46[a]	22.79[c]	25.83[b]	25.72
	(0.92)	(1.27)	(0.93)	(1.21)	(1.18)	(1.54)

Note. *ANOVA* pairwise significant differences are denoted by superscript letters ‘a’–‘e’

Table 9

Significant mean (SD) Differences Among Continuous Teacher and Program Characteristics by Profile

Background Variable	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	*F*-value
Teacher Age	40.66[a]	41.44[a]	41.63[a]	37.71[a]	41.41[a]	0.90
	(9.77)	(9.76)	(11.50)	(11.32)	(10.54)	
Teacher Preschool Experience	7.94[a]	8.63[a]	8.66[a]	6.66[a]	8.12[a]	0.64
	(5.07)	(6.27)	(7.56)	(6.88)	(5.88)	
Teacher Salary (in thousands)	44.56[a]	39.56[a,b]	41.32[a,b]	31.96[b]	38.21[a,b]	1.91[†]
	(16.68)	(18.92)	(21.77)	(21.95)	(20.24)	
Teacher Beliefs	62.84[a]	63.58[a]	59.84[a,b]	57.95[b]	57.42[b]	6.19***
	(4.90)	(3.82)	(4.72)	(5.61)	(6.04)	
Teacher Self-Efficacy	4.75[a]	4.68	4.51	4.47	4.43[b]	3.11*
	(0.36)	(0.49)	(0.57)	(0.67)	(0.59)	
Child–Adult Ratio	8.17[b,c]	6.29[a]	7.19[a,b]	7.53[a,b,c]	9.19[c]	6.86***
	(3.57)	(2.83)	(2.49)	(2.33)	(4.75)	

Note. [†] $p < .10$; * $p < .05$; ** $p < .01$. *ANOVA* pairwise significant differences are denoted by superscript letters ‘a’–‘e’

Table 10

Differences Among Categorical Teacher and Program Characteristics by Profile

Background Variable	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	χ^2-value
Teacher Highest Degree						
No College (%)	2.9[c]	14.1[b,c]	17.4[a,b]	28.1[a,b]	30.5[a]	14.13**
Associate's Degree (%)	8.6[a]	12.7	14.0	21.9	15.3	2.66
Bachelor's Degree (%)	77.1[a]	49.3[b]	40.7[b]	40.6[b]	39.0[b]	16.33**
Master's Degree (%)	11.4[a, b]	23.9[a,b]	27.9[b]	9.4[a]	15.3[a, b]	8.70[†]
Highest Degree with ECE Major						
Associate's Degree	27.3[a]	30.4[a]	31.0[a]	50.0[a]	33.3[a]	1.33
Bachelor's Degree	54.5[a]	34.8[a]	31.0[a]	50.0[a]	47.6[a]	3.04
Master's Degree	18.2[a]	34.8[a]	37.9[a]	0.0[a]	19.0[a]	6.50
Major within Bachelor's Degree						
ECE Major	22.2[a]	25.7[a]	27.3[a]	30.8[a]	43.5[a]	3.35
Education Major (non-ECE)	48.1[a]	34.3[a]	33.3[a]	46.2[a]	26.1[a]	3.65
Other Major	29.6[a]	40.0[a]	39.4[a]	23.1[a]	30.4[a]	1.77
Program Type						
Public Pre-K	80.0[a]	74.6[a]	59.3[b]	34.4[c]	49.2[b,c]	9.43*
Private Child Care	0.0[c]	5.6[c]	7.0[b,c]	28.1[a]	16.9[a,b]	8.91*
Head Start	20.0[a]	19.7[a]	33.7[a]	37.5[a]	33.9[a]	4.76
Length of Program Day						
Full-Day	85.2[a]	88.6[a]	85.7[a]	100.0[a]	87.0[a]	2.18

Note. [†] $p < .10$; * $p < .05$; ** $p < .01$, *** $p < .001$. Chi-square pairwise significant differences are denoted by superscript letters

Table 11

Multilevel model examining relationship between profile classification and preschool spring child outcomes

	PPVT		W-J Letter-Word ID		W-J Applied Pblms		SSRS Social Skills		PLBS App to Lng	
	β	SE	β	SE	β	SE	β	SE	β	SE
Fixed effects										
Intercept (β_{0j})	99.39***	0.99	101.13***	1.21	100.57***	1.16	105.60***	1.54	104.84***	1.50
Child and Family Demographics										
Child age	-0.07*	0.33	-0.31***	0.04	-0.13**	0.04	0.10*	0.04	0.21***	0.04
Child is male	-0.27	0.25	-0.99***	0.28	-0.96**	0.29	-0.65*	0.27	-2.21***	0.29
Child is Black	-1.08**	0.38	0.03	0.45	-0.78†	0.44	0.24	0.47	0.44	0.47
Child is Hispanic	-0.85†	0.48	-0.35	0.55	-0.42	0.58	0.31	0.57	1.04†	0.57
Child is other ethnicity	-0.41	0.53	0.06	0.64	1.06	0.65	0.19	0.61	0.58	0.61
English is primary language	1.47**	0.52	-0.36	0.58	0.38	0.61	-0.25	0.59	-0.50	0.60
Child's fall score	0.73***	0.15	0.64***	0.02	0.62***	0.02	0.65***	0.02	0.64***	0.02
Maternal education > HS	0.79**	0.27	0.76*	0.30	1.78***	0.31	0.35	0.30	0.25	0.31
Household income	0.02**	0.01	0.02*	.01	0.02*	0.01	0.01	0.01	0.02*	0.01
Teacher/Program Demographics										
Teacher age	0.02	0.02	-0.01	0.02	0.01	0.02	-0.03	0.03	-0.03	0.03
Teacher is Black	-0.69†	0.42	0.13	0.54	-0.55	0.49	-1.12	0.72	-1.01	0.68
Teacher is other ethnicity	-0.92†	0.51	-0.10	0.66	-0.89	0.61	-2.35**	0.87	-1.77*	0.84
Teacher experience	-0.02	0.03	-0.05	0.04	-0.33	0.03	0.02	0.05	-0.08	0.05
Teacher education ≥ BA	0.77†	0.45	0.10	0.58	0.93†	0.52	-0.10	0.79	-0.35	0.76
Teacher salary	-0.01	0.01	0.03*	0.01	-0.01	0.01	-0.01	0.02	0.01	0.02
Head Start program	0.77†	0.47	-0.58	0.60	-0.60	0.54	-0.75	0.83	-0.90	0.79
Child Care program	-0.17	0.66	-1.22	0.86	0.07	0.77	-0.93	1.18	-0.01	1.12
Adult–child ratio	0.13**	0.05	0.19**	0.06	0.19**	0.05	0.14	0.09	0.12	0.08
Full-day program	0.29	0.55	3.08***	0.68	-0.31	0.65	-3.46***	0.93	-1.29	0.89
Profile Membership										
Profile 2	-0.50	0.54	-3.02***	0.70	-1.46*	0.63	-0.95	0.97	-1.27	0.92
Profile 3	-1.38**	0.52	-3.85***	0.67	-0.86	0.61	-0.70	0.93	-1.58	0.89
Profile 4	-1.25*	0.66	-4.75***	0.85	-0.09	0.78	-2.43*	1.18	-3.63***	1.12
Profile 5	-1.16*	0.56	-3.37***	0.73	-1.27†	0.66	-3.12**	1.01	-2.88*	0.96
Random Effects										
Level-1	33.83***	1.05	40.55***	1.26	43.75***	1.36	40.86***	1.27	41.48***	1.29
Level-2	1.92***	0.54	5.40***	0.90	2.98***	0.72	16.44***	1.81	13.36***	1.61

Note. † $p < .10$; * $p < .05$; ** $p < .01$, *** $p < .001$.

Table 12

Estimated profile means for preschool spring with multiple comparisons for each outcome

	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5
Pre-K PPVT	101.42[a]	100.77[a,b]	99.82[c]	99.99[b,c]	100.09[b,c]
Pre-K WJ-J Letter-Word ID	101.28[a]	98.48[b]	97.58[b]	96.55[b]	98.11[b]
Pre-K WJ-Applied Problems	100.70[a]	99.14[b]	99.80[a,b]	100.47[a,b]	99.27[b]
Pre-K SSRS Social Skills	101.50[a]	100.52[a,b]	100.78[a,b]	99.03[b,c]	98.36[c]
Pre-K PLBS Approaches to Lng	102.01[a]	100.77[a,b]	100.47[a,b]	98.40[c]	99.15[b,c]

Note. Values represent male, White, English-speaking children, with mother's education greater than high school, with average fall scores and average household income.

Table 13

Multilevel model examining relationship between profile classification and kindergarten spring child outcomes

	PPVT (K)		W-J Letter-Word (K)		W-J App. Pblms (K)		SSRS Soc. Skills (K)		LBS ATL (K)	
	β	SE	β	SE	β	SE	β	SE	β	SE
Fixed effect										
Intercept (β_{0j})	96.60***	1.31	109.64***	1.74	102.87***	1.55	101.39***	2.34	99.69***	2.23
Child and Family Demographics										
Child age	-0.34***	0.05	-0.84***	0.06	-0.25***	0.06	0.33***	0.07	0.51***	0.07
Child is male	0.27	0.24	-1.21**	0.43	-0.45	0.44	-2.64***	0.51	-5.47***	0.54
Child is Black	-1.05*	0.52	0.03	0.65	-1.26*	0.59	-0.98	0.83	-0.38	0.83
Child is Hispanic	-1.21†	0.72	-0.69	0.92	-0.13	0.83	1.37	1.05	0.06	1.05
Child is other ethnicity	0.52	0.72	-0.20	0.88	0.18	0.84	-1.08	-0.97	-0.67	1.15
English is primary language	1.56*	0.73	2.64**	0.89	-1.70*	0.83	-0.05	1.08	-2.04†	1.10
Child's fall score	0.85***	0.02	0.67***	0.03	0.70***	0.03	0.53***	0.03	0.48***	004
Maternal education > HS	0.87*	0.80	1.34**	0.45	1.47***	0.44	1.84***	0.56	1.90***	0.58
Household income	0.04***	0.01	0.04***	0.01	0.04***	0.01	0.04***	0.01	0.05	0.01
Teacher/Program Demographics										
Teacher age	0.16	0.02	-0.28	0.03	-0.36	0.03	0.07	0.05	0.02	0.04
Teacher is Black	-1.64**	0.55	-0.27	0.75	-0.78	0.64	-1.03	1.03	-0.34	0.95
Teacher is other ethnicity	-1.68*	0.69	-1.37	0.94	-1.34	0.82	-0.85	1.27	-0.95	1.17
Teacher experience	-0.03	0.04	-0.01	0.05	0.02	0.04	-0.08	0.07	-0.06	0.07
Teacher education ≥ BA	0.40	0.58	0.87	0.80	0.84	0.68	-1.01	1.12	-0.05	1.03
Teacher salary	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.03	0.02	0.02
Head Start program	1.05†	0.60	0.90	0.83	0.66	0.70	-0.72	1.18	0.54	1.08
Child Care program	0.03*	0.84	0.60	1.16	1.90†	1.01	0.04	1.67	1.09	1.52
Adult–child ratio	0.14*	0.06	0.28**	0.09	0.13	0.08	0.23†	0.12	0.31**	0.11
Full-day program	-1.22†	0.71	-0.63	0.97	-2.03*	0.86	-0.20	1.35	-1.47	1.24
Profile Membership										
Profile 2	-2.01**	0.68	0.27	0.96	-1.07	0.84	-0.10	1.37	-1.47	1.24
Profile 3	-1.76**	0.65	-0.29	0.93	-0.24	0.81	0.61	1.32	-1.52	1.24
Profile 4	-1.55*	0.83	-1.93†	1.18	-1.17	1.02	0.10	1.67	-0.45	1.20
Profile 5	-1.01*	0.72	-1.65	1.01	-1.19*	0.87	-0.16	1.43	-0.85	1.30
Random Effects										
Level-1	66.94***	2.09	88.24***	2.75	86.54***	2.68	138.54***	4.32	67.56***	2.10
Level-2	2.34***	0.96	7.17***	1.62	4.66***	1.28	21.37***	3.41	5.81***	1.22

Note. † $p < .10$; * $p < .05$; ** $p < .01$, *** $p < .001$.

Table 14

Estimated profile means for kindergarten spring with multiple comparisons for each outcome

	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5
Kgtn. PPVT	97.41[a]	95.02[b]	95.28[b]	95.33[b]	95.56[b]
Kgtn WJ-J Letter-Word ID	107.87[a,b]	107.94[a]	107.28[a,b]	105.18[c]	105.77[b,c]
Kgtn WJ-Applied Problems	100.61[a,b]	99.05[b,c]	99.99[b,c]	99.10[b,c]	99.01[c]
Kgtn SSRS Social Skills	99.37[a,b]	98.09[b]	99.97[a]	99.39[a,b]	98.78[a,b]
Kgtn LBS	94.60[a]	92.73[a]	94.23[a]	93.10[a]	93.55[a]

Note. Values represent male, White, English-speaking children, with mother's education greater than high school, with average fall scores and average household income.

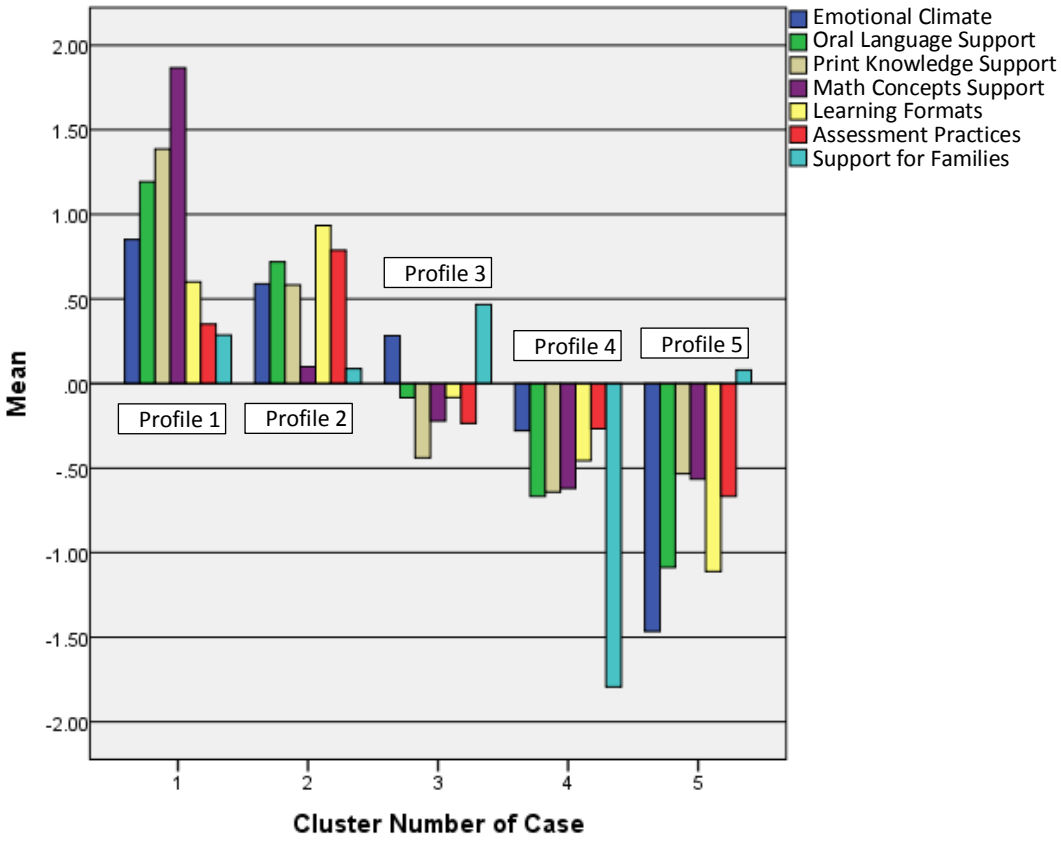

Figure 1. Profile *z*-scores on each of the dimensions. *Profile 1* = high instructional support, above average quality overall; *Profile 2* = high individualization, above average quality overall; *Profile 3* = relationship-focused, below average instructional and individualizing support; *Profile 4* = low support for families, below average quality overall; *Profile 5* = low positive interactions, below average quality overall, average support for families.

Appendix A

Measures and Items for Classroom Quality Dimensions.

Emotional Climate		Scale
Arnett Caregiver Interaction Scale (CIS)	**Detachment Scale** (Items #5, 13, 21, 23) Seems distant or detached from children (R) Spends time in activity not interacting with children (R) Not interested in children's activities Doesn't supervise children closely	1 = Very much 2 = Quite a bit 3 = Somewhat 4 = Not at all
	Positive Interaction Scale (Items #1, 3, 6, 7, 8, 11, 14, 16, 19, 25) Speaks warmly to children Listens attentively when children speak Seems to enjoy the children When children misbehave, explains reason for rule Encourages children to try new experiences Seems enthusiastic about children's activities Pays positive attention to children as individuals Talks to children on level they understand Encourages children to exhibit prosocial behavior When talking establishes eye contact	1 = Not at all 2 = Somewhat 3 = Quite a bit 4 = Very much
	Harshness Scale (Items #2, 4, 10, 12, 17, 20, 22, 24, 26) Seems critical of children Places high value on obedience Speaks with irritation or hostility to children Threatens children in trying to control Punishes children without explanation Finds fault easily with children Prohibits many things children want to do Expects children to exercise self-control Unnecessarily harsh when scolding	1 = Very much 2 = Quite a bit 3 = Somewhat 4 = Not at all
Learning Formats		**Scale**
Early Childhood Environment Rating Scale–Revised Edition (ECERS–R)	**Program Structure** 1.1 Schedule is *either* too rigid or too flexible 3.1 Basic daily schedule exists that is familiar to children 3.2 Written schedule is posted in room and relates generally to what occurs 3.3 At least one indoor and one outdoor play period daily 3.4 Both gross motor and less active play occur daily 5.1 Schedule provides balance of structure and flexibility 5.2 A variety of play activities, some teacher-directed and some child initiated 5.3 A substantial portion of the day is used for play activities 5.4 No long period of waiting during transitions between daily events 7.1 Smooth transitions between daily events 7.2 Variations made in schedule to meet individual needs	1 = Inadequate 2 3 = Minimal 4 5 = Good 6 7 = Excellent

	Free Play 1.1 *Either* little opportunity for free play *or* much of day spent in unsupervised free play 1.2 Inadequate toys, games, and equipment provided for children to use in free play. 3.1 Some free play occurs daily indoors and outdoors 3.2 Supervision provided to protect children's health and safety 3.3 Some toys, games, and equipment accessible for children to use in free play 5.1 Free play occurs for a substantial portion of the day both indoors and outdoors 5.2 Supervision provided to facilitate children's play 5.3 Ample and varied toys, games, and equipment provided for free play 7.1 Supervision used as an educational interaction 7.2 New materials/experiences for free play added periodically	1 = Inadequate 2 3 = Minimal 4 5 = Good 6 7 = Excellent
	Group Times 1.1 Children kept together as whole group most of the day 1.2 Very few opportunities for staff to interact with individual children or small groups 3.1 Some play activities done in small groups or individually 3.2 Some opportunity for children to be a part of self-selected small groups 5.1 Whole-group gatherings limited to short periods, suited to age and individual needs of children 5.2 Many play activities done in small groups or individually 5.3 Some routines done in small groups or individually 7.1 Different groupings provide a change of pace throughout the day 7.2 Staff engage in educational interaction with small groups and individual children as well as with the whole group 7.3 Many opportunities for children to be a part of self-selected small groups	1 = Inadequate 2 3 = Minimal 4 5 = Good 6 7 = Excellent
Instructional Practices		**Scale**
Teacher Behavior Rating Scale	**Oral Language (Quantity & Quality)** Grammatically correct speech Express ideas in sentences Uses scaffolding language Thinking questions are asked Relates previously learned words/concepts Opportunities to talk to adults Conversation with multiple turns	**Quantity** 0 = Never 1 = Rarely 2 = Sometimes 3 = Often **Quality** 0 = Never 1 = Low 2 = Average 3 = High

	Print and Letter Knowledge (Quantity & Quality) Activities that promote letter/word knowledge Opportunities to compare letters Discussion of concepts of print Learning centers with literacy connections Environmental print Letter wall	**Quantity** 0 = Never 1 = Rarely 2 = Sometimes 3 = Often **Quality** 0 = Never 1 = Low 2 = Average 3 = High
	Math Concepts (Quantity & Quality) Hands-on math Math incorporated into daily routine Specific math materials present Variety of math materials present Math-oriented talk Mathematical work on display Teachable moments to develop math ideas Math discussions encouraged	**Quantity** 0 = Never 1 = Rarely 2 = Sometimes 3 = Often **Quality** 0 = Never 1 = Low 2 = Average 3 = High
Assessment Practices		**Scale**
Assessment Profile	**Individualizing Subscale** (select items) Portfolio available for each child System for summarizing child abilities available System used to summarize abilities and interests Information from system used to group child by need Information from system used to plan specific activities Information from assessments used to plan activities	0 = No 1 = Yes
Support for Families		**Scale**
	Since your child started the preschool program, how satisfied are you with how well the preschool is… Being open to your ideas and participation? Supporting and respecting your family's culture and background? Identifying and helping to provide services that help your family (e.g., public assistance, transportation, job training)? Helping you become more involved in groups that are active in your community?	1 = Very Dissatisfied 2 = Somewhat Dissatisfied 3 = Somewhat Satisfied 4 = Very Satisfied
	How often is your child's teacher… Open to new information and learning? Supportive of you as a parent? Welcoming to you as a parent?	1 = Never 2 = Sometimes 3 = Often 4 = Always