



**Executive
Summary**

June 1999

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

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SUMMARY OF RESULTS OF THE STUDY

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 (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 these children who attended typical child care centers, these 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 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 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.

INTRODUCTION

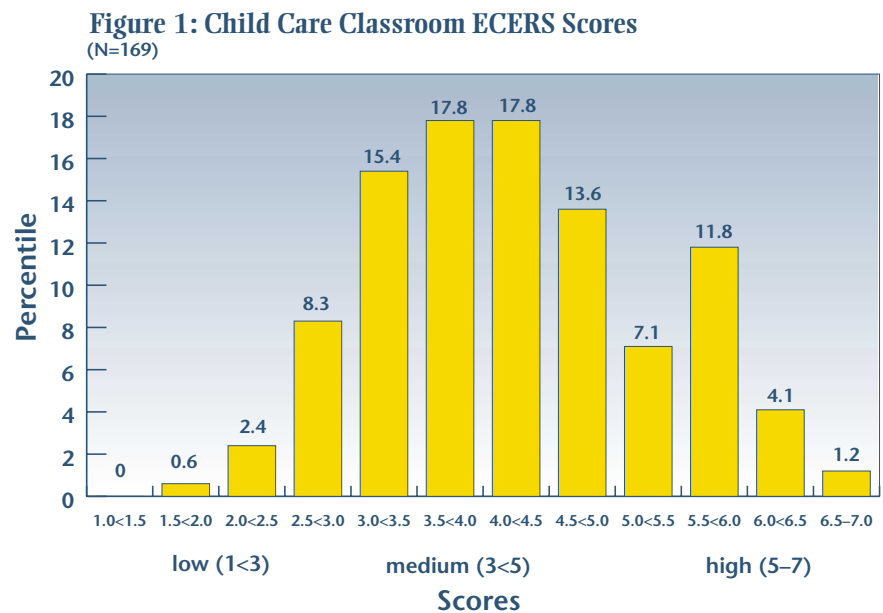
IN THE CURRENT ERA OF MAJOR SOCIAL REFORM in the areas of family welfare and public education in the US, children's experiences outside the home in child care are playing an increasingly important role in their lives. Recent estimates indicate that approximately 68 percent of 3-year-olds, 78 percent of 4-year-olds, and 84 percent of 5-year-olds are receiving some type of child care on a regular basis, 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 during their child care experiences and over time) and subsequent readiness for and success in school. While there are several studies that have explored the long-term effects of early intervention programs for children from low-income families, few have examined the effects for children of all incomes attending typical community child care programs as they make the transition from child care to school and on into the early elementary years.

The Cost, Quality, and Child Outcomes in Child Care Centers Study was initiated early in 1993 (for more details, see CQO Study Team, 1995). In the first phase of the study, we recruited a stratified random sample of 401 full-day child care centers, half for-profit and half nonprofit, in regions of four states—California (Los Angeles county), Colorado (the front range), Connecticut (the Hartford–New Haven corridor), and North Carolina (the Piedmont Triad area). Within each center we observed two randomly selected classrooms. Intensive data collection efforts documented the quality of services provided in these centers and the full range of costs associated with providing the services.

After collecting the data on costs and quality in these programs, we identified classrooms we had visited that enrolled children who would be entering kindergarten in the fall of 1994. Starting in the late spring of 1993, we selected a total of 826 children from 183 of these classes and gathered a range of data about their developmental progress. We followed these children over a four-year period, starting near the end of their next-to-last preschool year in child care and continuing until the children were nearing the end of second grade.

Our initial reports on the first phase of data collection were issued in 1995 and documented that the quality of child care occurring in these typical settings in the US was well below what the early childhood profession recognizes as high quality. Similar to the full sample, the average quality scores for the preschool child care classrooms from which we selected children for the longitudinal study were in the medium range. For

the classrooms in the longitudinal study, the mean score on the *Early Childhood Environment Rating Scale* (ECERS) (Harms & Clifford, 1980) was 4.26, on a scale of 1 (inadequate level of care) to 7 (excellent care). A child care center which meets the definition of developmentally appropriate care put forth by the National Association for the Education of Young Children (NAEYC) (Bredekamp & Copple, 1997) would be expected to score in the range of 5 or higher. There was a broad range of quality scores as shown in Figure 1, with more than 11% scoring below 3 (minimally acceptable) and nearly one quarter scoring above 5 (good quality).



Children in classrooms scoring low on quality ratings were more likely to have mothers with lower levels of formal education. We found that children in lower quality classrooms scored lower on measures of cognitive and social development, even after taking into account differences in background factors known to be related to children’s development. Given this wide range of quality in typical child care centers and the finding that children in lower quality classrooms were faring less well than their counterparts in high quality classrooms, we were concerned about the longer term impact of child care quality on children’s performance as they moved into school. Would the effects of child care quality on children’s development persist as they moved into elementary school settings or were they simply a short-term phenomenon related to the preschool years? We now have followed these children through the first three years of school, into second grade.

For most of our analyses, we measured two dimensions of 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, and teaching style. Teachers rated the closeness of their relationship with each individual child to measure this dimension of child care quality. In order to measure the influence of subsequent experiences in child care and school (during the last year of child care, kindergarten, and second grade), classroom practices were measured with brief observations, and teachers completed the same ratings of teacher-child closeness. Children's developmental outcomes were measured each year through individual assessments of language ability, letter-word recognition, and math skills, and teacher ratings of classroom behavior (thinking/attention skills, problem behaviors, and sociability) and peer relations (second grade only). (We did not collect classroom quality or child outcomes data during children's first grade year.) Our analyses also controlled for the effects of family background factors (maternal education, child gender and ethnicity) related to both selection of child care and children's development.

This report summarizes the findings of our research on the relation of child care quality to the developmental outcomes of children from the preschool years through the second grade. The overarching research question guiding our work was, "Do early child care experiences have long-term consequences for children's development?" The findings are reported in two sets. The first set, the longitudinal findings, looked at the influence of early child care experiences on children's development over the time period from the preschool years into the early elementary years. The second set, the second grade findings, looked at 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.

MAJOR FINDINGS FROM OUR STUDY

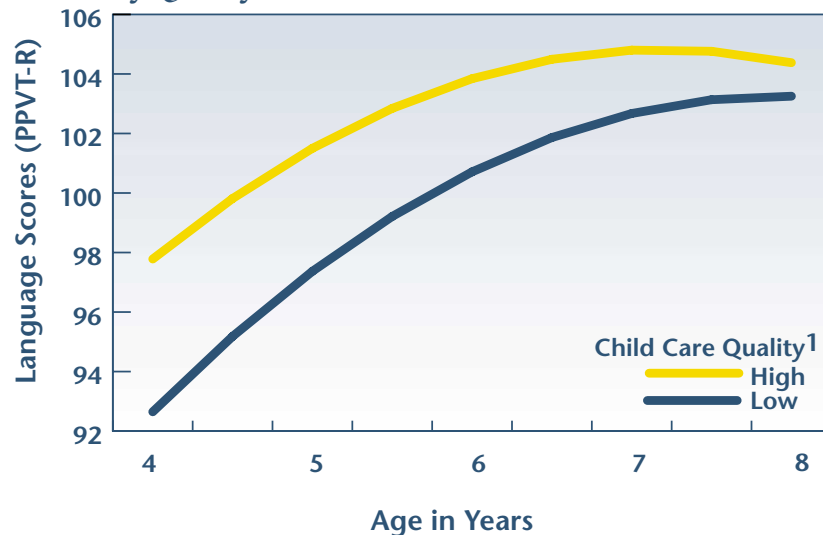
Longitudinal Findings: The Children Over Time

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. We also examined whether child care quality related to outcomes differently for children from different backgrounds.

■ **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.**

Children attending child care classrooms with higher quality practices scored better in receptive language ability (i.e., understanding of language). For example, as seen in Figure 2, children who attended high quality child care (defined as the 75th percentile of quality scores) had better language skills than children in low quality child care (defined as the 25th percentile of quality scores). As the children moved to second grade, the difference between the language skills of children in high and low quality care decreased. Children in higher quality child care also scored better in math ability than children in low quality care. Further, the math skills of children in high quality care were better at all ages, from the preschool years through second grade. In contrast, there was no relation between letter-word recognition skills and child care quality.

Figure 2: Children's Language Skills over Time by Quality of Child Care Classroom Practices

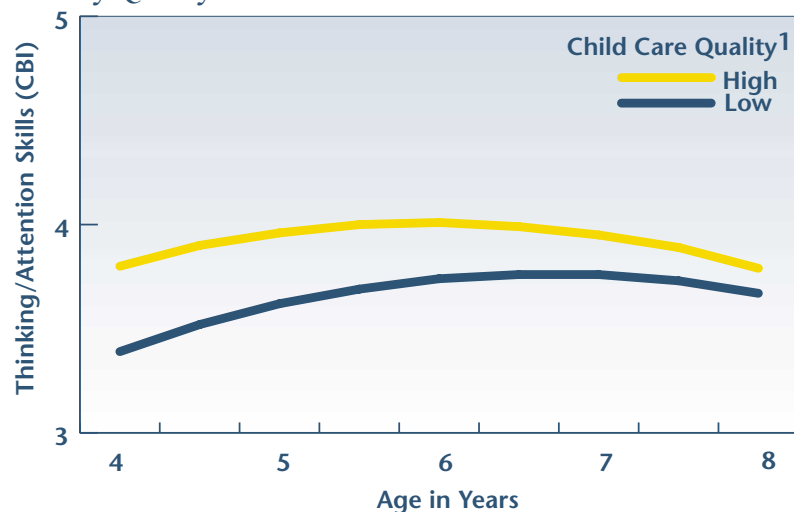


¹Note: High=75th percentile of quality scores;
Low=25th percentile of quality scores

■ **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.**

Children with closer relationships with their child care teachers had better classroom skills from the preschool years through second grade. They were rated higher in thinking/attention skills and sociability and lower in problem behaviors. For example, as seen in Figure 3, children with closer relationships with their child care teachers (defined as the 75th percentile of closeness ratings) had better thinking/attention skills than children who had less close relationships with their child care teachers (defined as the 25th percentile of closeness ratings). As the children moved to second grade, the differences between the skills of children with high versus low closeness with their child care teachers decreased, although these differences remained significant through second grade for thinking/attention skills and problem behaviors. Children with closer relationships with their child care teachers also had better language and math skills from the preschool years through second grade, but this relation was not as strong. In contrast, children’s letter-word recognition skills from preschool through second grade were not related to the closeness of child care teacher-child relationships.

Figure 3: Children’s Thinking/Attention Skills over Time by Quality of Child Care Teacher-Child Closeness

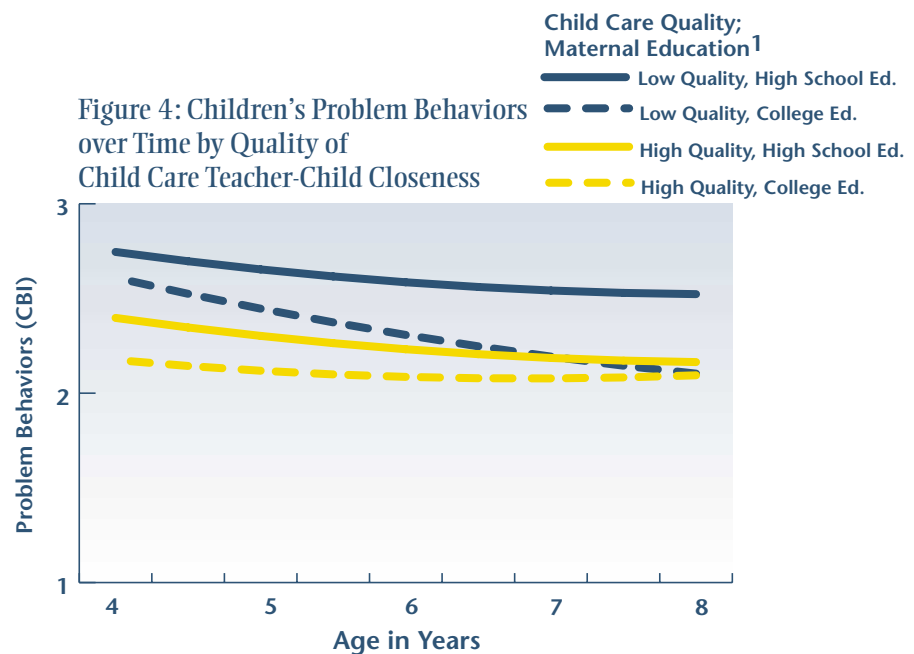


¹Note: High=75th percentile of closeness ratings;
Low=25th percentile of closeness ratings

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

We found some evidence that there was an even stronger effect of child care quality on the developmental outcomes of children whose mothers have fewer years of education. While better quality child care practices were related to better math skills for children through second grade, there were even greater differences in the skills of children with less highly educated mothers who attended high versus low quality child care. Similarly, for children whose mothers have less education, closer teacher-child relationships in child care were even more strongly associated with fewer problem behaviors through second grade.

Figure 4 shows examples of the relation between children’s problem behaviors and low and high teacher-child closeness—for children whose mothers have 12 years of education (a high school diploma) and for children whose mothers have 16 years of education (a bachelor’s degree). For the children with more highly educated mothers, the influence of child care teacher-child closeness declined from the pre-school years through second grade, while for children with less highly educated mothers, the effect of closeness remained consistent over this time period. There is no evidence in our data that quality related to outcomes differently on the basis of gender or ethnicity.



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

Discussion of Longitudinal Findings

In most areas of development that we examined, there was evidence for a modest continued influence of child care quality on children's abilities and skills through second grade. Long-term effects were found for receptive language ability, math skills, thinking/attention skills, problem behaviors, and sociability, indicating that children who experienced better quality child care were more advanced in their development continuing into the school years. While the relations between child care quality and children's development were modest, the findings of long-term effects, after taking into account 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 typical community child care programs in four regions of the US and included children from a variety of family backgrounds. While long-term effects of preschool experiences have been established for a variety of model early intervention programs for children from low-income families (e.g., Campbell & Ramey, 1994; Lazar, Darlington, Murray, Royce, & Snipper, 1982; Schweinhart, Barnes, & Weikart, 1993), our study showed that the quality of typical child care centers had long-term effects on children's development. In these community child care programs, higher quality care was associated with better developmental outcomes for children across the range of family circumstances.

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 of school failure, who are presumably more similar to the participants in the early intervention programs. For children with less highly educated mothers, 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, child care quality continued to exhibit an influence on children's outcomes at least through kindergarten (for language ability and sociability) and, in some cases (for math ability, thinking/attention skills, and problem behaviors), through second grade four years later. These long-term findings cover a substantial portion of time in these children's lives. 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.

Two dimensions of child care quality, classroom practices and teacher-child relationships, are differentially associated with children's outcomes. Fourth, our results showed that two different aspects of the quality of child care experiences, classroom practices and teacher-child relationship closeness, influenced cognitive and socio-emotional development somewhat differently. While actual classroom practices, including materials, activities, and interactions, contributed most strongly to children's language and math development, early relationships with caregivers were the strongest predictors of children's social and behavioral skills (thinking/attention skills, sociability, and problem behaviors).

Second Grade Findings: The Children as Second Graders

Our second set of findings answered questions about the extent to which child care experiences affected children's abilities four years later, after considering the effects of subsequent experiences during this time period. These analyses examined children's outcomes in the second grade, also taking into account background characteristics. The first finding considered the quality of children's classroom experiences in kindergarten and second grade, while the second finding considered previous problem behaviors and child care and second grade teachers' ratings of teacher-child closeness and conflict.

■ **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.**

Child care quality during the preschool years was related to children's cognitive and social skills in the second grade, after considering background characteristics and the quality of subsequent experiences in kindergarten and second grade. As with the longitudinal findings, children's math skills related to child care classroom practices, while children's problem behaviors related to child care teacher-child closeness. Similarly, better quality child care was more strongly related to fewer problem behaviors in second grade for children with less highly educated mothers.

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

Children rated higher on aggressive and disruptive behavior 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, higher ratings of social withdrawal in second grade were associated with child care classrooms characterized by high levels of problem behaviors. Children's prosocial behavior in second grade, on the other hand, was predicted by child care classrooms that involved greater peer interaction during play.

Discussion of Second Grade Findings

Children's cognitive 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 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 on children's second grade outcomes are notable for two reasons.

The effects of child care quality on children's second grade outcomes hold after considering subsequent classroom experiences.

First, 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 influences of child care quality on second grade outcomes, despite the variety of subsequent experiences, suggests the long-term importance of early experiences on children's development.

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 opportunities for children to play together) in addition to positive teacher-child relationships (both current and earlier relationships). These findings suggest that child care classrooms provide an environment for children to establish patterns of relationships that persist over time and over the transition into elementary school.

The longitudinal and second grade findings reported above mirror one another. The longitudinal findings provide evidence for the effects of child care quality on children's patterns of growth and development from the preschool years through the early elementary years. Correspondingly, the second grade findings provide evidence for the long-term effects of child care experiences on children's abilities four years later, after considering the effects of subsequent educational experiences between child care and second grade. Both sets of findings reveal that children who have more positive child care experiences during the preschool years have better outcomes through the elementary school years, after controlling for differences in background characteristics. Whether child care experiences are examined in terms of the global quality of classroom practices, the nature of teacher-child relationships, or the social-emotional climate, more positive experiences are related to better outcomes in both social and cognitive domains.

IMPLICATIONS FOR POLICY AND PRACTICE

THERE IS ONE OVERARCHING IMPLICATION from the 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 is having negative effects on children’s readiness for school and on their development during the early school years. Improving child care quality in the US will require a broad array of efforts including 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

The first phase of the study demonstrated the link between the cost of services and the quality of care received by children in typical child care centers in the US. In order to raise the quality of care, attention needs to be given to the financing of child care.

- Increased investments in child care from both the public and private sector are needed. While progress has been made over the past decade, greater effort will be required to raise quality to the level called for in this report.
- The quality set aside in the federal and state funds for child care is a wise investment and should be extended. A broad examination of the use of the quality set aside should be undertaken to ensure that efforts are targeted to improving the quality of services as originally intended. The funds available for quality improvements should be expanded.
- Child care subsidies should be redesigned to offer incentives for providing high quality care. Subsidy systems can be reconfigured to tie subsidy payments to higher program standards and to provide higher compensation for teachers. Such approaches to subsidy systems provide good opportunities for improving the quality of care in all states.
- Tax incentives should encourage use of higher quality care and education. 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. These incentives encourage parents to choose the lowest cost services available, which are often of lower quality as well.

Professional Preparation and Compensation Approaches

Findings of the first phase of the study suggest that the training and compensation of teachers who work in early care and education settings are important areas to target for improving quality. Our research 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. Similarly, teacher compensation was closely linked to the quality of services in child care. The findings reported here further underline the need to raise quality, indicating that these child care experiences continue to influence children's development through the early elementary years.

- Regulations at the state level should call for much higher minimum levels of training for teachers than are currently in place. Formal training is a key element for teacher preparation and should be required such as through some form of credentialing comparable to the K–12 system.
- A major new initiative to support teacher preparation programs should be implemented, similar to the federal initiatives to improve professional preparation for teachers working with young children with disabilities. In particular, teacher preparation programs should include a greater focus on helping teachers develop skills in relationship building with young children.
- Inservice training is also important in building a high quality early childhood system. The current systems of training and technical assistance available to Head Start programs and programs serving children with disabilities could be used as models for extending support services to all early childhood programs in the country.
- Teacher compensation issues are important to address so that these training initiatives will produce long-term improvements in child care quality. As reported in our phase one findings, teacher salaries are so low that trained teachers leave the early childhood field in great numbers, resulting in overall lower levels of teacher qualifications and child care quality.

System and Program Change Strategies

Adequate improvement in the quality of care is unlikely to occur without improvements in the entire system. Attention should be paid to the infrastructure, including the regulatory system in states, the expanded use of program accreditation, and development of broader professional preparation opportunities.

- 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 the study support policies focusing on early childhood care and education as a means of improving children's chances of being ready for school.
- Programs which are accredited by national accrediting agencies tend to have higher quality. Efforts to expand use of such accrediting could prove useful in overall efforts to raise the quality of child care.
- In order to improve the level of education and specialized training of child care teachers called for in the previous section, improvements and expansion of the teacher preparation systems will be needed.
- States should focus on improving licensing standards as a means of raising quality. As indicated in the first phase of this study, improvement in regulation of child care can have a positive impact on quality. Child care policies which keep regulations at a minimum and exempt categories of providers from regulation to help expand supply, encourage the use of lower quality informal and unregulated care and are harmful to the children.

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 better the programs that were rated higher in quality than those rated lower. So the programs which 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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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 of the 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. Children initially were included in the sample if (1) they were of an age to enter kindergarten in the fall of 1994; (2) they had been enrolled in the target classroom during the classroom observation phase; (3) they expected to attend the same center the following year; and (4) 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.

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 preschool year 1, 579 in preschool year 2, 451 in kindergarten, 463 in first grade, and 418 in second grade. 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.

Procedures

Four sources of data were gathered to examine the relations between child care quality and children's development: (1) classroom observations, (2) individual child assessments, (3) teacher ratings of children, and (4) parent reports of child and family characteristics. Data were gathered

in each of these domains in years 1, 2, 3, and 5 of the study, corresponding to children's next to last year in child care, last year in child care, kindergarten year, and second grade year.

In each of these years, 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. In addition, to gather information about the quality of teacher-child relationships, each year teachers completed ratings of the closeness of their relationship with each child.

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 language and cognitive 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

Classroom quality measures

Four observational measures of child care practices or process quality were used in the first year of the study. The first three measures involved ratings of the global classroom environment. 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 components analysis.

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* (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 areas 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: a thinking/attention factor, a sociability factor, and a problem behavior factor. In second grade, teachers also completed the *Teacher Assessment of Social Behavior* (Cassidy & Asher, 1992), which measures peer relations, another aspect of social development appropriate for older children. This scale provides a teacher rating of the social behavior of the focus child in relation to the other

children in the class. The scale consists of 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. Basic demographic information about the children was also collected, including child ethnicity, gender, and birth date.

Data Analyses

For the longitudinal findings, hierarchical linear models analyses were used to examine children's developmental outcomes longitudinally from ages 4 (next-to-last year of preschool) through 8 (second grade). A separate analysis was conducted for each outcome (receptive language, letter-word recognition skills, math ability, thinking/attention skills, problem behaviors, and sociability). Patterns of development on these outcomes were predicted from three sets of predictors: (1) background variables (maternal education and child's gender, ethnicity, and age); (2) child care quality (observed quality index and teacher-child closeness ratings); and (3) interactions between background variables and child care quality. For the second grade findings on prior and contemporaneous effects of classroom quality, hierarchical multiple regression analyses were conducted to examine the same six developmental outcomes, using only the child's scores from the second grade. The blocks of predictors were: (1) background variables, (2) child care quality, (3) kindergarten quality (shortened ECERS and closeness rating by the kindergarten teacher), (4) second-grade quality (the two Instructional Environment factor scores and closeness rating by the second grade teacher), and (5) interactions among second grade quality and prior quality. For the peer relations analysis, 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) from four sets of predictors, in order: (1) background variables, (2) classroom social-emotional climate, (3) four-year-old measures of problem behaviors and teacher-child relationships, and (4) second grade ratings of teacher-child relationships.

