The Children of the Cost, Quality, and Outcomes Study Go To School

Technical Report

October 1999

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Dedication

We dedicate this work to the memory of Mary Culkin and Leslie Phillipsen. These two outstanding women were integral members of our research team from its inception. Through their brilliant and caring work, they helped improve the lives of children today and of future generations as well. We miss them greatly.

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Summary

In recent years there has been increasing interest in the effects of preschool experiences—especially child care—on children's later performance in school. A substantial majority of preschoolers now participate in some form of child care before coming to school (West, Wright, & Hausken, 1995). The Cost, Quality, and Child Outcomes in Child Care Centers Study, begun in 1993, was designed in part to examine the influence of typical center-based child care on children's development during their preschool years and then subsequently as they moved into the formal elementary education system. We have now followed these children through the end of second grade, four years after our initial contact with them when they were nearing the end of their next-to-last year in child care. The overall findings can be summarized in a few broad statements about the influence of center-based child care in America on children.

- **High quality child care is an important element in achieving the national goal of having all children ready for school.**

  Our findings showed that the quality of children's experiences in typical child care centers affects their development while they are in child care and their readiness for school. Children who attended higher quality child care centers performed better on measures of both cognitive skills (e.g., math and language abilities) and social skills (e.g., interactions with peers, problem behaviors) in child care and through the transition into school. Further, this influence of child care quality was important for children from a wide range of family backgrounds.

- **High quality child care continues to positively predict children's performance well into their school careers.**

  Our longitudinal analysis of children's performance indicated that the quality of child care experienced by children before they entered school continued to affect their development at least through kindergarten and in many cases through the end of second grade. Child care quality was related to basic cognitive skills (language and math) and children's behavioral skills in the classroom (cognitive/attention skills, sociability, problem behaviors, and peer relations), both of which are important factors in children's ability to take advantage of the opportunities available in school.

- **Children who have traditionally been at risk of not doing well in school are affected more by the quality of child care experiences than other children**.

  For some outcomes (math skills and problem behaviors), children whose mothers had lower levels of education—children who often are at risk of not doing well in school—were more sensitive to the negative effects of poor quality child care and received more benefits from high quality child care. Moreover, for these children who attended typical community child care centers, the influences of child care quality were sustained through second grade.

- **The quality of child care classroom practices was related to children's cognitive development, while the closeness of the child care teacher-child relationship influenced children's social development through the early school years.**

  Children who attended child care with higher quality classroom practices had better cognitive development (language and math skills) through early elementary school. Children who had closer relationships with their child care teachers had better classroom behavior and social skills (greater cognitive/attention skills and sociability, fewer problem behaviors, and better peer relations) through early elementary school. It is no surprise that the nature of children's experiences in child care are important, but the

results of this study confirm the lasting impact of these early experiences. High quality child care experiences, in terms of both classroom practices and teacher-child relationships, enhance children's abilities to take advantage of the educational opportunities in school.

Recommendations

The main recommendation of this study is that if America wants all its children to be ready for school, it must improve the quality of child care experiences available in this country. The study identifies key initiatives in three major areas that will be necessary to improve child care quality.

- Greater funding, from both government and private sources, should be provided for improving the quality of child care. This includes funds set aside specifically for quality improvement as well as increased child care subsidies and larger tax credits for parents so that they can afford high quality care.
- Greater opportunities and stronger requirements for training of child care teachers are needed, and teachers should be paid more so that qualified people will stay in the field.
- The child care system as a whole should be improved to provide more high quality child care, including changes in state policies and regulations, greater use of national accreditation systems, and improvements in the systems for teacher preparation.

Organization of This Report

Chapter 1 introduces the study by describing our conceptual framework and the methods we used in conducting the study. The next three chapters present descriptive information about our sample. Chapter 2 describes the child care, kindergarten, and second grade classrooms that were observed as part of the study, including a discussion of the continuity between child care and school environments. Chapter 3 describes the families of the participating children, and Chapter 4 describes the children themselves.

Chapter 5 presents the main findings of the study relating child care quality to children's outcomes and discusses the broader importance of the findings. Finally, Chapter 6 delineates the implications that follow from our findings and makes recommendations for policy and practice.

Chapter 1
Introduction

In the current era of major social reform in the areas of family welfare and public education in the US, children's experiences outside the home in child care are playing an increasingly important role in their lives. Recent estimates indicate that approximately 60 percent of all children under the age of six are receiving some type of child care on a regular basis. The percentages are even higher among the oldest age groups, with 68 percent of 3-year-olds, 78 percent of 4-year-olds, and 84 percent of 5-year-olds receiving such care, which translates to more than 6.8 million preschoolers in child care (West, Wright, & Hausken, 1995). Thus, the task of fostering children's physical, emotional, social, and cognitive development before school entry has shifted away from being solely the responsibility of families to being shared by families and child care providers. Given this shift, it is important to understand how differences in child care experiences affect children's development (both concurrently and over time) and subsequent readiness for and success in school. While there are several studies that have explored the longitudinal effects of early intervention programs, few have examined the effects for children attending community child care programs as they make the transition from child care to school and on into the early elementary years. Research involving community child care settings provides a more typical picture of the child care experiences of a broad cross-section of children in this country, and provides necessary information for understanding variations in the developmental patterns of children and their success in the early school years.

While there are relatively few longitudinal studies, the relations between children's concurrent development and center-based child care experiences have been extensively documented in the child care literature. A number of studies have established that child care quality has modest positive effects on children's cognitive and social functioning. These associations have been obtained even after adjusting for child and family factors (e.g., socio-economic status, gender, and ethnicity) known to be linked to both child outcomes and child care quality. Several studies have found that higher quality care is related to better child outcomes (e.g., Bryant, Burchinal, Lau, & Sparling, 1994; Burchinal, Roberts, Nabors, & Bryant, 1996; Burchinal, Roberts, Riggins, Zeisel, Neebe, & Bryant, in press; Dunn, 1993; Howes, 1990; McCartney, Scarr, Phillips, & Grajek, 1985; NICHD ECCRN, 1997, 1998; Phillips, McCartney, & Scarr, 1987; Schliecker, White, & Jacobs, 1991; Whitebook, Howes, & Phillips, 1989). While most studies have found influences of child care quality on children's outcomes, a few have found little effect (Clarke-Stewart & Gruber, 1984; Goelman & Pence, 1987; Kontos, 1991; Kontos & Fiene, 1987), perhaps because of restricted ranges of quality across the centers in these studies and/or relatively small sample sizes of centers.

Fewer studies, however, have examined the extent to which the quality of earlier child care experiences relate to children's patterns of development once they enter school. Such studies address the question of whether child care experiences have long-term effects on children's development in subsequent environments after they leave the child care environment. A number of studies of early intervention programs for children from families with low income have found some long-term positive effects on children's cognitive development and academic achievement at least through the third or fourth grade and sometimes longer, especially for indicators of school

success such as retention in grade, special education placement, and intellectual functioning (e.g., Burchinal, Campbell, Bryant, Wasik, & Ramey, 1997; Campbell & Ramey, 1994; Lazar, Darlington, Murray, Royce, & Snipper, 1982; Schweinhart, Barnes, & Weikart, 1993).

This report presents the longitudinal findings from the Cost, Quality, and Child Outcomes in Child Care Centers study, an investigation designed to examine the complex relationships between children's experiences in center-based child care and school and their social, emotional, and cognitive outcomes.[1] This research began in 1992-93 as a comprehensive examination of the costs and quality of early childhood care and education in four states (California, Colorado, Connecticut, and North Carolina) that would provide information about the operation of child care markets and the levels of child care quality. Detailed information about the operating costs, structural characteristics, and process quality of classroom activities and interactions was gathered from 401 child care centers, representing a wide variety of early childhood programs, both for-profit and nonprofit.

The longitudinal phase of the study began in the spring of 1993, when 826 preschoolers in their next-to-last year of child care were recruited from 183 of the classes in 151 of the centers in which quality data had been collected. The intent of this portion of the study was to examine the impact of child care experiences, as well as the continuity between earlier and later experiences, on early school success. Information was gathered from children, parents, teachers, and independent observers at five time points: during children's last two years in child care and during the kindergarten, first, and second grade years. We gathered data on children's cognitive and socio-emotional development, child and family background characteristics and risk status, parental beliefs, teacher beliefs, and the quality of the child care and school environments. These data provide a unique opportunity to more thoroughly understand how differences in child care experiences affect children both in the short-term and over time as they embark on their school careers. The results of this research are pertinent to the design of policies and regulations pertaining to child care and school, as well as broader social policies such as welfare and educational reform, that will promote optimal outcomes for young children.

Conceptual Framework

The Cost, Quality, and Outcomes study was guided by an ecological model of development. With this model, human development is viewed as the product of four components and the relationships among them: process, person, context, and time (Bronfenbrenner & Morris, 1998). Process, the primary mechanism for development, includes all interactions between the developing person and the environment. The influence of these processes on development varies as a function of characteristics of the other three components of the model, namely person (biological endowment and dispositions), environmental contexts (both immediate and more distant and including the relationships in those contexts), and time periods in which the processes occur.

Although much of the research on children's outcomes has focused on a few variables at a time, behavioral and cognitive differences in young children are most certainly the result of an interaction among the child, the family environment (including relationships within the family), and the child care or school environment (including teacher-child relationships). In the study reported herein, information on all of these aspects provide a greater understanding of children's outcomes in relation to their experiences in the child care setting and in the school setting.

In examining the association between child outcomes and early childhood and school environments, we have considered the environments in which children spend large portions of their days, in addition to more traditional child characteristics, such as gender, ethnicity, family background, and developmental level. For all children, the home environment is clearly one of the primary settings, as is the school environment once children enter kindergarten and/or first grade. However, increasing numbers of children are spending significant amounts of

time in out-of-home care settings in the preschool years, so that the child care environment is the first major non-home setting they experience. In examining the relative influence of these different settings on children's development, it is important to examine the nature of experiences in both child care environments and later school environments, as well as the degree of continuity between those environments.

The following major research questions are addressed in this report: (a) What were the levels of quality experienced by children in the child care and school environments? (b) What were the characteristics of the children and families in the study? (c) To what extent did child care quality affect children's patterns of development as they moved from child care into the early elementary years? (d) Were there differential effects of environmental quality on developmental outcomes for children at greater risk? (e) To what extent did concurrent educational environments versus earlier out-of-home care predict children's developmental outcomes? and (f) To what extent did the peer climate in child care classrooms predict children's peer relationships in the second grade?

To answer these questions, we gathered data from multiple sources over a 4-year period, from children's next-to-last year in preschool through second grade. Each year, we measured individual children's developmental outcomes in the domains of literacy skills (receptive language ability and letter-word recognition), math skills, and classroom social and cognitive functioning. We considered these outcomes to be a function of prior child care and concurrent school experiences as well as child and family characteristics. Child care experiences were studied extensively, including a variety of observational measures of both global and more specific characteristics of classroom quality, such as the learning environment, teacher-child relationships, and teacher sensitivity and responsiveness. The impact of the concurrent school environment was also considered, including observations of the learning environment and descriptions of teacher-child relationships and teacher beliefs.

Demographic information was gathered from the families to examine whether associations between child care and developmental outcomes were moderated by family or child characteristics. Family demographic characteristics included parental education and socio-economic status. Individual child characteristics included gender, ethnicity, and age. Family process measures were collected, including descriptions of parental beliefs and practices and the home environment.

Method

Participants

The participants included the children and families who participated in the longitudinal outcomes component of the Cost, Quality, and Outcomes (CQO) study examining children's development from child care through second grade. In the first phase of the study, detailed information about operating costs, structural characteristics, and process quality was gathered from 401 randomly selected child care centers, about half for-profit and half nonprofit. The longitudinal outcomes phase of the study began in the spring of 1993, when 826 preschoolers in their next-to-last year of child care were recruited from 183 of the classes in 151 centers in which quality data had been collected. Observed classrooms were included in the longitudinal outcomes phase if they served any children eligible for kindergarten in the fall of 1994. Centers with eligible classrooms were recontacted for agreement to participate in the outcomes study phase.[2] Children initially were included in the sample if (a) they were of an age to enter kindergarten in the fall of 1994, (b) they had been enrolled in the target classroom during the classroom observation phase, (c) they expected to attend the same center the following year, and (d) the primary language spoken in the child's home was English. All eligible children in the classroom were invited to participate in the study, and up to 12 children could be randomly selected from those with parent permission to participate.

Data on individual children was gathered in years 1 (next-to-last year in preschool), 2 (last year in preschool), 3 (kindergarten), and 5 (second grade). The average age of children each year was 4.3, 5.1, 6.0, and 8.0 years old respectively at the time of the child assessments. The initial sample was approximately evenly divided by gender (51% boys), and about 30% were children of color. A total of 826 children were initially recruited for the study from four states (CA, CO, CT, and NC). Because of attrition, as expected in a longitudinal study of the scope of our project, the number of families in the study decreased somewhat each year. The sample consisted of 826 children in year 1, 579 in year 2, 451 in year 3, 463 in year 4, and 418 in year 5. These 418 children participating in year 5 represented 160 of the original 183 classes.

Most of the attrition from year 1 to year 2 was planned by design. Only children who participated in the study in year one and who stayed in the same child care center for the second year of data collection were invited to remain in the sample. This selection procedure maximized the retention of children in year 2 who had relatively stable child care situations.

The study also experienced attrition due to family mobility. We did not have the resources to follow families when they moved out of their states of origin, although we have continued to make every attempt to keep in contact with all families through mailings to parents. As shown in Table 1.1, we examined whether families who remained in the study differed from families who left the study. While there is still variation in the demographic characteristics of the sample over time, there tended to be greater attrition among children of color and among less educated and poorer families. In the first year, 30% of the sample was children of color, while by the second grade, this percentage was 21%. Table 1.1 also reports the maternal education and income data that were collected in year 1. The increase in these averages over time suggests that there was somewhat greater attrition among families from lower SES backgrounds. In contrast, the distribution by gender remained fairly constant over time.

The sample sizes reported in particular analyses of the CQO data fluctuate slightly depending on which measures are used in the analyses. As described above, 826 children were recruited for the study. From year 1, we have complete child assessments, classroom observations, teacher surveys, and parent surveys on 745 children from 169 classrooms. Because the analyses reported in this study are based on a bioecological model of development, which considers the multiple influences of child characteristics, family factors, and classroom environment on development, we describe these 745 children as the core sample.

Procedures

Five sources of data were gathered to examine the relation between child care quality and children's outcomes: (a) classroom observations, (b) teacher reports of beliefs and practices, (c) individual child assessments, (d) teacher ratings of children, and (e) parent reports of child and family characteristics. Complete data were gathered in years 1, 2, 3, and 5 (the last two years of child care, kindergarten, and second grade); only teacher reports of practices and parent surveys were gathered in year 4 (first grade).

In years 1, 2, 3, and 5, classroom observations were conducted to gather information about the quality of practices. During the first year, a 3-4 hour classroom observation was conducted in each classroom to gather information on child care quality. In subsequent years (2, 3, and 5) classroom quality and practices were measured with brief observations conducted at the time of the child assessments. To gather information about the quality of teacher-child relationships, in years 1, 2, 3, and 5 teachers completed ratings of the closeness of their relationship with each child. In addition, teachers completed various measures of practices and beliefs each year.

Information on children's developmental status was gathered in years 1, 2, 3, and 5 of the study. Children were individually assessed using standardized measures of receptive language ability, letter-word recognition, and math skills. Teachers completed ratings of children's classroom social and cognitive functioning.

Each year, parents completed surveys that included information on family demographics and various measures of child rearing beliefs and practices to gather information on family structure and process.

Measures

This section describes the measures that were used in the analyses described in this report. Table 1.2 provides an overview of the measures used in the analyses reported herein. The CQO study involved a wider array of measures than those reported here; Appendix B includes a chart listing the full complement of measures used in our study and contains more technical information about the measures.

Classroom quality measures. Four observational measures of child care practices (or process quality) were used in the first year of the study. Classroom environment was measured using the *Early Childhood Environment Rating Scale* (ECERS; Harms & Clifford, 1980), which examines the developmental appropriateness of classroom practices by assessing routine care needs; furnishings and display; activities and experiences related to motor, language, cognitive, and social development; and adult provisions. Teacher sensitivity was rated with the *Caregiver Interaction Scale* (CIS; Arnett, 1989), which measures teacher sensitivity, harshness, detachment, and permissiveness. The extent to which the teaching style was didactic versus child-centered was rated using the *UCLA Early Childhood Observation Form* (ECOF; Stipek, Daniels, Galuzzo, & Milburn, 1992), which examines five areas: child initiation, academic emphasis, discipline, performance pressure, and negative evaluation. Teacher responsiveness to children was measured with the *Adult Involvement Scale* (AIS; Howes & Stewart, 1987). For this instrument, two children (one boy and one girl) were randomly selected in each classroom, and the level of the teacher's interactions with the target children was coded. These four observational child care quality measures tended to be highly related. Therefore, a single composite quality index was computed from the scores on these four measures using principal component analysis. In addition, for one set of analyses looking at children's peer relations, a fifth measure, the *Peer Play Scale* (Howes & Matheson, 1992), examined the level of peer play, from solitary play to complex pretend play. For this instrument, the same two children randomly selected for scoring the AIS were observed, and the level of their play with peers was coded.

In year 2, a shortened version of the ECERS was used, based on items that were readily observable and highly correlated with the overall score based on the first year's data. For the kindergarten year, this shortened version of the ECERS was modified to include items that were appropriate to the kindergarten setting. In second grade, we used a modified version of the *Instructional Environment Observation Scales* (IEOS; Secada, 1997), an instrument designed to measure the instructional environment experienced by children in second and third grade classrooms. This instrument yields information relevant to the domains measured in previous years and includes two factors representing different aspects of the classroom environment: general classroom climate and linkages (across disciplines and to children's experiences beyond the classroom).

Teacher-child relationship quality. Another aspect of children's experiences in child care, kindergarten, and second grade environments was measured by teachers' ratings of their relationship with each participating child using the *Student-Teacher Relationship Scale* (STRS; Pianta, 1992). Items on this measure are summed into three factors representing different aspects of the teacher-child relationship: closeness, conflict, and overdependency.

Child assessment measures. Information pertaining to children's cognitive and social functioning was gathered from individual assessments and from teacher ratings in years 1, 2, 3, and 5. Individual child assessments were

conducted using two instruments. Receptive language ability was measured using the *Peabody Picture Vocabulary Test-Revised,* (PPVT-R; Dunn & Dunn, 1981), which involves children pointing to the picture that matches the word spoken by the examiner. Letter-word recognition and math skills were measured using two subtests of the *Woodcock-Johnson Tests of Achievement-Revised* (WJ-R; Woodcock & Johnson, 1990). The letter-word identification subtest measures reading ability, including association of pictures and symbols and recognition of letters and words. The applied problems subtest measures math skills, including understanding of basic numeracy, comparisons of differing numbers of items, counting, and solving mathematical problems.

Each of the four years teachers rated children's classroom social and cognitive skills using the *Classroom Behavior Inventory* (CBI; Schaefer, Edgerton, & Aaronson, 1978). The items on the CBI are rated for how well they describe the child and represent three factors: cognitive/attention, sociability, and problem behaviors. In second grade, teachers also completed the *Teacher Assessment of Social Behavior* (Cassidy & Asher, 1992) to explore in more detail children's social development in terms of peer relations. This scale provides a teacher rating of the social behavior of the focus child in relation to the other children in the class on four subscales: prosocial, disruptive, aggressive, and social withdrawal behaviors.

Parent Surveys. Parents were asked to complete surveys each year to gather a variety of demographic and family climate information, including parental education, family income, marital status, and various measures of parental beliefs and practices (see Appendix B for specific information about these measures). Basic demographic information about the children was also collected, including ethnicity, gender, and birth date.

The wide array of classroom quality data we gathered allowed us to construct a picture of the child care and school environments experienced by the children in our study. In addition, the child assessments and parent surveys provide descriptive information about our sample. The wealth of data we collected over time allows us to explore the extent to which child care quality affected children's patterns of development as they moved from child care into the early school years.

Table 1.1: Sample Demographics from Child Care through Second Grade

		PRESCHOOL		SCHOOL	
Variable		**Preschool 1**	**Preschool 2**	**Kindergarten**	**Second grade**
Ethnicity (percent white)	n	745	527	424	398
	%	69.9	72.1	76.2	78.6
Gender (percent male)	n	745	527	424	398
	%	50.7	51.2	48.8	50.8
Maternal education in Year 1	n	745	527	424	398
(in years)	M	14.2	14.4	14.6	14.8
	SD	2.3	2.3	2.3	2.3
Income in Year 1	n	695	504	411	395
(in dollars)	M	47,753	48,421	51,568	52,381
	SD	26,300	25,589	25,275	25,479

Table 1.2: Overview of Data Collection Measures

	Preschool - 1 Spring 1993	**Preschool - 2** Spring 1994	**Kindergarten** Spring 1995	**First Grade** Spring 1996	**Second Grade** Spring 1997
Child					
Individual Assessments of Cognitive Skills	Peabody Picture Vocabulary Test-Revised (PPVT-R)	PPVT-R	PPVT-R		PPVT-R
	Woodcock-Johnson Tests of Achievement Revised (WJ-R): Math & Letter-Word ID subtests	WJ-R Letter-Word WJ-R Math	WJ-R Letter-Word WJ-R Math		WJ-R Letter-Word WJ-R Math
Teacher Ratings of Social/Behavioral Skills	Classroom Behavior Inventory (CBI)	CBI	CBI		CBI Assessment of Social Behavior (Peer Relations)
Parent/Family Environment					
Child and Family Demographic Characteristics	Family Demographics (education, occupation, family composition, income; child age, gender, ethnicity)	Demographics update	Demographics update	Demographics update	Demographics update
Parental Beliefs/Practices	Rank Order of Parental Values	Home Screening Questionnaire	Family Routines Inventory	Parenting Stress Index	Parental Modernity Scale
Classroom					
Observed Practices Quality	Early Childhood Environment Rating Scale (ECERS)	Shortened ECERS	Shortened ECERS		
	UCLA Early Childhood Observation Form				Instructional Environment Observation Scales
	Caregiver Interaction Scale				
	Adult Involvement Scale				
	Peer Play Scale				
Teacher Reported Relationship Quality	Student-Teacher Relationship Scale (STRS)	STRS	STRS		STRS
Teacher Characteristics	Teacher demographics (education, experience, gender, ethnicity)	Teacher demographics	Teacher demographics Teacher beliefs	Teacher demographics Teacher beliefs	Teacher demographics Teacher beliefs

Chapter 2

Characteristics of the Classroom Environments

The primary purpose of our study was to examine the influence of child care experiences on children's development in both the short term in child care and over the longer term in elementary school. As a first step in examining this issue, it is important to gain an understanding of the nature of experiences in child care and school classrooms and to determine the degree of continuity between those environments. This chapter describes the quality of experiences in both child care and school classrooms, including observed classroom practices and children's relationships with their teachers. In the following descriptions, the practices measures are reported at the level of the classroom, while the relationship measures are reported at the level of the individual child.

Child Care Classroom Environments

We gathered extensive information about the classroom environments of children when they were in their next-to-last year of child care, including measures of global quality, teacher sensitivity, teaching approach (child-centered versus didactic), teacher responsiveness, and the quality of relationships between teachers and children. In year 2 of our study, when children were in their last year of child care, we used an abbreviated measure of global quality and again measured the closeness of teacher-child relationships.

As seen in Table 2.1 the observed quality of child care experienced by the children in the study tended to be medium. Figure 2.1 presents the distribution of year 1 ECERS scores graphically. The average global classroom environmental quality scores each year (ECERS mean=4.26 in year 1 and Short ECERS mean=4.05 in year 2) are in the medium range (i.e., between 3.0 and 4.9), suggesting that children were attending centers that met their routine care needs but that offered limited opportunities for learning activities, individual attention, or language stimulation. In general, teachers were rated as moderately sensitive (CIS mean=2.96 on a 1 to 4 scale). Teachers were observed to be at least minimally responsive to a target child an average of 31% of the time as measured by the AIS. Children engaged in interactive play with peers an average of 77% of the time, and they were observed to spend 5% of that time in pretend play. On average, the teaching approach observed in the classrooms was slightly closer to a child-centered approach than a didactic approach (ECOF mean=3.49 on a 1 to 5 scale). In contrast, teacher-child relationships tended to be positive, with teachers reporting relatively close relationships (year 1 STRS mean=4.17 and year 2 mean=4.14 on a 1 to 5 scale) that were generally not overdependent (year 1 mean=2.08 and year 2 mean=1.99) or conflicted (year 1 mean=1.79 and year 2 mean=1.75). Figure 2.2 provides descriptions of the types of materials, activities, interactions, and configurations one might see in classrooms characterized as being low, medium, and high in quality.

In order to differentiate classrooms along a continuum of developmentally appropriate practice, a further analysis of the ECOF was performed. These results indicated that fewer than half of the children (48%) were enrolled in child care classrooms that implemented high levels of child initiation and positive discipline, important characteristics of a developmentally appropriate practice pedagogy.

Elementary School Classroom Environments

We also gathered information about the classroom environments that children experienced in kindergarten and second grade. When the children were in kindergarten, we conducted a brief observation to assess the global quality of classroom practices using a shortened version of the ECERS. In the second grade, we assessed the quality of practices using two factors of the modified IEOS (overall climate and linkages). In both kindergarten and second grade, teachers rated the quality of their relationship with each child.

Table 2.1 also displays the average quality scores of the environments experienced by children in elementary school classrooms. As in child care, the global quality rating indicated that kindergarten classrooms on average were medium in quality (mean=4.47). However, kindergarten teachers tended to report close relationships with the children (STRS mean=4.16), with relatively little conflict (mean=1.60) or overdependency (mean=1.88).

The second grade classrooms we observed tended to be characterized by moderately positive overall climates (mean=3.69 on a 1 to 5 scale), indicating that they had relatively smooth transitions between and within activities, moderately high levels of social support for learning, and relatively high levels of student engagement. In contrast, the classrooms showed little evidence of linkages in the activities (mean=1.90 on 1 to 5 scale), suggesting that lessons were not integrated across disciplines and were not connected to children's experiences outside of the classroom. Second grade teachers, similar to their counterparts in child care and kindergarten, tended to report close relationships with the children (STRS mean=3.97) and reported relatively low levels of conflict (mean=1.55) and overdependency (mean=1.84) in their teacher-child relationships.

Continuity Between Child Care and School Environments

To examine the degree of continuity between child care and school environments, we first looked at correlations among the environmental quality measures. While there is a slight indication that children in higher quality child care arrangements remained in higher quality environments once they entered school, these associations are modest. As shown in Table 2.2, the correlations among the observed practices measures for child care (composite measure), kindergarten (short ECERS), and second grade (IEOS Climate and Linkages factors) ranged from .06 to .15, with the strongest correlations between child care/kindergarten and kindergarten/second grade environments. (Table C.1 in Appendix C contains the full intercorrelation matrix of all classroom quality measures, including both observed practices and teacher-child relationships.) As shown in Table 2.3, the correlations among ratings of teacher-child relationships over time were somewhat stronger overall, ranging from .20 to .31 for closeness, .36 to .50 for conflict, and .08 to .22 for overdependency. While these correlations indicate only modest levels of continuity over time, some of the lack of continuity in observed classroom practices over time may relate to the use of different measures each year. Because child care quality was the focus of this study, the classroom observations in the first year were conducted with a comprehensive battery of measures. In subsequent years, we used more abbreviated measures that yielded information similar to that collected in the first year, but that may not have measured classroom quality dimensions in exactly the same way from one year to the next.

We also examined the issue of continuity from a pedagogical perspective. Child care, kindergarten, and second grade classrooms were classified based on observational measures and teacher reports of beliefs and practices as either high or low in terms of adherence to a developmentally appropriate practice (DAP) pedagogy. From child care to kindergarten, 44% of children experienced continuity in pedagogy (either low DAP to low DAP or high DAP to high DAP), while from kindergarten to second grade, only 23% experienced continuity. These results suggest that the majority of children experience little pedagogical continuity across the years from child care to second grade. As with our findings on continuity of quality over time, the use of different measures each year may have partially contributed to the lack of pedagogical continuity across the years.

Table 2.1: Descriptive Statistics for Quality Measures from Child Care through Second Grade

Variable	N	Mean	SD	Range	Scale Range
Preschool 1					
Quality Composite Index	166	-0.11	1.60	-4.35-2.96	z-score
ECERS Total	169	4.26	1.04	1.69-6.56	1-7
CIS Total	169	2.96	0.55	1.38-3.81	1-4
AIS Percent Responsiveness	169	0.31	0.27	0.00-1.00	0-1
ECOF Total	166	3.49	0.82	1.40-5.00	1-5
Peer Play—Percent Interactive	169	0.77	0.14	0.21-1.00	0-1
Peer Play—Percent Pretend	169	0.05	0.09	0.00-0.50	0-1
Teacher-Child Closeness	745	4.17	0.58	1.91-5.00	1-5
Teacher-Child Conflict	745	1.79	0.78	1.00-4.75	1-5
Teacher-Child Overdependence	745	2.08	0.74	1.00-4.60	1-5
Preschool 2					
Short ECERS	149	4.05	1.21	1.71-7.00	1-7
Teacher-Child Closeness	452	4.14	0.58	1.73-5.00	1-5
Teacher-Child Conflict	452	1.75	0.80	1.00-4.33	1-5
Teacher-Child Overdependence	451	1.99	0.70	1.00-4.20	1-5
Kindergarten					
Short ECERS	301	4.47	0.97	1.20-6.80	1-7
Teacher-Child Closeness	342	4.16	0.59	1.45-5.00	1-5
Teacher-Child Conflict	342	1.60	0.71	1.00-4.42	1-5
Teacher-Child Overdependence	342	1.88	0.66	1.00-4.00	1-5
Second Grade					
IEOS Climate	319	3.69	0.73	1.50-5.00	1-5
IEOS Linkages	319	1.90	1.11	1.00-5.00	1-5
Teacher-Child Closeness	277	3.97	0.62	2.00-5.00	1-5
Teacher-Child Conflict	277	1.55	0.67	1.00-4.18	1-5
Teacher-Child Overdependence	277	1.84	0.61	1.00-4.20	1-5

Table 2.2: Correlations between Classroom Practices and Teacher-Child Closeness from Child Care through Second Grade

	1	2	3	4	5	6	7	8	9
1 Child Care Quality Composite	-								
2 Teacher-Child Closeness Year 1	.17***	-							
3 Short ECERS Year 2	.50***	.02	-						
4 Teacher-Child Closeness Year 2	.12*	.40***	.04	-					
5 Short ECERS Year 3	.15**	.04	.19**	.11	-				
6 Teacher-Child Closeness Year 3	-.01	.20***	-.03	.26***	.01	-			
7 IEOS Climate	.11*	.01	.24***	-.02	.15*	-.12	-		
8 IEOS Linkages	.06	-.00	.06	-.03	.11	-.07	.24***	-	
9 Teacher-Child Closeness Year 5	.03	.23***	-.12	.20**	.03	.31***	.01	.08	-

*p < .05 **p < .01 ***p < .001.

Table 2.3: Correlations among Teacher-Child Relationship Factors from Child Care through Second Grade

	1	2	3	4	5	6	7	8	9	10	11	12
1 T-C[a] Closeness Year 1	-											
2 T-C Conflict Year 1	-.40***	-										
3 T-C Overdep. Year 1	.13***	.29***	-									
4 T-C Closeness Year 2	.40***	-.28***	-.02	-								
5 T-C Conflict Year 2	-.23***	.61***	.20***	-.42***	-							
6 T-C Overdep. Year 2	-.03	.20***	.31***	.02	.42***	-						
7 T-C Closeness Year 3	.20***	-.21***	-.06	.26***	-.21***	.05	-					
8 T-C Conflict Year 3	-.22***	.48***	.06	-.29***	.50***	.14*	-.43***	-				
9 T-C Overdep. Year 3	-.12*	.24***	.16**	-.09	.25***	.25***	.02	.42***	-			
10 T-C Closeness Year 5	.23***	-.11	.16**	.20**	-.10	.04	.31***	-.17*	.06	-		
11 T-C Conflict Year 5	-.28***	.36***	.05	-.21**	.40***	.19**	-.22***	.50***	.15*	-.46***	-	
12 T-C Overdep. Year 5	-.07	.20***	.22***	-.01	.20**	.17*	-.08	.12	.08	-.06	.41***	

[a] Teacher-Child
*p < .05 **p < .01 ***p < .001.

Figure 2.1: Child Care Classroom ECERS Scores

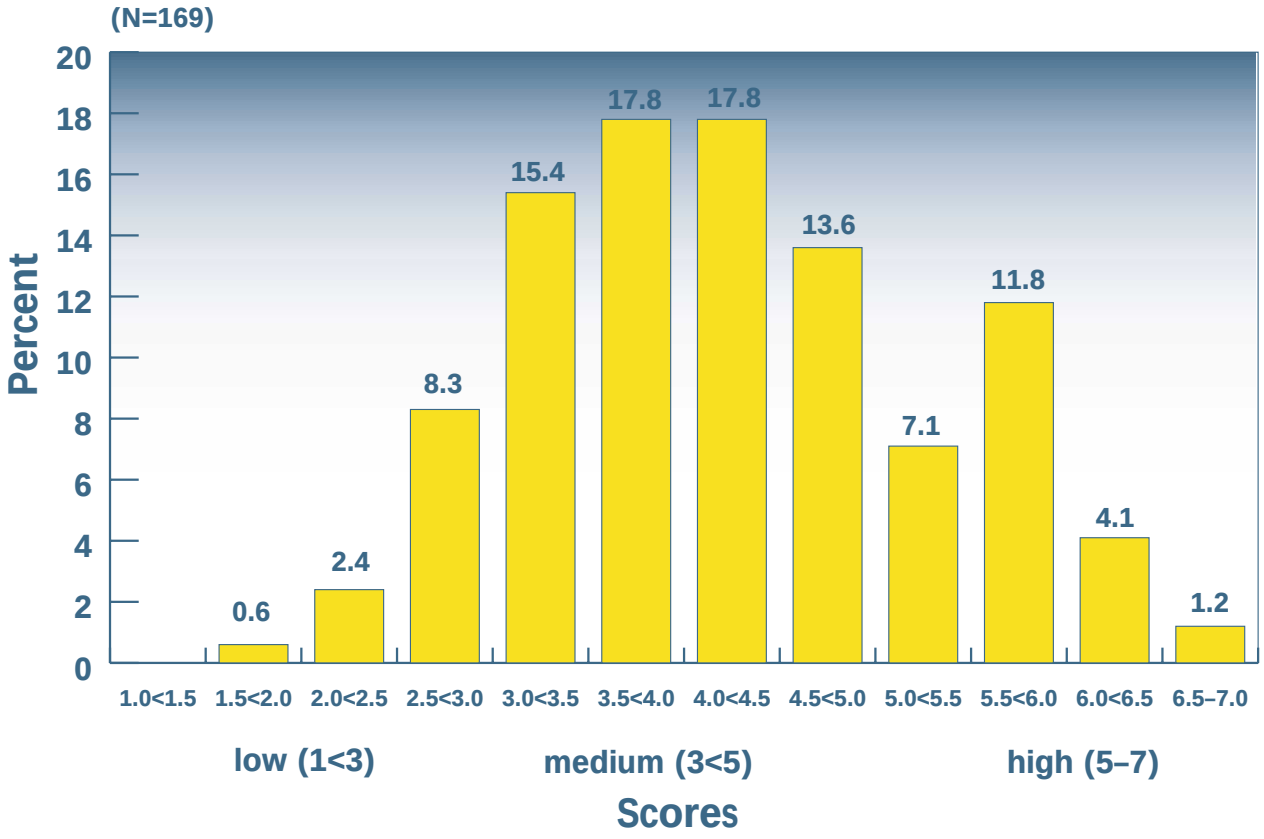


Figure 2.2: Defining Child Care Quality

What do we mean when we characterize classes as low, medium, or high in quality? These ratings are based on observations of a variety of different aspects of the child care environment that affect children's learning and experiences in that setting. The following information attempts to make these general terms more concrete by describing the interactions, activities, materials, and configurations that one might expect to see in classrooms at each level.

Low Quality

A classroom described as low quality is generally characterized by either disorganization and chaos or an overly strict atmosphere, both of which prevent children from engaging in productive learning activities. Adults are often inattentive and unresponsive or overly harsh with children. Conversations between teachers and children are infrequent, and teachers do not regularly encourage positive peer interaction or help children develop positive solutions to problems. Children are often kept together as one large group, with little attention to individual needs. The teacher often makes decisions about activities, rather than allowing children to make their own choices, which may result in activities that are not of interest to children and therefore dampen their normal enthusiasm for learning. Materials and activities may be lacking altogether, or may be inappropriate for the ages of the children in the group. Basic nutritional, health, and sanitary needs are not met, and children's indoor and outdoor play spaces may be dangerous.

Medium Quality

In a classroom described as medium quality, adults pay little positive attention to individual children, and supervision of the group is often divided with other tasks, such as preparing food or doing paperwork. Adults often do not provide educational guidance to support children's learning (i.e., teachers do not encourage children to try new things with materials or do not ask children questions to encourage them to think and talk about what they are doing). Children have some opportunities for choices. For example, they may be assigned to activities, but are able to choose how they use the materials. The classroom is organized into interest areas (centers) to support play and learning, with some materials for a variety of hands-on activities, such as art (e.g., crayons and paint), language (e.g., books), manipulatives (e.g., puzzles), dramatic play (e.g., a housekeeping area), and building (e.g., blocks). There might not be enough materials for all of the children, or some of the materials may be in disrepair. Children spend a lot of time as a whole group and have limited opportunities for small group or individual activities. Adults are generally attentive to children's safety during activities and typically meet children's basic nutritional and other personal care needs.

High Quality

In a classroom described as high quality, teachers interact frequently with children and provide guidance to enhance their learning. There is a buzz of talk among children in a friendly, respectful atmosphere. The teacher has close relationships with the children, talks with them about what they are doing in the classroom as well as about their lives outside of the classroom, and is enthusiastic about the children's activities and their learning. The classroom is well organized and has a variety of age-appropriate materials for a range of hands-on activities, including art (e.g., crayons, paints, clay), science (e.g., plants/animals, magnets, science books), music (e.g., simple instruments, records and tapes), language (e.g., books, flannel board stories, picture card games), mathematics (e.g., tape measure, objects to count), manipulatives (e.g., puzzles, sewing cards), dramatic play (e.g., dress-up clothes, pretend office, housekeeping area), and building (e.g., blocks of different sizes and materials). Activities and materials are changed frequently according to children's interests and abilities. Children have many opportunities throughout the day to choose hands-on activities and use materials to experiment and create, both independently and in small, often self-selected, groups. Teachers have a planned but flexible schedule of indoor and outdoor activities that are interesting to children. Nutrition and other personal care are provided in a flexible way designed to meet children's individual needs and encourage the development of self-help skills.

Chapter 3

Characteristics of the Families in our Study

Demographic Information

Our initial sample of families was fairly typical of US families in general. Table 3.1 presents a breakdown of our sample in terms of basic demographic information by state. Overall, the initial sample was about evenly divided by gender (51% male), approximately 30% were children of color (compared to 31% of children nationally; Hernandez, Saluter, & O'Brien, 1993), maternal education averaged 14.2 years (compared to an average of 13 years for U.S. women; US Census Bureau, 1997), and annual income averaged $47,753 (compared to a mean income of $47,221 for all US families in 1993; US Census Bureau, 1993)[3]. As can be seen in the table, there were some expected differences by state. We purposely sampled from four different states to include a range of families and child care settings. California had the largest proportion of children of color (46%) while Connecticut had the smallest proportion (20%). The California sample also was the most advantaged in terms of maternal education (mean=14.6 years) and family income ($58,724), while North Carolina had the lowest average maternal education (mean=13.6 years) and the lowest family income ($40,832).

Beliefs and Practices

In addition to basic background and demographic information, we also gathered information about parental beliefs and child rearing practices, the stimulation and responsiveness of the family environment, and parent-child interaction styles each year. (Chapter 1 and Appendix B provide detailed information about the various family measures used in this study.) The parental beliefs and family environment information provides further description of the home environments for the children in our sample and allows us to explore in more detail the relations of family characteristics to selection of child care and to children's development. We collected a different measure of family beliefs or practices each year to give us a broader picture of the home environment that children experienced, with the assumption that these family processes and contexts remain relatively stable from year to year. The family measures tended to be moderately correlated with one another, with cross-year correlations for most measures ranging from .10 to .40. (Table C.2 in Appendix C includes a complete intercorrelation matrix for the family beliefs and practices measures.) As expected, although these measures were collected over time, parental reports of beliefs and practices were associated in conceptually consistent ways.

Table 3.2 presents the means and standard deviations of the family measures. On average, parents reported having relatively progressive child rearing beliefs (ROPV nonconformity mean=3.48 on 1–5 scale; Parental Modernity progressive subscale=4.21 and traditional subscale=2.54 on 1–5 scale). In addition, parents tended to report positive child rearing practices (FRI Parent-Child Interaction subscale=2.31 on a 1–3 scale) and responsive and supportive home atmospheres (PSI Total Stress=66.06, which is within normal range of 59–82; HSQ=44.56 on 0–56 scale). However, the standard deviations and ranges for all of the measures indicate considerable variability among families. For example, the HSQ scores for our sample ranged from 14–53. Scores at or below 41 on this measure are considered "suspect," indicating that the child's development is suspected to be at risk due to poor home environment conditions. While the mean for our sample was above this threshold, 22% of the children had scores in the suspect range.

Family Selection Factors

While the focus of this study was to examine the relation between child care experiences and children's development through second grade, we know that developmental outcomes are also influenced by family background variables. In our analyses, we controlled for these family background variables before looking at the effects of child care quality on children's outcomes, and further examined whether family characteristics moderated the influence of child care quality. In choosing which family background variables to control, we examined correlations of family variables with child outcomes and of family variables with child care and school quality measures. Table 3.3 presents the correlations between key family measures and child outcomes over time. Demographic characteristics (i.e., maternal education and family income) generally had the strongest association with outcomes over time, ranging from .19 to .40 for language ability, .16 to .31 for letter-word recognition skills, and .20 to .31 for math skills. Most of the parent-reported child rearing beliefs we measured were modestly associated with children's outcomes over time, with average magnitudes across measures ranging from .21 to .28 for language ability, .13 to .15 for letter-word recognition skills, and .13 to .19 for math skills. Most of the parent-reported child rearing practices that we gathered were also modestly associated with children's development, with average magnitudes across measures ranging from .19 to .24 for language ability, .08 to .14 for letter-word recognition skills, and .15 to .20 for math skills. Family characteristics were generally less strongly associated with children's social skills, classroom behavior, and peer relations.

Table 3.4 presents correlations between family measures and the child care and school environment quality measures. These correlations show whether particular types of families are more likely to be found in particular types of child care or school arrangements. The correlations between child care quality and family measures represent family selection factors; that is, the extent to which different types of families tend to choose different types of care arrangements. As seen in the table, modest relations were found between child care quality and family measures. Children from more advantaged families, in terms of maternal education and income, were more likely to experience child care characterized by higher observed quality and closer relationships with their teachers. In addition, there is some evidence that children with parents who reported more progressive or less authoritarian child rearing beliefs were also more likely to be in higher quality child care. The relations between elementary school classroom quality and family measures were not as consistent, with very slight evidence that children from more advantaged families were more likely to be in school settings of higher quality.

Previously reported analyses of these data showed that there were consistent moderate relations of quality with gender and ethnicity. These analyses indicated that children of color were more likely to experience child care of lower observed quality than white children, and that teachers reported slightly closer relationships with girls than with boys (Peisner-Feinberg & Burchinal, 1997). Based on these previous analyses and the two sets of correlations reported above relating family variables to child outcomes and to child care quality, we chose maternal education, gender, and ethnicity to represent selection factors in our subsequent analyses. These three variables were associated with both quality and outcomes and were available on almost all of the children in the study. While child care selection is partially a financial decision, we chose to use maternal education as our major covariate for two reasons. First, child care quality was more strongly related to maternal education than to income, and second, more families chose to report maternal education (n=745) than income (n=695). In addition, although some of the family beliefs and practices were associated with child care quality, these associations were not consistent across the years, and again, fewer families completed these measures than reported maternal education. Furthermore, disproportionately more of the families who chose not to report income or parenting values had children in lower quality child care. Maternal education, gender, and ethnicity were controlled in our analyses before looking at the effects of child care quality on children's outcomes.

Table 3.1: Year 1 Demographic Variables by State

Variable		CA	CO	CT	NC	Total
Ethnicity						
Children of Color	N (%)	98 (46.2)	41 (22.7)	36 (20.3)	49 (28.0)	224 (30.1)
White Children	N (%)	114 (53.8)	140 (77.4)	141 (79.7)	126 (72.0)	521 (69.9)
Gender						
Male	N (%)	111 (52.4)	86 (47.5)	101 (57.1)	80 (45.7)	378 (50.7)
Female	N (%)	101 (47.6)	95 (52.5)	76 (42.9)	95 (54.3)	367 (49.3)
Maternal Education (in years)						
	N	212	181	177	175	745
	M	14.64	14.30	14.26	13.64	14.23
	SD	2.28	2.19	2.27	2.16	2.25
Income (in dollars)						
	N	204	169	170	152	695
	M	58,724	42,589	45,911	40,832	47,753
	SD	24,464	24,894	26,411	25,687	26,300

Table 3.2: Descriptive Statistics for Family Variables

Variable	N	Mean	SD	Range	Scale Range
Rank Order of Parental Values—Nonconformity Factor	685	3.48	.87	1.0–4.5	1–5
Rank Order of Parental Values—Curiosity Factor	686	3.59	1.07	1–5	1–5
Rank Order of Parental Values—Independence Factor	686	3.52	.92	1–5	1–5
Rank Order of Parental Values—Social Factor	686	3.62	.80	1.33–5.00	1–5
Home Screening Questionnaire—Total Score	422	44.56	5.06	14–53	0–56
Family Routines Inventory—Household Routines Factor	347	1.74	.52	.11–2.78	0–3
Family Routines Inventory—Work/School Routines	272	1.81	.49	.50–3.00	0–3
Family Routines Inventory—Parent-Child Interactions	348	2.31	.42	.71–3.00	0–3
Parenting Stress Index—Total Stress	354	66.06	17.87	36–136	36–180
Parenting Stress Index—Parental Distress	356	23.45	6.62	12–47	12–60
Parental Modernity Scale—Progressive	329	4.21	.45	2.63–5.00	1–5
Parental Modernity Scale—Traditional	329	2.54	.66	1.14–4.68	1–5

Table 3.3: Correlations between Family Variables and Outcome Measures from Child Care through Second Grade

	BACKGROUND		BELIEFS				PRACTICES			
	Maternal Education	Income	ROPV Non-conformity	ROPV Curiosity	Parental Modernity-Progressive	Parental Modernity-Traditional	HSQ Total	FRI Work/School Routines	FRI Parent-Child	PSI Total Stress
Year 1										
PPVT-R lang	.35***	.32***	.40***	.24***	.18**	-.22***	.37***	-.22***	.18***	-.08
WJ-R ltr-word	.28***	.31***	.19***	.18***	.09	-.07	.22***	-.03	.07	-.03
WJ-R math	.27***	.20***	.31***	.18***	.05	-.08	.32***	-.25***	.18**	-.04
CBI cog/att	.21***	.18***	.18***	.10**	-.03	-.08	.27***	-.09	.08	-.16**
CBI prob beh	-.16***	-.16***	-.08*	-.19***	.13*	.02	-.13**	.07	-.01	.11*
CBI soc	.09**	.05	.10**	.05	-.05	-.04	.18***	-.06	.04	-.12*
Year 2										
PPVT-R lang	.37***	.31***	.41***	.24***	.18**	-.28***	.46***	-.16*	.17**	-.16**
WJ-R ltr-word	.20***	.26***	.16***	.19***	.09	-.14*	.20***	-.04	.02	-.04
WJ-R math	.27***	.22***	.21***	.13**	.09	-.10	.31***	-.07	.20***	-.15*
CBI cog/att	.22***	.16**	.21***	.10*	.03	-.09	.25***	-.02	.03	-.20***
CBI prob beh	-.17***	-.18***	-.08	-.16**	.06	.07	-.15**	.04	-.01	.20***
CBI soc	.10*	.09	.11*	.02	-.05	-.02	.10*	-.01	-.01	-.01
Year 3										
PPVT-R lang	.40***	.23***	.40***	.29***	.12*	-.25***	.46***	-.21***	.14**	-.11
WJ-R ltr-word	.16**	.23***	.16**	.13*	.09	-.15**	.18**	-.02	.10	-.04
WJ-R math	.29***	.31***	.28***	.18***	.09	-.19**	.29***	-.14*	.15**	-.12*
CBI cog/att	.16**	.12*	.14*	.11*	.02	-.03	.29***	.01	.14*	-.15*
CBI prob beh	-.12*	-.07	-.01	-.13*	.05	.04	-.25***	.03	-.04	.15*
CBI soc	.04	.06	-.06	-.04	-.04	.09	.14*	.07	.15*	-.18**
Year 5										
PPVT-R lang	.26***	.19***	.33***	.17**	.10	-.24***	.27***	-.27***	.14*	-.06
WJ-R ltr-word	.16**	.21***	.16**	.10	.15**	-.13*	.22***	-.15*	.10	-.09
WJ-R math	.22***	.23***	.20***	.09	.06	-.16**	.25***	-.11	.08	-.14*
CBI cog/att	.19**	.17**	.13*	.00	.03	-.21**	.26***	-.10	.04	-.24***
CBI prob beh	-.13*	-.13*	-.06	-.01	-.00	.14*	-.18**	.09	.01	.23***
CBI soc	.08	.07	-.01	-.07	-.05	.04	.25***	-.02	.09	-.25***
Peer shy/wd	-.08	.06	.06	.06	.02	-.09	-.18**	.08	-.08	.22***
Peer negative	-.12*	-.15*	-.00	.01	-.03	.11	-.16*	.14	.03	.22***

*p < .05 **p < .01 ***p < .001.

Table 3.4: Correlations between Family Variables and Quality Measures

	YEAR 1		YEAR 2		YEAR 3		YEAR 5		
Variable	**Quality Composite**	**T-C Closeness**	**Short ECERS**	**T-C Closeness**	**Short ECERS**	**T-C Closeness**	**IEOS Climate**	**IEOS Link.**	**T-C Close**
Maternal Education	.25***	.11**	.25***	.07	.06	.12*	.11*	.08	.07
Income	.16***	.10**	.09	.14**	.01	.08	.07	.02	.13*
ROPV Nonconformity	.22***	.02	.28***	.08	.08	.04	.06	.02	-.01
ROPV Curiosity	.11**	.04	.23***	.02	-.03	-.02	.07	-.00	-.11
ROPV Independence	.04	-.06	.13*	.06	-.12*	-.06	.05	-.12*	-.02
ROPV Social	-.04	.03	-.06	-.10*	.04	-.05	-.01	.11	.06
HSQ Total	.14**	.14**	.18***	.11*	.07	.19**	.01	.07	.26***
FRI Household	-.04	.08	-.04	.06	.05	.13*	.09	.01	-.02
FRI Work/School	-.06	-.02	-.17*	.06	-.07	-.01	-.10	-.15*	.09
FRI Interaction	.12*	.09	.09	.04	.04	.08	.08	.14*	.12
PSI Total Stress	-.06	-.11*	-.03	-.10	-.02	-.11	.01	.03	-.15*
PSI Parental Distress	-.08	-.06	-.04	-.03	-.02	-.05	.03	.08	-.03
Parental Modernity-Progressive	.13*	-.07	.15*	-.07	.19**	-.10	.07	.01	-.03
Parental Modernity- Traditional	-.17**	-.03	-.13	-.05	.02	.07	-.01	-.03	.04

*p < .05 **p < .01 ***p < .001.

Chapter 4

Developmental Status of the Children in Our Study

On average, the children in our study are scoring within normal ranges for the various measures of cognitive and social development from child care through second grade, although there is a wide range of scores at each time point from well below to well above average. Table 4.1 presents descriptive statistics for the outcome measures each year. In general, children scored close to average on language ability, letter-word recognition, and math skills each year[4]. However, there were consistent increases in scores over time. For language ability, children ranged from slightly below average (94.35) in year 1 to slightly above average (106.5) in year 5. For both letter-word recognition and math skills, children's scores ranged from about average to slightly above average, with a large jump in scores in year 5. Children's scores on behavioral and social skills remained fairly consistent over this time period, indicating moderately good skills on average. From child care through second grade, children were rated by their teachers as having relatively high cognitive/attention skills (CBI scores ranging from 3.62 to 3.89 on a 1–5 scale) and being fairly sociable (CBI scores ranging from 3.97 to 4.14 on a 1–5 scale). Consistent with this pattern, children were rated relatively low in problem behaviors over this time period (CBI scores ranging from 2.17 to 2.44 on a 1–5 scale).

As expected, children's language, letter-word recognition, and math skills increased over time as children gained new competencies through schooling and the normal process of development. However, as a group, the children's *standard scores* on the language, letter-word recognition, and math assessments, which are adjusted for age and therefore expected to remain relatively stable, increased over time from child care to second grade (see Table 4.1). These increases were especially dramatic for the Woodcock-Johnson measures of letter-word recognition and math skills. Children's classroom social and cognitive skills also fluctuated over time, but the patterns were not as clear as with the increases in literacy and math skills (see Table 4.1). Teacher ratings of children's cognitive/attention skills were slightly higher just prior to entry into kindergarten and during elementary school than in the first year of child care. Teacher ratings of problem behaviors were slightly lower in elementary school than in child care. Teacher ratings of sociability showed slightly less variation over time, with the lowest ratings in second grade and the highest in the last year of child care.

Ratings of children's social behavior with respect to peers are also presented in Table 4.1. We collected this measure in the second grade only and therefore cannot examine children's developmental patterns over time. Although there was variability in the ratings, teachers generally perceived the children to be low in aggressive, disruptive, and social withdrawal behaviors and high in prosocial behaviors with peers.

Given the increases in language, letter-word recognition, and math scores and the fluctuations in classroom social and cognitive scores, we were interested in exploring factors that might be affecting our results in addition to child care experiences. In particular, we investigated whether sample attrition was related to these patterns of scores over time. As described in Chapter 1, somewhat disproportionate numbers of children of color and children from lower income families were lost from our study due to sample attrition. If these children were initially scoring relatively lower on measures of language ability and achievement, then increases in the average scores over time might be partially explained by the fact that these children were no longer in our sample.

We examined this issue by performing a series of analyses. First, we compared the year 1 scores of two groups of children: those who were in the year 5 sample and those who were not. The differences between these groups were consistent and statistically significant. For each outcome measure, the children who remained in the sample by year 5 had better year 1 outcomes than the children who left the sample (see Table 4.2). Second, we compared the year 1 and the year 5 scores of children who had data at both time points, to see if scores for the same children were changing over time. For all outcome measures except cognitive/attention skills, children's scores in year 5 were significantly better than their scores in year 1, even though the scores for language, letter-word recognition, and math skills were standardized for age, and therefore would be expected to remain relatively stable over time. Figures 4.1, 4.2, and 4.3 graphically present the changes in language abilities, letter-word recognition skills, and math skills over time for children with data in both year 1 and year 5.

These results suggest that while there is some influence of attrition on the average scores over time, there is also some change over time associated with individual patterns of development and/or the measurement of these skills. First, sample attrition is affecting our results. Children who left the sample by year 5 scored lower on outcome measures in year 1 than did children who remained in the sample. The effect of attrition varied somewhat by outcome measure. For language ability, the difference between the two groups was about .7 of a standard deviation, while for letter-word recognition and math skills the difference was .3 and .5 of a standard deviation, respectively. The differences on the CBI measure of behavioral skills (cognitive/attention, problem behaviors, and sociability) were all less than .5 of a standard deviation.

Second, sample attrition is not the only factor causing changes in scores over time. Comparing the year 1 and year 5 scores for the same children reveals substantial increases in language, letter-word recognition, and math scores as well as smaller positive changes in problem behaviors and sociability. For language ability, the increase was on the order of about .4 of a standard deviation. For letter-word recognition and math skills, the increase was 1.0 and .9 standard deviations, respectively. For problem behaviors and sociability, the change was .2 and .1 standard deviations, respectively. The difference in cognitive/attention skills at the two time points was not significant. Comparing these increases over time with increases due to attrition, it appears that attrition had a relatively stronger influence on language ability, while developmental changes were relatively greater than changes due to attrition for letter-word recognition and math scores.

Because these are standard scores that should remain relatively stable, it is difficult to interpret these changes over time on the language, letter-word recognition, and math scores. While these differences may reflect individual development, they may also reflect differences in how the tests measure these skills for younger versus older children. With respect to individual development, it may be that children's experiences in first and/or second grade have led to substantial development in these areas. It is likely that school experiences in first and second grade are different from child care and kindergarten experiences and may promote the development of skills more consistent with these standardized assessments. With respect to differences in the measurement of the skills for different age groups, it may be that these instruments measure abilities on a somewhat different scale for younger and older children.

In sum, although the study experienced attrition that influenced the average scores on some measures, there is still variation in the sample by the second grade. Further, developmental changes in individual children's scores over time tended to be of similar or slightly greater magnitude than changes due to attrition. Because attrition resulted in proportionally fewer children scoring at the lower ranges (i.e., the overall means were higher), our results are probably underestimates of the influence of child care quality on children's development.

Table 4.1: Descriptive Statistics for Child Outcome Measures

Measure	n	Mean	SD	Range
PPVT-R language				
Preschool 1	745	94.35	18.02	40-144
Preschool 2	510	101.69	17.71	40-146
Kindergarten	406	104.35	16.47	40-150
Second grade	352	106.50	14.13	64-149
WJ-R letter-word				
Preschool 1	743	99.83	12.85	63-161
Preschool 2	511	100.38	13.23	61-158
Kindergarten	406	102.31	15.00	63-153
Second grade	352	116.73	16.48	62-161
WJ-R math				
Preschool 1	704	102.57	13.53	46-139
Preschool 2	511	106.14	15.09	39-175
Kindergarten	406	107.15	15.03	46-183
Second grade	352	120.24	16.94	54-188
CBI cog/att				
Preschool 1	744	3.62	.71	1.37-5.00
Preschool 2	451	3.85	.71	1.84-5.00
Kindergarten	342	3.89	.68	1.83-5.02
Second grade	277	3.81	.75	1.80-5.00
CBI prob beh				
Preschool 1	744	2.44	.87	.83-4.93
Preschool 2	451	2.38	.88	1.00-4.87
Kindergarten	342	2.20	.80	1.00-4.44
Second grade	277	2.17	.85	1.00-4.82
CBI sociability				
Preschool 1	745	3.98	.72	1.30-5.33
Preschool 2	451	4.14	.67	1.60-5.00
Kindergarten	342	4.04	.70	1.77-5.17
Second grade	277	3.97	.72	1.30-5.00
Peer relations (Second grade)				
Shy/withdrawn	277	4.48	1.93	3-13
Peer negativity	274	-1.49	7.46	-9-25
Aggressive	277	4.53	2.50	3-14
Disruptive	276	5.74	3.28	3-15
Prosocial	275	11.76	2.79	3-15

Table 4.2: Average Scores on Outcome Measures for Children in Year 5 and Children Lost to Follow-up

	CHILDREN WITH DATA AT YEAR 5			CHILDREN LOST TO FOLLOW-UP		
Mean Scores in Year 1	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
PPVT-R	99.0	15.9	417	88.4	19.1	411
WJ-R Letter-Word ID	101.8	13.0	416	97.8	12.9	410
WJ-R Applied Problems	106.0	12.5	392	98.6	13.7	383
CBI Cognitive/Attention	3.8	0.7	403	3.5	0.7	390
CBI Problem Behavior	2.3	0.9	403	2.6	0.9	390
CBI Sociability	4.0	0.7	403	3.9	0.7	391

Figure 4.1: Mean Language Skills Over Time for Children with Data at Year 1 & Year 5

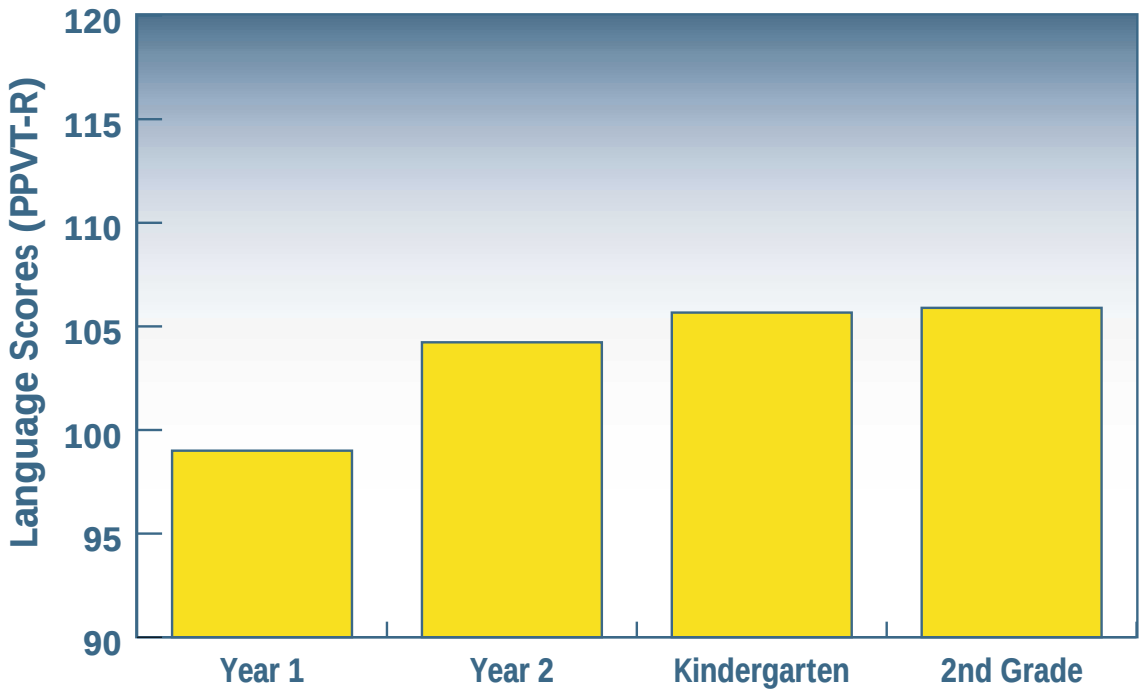


Figure 4.2: Mean Letter-Word Recognition Skills Over Time for Children with Data at Year 1 & Year 5

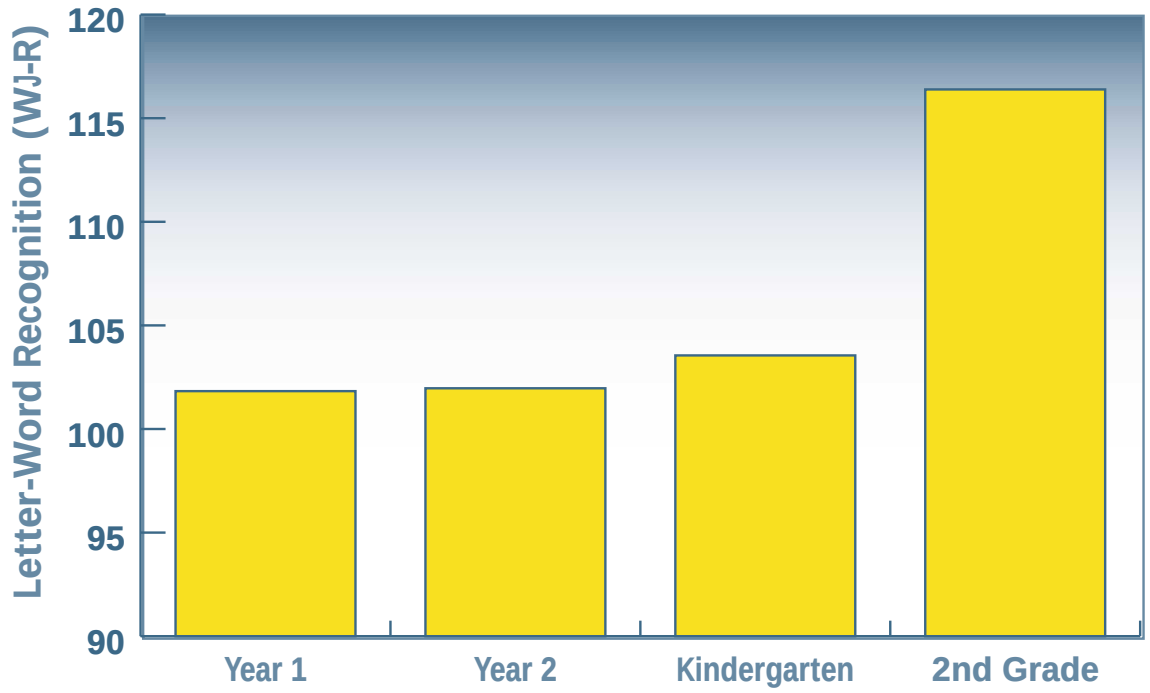
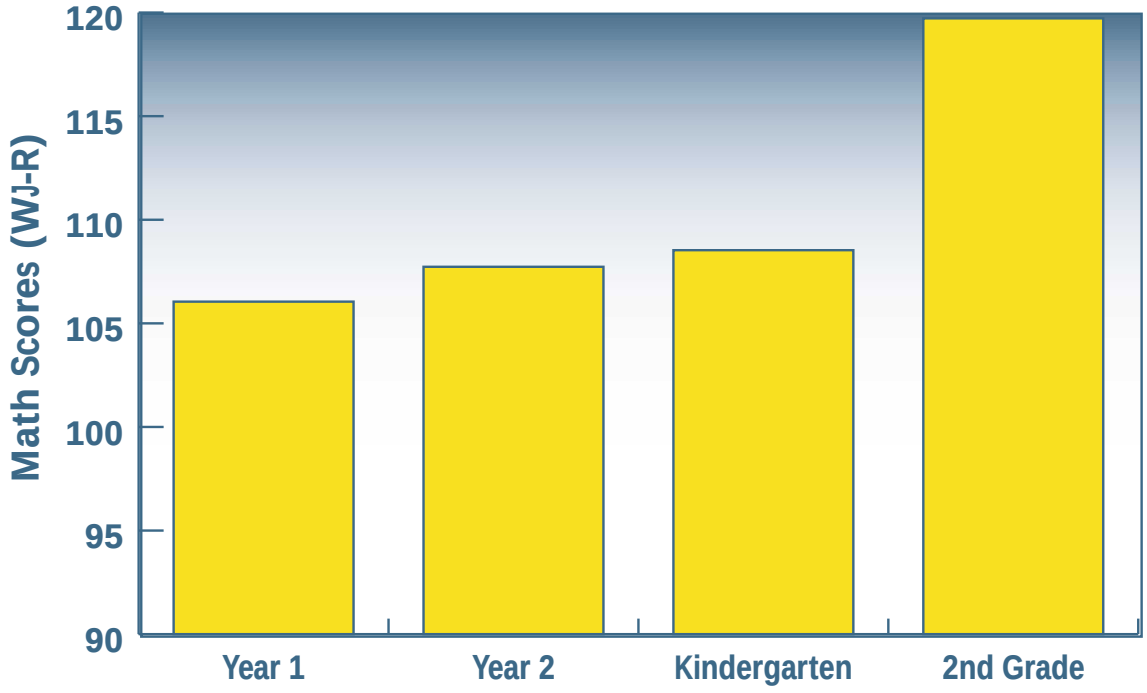


Figure 4.3: Mean Math Skills Over Time for Children with Data at Year 1 & Year 5



Chapter 5

Child Care and Children: Findings From Our Study

This chapter summarizes our major findings on the relation of child care quality to the developmental outcomes of children from preschool through second grade. The overarching research question guiding our work was, "Do early child care experiences have long-term consequences for children's development?" We answered this question by examining the influence of child care experiences *after* taking into account background differences among children that we would expect to affect outcomes, including maternal education and child gender and ethnicity.

For most of our analyses, we measured two dimensions of preschool child care quality, classroom practices and teacher-child relationships. Classroom practices were examined in the first year of the study with a variety of observational instruments that measured the quality of the child care environment, teacher sensitivity and responsiveness in interactions with children, and teaching style. Teachers rated the closeness of their relationship with each individual child to measure the teacher-child relationship dimension of child care quality. In order to measure the influence of subsequent experiences in child care and school, classroom practices were measured with brief observations and teacher reports of beliefs and practices each year (in the last year of child care, kindergarten, and second grade). Teachers also completed the same ratings of the closeness of the teacher-child relationship at each assessment period. Children's developmental outcomes were measured each year through individual assessments of language ability, letter-word recognition, and math skills and teacher reports of classroom behavior (cognitive/attention skills, problem behaviors, and sociability) and peer relations (second grade only).

We examined the long-term consequences of variations in the quality of child care experiences from two perspectives. First, we looked at the longitudinal influences of child care experiences over time, as children moved from child care into the early elementary years. The primary research question was: "To what extent does child care quality affect children's patterns of development from child care through second grade?" With this question, we were interested in looking at the influence of early experiences on children's development of greater cognitive and social skills from preschool to the second grade, after accounting for child and family background characteristics.

Second, we examined the influence of both early child care experiences and later school experiences in kindergarten and second grade on children's abilities in the second grade. The primary research question from this perspective was: "To what extent do child care experiences affect children's development four years later in the second grade after considering the subsequent experiences of kindergarten and second grade classroom quality, as well as child and family background?" This second set of analyses also allowed us to expand our outcome measures to include a peer relations measure that was gathered only in the second grade. These two sets of findings are presented separately below.

Longitudinal Findings: The Children Over Time

Our first set of findings looked at the relationship between child care quality and children's patterns of development from the preschool years through second grade after taking into account differences in background characteristics. The set of longitudinal findings comprises three separate findings. We arrived at these findings using longitudinal hierarchical linear models analyses, which examined the children's developmental outcomes from age 4 through second grade (see Appendix B for details about the analyses). Separate analyses were conducted for each of the six developmental outcomes: individual assessments of receptive language ability, letter-word recognition, and math achievement, and teacher ratings of children's cognitive/attention skills, problem behaviors, and sociability. With these analyses, we were able to predict patterns of development over time on these outcomes. In addition, we adjusted for children's age and for background characteristics that we would expect to influence development (maternal education and child gender and ethnicity) before considering the effects of preschool child care quality. We also examined whether the background characteristics (maternal education and child gender and ethnicity) moderated the effects of child care quality on children's outcomes, that is, whether quality related to outcomes differently for children from different backgrounds. Our three separate longitudinal findings are presented below.[5]

- **Finding One: Children who attended child care with higher quality classroom practices had better language and math skills from the preschool years into elementary school.**

We examined the association between the quality of observed practices in child care and patterns of receptive language, letter-word recognition, and math skills development from child care to second grade. For receptive language ability, after adjusting for the background variables, children who attended preschool child care with higher quality practices tended to have higher language scores at least through kindergarten. Although child care quality was measured on a continuum, we can examine the differences between two levels of quality as an example. As shown in Figure 5.1, children who attended high quality child care (defined as the 75th percentile of quality scores) had better language skills over time than children in low quality child care (defined as the 25th percentile of quality scores). While this relationship held at least through kindergarten, preschool child care quality was less strongly associated with language ability over time, so that child care quality had the strongest relation to children's language ability in year 1, when both were measured at the same time, and related less strongly to language ability as children grew older. In other words, as the children moved to second grade, the differences between the language skills of children in high and low quality care decreased.

The development of math skills was also related to the observed quality of child care practices, after considering background variables. Children in higher quality care scored better in math skills than children in lower quality care. Further, unlike language ability, this association did not decrease over time, so that child care quality continued to have the same relation to children's math scores from child care through second grade. In other words, the math skills of children in high quality care were better than the math skills of children in low quality care at all ages, from the preschool years through second grade. In contrast, there was no relation between the development of letter-word recognition skills and child care quality.

- **Finding Two: Children with closer teacher-child relationships in child care had better classroom social and thinking skills, language ability, and math skills from the preschool years into elementary school.**

We examined the association between the closeness of the relationships child care teachers reported with children during year 1 and children's cognitive and social development, including classroom behavior (cognitive/attention skills, problem behaviors, and sociability), language ability, letter-word recognition skills, and math skills, from preschool through second grade. Teacher ratings of children's classroom behavior were related to the closeness of the child care teacher-child relationship, after controlling for background characteristics. Children with closer relationships with their teachers in child care were rated better in cognitive/attention skills by their

teachers from preschool through second grade. Although the quality of child care teacher-child closeness was measured on a continuum, we can look at two levels of closeness as an example. As seen in Figure 5.2, children with closer relationships with their child care teachers (defined as the 75th percentile of closeness ratings) had better cognitive/attention skills over time than children who had less close relationships with their child care teachers (defined as the 25th percentile of closeness ratings). As the children grew older, the differences between the skills of children with high versus low closeness with their child care teachers decreased, although these differences remained statistically significant through the second grade.

The closeness of child care teacher-child relationships was also related to teacher ratings of children's problem behaviors over time. Children who had closer relationships to their child care teachers were rated lower in problem behaviors by their teachers from preschool through second grade. As with cognitive/attention skills, the differences between the problem behaviors of children with high versus low closeness with their child care teachers decreased over time, although the differences were still statistically significant through second grade.

Children with closer teacher-child relationships in child care were also rated better in sociability by their teachers at least through kindergarten. The effects of child care teacher-child closeness on ratings of children's sociability decreased in subsequent years; this association was statistically significant at least through kindergarten but not by second grade. Figure 5.3 displays these developmental patterns, indicating that children with closer relationships with their child care teachers (defined as the 75th percentile of closeness ratings) were more sociable over time than children who had less close relationships with their child care teachers (defined as the 25th percentile of closeness ratings).

Similar but less strong relations between child care teacher-child closeness and children's language and math skills development were found, after adjusting for background characteristics. In contrast, children's letter-word recognition scores over time were not related to the closeness of teacher-child relationships. Children whose child care teachers rated their relationship as closer tended to have higher language scores and better math skills through second grade. Figure 5.4 shows children's language scores over time as a function of teacher-child closeness, and Figure 5.5 displays the relation for math skills. Each of these figures shows the relation of low and high levels of teacher-child closeness (defined as the 25th and 75th percentiles of ratings) to children's scores over time.

- **Finding Three: Better quality child care was more strongly related to better math skills and fewer problem behaviors from the preschool years through second grade for children whose mothers had less education.**

By including in our analysis models interactions between child care quality and the background characteristics of maternal education and child gender and ethnicity, we were able to examine whether child care quality related to outcomes differently for children from different backgrounds. Based on these analyses, there is some evidence from our findings for math skills and problem behaviors that child care quality relates even more strongly to developmental outcomes for children whose mothers have fewer years of education. There is no evidence in our data that child care quality relates to outcomes differently on the basis of children's gender or ethnicity.

Child care practices of higher observed quality were even more strongly related to better math scores over time for children whose mothers had less education compared to children whose mothers had more education. Although maternal education was measured on a continuum, with the range in our sample being 10 to 20 years of education, we can examine the differences between two levels of maternal education as an example. Figure 5.6 shows examples of the relation between children's math skills and quality of child care practices—for children whose mothers had 12 years of formal education (i.e., the equivalent of a high school diploma) and for children whose mothers had 16 years of education (i.e., the equivalent of a bachelor's degree). For mothers at the higher level of education, the two lines for low and high quality care practically overlap; there is no significant

effect of quality. However, for mothers at the lower level of education, quality has a significant effect; children experiencing higher quality care continue to have higher math scores over this time period. This result suggests that while better child care quality is related to better math skills for children, the influence of child care quality is even stronger for children of less educated mothers.

Similarly, the closeness of children's relationship with their child care teachers related to problem behaviors differently over time for children of mothers with different levels of education. For children whose mothers had less education, closer teacher-child relationships in child care continued to be associated with fewer problem behaviors through second grade. For children whose mothers had more education, closer teacher-child relationships in child care were less strongly related to problem behaviors by second grade. Figure 5.7 shows examples of the relation between children's problem behaviors and child care teacher-child closeness—for children whose mothers had 12 years of formal education (i.e., a high school diploma) and for children whose mothers had 16 years of formal education (i.e., a bachelor's degree). For the children with more highly educated mothers, the influence of child care teacher-child closeness declines over time (the two lines on the graph get closer together over time), while for children with less highly educated mothers, the effect of child care teacher-child closeness remains consistent over time (the two lines are the same distance apart at age 4 as they are at age 8).

Discussion of Longitudinal Findings

In most domains of development that we examined, there was evidence for a modest continued influence of preschool child care quality on children's abilities and skills at least through kindergarten, and often through second grade. Longitudinal effects were found for receptive language ability, math skills, cognitive/attention skills, problem behaviors, and sociability, indicating that children who experienced better quality child care were more advanced in their development into the early elementary years.

The only outcome measure for which an influence of quality was not found was letter-word recognition. There are many aspects of literacy development, and we included two in our battery of assessments—receptive language ability and letter-word recognition. Child care quality was associated longitudinally with receptive language ability but not letter-word recognition. It may be that the literacy aspects of the developmentally appropriate environments offered by high quality child care are more supportive of the acquisition of receptive language skills than letter-word recognition skills for young children.

The findings of a consistent pattern of effects across the various domains of development suggest that child care quality influences a wide range of children's outcomes. While the relations between child care quality and children's development were modest, the findings of long-term effects, after adjusting for child and family characteristics, are notable for several reasons.

Child care quality is important for all children

First, these results were obtained on a sample of community child care programs in four regions of the U.S. While long-term effects of preschool experiences have been established for a variety of model early intervention programs (e.g., Campbell & Ramey, 1994; Lazar et al., 1982; Schweinhart et al., 1993), much less is known about the long-term effects across the range of child care experiences and for children from a range of backgrounds. The children and families in our study were enrolled in typical community child care programs, representing a wide range of quality. In addition, the families themselves were from a variety of backgrounds. Across the range of family circumstances, child care quality generally had a positive association with children's developmental outcomes.

Child care quality may be especially important for children at risk

Second, in some cases, child care quality had even stronger influences for children at greater risk, who are presumably more similar to the participants in the early intervention programs. This was the case for children with less highly educated mothers. For these children, better quality child care was even more strongly related to better math skills and fewer problem behaviors through second grade. These findings extend the results of the early intervention studies, and suggest that child care experiences, in both the short- and long-term, have an even greater influence on some areas of development for children at greater risk.

The effects of child care quality are long term

Third, for all but one of the outcomes studied (letter-word recognition skills), child care quality continued to exhibit an influence at least through kindergarten (for language ability and sociability) and, in some cases (for math skills, cognitive/attention skills, and problem behaviors), through second grade four years later. These long-term findings cover a substantial portion of time, representing about half of these children's lives at that point. While there was some evidence of a diminishing influence of child care quality over time, this is to be expected given the variety of subsequent experiences in children's lives which also contribute to their development.

Another way of looking at our results is to consider effect sizes, which allow a comparison of the scores on the outcome measures for children who were in low quality child care with children who were in high quality care, taking into account the variation within the groups and adjusting for background characteristics.[6] Low quality care was defined as the classes in the lowest quartile of quality ratings, and high quality care was defined as the classes in the highest quartile of quality ratings. Generally speaking, effect sizes around .2 are considered modest, .5 moderate, and .8 large.

Table 5.1 presents the language and math means of children in the lowest quality group for classroom practices (0–25th percentile of quality scores) and the means of children in the highest quality group (75–100th percentile of quality scores), with the standard errors and effect sizes for each year. (Effect sizes are not reported for letter-word recognition, cognitive/attention, problem behavior, or sociability scores because there was no effect of the quality of child care practices on these scores.) For language scores, the effect sizes for the first two years are moderate (.60 and .51), while the effect sizes for kindergarten and second grade are more modest (.30 and .14). These findings are another way of reporting that the influence of child care quality diminishes over time for language ability. For math skills, the effect sizes remain modest (ranging from .20 to .29) from child care through second grade. These findings reiterate that for math skills, unlike language ability, the association with quality does not decrease over time; child care quality had the same influence on children's math scores in child care as in second grade.

Table 5.2 presents the classroom behavior (cognitive/attention skills, problem behaviors, and sociability), language, and math means of children in the lowest quality group for child care teacher-child closeness (0–25th percentile of closeness ratings) and the means of children in the highest quality group (75–100th percentile of closeness ratings), along with the standard errors and effect sizes for each year. (The effect sizes for letter-word recognition are not presented because there was no significant effect of closeness on these scores.) The year 1 effect sizes for cognitive/attention skills, problem behaviors, and sociability may be inflated because the same child care teacher rated both the closeness of relationship and the classroom behavior of the children.

For cognitive/attention skills, the child care teacher-child closeness effect sizes range from .72 for the second year of child care to .59 for kindergarten to .45 for second grade. While the influence of child care teacher-child closeness on cognitive/attention skills diminishes over time, it continues to have a moderate effect through second grade. The effect sizes of closeness for problem behaviors show a similar pattern, in the moderate range

in the second year of child care (-.69) and becoming more modest by second grade (-.35). (Note that the negative effect sizes indicate that greater teacher-child closeness is associated with fewer problem behaviors.) For sociability, the effect sizes of child care teacher-child closeness were moderate in the second year of child care (.59) and were more modest in kindergarten (.42) and second grade (.41).

The effect sizes of teacher-child closeness with respect to language and math are not as large as the effect sizes for the classroom behavior ratings, highlighting the fact that the association of closeness with language and math was not as strong. For language ability, the effect sizes were relatively modest throughout, ranging from .17 to .35. The effect sizes for math skills were similarly modest, ranging from .14 to .46.

Children's development is the product of many influences, including both child care and family environments

Fourth, comparing the influence of family characteristics with the relative contribution of child care quality shows how the two factors relate to different aspects of children's development. We expected that characteristics of the home would significantly predict children's development; the family provides the primary environment for the child as well as what is typically the one consistent environment over time. Child care experiences, on the other hand, provide a secondary environment for only part of this time and are replaced by other preschool, school, and possibly other child care environments as children grow older. Comparisons of the associations of family and child care measures with children's outcomes over time suggest that maternal education is a somewhat stronger predictor of children's language and academic skills over time, although child care practices still exhibit a significant association. In contrast, the closeness of the child's relationship with the child care teacher tends to be an even stronger predictor of children's behavioral and social skills in the classroom than either maternal education or classroom practices. However, our measures of family background represented structural characteristics, while the child care quality measures examined classroom processes. It may be that process measures of the family environment would yield a different pattern of relations.

Taken together, these results support an ecological perspective, wherein children's development is the product of influences from the multiple environments in which they live. The family is the primary environment for most children, but for children in full-time child care, the child care environment is likely to be the second most frequent environment in which they spend time. Our findings show that the quality of these secondary environments also plays a role in determining young children's developmental outcomes, not only during their child care years but also longitudinally through the early school years.

The two measured dimensions of quality, practices and teacher-child relationships, are associated differentially with children's outcomes

Fifth, this study examined two different aspects of the child care experience, observational ratings of classroom practices and the teacher's rating of the closeness of the teacher-child relationship. Our results showed that these two aspects of quality were differentially associated with children's patterns of development. Children's cognitive skills were most strongly related to observational measures of practices, while children's classroom behavior and social skills were more strongly related to teacher-child closeness. These findings suggest that child care experiences influence cognitive and socio-emotional development somewhat differently. While actual classroom practices, including materials, activities, and interactions, contribute most strongly to children's language and math development both concurrently and over time, early relationships with caregivers were the strongest longitudinal predictors of children's classroom behavior and social skills.

Of course, we recognize that the teacher-child relationship aspect of child care quality is not solely the product of the teacher. Relationships are constructed through a two-way interaction between teacher and child; thus, the child contributes to the nature of this relationship as well. This complicates the interpretation of the association between teacher-child relationships and child outcomes, especially with respect to social outcomes. Characteristics of the child, especially in terms of social interaction skills, as well as characteristics and behaviors of the teacher, affect the nature of teacher-child relationships. It is difficult to determine the extent to which the relation between teacher-child closeness and children's outcomes is the product of teacher characteristics, child characteristics, or the particular combination of the two.[7] On the other hand, the second measured aspect of child care quality, observed classroom practices, is less affected by characteristics of individual children. Thus, our findings of an association between child care practices and children's development can be interpreted more clearly as an effect of child care on children's later outcomes.

Second Grade Findings: The Children as Second Graders

Our second set of findings answers questions about the extent to which child care experiences affect children's abilities four years later, when children are in the second grade, after considering the effects of subsequent experiences during this time period. Two sets of analyses were conducted. The first set examined children's language ability, letter-word recognition, math skills, and classroom behavior, while the second set examined children's peer relationships. For the first set of analyses, we considered the subsequent experiences children had between child care and second grade, in particular, the quality of their classroom experiences in kindergarten and second grade. To arrive at these findings, we examined the contribution of classroom quality in child care to children's developmental outcomes in second grade, after considering kindergarten and second grade classroom experiences as well as family and child background characteristics. As with the longitudinal analyses, we also examined whether quality related differently to second grade outcomes for children from different backgrounds. The same six developmental outcomes were examined, using only the child's scores from the second grade assessment (language ability, letter-word recognition skills, math skills, cognitive/attention skills, problem behaviors, and sociability). In the second set of analyses, outcome measures of children's peer relationships were examined, based on second grade teacher ratings of children's aggressive, disruptive, prosocial, and withdrawn behavior with peers. Measures of the child care classroom social emotional climate (created by averaging the scores across all children on level of peer play, problem behaviors, and teacher-child relationships) were used to examine the extent to which child care experiences influenced children's peer relations. These analyses also controlled for background characteristics, previous problem behaviors, and child care and second grade teachers' reports of teacher-child closeness and conflict.

Looking at the developmental status of second graders is important because of the widely held belief that this represents a critical period in children's academic and social development. Children's achievement (in terms of both academic and social skills) in their first years of schooling is believed to set them on academic and social trajectories that are difficult to change as children get older and patterns of achievement become more established (Alexander & Entwisle, 1988). Children's social and academic skills in the second grade are highly predictive of their longer term social and academic adjustment (Ensminger & Slusarcick, 1992; Entwisle & Hayduk, 1988; Howes & Tonyan, in press). We were interested in further examining peer relations because of evidence that suggests by mid-elementary school, individual differences in children's social competence with peers appear to stabilize and predict future adaptive or non-adaptive behavior in adolescence (Asher, Parkhurst, Hymel, & Williams, 1990; Parker & Asher, 1987; Rubin, Chen, McDougall, Bowker, & McKinnon, 1995). Our two separate second grade findings are presented below.

- **Finding Four: Children who attended higher quality child care had better cognitive and social skills in the second grade, even after taking into account kindergarten and second grade classroom experiences.**

The results of our study provide some evidence that preschool child care quality is related to children's math and classroom social skills in the second grade, after considering background characteristics and the quality of subsequent experiences in kindergarten and second grade.[8] At all three time points (child care, kindergarten, and second grade), quality included both measures of observed classroom practices and the closeness of teacher-child relationships. As with the longitudinal findings, children's math achievement related to child care classroom practices, while children's problem behavior related to child care teachers' ratings of teacher-child closeness. Also similar to the longitudinal findings, the influence of child care quality on children's outcomes varied somewhat depending on children's background characteristics.

Children's second grade math scores were predicted by child care quality. Higher math scores in the second grade were associated with better observed child care quality, even after considering background characteristics and kindergarten and second grade classroom experiences. Children's language and letter-word recognition scores in the second grade were not influenced by preschool child care quality, after considering background characteristics and kindergarten and second grade classroom experiences.

Children's classroom social skills in the second grade were also related to preschool child care quality, again, after considering background characteristics and kindergarten and second grade classroom experiences. Teachers reported fewer problem behaviors in second grade for children who had closer relationships with their child care teachers. This association was also affected by maternal education; it was found only for children whose mothers had fewer years of education. Children's cognitive/attention skills and sociability in second grade were not related to child care quality after considering background characteristics and kindergarten and second grade classroom experiences.

- **Finding Five: Children who experienced more positive classroom climates in child care had better relationships with peers in second grade.**

To examine the association between child care experiences and second grade peer relations, we conducted an analysis that considered the social-emotional climate of the child care classroom.[9] Child care social-emotional climate was measured as the average levels for each classroom of (a) peer interaction during play, (b) problem behaviors, and (c) teacher-child closeness ratings. We included four separate aspects of children's interactions with other children as outcome measures: aggression, disruption, prosocial (friendly) behavior, and withdrawal.

Teacher ratings of children's social behavior with peers in the second grade were associated with various aspects of the child care social-emotional climate, after controlling for children's background characteristics, previous problem behaviors, and closeness and conflict with child care and second grade teachers. In general, negative peer interactions in the second grade (aggression, disruption, and social withdrawal) related more to the negative aspects of the child care social-emotional climate (high levels of problem behaviors and low levels of teacher-child closeness). Positive peer interactions in second grade (prosocial or friendly behaviors) related more to the positive aspects of the child care environment (greater peer interaction during play).

Children rated high on aggression in the second grade were more likely to have been in child care classrooms with climates characterized by high levels of problem behaviors and low levels of teacher-child closeness. Similarly, greater disruptive behavior in the second grade was related to earlier experiences in child care classroom climates high in problem behaviors and low in teacher-child closeness. Higher ratings of social withdrawal in second grade were associated with child care experiences in classrooms characterized by high levels of problem behaviors. Greater second grade prosocial behavior, on the other hand, was predicted by earlier child care classroom climates that involved greater peer interaction during play.

Discussion of Second Grade Findings

Children's academic and social competence in second grade can be predicted by the experiences they had four years previously in child care, after taking into account subsequent experiences in elementary school. While there was some evidence of an effect of child care quality on children's academic skills, particularly math achievement, most of the effect was seen in the social domain, in terms of second grade classroom behavior and peer relationships. The findings of a long-term influence of child care experiences are notable for two reasons.

There are lasting effects of child care quality on children's second grade outcomes even after considering subsequent classroom experiences

First, given the nature of longitudinal designs, children have had a number of subsequent experiences in out-of-home environments over this time period. From their next-to-last year in child care through second grade (ages 4 to 8), children have experienced a variety of care and education settings, including the transitions to and experiences in kindergarten, first grade, and second grade. The findings of long-term child care influences in second grade despite the variety of subsequent experiences suggest the long-term importance of early experiences on children's development.

While there is a slight indication that children in higher quality child care are also ending up in higher quality environments once they enter school, these relations are fairly modest. As was reported in Chapter 2 and Table 2.2, the correlations among the observed practices measures for child care, kindergarten, and second grade ranged from .06 to .15. (Table C.1 in Appendix C contains the full intercorrelation matrix of all classroom quality measures, including both observed practices and teacher-child relationships.) As was shown in Table 2.3, the correlations among ratings of teacher-child closeness over time were somewhat stronger than among classroom practices, ranging from .20 to .31, with the strongest correlation between kindergarten and second grade. While these patterns suggest that there is only a slight association among the quality of practices over time, there is more similarity in the nature of teacher-child relationships over time. It may be that children are learning ways of interacting and establishing relationships with non-parental caregivers during their preschool years that carry over, at least to some extent, into the relationships they form with their teachers in elementary school. Looked at in another way, it may be easier to establish close relationships with some children because their behaviors promote such relationships. Similarly, children may learn patterns of behavior that are likely to elicit certain patterns of response on the part of caregivers, so that continuity in children's behaviors over time would increase the likelihood that earlier and later caregivers respond in a similar manner.

The social-emotional climates of child care classrooms as well as individual children's relationships with their teachers are important predictors of children's outcomes

Second, our results indicated that social competence with peers was related to positive child care classroom environments (i.e., classrooms with close teacher-child relationships, low problem behaviors, and frequent opportunities for children to play together) in addition to positive teacher-child relationships. Child care classrooms have been described as a matrix of social relationships within which children establish patterns of relationship quality (Howes, Matheson & Hamilton, 1994). The nature of these relationships appears to persist over time and over the transition into more formal school. The particular pathways in which child care social and emotional climates and individual behavior interact are consistent with other studies that suggest that contemporary and earlier positive teacher-child relationships are linked to social competence with peers (Howes, in press). While child care climate measures of problem behaviors and teacher-child relationships predicted second grade

aggression, disruption, and social withdrawal, the peer social emotional climate predicted prosocial behavior. These findings are consistent with other studies which suggest that social competence with peers as opposed to maladaptive behaviors with peers appears to be best predicted by early opportunities to engage with peers (Howes & Phillipsen, 1998).

In sum, the second grade findings reported above mirror the longitudinal findings in at least two ways. First, while the longitudinal findings pertaining to child care teacher-child closeness may reflect characteristics of the individual child to some extent (children's skills and behaviors, especially social skills, affect the nature of the teacher-child relationship), the second grade findings reported above for peer relationships have adjusted for individual behavior before considering the effect of child care experiences. Both the longitudinal and second grade findings show a similar pattern of relationship between teacher-child closeness and outcomes, suggesting again that the effects of closeness in the longitudinal findings are not solely child effects. Second, both sets of findings reveal that children who have more positive child care experiences have better outcomes over time through second grade. Whether child care experiences are examined in terms of global quality of classroom practices, the nature of teacher-child relationships, or social-emotional climate, more positive experiences are related to better outcomes, in both social and cognitive domains.

Table 5.1: Effect Sizes for Observed Practices[a]

	CHILD CARE YEAR 1	CHILD CARE YEAR 2	KINDERGARTEN	SECOND GRADE
PPVT-R Language				
Low Quality Mean	89.0	97.9	102.8	105.7
High Quality Mean	98.0	105.4	107.0	107.6
Standard Error	15.0	14.6	14.1	13.5
Effect Size	0.60	0.51	0.30	0.14
WJ-R Math				
Low Quality Mean	101.5	103.5	106.8	117.6
High Quality Mean	104.9	107.3	109.5	122.3
Standard Error	11.9	13.8	14.0	16.3
Effect Size	0.29	0.28	0.20	0.29

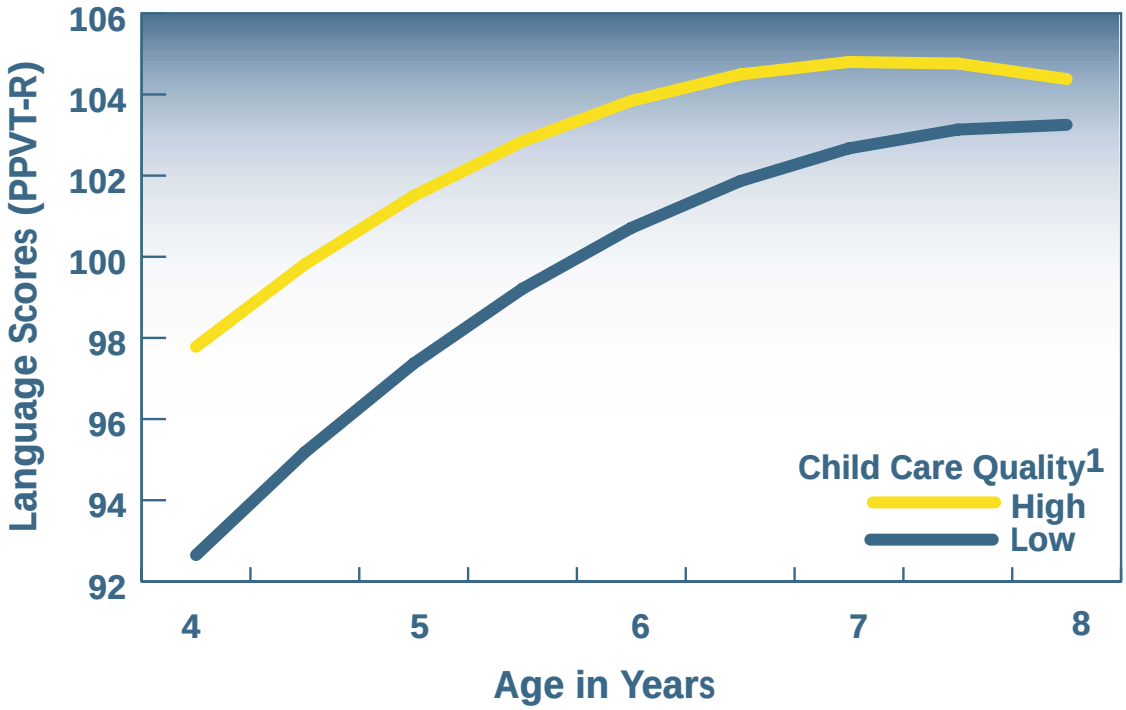
[a]Low=0–25th percentile of quality scores; High=75th–100th percentile of quality scores

Table 5.2: Effect Sizes for Teacher-Child Closeness[a]

	CHILD CARE YEAR 1	CHILD CARE YEAR 2	KINDERGARTEN	SECOND GRADE
CBI Cog/Attn				
Low Closeness Mean	3.22	3.58	3.70	3.68
High Closeness Mean	4.04	4.06	4.09	4.01
Standard Error	0.61	0.67	0.66	0.73
Effect Size	1.34	0.72	0.59	0.45
CBI Prob Beh				
Low Closeness Mean	2.86	2.73	2.42	2.35
High Closeness Mean	2.12	2.16	2.05	2.06
Standard Error	0.80	0.83	0.78	0.82
Effect Size	-0.92	-0.69	-0.46	-0.35
CBI Soc				
Low Closeness Mean	3.48	3.92	3.87	3.82
High Closeness Mean	4.43	4.31	4.16	4.11
Standard Error	0.62	0.66	0.69	0.71
Effect Size	1.54	0.59	0.42	0.41
PPVT-R Language				
Low Closeness Mean	91.2	98.9	102.4	103.7
High Closeness Mean	95.8	104.0	104.9	108.0
Standard Error	15.1	14.6	14.1	13.2
Effect Size	0.30	0.35	0.17	0.33
WJ-R Math				
Low Closeness Mean	101.3	104.3	106.0	116.3
High Closeness Mean	105.0	106.7	108.0	123.7
Standard Error	12.0	13.8	14.2	16.1
Effect Size	0.30	0.17	0.14	0.46

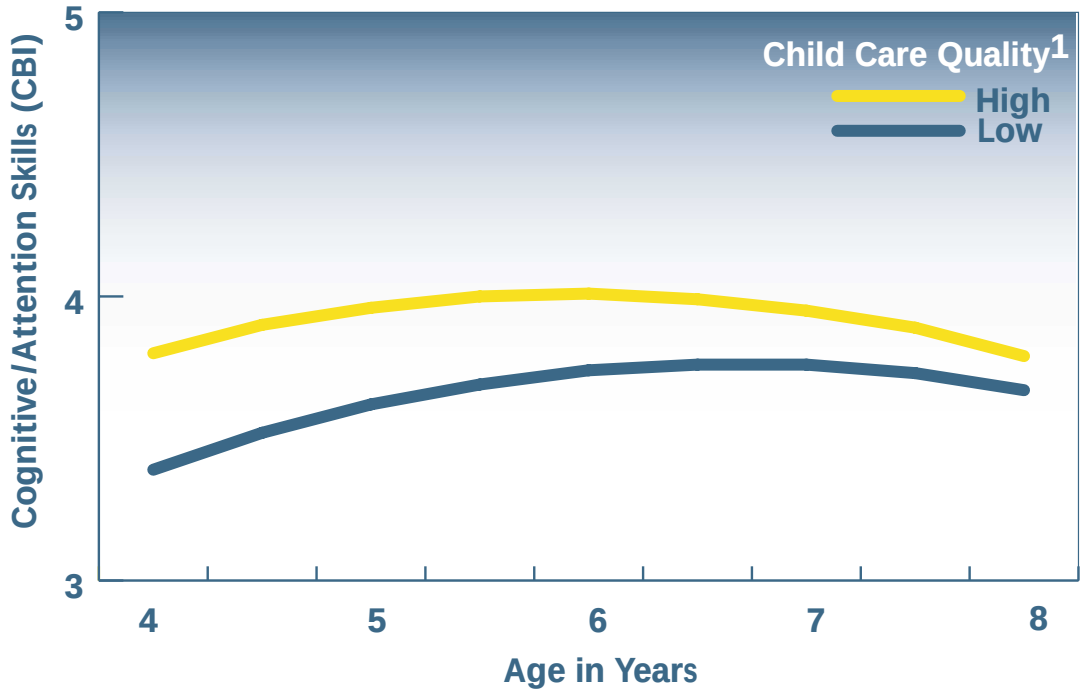
[a]Low=0–25th percentile of closeness ratings; High=75th–100th percentile of closeness ratings

Figure 5.1: Children's Language Skills Over Time by Quality of Child Care Classroom Practices



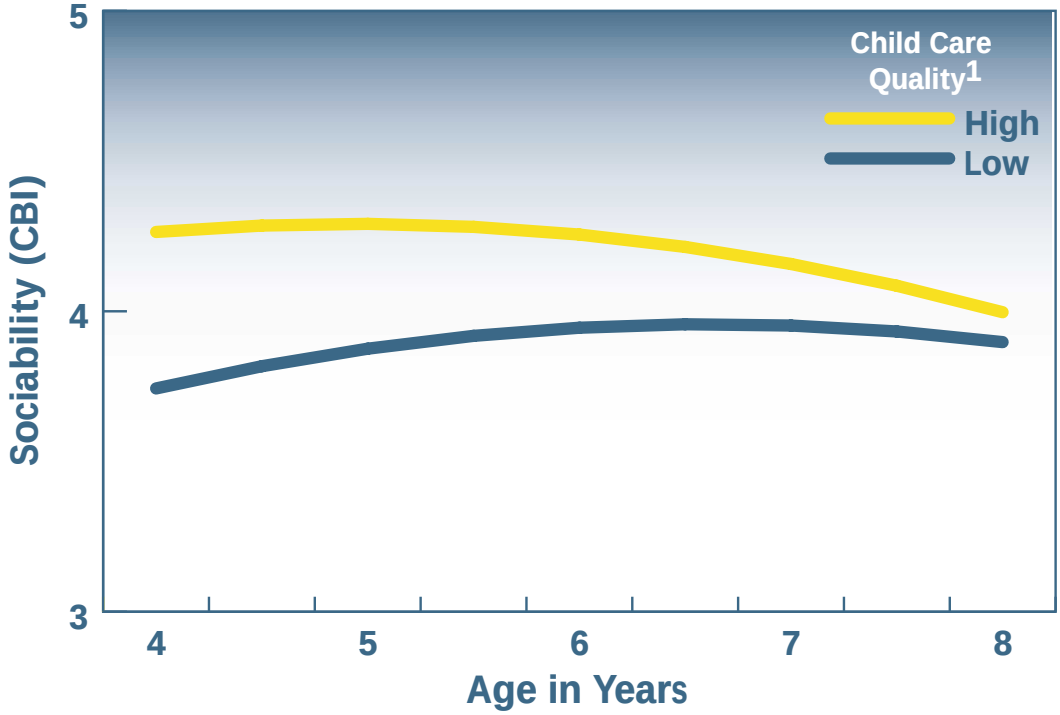
1Note: High=75th percentile of quality scores: Low=25th percentile of quality scores

Figure 5.2: Children's Cognitive/Attention Skills Over Time by Quality of Child Care Teacher-Child Closeness



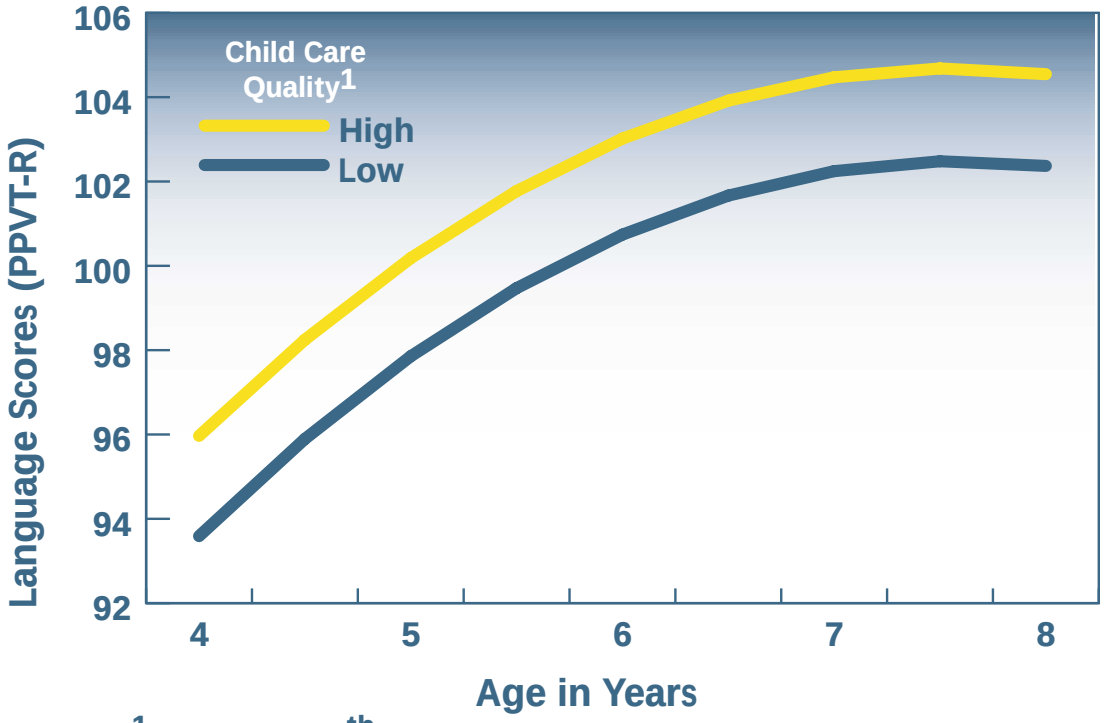
1Note: High=75th percentile of closeness ratings; Low=25th percentile of closeness ratings

Figure 5.3 Children's Sociability Over Time by Quality of Child Care Teacher-Child Closeness



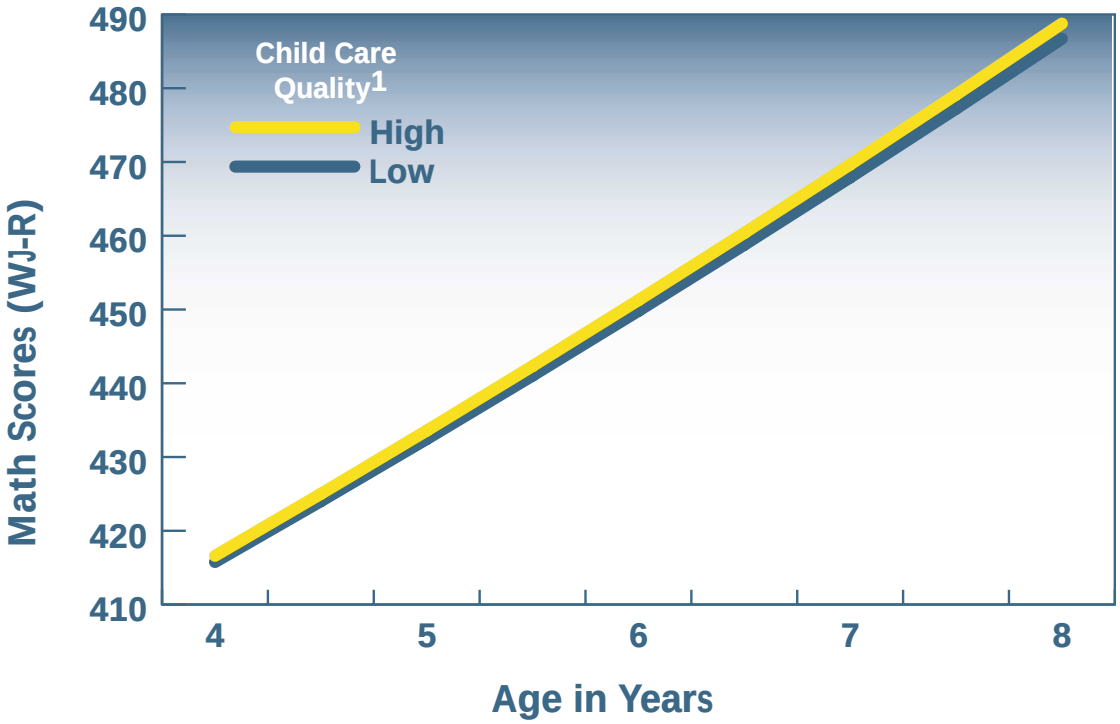
1Note: High=75th percentile of closeness ratings; Low=25th percentile of closeness ratings

Figure 5.4 Children's Language Skills Over Time by Quality of Child Care Teacher-Child Closeness



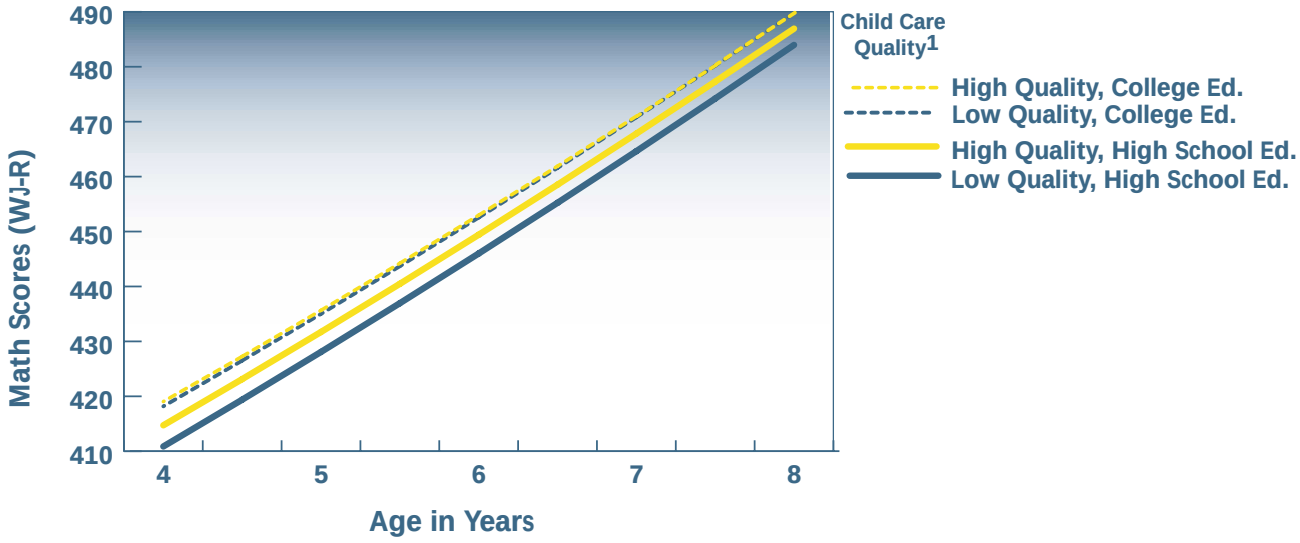
1Note: High=75th percentile of closeness ratings; Low=25th percentile of closeness ratings

Figure 5.5: Children's Math Skills Over Time by Quality of Child Care Teacher-Child Closeness



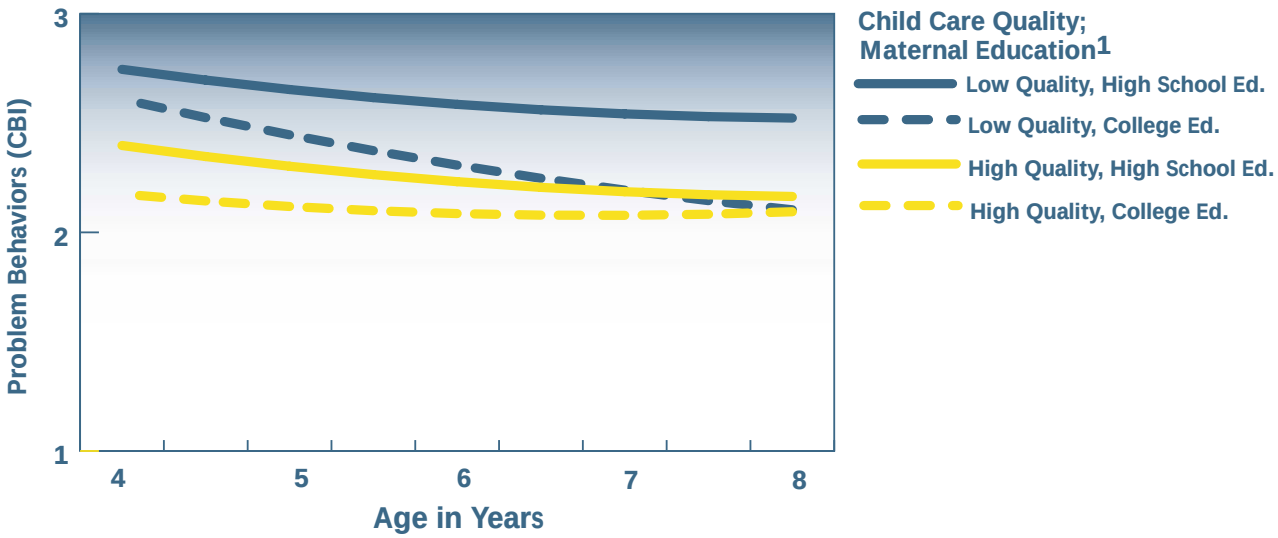
1Note: High=75th percentile of closeness ratings; Low=25th percentile of closeness ratings

Figure 5.6: Children's Math Skills Over Time by Quality of Child Care Classroom Practices and Maternal Education



1Note: High=75th percentile of quality scores; Low=25th percentile of quality scores

Figure 5.7: Children's Problem Behaviors Over Time by Quality of Child Care Teacher-Child Closeness and Maternal Education



1Note: High=75th percentile of closeness ratings; Low=25th percentile of closeness ratings

Chapter 6
Summary & Implications

Summary of Results of the Study

Our knowledge of the details of the child care experienced by children in our sample enabled us to trace the impact of the quality of that care on these children as they were in the centers and then subsequently as they moved into the formal elementary and secondary education system. We have now followed these children through the end of second grade, four years after our initial contact with them when they were nearing the end of their next-to-last year in child care. The overall findings can be summarized in a few broad statements about the influence of center-based child care in America on children, each of which has significant public policy implications.

- **High quality child care is an important element in achieving the national goal of having all children ready to learn when they come to school.**

Our findings showed that the quality of children's experiences in typical child care centers affects their development while they are in child care and their readiness for school. Children who attended higher quality child care centers performed better on measures of both cognitive skills (e.g., math and language abilities) and social skills (e.g., interactions with peers, problem behaviors) in child care and through the transition into school. Further, this influence of child care quality was important for children from a wide range of family backgrounds.

- **High quality child care continues to be positively related to children's performance well into their school careers.**

Our longitudinal analysis of children's performance indicated that the quality of child care experienced by children before they entered school continued to affect their development at least through kindergarten and in many cases through the end of second grade. Child care quality was related to basic cognitive skills (language and math) and children's behavioral skills in the classroom (thinking/attention skills, sociability, problem behaviors, and peer relations), both of which are important factors in children's ability to take advantage of the opportunities available in school.

- **Children who have traditionally been at risk of not doing well in school are affected more by the quality of child care experiences than other children**.

For some outcomes (math skills and problem behaviors), children whose mothers had lower levels of education—children who often are at risk of not doing well in school—were more sensitive to the negative effects of poor quality child care and received more benefits from high quality child care. Moreover, for at-risk children who attended these typical child care centers, the influences of child care quality were sustained through second grade.

- **The quality of child care classroom practices was related to children's cognitive development, while the closeness of the child care teacher-child relationship influenced children's social development through the early school years.**

The approach to providing services makes a difference over time. Children who attended child care with higher quality classroom practices—that is, which were more closely aligned with the concept of developmentally appropriate practices—had better cognitive development (language and math skills) through early elementary school. Children who had closer relationships with their child care teachers had better behavioral skills (greater thinking/attention skills and sociability, fewer problem behaviors, and better peer relations) through early elementary school. It is no surprise that the nature of children's experiences in child care is important, but the results of this study confirm the lasting impact of these early experiences. High quality child care experiences, in terms of both classroom practices and teacher-child relationships, enhance children's abilities to take advantage of the educational opportunities as they enter kindergarten and through the early elementary school years.

Implications for Policy and Practice

There is one overarching implication from this study—if America wants all its children to be ready for school, it must improve the quality of child care experiences available in this country. The first phase of the study indicated that the majority of children in child care do not have access to the level of quality recommended by child care professionals. The current phase of research shows that this lack of quality care not only has negative effects on children's readiness for school but also on their development during the early school years. Improving child care quality is a national necessity. It is not easy and will require attention from federal, state, and local officials in Education, Health and Human Services, and related agencies, as well as the private sector. Below we list a number of suggested ways of working toward the goal of high quality child care. These suggestions are broken down into three broad categories—fiscal strategies, professional preparation/compensation approaches, and program/system improvements.

Fiscal Strategies

In the first phase of this study, we explored the association between the cost of child care services and the quality of care received by children in typical child care centers in the US Our analyses revealed that there is a clear link between cost and quality—the more dollars (per child) invested in child care, the higher the quality of services for children. Consequently, in order to raise the quality of care, attention needs to be given to the financing of child care. In particular, our findings from the first phase of the study suggest four fiscal strategies that would enable us to move toward the goal of ensuring higher quality child care for America's children.

First, an overall greater investment in child care, from both the public and private sectors, is needed. In the first phase of our study, we found that centers providing higher quality care shared a common characteristic—they had access to extra resources that were used to improve the quality of services provided. The provision of those extra resources, whether from in-kind donations or outside funding, allowed these centers to provide higher quality care. While the primary source of revenue is typically parent fees, higher quality centers did not have to depend solely on parent fees to finance the provision of services. They had access to government resources to help with financing the programs, some in the form of subsidies for lower income families and some as direct grants. To a lesser degree they also acquired additional resources in the form of donated goods and services, the most important of which helped hold down occupancy costs for centers (e.g., free or reduced rent, utilities, or maintenance services). These extra resources allowed centers to devote a larger proportion of their revenue to salaries, wages, and benefits. The centers hired more staff, providing better staff-child ratios. They also paid

higher wages and provided more staff benefits, had staff with higher levels of education, and had lower staff turnover rates, all of which contributed to producing higher quality care. While some progress has been made over the past decade in securing and maintaining greater investment from the public and private sectors, even greater effort will be required to raise quality to the level called for in this report.

Second, as a more specific strategy, the quality set aside in the federal/state block grant funds for child care is a wise investment and should be expanded. Our findings have shown that higher quality care is related to better outcomes for children through the early school years. Providing funds which allow for the improvement of quality, rather than for expansion (i.e., purchasing care for more children at a lower level of quality), is consistent with the goal of helping all children be ready for school. The use of the quality set aside funds for such activities as enabling child care staff to raise their level of education, increasing compensation and benefits for staff, and improving child-staff ratios all serve to raise the quality of services. In conjunction with an extension of the quality set aside, a study of the use of the quality set aside funds should be conducted to ensure that efforts are targeted to improving the quality of services as originally intended and to share information regarding effective quality enhancement strategies.

Third, child care subsidies should be redesigned to offer incentives for providing high quality care. In the first phase of our study, we found that centers which complied with additional standards beyond those required for licensing, whether voluntarily or in order to receive public funding, provided higher quality care. Subsidy systems can be and are being reconfigured to tie subsidy payments to higher program standards and to provide higher compensation for teachers. Based on our findings, such approaches to subsidy systems would provide good opportunities for improving the quality of care in all states. Current market forces have been shown to encourage price competition at the expense of quality. Thus, care must be taken to ensure that such strategies do, in fact, accomplish the intended goals rather than simply reduce fees charged to parents.

Fourth, tax incentives should be used to encourage parents to choose high quality care and education services. From the first phase of our study, we know that higher quality child care costs more to provide than lower quality care. The current federal and state tax credits have ceilings so low that families purchasing high quality care get tax credits for only a fraction of the real cost of services. This existing approach encourages parents to choose the lowest cost services available, which, as we know from the first phase of the study, are often of lower quality as well. In contrast, providing higher state and federal tax subsidies for families in programs of higher demonstrated quality, as is currently the case for Arkansas state taxes, would provide incentives to use child care of higher quality. Additionally, simply raising the ceilings of the expenses eligible for tax credits would provide expanded benefits for families choosing higher quality care which costs more than the current artificially low limits.

Professional Preparation and Compensation Approaches

Our research in phase one indicated that the quality of child care was related to both the formal education levels and the specialized early childhood training of the classroom teachers. Teacher compensation was also closely linked to the quality of services in child care. Given the links between teacher preparation/compensation and child care quality, and between child care quality and children's early school outcomes, we offer the following four strategies for working to improve child care quality through teacher preparation/compensation policies.

First, states should require much higher minimum levels of training for teachers than are currently in place. Of the four states included in the study, the one with the lowest quality child care required far less training in early childhood education for staff than did the other three states. Formal training is an essential element for teacher preparation and should be mandated in every state. Both general education and early childhood specific training can be a part of the teacher preparation efforts. We recommend that some form of child care teacher credentialling be instituted to assist in building a truly professional early childhood workforce. This credential

could be linked with that of K–12 teachers or could be a separate competency-based system. In either case, the need for mandated credentials is the quality linchpin.

Second, given the importance of teacher preparation to child care quality, we recommend that a major new initiative be implemented to support teacher preparation programs. Data from the centers in this study indicate an overall low level of training for personnel. For example, only 36% of the lead teachers in these centers had bachelor's degrees or above. Clearly the current set of training institutions is not prepared to meet the great need for formal training experiences. Without some major initiative to increase the availability of training programs, it will take an extremely long time to bring the level of training up to the desired level for early childhood personnel. The federal initiative launched to improve professional preparation for teachers working with young children with disabilities provides an example of a highly successful model that could be followed.

Further, our current findings suggest that child care teacher-child closeness continues to relate to children's outcomes through the early elementary years, especially for social skills such as classroom behaviors and peer relationships. Thus, we would recommend that teacher preparation programs include a greater focus on helping teachers develop skills in building relationships with young children.

Third, inservice training is also important in building a high quality early childhood system. Currently, such training largely relies on individual child care centers finding and providing opportunities for their staff, with no central source for training information nor any additional resources to finance the costs of training. As a result, inservice training is often scattered, duplicative, and not tailored to the needs of the participants. The current systems of training and technical assistance available to Head Start programs and to programs serving children with disabilities could be used as models for extending support services to all early childhood programs in the country. The multi-state technical assistance centers funded by Head Start provide support for services nationwide. For services to children with disabilities, each state is required by the Individuals with Disabilities Education Act to establish a statewide professional preparation plan, and the legislation provides for funding to assist with accomplishing the goals laid out in the plan. These models offer but two options for enhancing the continuity and availability of inservice training for early childhood professionals. Whatever model is chosen should provide educational credits for inservice training that can be accumulated over time in ways that contribute to teachers' efforts to obtain formal credentials or degrees.

Fourth, we must improve the levels of teacher compensation so that these training initiatives will produce long-term improvements in child care quality. Findings from the first phase of the study indicated that under the current system, teacher salaries are so low that trained teachers leave the early childhood field in great numbers. The high turnover rate of trained staff often leads to replacement with less experienced staff, resulting in overall lower levels of teacher qualifications, which in turn are related to lower quality child care. Incentives that significantly reward staff who have greater training and competence will improve the overall level of quality and enable the field to move beyond a profession characterized by minimum wages.

System and Infrastructure Change Strategies

We recognize that adequate improvement in the quality of care is unlikely to occur without improvements in the system and the infrastructure that supports the system. The basic building blocks of a high quality early care and education system, including appropriate financing, professional development systems, and governance structures, are necessary to support high quality services at the program level. Without these basic supports, individual programs may succeed at raising quality, but there will never be an overall improvement in the level of quality provided to our children throughout the child care system.

We use the term "system" loosely, as we believe one reason for an overall lack of quality in child care is that there is no single child care system, but rather, different levels of networks that are not connected. We do not advocate that all programs be lodged under a single form of sponsorship (such as Head Start or the schools). Rather, we advocate that service providers be part of a coordinated system that reduces inefficiencies and redundancy, and that services be linked in ways that make sense to families and professionals in the field.

To improve the quality of the child care system, attention must be paid to the child care infrastructure. In particular, we suggest (a) improving the regulatory system in states by strengthening standards as described above as well as strengthening enforcement of the standards, (b) expanding the use of program accreditation as a means of supporting quality, and (c) providing for state level planning to facilitate collaboration across the various components of the system. We offer three strategies for improving the infrastructure of child care.

First, states should focus on improving licensing standards as a means of raising quality, and should ensure that funds are invested to adequately enforce the standards. As indicated in the first phase of this study, improvement in the regulation of child care can have a positive impact on quality. The relationship is simple: states that have more stringent licensing standards have fewer low quality child care centers. Child care policies that keep regulations at a minimum and exempt categories of providers from regulation help expand supply at the expense of quality. In addition, policies that allow the use of child care subsidies in exempt or otherwise unregulated settings also impede the promotion of high quality child care.

Second, efforts should be directed toward encouraging national accreditation as a means of improving the quality of child care. In the first phase of our study, we found that accredited centers, those that voluntarily met higher program standards that were specified by an outside organization, provided higher quality services than nonaccredited centers. Accreditation can be expanded by providing fiscal incentives such as higher reimbursement rates for accredited programs. In addition, training and technical assistance initiatives designed specifically to help programs that are working toward accreditation have been shown to be effective.

Third, recent comprehensive attempts by states to provide preschool care and education experiences for children are well founded and should be greatly expanded. The results of this study support policies focusing on early childhood care and education as a means of improving children's chances of being ready for school. Our findings from the first phase suggested that centers with public funds provided higher quality care. A number of different state initiatives are underway which offer guidance about how to effectively use these public resources to raise the quality of services provided. The best of these efforts try to bring together some or all of the disparate segments of early childhood services (child care centers and homes, Head Start, early intervention, family support services, and the schools).

In closing we must be reminded of two important issues. Providing quality early childhood programs is not only about better cognitive and social outcomes for young children, but also about providing opportunities for a good life for them while they are in the child care setting. Our findings in phase one indicated that children actually liked the programs that were rated higher in quality better than those rated lower. So the programs that we have defined as higher in quality are seen by the children themselves as preferable. It is too easy to leave their concerns for a good life out of our thinking about what is needed. Second, it is important to note that the impact of child care quality on children's success in the early years of school is modest. While child care experiences are important, they are not the only determining factor in children's success. We should not hold hopes that high quality child care will forever erase the major disadvantages some children face as they come to school. The study emphasizes that while we must be realistic in what we promise, we need to promote efforts to improve the quality of early care and education experiences to enable all children to be ready to learn and succeed in school. ■

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APPENDIX A

List of Papers Reporting CQO Findings

Burchinal, P., Peisner-Feinberg, E., Bryant, D., & Clifford, R. (In press). Children's social and cognitive development and child care quality: Testing for differential associations related to poverty, sex, or ethnicity. *Applied Developmental Sciences.*

Byler, P., & Howes, C. (In preparation). Pedagogy from child care to second grade: Influences of developmentally appropriate practices.

Clifford, R. M., Rossbach, H.-G., Burchinal, M. R., Lera, M. J., & Harms, T. (In preparation). Factor structure of the Early Childhood Environment Rating Scale (ECERS): An international comparison.

Cryer, D., & Phillipsen, L. (1997). Quality details: A close-up look at child care program strengths and weaknesses. *Young Children 52(5),* 51-61.

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Howes, C. (1997). Children's experiences in center based child care as a function of teacher background and adult:child ratio. *Merrill-Palmer Quarterly, 43,* 404-425.

Howes, C., Phillipsen, L., & Peisner-Feinberg, E. S. (In press). The consistency of teacher-child relationships between preschool and kindergarten. *Journal of School Psychology.*

Peisner-Feinberg, E., & Burchinal, P. (1997). Relations between preschool children's child care experiences and concurrent development: The Cost, Quality, and Outcomes Study. *Merrill-Palmer Quarterly, 43,* 451-477.

Peisner-Feinberg, E. S., & Yazejian, N. (In preparation). School-age child care use and children's development.

Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kagan, S. L., Yazejian, N. (Under review). The relation of preschool child care quality to children's cognitive and social developmental trajectories through second grade.

Phillipsen, L.C., Burchinal, M.R., Howes, C., & Cryer, D. (1997). The prediction of process quality from structural features of child care. *Early Childhood Research Quarterly, 12,* 281-303.

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Appendix B

Technical Information on Measures and Data Analyses

Measures

Table B.1 lists the full complement of measures used through the course of the CQO project. Additional technical information about the measures included in this report is listed below.

Classroom quality measures. Four observational measures of process child care quality were used in the first year of the study: (a) classroom environment was measured using the *Early Childhood Environment Rating Scale* (ECERS; Harms & Clifford, 1980); (b) teacher sensitivity was measured with the *Caregiver Interaction Scale* (CIS; Arnett, 1989); (c) child-centeredness was measured by the *UCLA Early Childhood Observation Form* (ECOF; Stipek, Daniels, Galuzzo & Milburn, 1992); and (d) teacher responsiveness was measured with the *Adult Involvement Scale* (AIS; Howes & Stewart, 1987).

The quality of the classroom environment was measured by the ECERS, which examines the developmental appropriateness of classroom practices by assessing routine care needs; furnishings and display; activities and experiences related to motor, language, cognitive, and social development; and adult provisions. The ECERS contains 37 items rated on a 1–7 scale from inadequate (1) to excellent (7). Psychometric analysis indicated that a single total score of the child-related items (1–32) most parsimoniously represented the data (Cronbach's alpha = .96), with scores of 1.0–2.9 defined as low quality, 3.0–4.9 medium quality, and 5.0–7.0 high quality (i.e., in the range of developmentally appropriate practices). Interrater reliability (correlations between raters) ranged from .83–.98 for the total score, with a median of .94.

Teacher sensitivity was rated using the CIS, with 26 items measuring teacher sensitivity, harshness, detachment, and permissiveness. Items are rated on a 1–4 scale indicating how characteristic they are of the teacher, from not at all (1) to very much (4). Psychometric analyses suggested a single factor most parsimoniously represented these data (alpha = .93). Interrater reliability ranged from .89-.98 for each subscale, with median subscale scores from .92–.95.

The extent to which the teaching style was didactic versus child-centered was rated using the ECOF. The ECOF examines five areas: child initiation, academic emphasis, discipline, performance pressure, and negative evaluation. Twenty-four items are scored on 3-, 4- and 5-point scales, ranging from didactic (low) to child-centered (high). A total mean score was computed after converting all items to the metric of a 5-point scale (alpha = .92). Interrater reliability ranged from .81-.97 for each subscale, with median scores ranging from .91–.95.

Teacher responsiveness to children was measured using the AIS. For this instrument, two children (one boy and one girl) were randomly selected in each classroom and observed for three observations of five minutes each, with teacher-child interactions coded every 20 seconds. (No additional information was gathered for these children.) The level of the teacher's interactions with the target child are coded on a 6-point scale of ignore, routine, minimal, simple, elaborative, and intense. Teacher responsiveness was calculated as the percentage of time the teacher was at least minimally responsive to the target child (the four upper points of the scale). The median interrater reliability using Cohen's kappa was .92 (range = .83-.96).

These four observational child care quality measures tended to be highly related, with correlations from .74–.91 among the ECERS classroom environment, CIS teacher sensitivity, and ECOF teaching style, and from .26–.31 between the AIS teacher responsiveness and the other measures. Therefore, a single composite quality index was computed. A principal component analysis (PCA) of the four measures indicated that one factor accounted for 68% of the total variance, and that subsequent factors were unnecessary. The composite observed child care quality index was calculated for each classroom based on this principal component, computed as a z-score (M = 0, SD = 1).

In addition, a fifth measure, the *Peer Play Scale* (Howes & Matheson, 1992) was used to examine the level of peer play. For this instrument, the same two children (one boy and one girl) who were randomly selected for the AIS were observed for three observations of five minutes each. The children's level of play with peers was coded on an 8-point scale of solitary play, onlooker behavior, parallel play without awareness of the peer, parallel play with eye contact, simple social play, complementary and reciprocal play, cooperative pretend play, and complex pretend play. Since scores on the scale are confounded with age, all individual scores were adjusted for child age. Two scores were used in analyses reported in this report: the average percent time target children spent in interactive peer play (the four upper points of the scale) and the percent of interactive play spent in pretend play (the two upper points of the scale). The average interrater reliability using Cohen's kappa was .93 (range = .86-.95).

For the kindergarten year, a shortened version of the ECERS was used, based on items that were readily observable, appropriate to the kindergarten setting, and highly correlated with the overall score from the first year's data. This 5-item version of the ECERS was completed while assessors were in the classrooms for the child assessments. The total mean-item score for the kindergarten short ECERS was used for purposes of analysis (alpha=.83).

In second grade, we used a modified version of the *Instructional Environment Observation Scales* (IEOS; Secada, 1997), an instrument designed specifically to measure the instructional environment of second and third grade classrooms. The IEOS requires observers to rate a number of characteristics of the classroom environments that students experience and yields information relevant to the domains measured in previous years. This measure includes six subscales: classroom routines, classroom climate, cross-disciplinary connections, linkages to life beyond the classroom, social support for student learning, and student engagement. Each item is measured on a 1 to 5 scale. Interrater reliabilities using Cohen's Kappa for the six subscales ranged from .50 to .79, with a median of .64. A principal component analysis performed on the data from the IEOS yielded two factors. The first factor, general climate, included the classroom routines, classroom climate, social support for student learning, and student engagement subscales (alpha=.84). The second factor, linkages, included the cross-disciplinary connections and linkages to life beyond the classroom subscales (alpha=.79).

Another aspect of children's experiences in child care, kindergarten, and second grade was measured by teachers' ratings of their relationship with each participating child using the *Student-Teacher Relationship Scale* (STRS; Pianta, 1992). This measure contains 30 items rated on a 5-point scale indicating how characteristic they are of the particular teacher-child relationship, from definitely does not apply (1) to definitely applies (5). Items are summed into three factors representing different aspects of the teacher-child relationship: closeness (11 items), conflict (12 items), and overdependency (5 items). Based on the first year data, the internal consistency within this sample was very good for the conflict (.91) and closeness (.86) factors and acceptable for overdependency (.61).

Child assessment measures. Information pertaining to children's cognitive and socio-emotional functioning was gathered from individual assessments and from teacher ratings each year.

Individual child assessments were conducted using two instruments. Receptive language ability was measured using the *Peabody Picture Vocabulary Test-Revised,* (PPVT-R; Dunn & Dunn, 1981), and letter-word recognition

and math skills were measured using the *Woodcock-Johnson Tests of Achievement-Revised* (WJ-R; Woodcock & Johnson, 1990).

The format of the PPVT-R is appropriate for both younger and older children, having them point to the picture that matches the word spoken by the examiner. PPVT-R raw scores were converted into standard scores based on age (i.e., $M = 100$, $SD = 15$ within the norming sample). Based on the original test development, this measure has good split-half (*Mdn* = .80) and test-retest reliability (*Mdn* = .82), and correlates highly with other measures of vocabulary and moderately with intelligence tests and school achievement.

Children's academic achievement in letter-word recognition and math each year was measured using two subtests of the WJ-R. The letter-word identification subtest measures letter-word recognition ability, including association of pictures and symbols and recognition of letters and words. The applied problems subtest measures math skills, including understanding of basic numeracy, comparisons of differing numbers of items, counting, and solving mathematical problems. Test development information showed high internal consistency for these subtests (*Mdn* = .92, .91), and moderate correlations with other tests of achievement. Rasch scores were used for the analyses, which allowed for calculation of individual growth over time in the longitudinal data.

Each of the four years teachers rated children's social and cognitive skills using the *Classroom Behavior Inventory* (CBI; Schaefer, Edgerton, & Aaronson, 1978). In second-grade, teachers also completed the *Teacher Assessment of Social Behavior* (Cassidy & Asher, 1992).

For each participating child, the lead teacher was asked to rate the child's social and cognitive skills using the 42-item research version of the CBI. Items represent 10 scales, and are rated for how well they describe the child, using a 5-point scale from not at all (1) to very much (5). Factor analysis of the 10 CBI scale scores from the first year resulted in three factors accounting for 76% of the variance. These factors replicated other factor analyses of the CBI (Osborne, Schulte, & McKinney, 1991), yielding a cognitive/attention factor, a sociability factor, and a problem behavior factor. The cognitive/attention factor consisted of the creativity, verbal intelligence, independence, task orientation, dependence (reversed), and distractibility (reversed) scales, with internal consistency (alpha) of .84 in this sample. The sociability factor included the extroversion and introversion (reversed) scales, with an alpha of .65. The problem behavior factor consisted of the distractibility, hostility, and consideration (reversed) scales, with an alpha of .77.

In second grade, teachers also completed the *Teacher Assessment of Social Behavior* (Cassidy & Asher, 1992) to explore in more detail children's social development in terms of peer relations. This 12-item scale provides a teacher rating of the social behavior of the focus child in relation to the other children in the class. Teachers rate each statement from "not true" (1) to "very true" (5). This scale consists of four subscales: prosocial (e.g., "This child is friendly and nice to other children"), disruptive (e.g., "This child disrupts other children's activities"), aggressive (e.g., "This child starts fights"), and social withdrawal (e.g., "This child is shy with other children").

Parent Surveys. Parents were asked to complete surveys each year, from which a variety of demographic and family climate information was obtained, including family income, parental education, marital status, and parental beliefs and practices. Basic demographic information about the children was also collected, including child ethnicity, gender, and birth date.

Each year, we used a different measure to collect parental beliefs and practices information. In year 1, we used the *Rank Order of Parental Values* (ROPV; Schaefer & Edgerton, 1985), a scale of values about child rearing that includes questions concerning child behaviors and characteristics deemed important by their parents. Items on the ROPV are rank ordered across five levels of importance. Factor analysis with varimax rotation resulted in four factors: nonconformity (inverse of cleanliness, politeness, neatness, and good manners) (alpha = .81), curiosity (curiosity, imagination, interest in how and why) (alpha = .79), social (being kind to other children, getting along

with others) (alpha = .64), and independence (thinking for self, responsible for own work) (alpha = .61). Higher scores represent greater value placed on that dimension.

In the second year survey, parents completed the *Home Screening Questionnaire* (HSQ; Frankenburg & Coons, 1986) which provides information about the quality of the home environment for children. The HSQ is a self-administered version of the *Home Observation for Measurement of the Environment* (HOME) scale (Caldwell & Bradley, 1980), which is a well-established and widely used observational measure of the social, emotional, and cognitive support available to the child in the home. The HSQ captures parental perceptions of the support available in the home. The HSQ is scored as a total score, based on the sum of the 35 item scores, with a range from 0 to 56. Scores at or below 41 are considered "suspect" for developmental screening for the child, indicating that the child's development is at risk due to poor home environment conditions. The internal consistency of the scale was determined by first examining correlations of items with the total score. Six of the items were nonsignificantly correlated ($r < .04$). We next used the KR20 formula to test the internal consistency of the scale. (The KR20 was used because 30 of the items had a binary score, one used a 2-point scale, one used a 3-point scale, one used a 6-point scale, and one used a 14-point scale.) The KR20 for the overall scale was .66. We then recalculated the KR20 after deleting the six items that had nonsignificant correlations with the total score. This improved the KR20 to .73. Therefore, the revised HSQ total deleting the six noncorrelated items was used as the summary measure for this variable.

The third year survey included the *Family Routines Inventory* (FRI; Boyce, Jensen, James, & Peacock, 1983), which is designed to measure the use of positive routines that support children's development and family cohesion. The routines captured on the scale include those associated with the typical workday, weekend and leisure time, bedtime, meals, extended family, leaving and arriving home, discipline, and chores. The modified FRI that we used consisted of 28 items scored on a 0–3 scale of frequency, with 3 indicating the routine is more frequently followed and 0 indicating it is never followed. We used factor analyses to derive three subscale scores: (a) parent-child interactions (e.g., parents have time to talk with children, parents read stories to children) (alpha = .71); (b) household routines (e.g., family eats dinner together, family visits with relatives) (alpha = .66); and (c) work/after-school routines (e.g., working parents are home at same time each day, young children go to child care regularly) (alpha = .32).

The fourth year survey included the short form version of the *Parenting Stress Index* (PSI; Abidin, 1990). The PSI is a widely used measure of parents' perceptions of their concerns about being parents and the parent-child relationship. Items are scored on a 1–5 scale, with higher scores indicating more stress in the parent-child relationship. A total score was used as a summary measure for this variable (alpha=.93).

The fifth year survey included the *Parental Modernity Scale* (Schaefer & Edgerton, 1985), which is a 1 to 5 rating scale of child rearing beliefs. The measure discriminates between "traditional" or more authoritarian approaches to child rearing and "progressive" or more child-centered approaches. There are two subscales, the 22-item traditional subscale (alpha = .88) and the 8-item progressive subscale (alpha = .60). Higher scores on the subscale represent stronger beliefs in that approach to child rearing.

Data Analyses

For the longitudinal findings (findings 1–3), analyses examined longitudinal patterns of development from ages 4 (next-to-last year of preschool) through 8 (second grade) using hierarchical longitudinal analyses. A separate analysis was conducted for each of six developmental outcomes: assessments of children's receptive language ability (PPVT-R standard score), letter-word recognition ability (WJ-R Letter-Word Identification Rasch score), and math ability (WJ-R Applied Problems Rasch score), and teacher ratings of children's cognitive/attention skills

(CBI cognitive/attention factor score), problem behaviors (CBI problem behaviors factor score), and sociability (CBI sociability factor score). In these analyses, both individual and group growth curves were estimated. A separate slope and intercept was estimated for each child and from these the group growth curves were computed as a function of background and child characteristics.

Patterns of development over time on these outcomes were predicted hierarchically from three sets of predictors. State was entered in all analyses to represent the sampling frame including four sites of data collection. The first set of predictors, the background variables, included mother's education (in years), ethnicity (white=1, not white=0), and gender (male=1, female=0). To describe patterns of change over time, this set of variables also included child age, child age-squared, and interactions between child age and mother's education, child ethnicity, and child gender. The second set of predictors included two different aspects of preschool quality, observed classroom practices and teacher-child closeness. Analysis variables included the observed quality index, the STRS teacher-child closeness rating, and the interactions between child age and these two quality measures. The third set of predictors, the moderators of child care quality, initially included all two-way interactions of the three background variables with the two child care variables and the three-way interactions adding year. Three a priori contrasts were tested. The first contrast tested whether, as a block, mother's education interacted with either observed preschool quality or teacher-child closeness in two-way interactions or in three-way interactions adding year. The other two contrasts tested the same set of interactions for ethnicity and for gender. When these contrasts were not significant, then that block of interactions was dropped from the analysis model. When these contrasts were significant, then the individual interaction terms were examined so that only the significant interactions were retained along with associated lower order interaction terms.

The second grade finding (finding 4) involved analyses that examined the prior and contemporaneous effects of classroom quality on children's second grade outcomes. The same six developmental outcomes were examined, using only the child's scores from the second grade assessment. Hierarchical multiple regression analyses were conducted. The first block of variables included state as a control variable and mother's education and child's ethnicity and gender as background variables. The second block added the two child care quality measures (the observed quality index and STRS closeness rating by the child care teacher) and any interaction between background and child care quality identified in the first analysis. The third block added the two kindergarten classroom quality measures (the shortened ECERS and STRS closeness rating by the kindergarten teacher). The fourth block added the three second grade classroom measures (the two IEOS factor scores and STRS closeness rating by the second grade teacher). The final block tested interactions among the second grade observed practice measures with prior measures of observed practice and between the second grade STRS closeness ratings with prior significant STRS closeness ratings.

For the peer relations analysis (finding 5), we used hierarchical multiple regression to predict second grade social competence with peers. A separate analysis was conducted for each peer relations outcome (prosocial, disruptive, aggressive, and withdrawal behavior) using four sets of predictors. First, we entered demographic information (maternal education and child gender and ethnicity) into the model as control variables. Second, we entered classroom social-emotional climate variables. Third, we entered individual four-year old measures of behavior problems and teacher-child relationship quality in order to test classroom effects against individual effects. The final step in the analysis consisted of contemporary (second grade) ratings of children's child-teacher relationship quality.

Table B.1: Comprehensive Overview of Data Collection Measures

	Preschool - 1 Spring 1993	**Preschool - 2** Spring 1994	**Kindergarten** Spring 1995	**First Grade** Spring 1996	**Second Grade** Spring 1997
Child					
Individual Assessments of Cognitive Skills	Peabody Picture Vocabulary Test-Revised (PPVT-R)	PPVT-R	PPVT-R		PPVT-R
	Woodcock-Johnson Tests of Achievement Revised (WJ-R): Math and Letter-Word ID subtests	WJ-R Letter-Word WJ-R Math	WJ-R Letter-Word WJ-R Math		WJ-R Letter-Word WJ-R Math
Individual Assessment of Socioemotional Skills	Attitudes-Perceptions of Competence	Attitudes-Perceptions	Attitudes-Perceptions		Attitudes-Perceptions
Teacher Ratings of Social/Behavioral Skills	Classroom Behavior Inventory	CBI	CBI		CBI
	Vineland Adaptive Behavior Scales—revised questions	Vineland questions	Vineland questions		Vineland questions Assessment of Social Behavior (Peer Relations)
Parent Reported Child Characteristics	Child's care history Child health info	Child care update Child health	Child care update Child health	Child care update Child health	Child care update Child health
School Records Information			Absences, referrals & placements		Absences, referrals & placements
Parent/Family Environment					
Child and Family Demographic Characteristics	Family Demographics (education, occupation, family composition, income; child age, gender, ethnicity)	Demographics update	Demographics update	Demographics update	Demographics update
Parental Beliefs/ Practices	Rank Order of Parental Values	Home Screening Questionnaire	Family Routines Inventory Literacy activities, educational future	Parenting Stress Index Major Life Events Neighborhood Measure	Parental Modernity Scale Major Life Events

	Preschool - 1 Spring 1993	Preschool - 2 Spring 1994	Kindergarten Spring 1995	First Grade Spring 1996	Second Grade Spring 1997
Family-School Links					
Parent Involvement	Parent involvement in child's child care-parent report	Child care involvement-parent report	Kindergarten involvement-parent report	First-grade involvement-parent report	Second-grade involvement-parent report
	Parent involvement in preschool-teacher report	Parent involvement-teacher report	Parent involvement-teacher report	Parent involvement-teacher report	Parent involvement-teacher report
Transition/ Selection		Adjustment to child care-parent report	Adjustment to school-parent report	Adjustment to school-parent report	Adjustment to school-parent report
		Child care/school choice-parent report	Preparation for kindergarten-parent report		
		Child care-kindergarten cooperation rating-teacher report	Child care-kindergarten cooperation rating-teacher report		-
Classroom					
Observed Practices Quality	Early Childhood Environment Rating Scale (ECERS)	Shortened ECERS	Shortened ECERS		
	Observation of Activities in the Preschool		OAP Room Arrangement		OAP Room Arrangement
	UCLA Early Childhood Observation Form				Instructional Environment Observation Scale
	Caregiver Interaction Scale				
	Adult Involvement Scale				
	Peer Play Scale				
Teacher Reported Relationship Quality	Student-Teacher Relationship Scale	STRS	STRS		STRS
Teacher Characteristics	Teacher demographics (education, experience, gender, ethnicity)	Teacher demographics	Teacher demographics	Teacher demographics	Teacher demographics
			Teacher beliefs	Teacher beliefs	Teacher beliefs
Child Care/School Characteristics					
Structural	Structural characteristics (center & classroom)	Enrollment update	Staff-child ratios	Staff-child ratios	Staff-child ratios
		Staff-child ratios	Group size	Group size	Group size
		Group size			
Financial	Financial characteristics (costs & revenues)	Total costs & revenues update			

Table C.3: Correlations between Outcome Variables and Quality Measures

	YEAR 1		YEAR 2		YEAR 3		YEAR 5		
	Quality Composite	Teacher Child Closeness	Short ECERS	Teacher Child Closeness	Short ECERS	Teacher Child Closeness	IEOS Climate	IEOS Linkages	Teacher Child Closeness
Year 1									
PPVT-R Lang	.28***	.17***							
WJ-R Ltr-word	.18***	.02							
WJ-R Math	.17***	.11**							
CBI Cog/Att	.16***	.45***							
CBI Prob Beh	-.04	-.35***							
CBI Soc	.14***	.55***							
Year 2									
PPVT-R Lang	.26***	.16***	.24***	.18***					
WJ-R Ltr-word	.01	.01	.16**	.06					
WJ-R Math	.17***	.07	.16**	.05					
CBI Cog/Att	.13**	.27***	.19***	.48***					
CBI Prob Beh	-.02	-.24***	-.14**	-.40***					
CBI Soc	.09*	.27***	.09	.52***					
Year 3									
PPVT-R Lang	.23***	.11*	.29***	.07	.14**	.09			
WJ-R Ltr-word	.02	.00	.08	.09	-.03	.09			
WJ-R Math	.16**	.03	.23***	.09	.17*	.04			
CBI Cog/Att	.02	.20***	-.02	.24***	.03	.45***			
CBI Prob Beh	-.04	-.18***	-.02	-.23***	.01	-.35***			
CBI Soc	-.09	.23***	-.11	.20***	-.00	.57***			
Year 5									
PPVT-R Lang	.14*	.10	.23***	.08	.08	.12	-.01	.07	-.02
WJ-R Ltr-word	.08	.10	.14*	.10	.11	.06	-.03	.06	.03
WJ-R Math	.17**	.14**	.13*	.13*	.06	.09	.05	.10	.05
CBI Cog/Att	.11	.19**	.00	.08	-.02	.19**	-.02	.01	.36***
CBI Prob Beh	-.04	-.23***	.08	-.17*	.08	-.20**	-.02	-.07	-.42***
CBI Soc	.05	.17**	.03	.18**	.10	.35***	-.02	.01	.53***
Peer Shy/with	-.02	-.07	-.04	.03	-.11	-.25***	.03	-.03	-.34***
Peer Negative	-.03	-.24***	.10	-.14*	.06	-.22**	-.01	-.03	-.43***

*p < .05 **p < .01 ***p < .001.

Table C.2: Correlations among Family Measures

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 ROPV nonconformity	-											
2 ROPV curiosity	.24***	-										
3 ROPV independence	.05	.18***	-									
4 ROPV social	-.34***	-.03	-.09*	-								
5 HSQ total	.37***	.28***	.09	-.02	-							
6 FRI household routines	-.06	.05	.04	-.01	.26***	-						
7 FRI work-school routines	-.14	-.05	-.09	-.01	-.09	.19**	-					
8 FRI interactions	.06	.13*	-.05	.08	.40***	.57***	.12*	-				
9 PSI total stress	-.08	-.04	-.09	.12*	-.26***	-.21***	-.12	-.26***	-			
10 PSI Parental distress	-.04	-.01	-.04	.05	-.24***	-.14*	-.15*	-.19**	.80***	-		
11 Progressive parent beliefs	.22***	.15**	.02	-.06	.09	-.06	-.05	.02	-.03	-.04	-	
12 Traditional parent beliefs	-.49***	-.27***	-.17***	.08	-.30***	.10	.03	-.10	.09	.09	-.19***	-

*p < .05 **p < .01 ***p < .001.

Table C.3: Correlations between Outcome Variables and Quality Measures

	YEAR 1		YEAR 2		YEAR 3		YEAR 5		
	Quality Composite	Teacher Child Closeness	Short ECERS	Teacher Child Closeness	Short ECERS	Teacher Child Closeness	IEOS Climate	IEOS Linkages	Teacher Child Closeness
Year 1									
PPVT-R Lang	.28***	.17***							
WJ-R Ltr-word	.18***	.02							
WJ-R Math	.17***	.11**							
CBI Cog/Att	.16***	.45***							
CBI Prob Beh	-.04	-.35***							
CBI Soc	.14***	.55***							
Year 2									
PPVT-R Lang	.26***	.16***	.24***	.18***					
WJ-R Ltr-word	.01	.01	.16**	.06					
WJ-R Math	.17***	.07	.16**	.05					
CBI Cog/Att	.13**	.27***	.19***	.48***					
CBI Prob Beh	-.02	-.24***	-.14**	-.40***					
CBI Soc	.09*	.27***	.09	.52***					
Year 3									
PPVT-R Lang	.23***	.11*	.29***	.07	.14**	.09			
WJ-R Ltr-word	.02	.00	.08	.09	-.03	.09			
WJ-R Math	.16**	.03	.23***	.09	.17*	.04			
CBI Cog/Att	.02	.20***	-.02	.24***	.03	.45***			
CBI Prob Beh	-.04	-.18***	-.02	-.23***	.01	-.35***			
CBI Soc	-.09	.23***	-.11	.20***	-.00	.57***			
Year 5									
PPVT-R Lang	.14*	.10	.23***	.08	.08	.12	-.01	.07	-.02
WJ-R Ltr-word	.08	.10	.14*	.10	.11	.06	-.03	.06	.03
WJ-R Math	.17**	.14**	.13*	.13*	.06	.09	.05	.10	.05
CBI Cog/Att	.11	.19**	.00	.08	-.02	.19**	-.02	.01	.36***
CBI Prob Beh	-.04	-.23***	.08	-.17*	.08	-.20**	-.02	-.07	-.42***
CBI Soc	.05	.17**	.03	.18**	.10	.35***	-.02	.01	.53***
Peer Shy/with	-.02	-.07	-.04	.03	-.11	-.25***	.03	-.03	-.34***
Peer Negative	-.03	-.24***	.10	-.14*	.06	-.22**	-.01	-.03	-.43***

*p < .05 **p < .01 ***p < .001.

Table C.4: Longitudinal Regression Results from Child Care through Second Grade[a]

	PPVT-R language	WJ-R ltr-word	WJ-R math	CBI cog./att.	CBI prob beh	CBI soc
State	***	***	***	ns	*	ns
Age	***	***	***	***	*	***
Age	2.38***	29.63***	17.88***	.03	-.08*	-.01
Age-squared	-.69***	2.73***	.35*	-.05***	.01	-.03***
Background	***	***	***	***	***	ns
Maternal education	1.68***	1.95**	1.34***	.05***	.06***	.01
Gender (male=1)	-1.42	-6.04***	-1.63	-.13**	.29***	-.03
Ethnicity (white=1)	12.05***	5.56**	7.32***	.10	.01	.07
Age x Med	-.14	-.04	-.10	.01	-.01	.00
Age x gender	.55	-1.50*	.43	.02	.02	-.02
Age x ethnicity	-.46	1.66*	-.27	.00	-.00	.03
Child care quality	***	ns	**	***	***	***
Observed quality index	1.20***	-.19	.74*	.01	.01	-.00
T-C closeness	2.78**	.31	1.77*	.33***	-.35***	.38***
Age x index	-.39**	-.23	-.08	-.00	-.01	-.01
Index slope- 4 yr old	1.97***					
Index slope- 5 yr old	1.59***					
Index slope- 6 yr old	1.20***					
Index slope- 8 yr old	.43					
Age x T-C closeness	-.06	.56	.37	-.09***	.06**	-.13***
T-C slope- 4 yr old				.51***	-.48***	.64***
T-C slope- 5 yr old				.42***	-.42***	.51***
T-C slope- 6 yr old				.33***	-.35***	.38***
T-C slope- 8 yr old				.15*	-.22**	.12
Interactions	ns	*	*	ns	*	ns
Med x observed quality		-.44*	-.29*			
Index slope, Med=12		.68	1.31**			
Index slope, Med=16		-1.06	.16			
Med x T-C closeness		1.18*			.04	
T-C slope, Med=12		-2.06				
T-C slope, Med=16		2.68				
Med x age x T-C closeness					.03**	
T-C slope,4 yr old, Med=12					-.42***	
T-C slope,5 yr old, Med=12					-.43***	
T-C slope,6 yr old, Med=12					-.43***	
T-C slope,8 yr old, Med=12					-.44***	
T-C slope,4 yr old, Med=16					-.53***	
T-C slope,5 yr old, Med=16					-.40***	
T-C slope,6 yr old, Med=16					-.27***	
T-C slope,8 yr old, Med=16					-.01	

[a]The numbers in the table are standardized regression coefficients.

*p < .05 **p < .01 ***p < .001.

Table C.5: Results from Hierarchical Regressions of Second Grade Outcomes[a]

	PPVT-R language	WJ-R ltr-word	WJ-R math	CBI cog./att.	CBI prob. beh.	CBI sociability
Total R^2	**.15***	**.12**	**.13**	**.15****	**.24*****	**.38*****
Background	****	**ns**	**ns**	**ns**	**ns**	****
Maternal Education	.21*	-.04	.09	.03	-.10	-.04
White	.15	.10	.12	.04	.01	.17*
Male	.15	.02	.10	.14	.08	.15*
Child Care Quality	**ns**	**ns**	*****	**ns**	*****	**ns**
Observed quality	.00	.06	.21*	.07	.02	.03
T-C closeness	.06	.11	.06	.12	-.16*	.05
Interactions						
Med x quality	-	.08	-.09	-	-	-
Med x closeness	-	-.06	-	-	.16*	-
Kindergarten						****
Short ECERS	.05	.08	.01	.01	.04	.10
T-C closeness	.15	.04	.12	.13	-.09	.23***
Grade 2	**ns**	**ns**	**ns**	****	****	****
IEOS climate	-.17*	-.22*	-.06	-.12	.05	-.09
IEOS linkages	.08	-.00	.08	-.11	-.02	-.06
T-C closeness	-.08	-.10	.01	.24**	-.27***	.51***

Note: State entered as covariate.

[a]The numbers in the table are standardized regression coefficients.

*p < .05 **p < .01 ***p < .001.

Table C.6: Results from Hierarchical Multiple Regressions of Second Grade Social Competence with Peers

	SECOND GRADE SOCIAL COMPETENCE WITH PEERS		
Outcome	**R^2**	**R^2 Δ for step**	**r_p**
Aggression	**.47*** **		
Demographics			
Maternal education			-.04
Ethnicity			.02
Gender			.01
Child care classroom climate		.06	
Behavior problem			.13
Teacher-child closeness			-.18
Percent time with peers			-.07
Percent pretend			.04
Child care individual behavior		.16	
Behavior problem			.38***
Teacher-child closeness			-.11
Teacher-child conflict			.35**
Second grade teacher-child relationships		.25	
Teacher-child closeness			-.26**
Teacher-child conflict			.56***
Disruption	**.54*** **		
Demographics			
Maternal education			.04
Ethnicity			.03
Gender			.14*
Child care classroom climate		.05	
Behavior problem			.07
Teacher-child closeness			-.08
Percent time with peers			-.01
Percent pretend			-.03
Child care individual behavior		.19	
Behavior problem			.44***
Teacher-child closeness			-.10
Teacher-child conflict			.30***
Second grade teacher-child relationships		.27	
Teacher-child closeness			-.20***
Teacher-child conflict			.61***

Table continues ☞

	SECOND GRADE SOCIAL COMPETENCE WITH PEERS		
Outcome	**R^2**	**R^2 Δ for step**	**r_p**
Prosocial	**.55*** **		
Demographics			
Maternal education			.02
Ethnicity			.01
Gender			-.09
Child care classroom climate		.03	
Behavior problem			-.05
Teacher-child closeness			.08
Percent time with peers			.12*
Percent pretend			.07
Child care individual behavior		.14	
Behavior problem			-.38***
Teacher-child closeness			.15**
Teacher-child conflict			-.28***
Second grade teacher-child relationships		.37	
Teacher-child closeness			.50***
Teacher-child conflict			-.50***
Social Withdrawal	**.17*** **		
Demographics			
Maternal education			-.04
Ethnicity			-.05
Gender			.01
Child care classroom climate		.01	
Behavior problem			.04
Teacher-child closeness			.04
Percent time with peers			-.06
Percent pretend			-.04
Child care individual behavior		.03	
Behavior problem			-.04
Teacher-child closeness			-.09
Teacher-child conflict			.05
Second grade teacher-child relationships		.13	
Teacher-child closeness			-.36
Teacher-child conflict			.19**

*p < .05 **p < .01 ***p < .001.

Endnotes

[1] Appendix A contains a list of papers that have been produced using the data collected from this study. For more detailed information about the analyses presented in this report, see Peisner-Feinberg et al. (under review), Howes (in press), and Byler and Howes (in preparation).

[2] For sample selection in the longitudinal outcomes phase, centers were stratified by global quality ratings (low, medium, high) and proportion of subsidized children served (<30%, 30≤49%, 50≤69%, ≥70%) to ensure diversity on these variables. Centers were recontacted randomly within strata, and we contacted centers until approximately 200 children had been recruited in each state, which resulted in contact with nearly all eligible centers in the end.

[3] Figures from 1993 were used to coincide with the year 1 data from the current study.

[4] The assessment instruments measuring these skills (the PPVT-R for language ability and the WJ-R for letter-word recognition and math skills) have a mean of 100 and standard deviation of 15 within the norming sample.

[5] Table C.3 in Appendix C contains a complete correlation matrix of outcome and quality measures each year. Table C.4 in Appendix C contains the regression coefficients from the final model and group specific slopes when interactions were significant.

[6] Effect sizes are differences, in standard error units, between the two groups after adjusting for background characteristics. To compute effect sizes, child care quality was converted from a continuous variable into four categories based on a quartile split (i.e., low, low average, high average, and high quality groups). Effect sizes were computed as the difference between the mean scores on the outcome measures for the low and high quality groups divided by the pooled standard deviation, after adjusting for age, maternal education, gender, and ethnicity as well as state and the other child care quality measure (classroom practices or teacher-child closeness).

[7] To try to clarify this complex association, we ran a separate analysis that looked at the relation between teacher-child closeness and outcomes after adjusting for individual child social characteristics. We adjusted for the child's mean sociability ratings, except for the sociability outcome, where we adjusted for the mean problem behaviors rating. After adjusting for child social characteristics, child care teacher-child closeness still was significantly related to teacher ratings of children's social/cognitive skills (cognitive/attention skills, problem behaviors, and sociability) over time. Thus, it appears that there are components of the teacher-child relationship beyond characteristics of the child that contributed to social/cognitive skills development over time. The results of this particular analysis for language and math, which are not as strongly associated with child care teacher-child closeness, were not significant.

[8] Table C.5 in Appendix C contains the standardized regression coefficients from the hierarchical analyses predicting second grade outcomes when adjusting for kindergarten and second grade experiences.

[9] Table C.6 in Appendix C contains the results of the hierarchical multiple regression predicting second grade social competence with peers from child care social-emotional climate measures.