Smart Start and Child Care in North Carolina:

Effects on Quality and Changes over Time

FPG-UNC Smart Start Evaluation Report

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This report was written by Donna Bryant, Kathleen Bernier, Ellen Peisner-Feinberg, and Kelly Maxwell. We want to thank all the child care center directors and child care teachers who participated in this study. We also wish to acknowledge the members of our research team who helped collect and analyze these data: Laura Agnew, Vicki Boggs, Kathryn Carrier, Jessica Dubberly, Cyndee Lohr, Steve Magers, Shari Miller-Johnson, Karen Mosley-Lyon, Carrie O'Brien, Michelle Poe, Debbie Sadler, Monica Shaw, Karen Taylor, and Wanda Westberry. Thanks also to Satsuki Scoville and Marie Butts for the formatting of this report. The opinions expressed in this report are those of the authors and may not be those of the funding agency, the NC Division of Child Development.

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Executive Summary

This study examined the effects of Smart Start on the quality of child care over time in North Carolina. Smart Start is the state's broad-based community initiative focused on early care and education. In 1994 and 1996, we collected data from over 180 center-based child care programs in the 12 Smart Start partnerships that were initially funded in 1993-94 (the pioneer partnerships). We gathered data from 135 of these centers again in 1999. Observations of classroom quality were made using the Early Childhood Environment Rating Scale (ECERS: Harms & Clifford, 1980). Information about the teachers, the directors and the centers was gathered in interviews. Key variables included teacher education levels, ratio and group size, licensing status of the center, and participation in Smart Start-funded activities.

Results showed that the quality of child care increased significantly from 1994 to 1999, with a greater increase from 1994 to 1996 and a smaller increase from 1996 to 1999. The level of child care quality in both 1996 and 1999 was significantly related to the number of Smart Start-funded activities in which centers had recently participated (in the past year), leading us to conclude that Smart Start has contributed to the increase in quality. The amount of Smart Start participation in 1996 was related to a center's 1996 quality but not 1999 quality. Quality in 1999 was only predicted by participation in 1999. These findings suggest that quality improvement requires continuous efforts. Extensive *previous* participation in Smart Start does not guarantee that a center's *current* quality is high.

In addition to classroom quality increases over time, other positive changes occurred, including increases in the number of teachers participating in programs to obtain more education and increases in the number of teachers with some college coursework. We also saw increases in the percentage of centers licensed at higher levels and the percentage of nationally accredited centers. Salaries increased as well, but not at a rate higher than inflation. Child care teachers continue to be paid very low salaries, although the number of centers offering benefits increased significantly. In addition, benefit levels were positively related to participation in Smart Start.

Almost all centers we visited in 1999 participated in at least one Smart Start quality improvement activity and the average number of activities per center increased steadily over the years. Local partnerships are reaching out to include almost all centers that want to be included in quality improvement efforts and providing important help. The most frequent types of help were workshops, on-site training and mentoring, and purchase of educational materials. These are the types of activities that should improve quality, although because this was not an experimentally controlled study, we cannot say which types of quality improvement activities might yield the greatest gains in classroom quality.

Over the years of the study, significantly more child care centers served poor children and children with disabilities. There seem to be increasing opportunities for children in North Carolina to receive early educational experiences in integrated settings. Significantly more child care centers are now providing developmental screenings to children, which enables the child care system to catch problems early and to begin intervention for children in need of speech or developmental therapies.

The positive results in this report indicate that child care quality in North Carolina is improving substantially and that participation in Smart Start is involved in this improvement. Although twice as many centers in 1999 compared to 1994 scored in the "good to excellent" range on the ECERS, we must also recognize that the majority of child care programs were still below the level that would optimally enhance children's learning and development. Smart Start partnerships must be encouraged and supported to continue their efforts at quality improvement. It is clear that North Carolina is on the right track, but needs to keep moving ahead.

North Carolina's Early Childhood Initiative, Smart Start, was established in 1993 as a partnership between state government and local leaders, service providers, and families to better serve children under six and their families. State funds are distributed to county partnerships which are non-profit corporations established specifically for the purpose of administering early care and education, family support, and health activities. All 100 counties in North Carolina have received Smart Start funds since 1997 either as a single-county partnership or as part of a multiple-county partnership. The first twelve partnerships (eighteen counties) awarded Smart Start funds in 1993 are called the "pioneer" partnerships.

The primary goal of Smart Start is to ensure that all children enter school healthy and prepared to succeed. Smart Start's innovative approach requires that local community partnerships plan how best to meet their own community's needs, improve and expand existing programs for children and families, and design and implement new programs. Although each partnership decides how best to meet the needs of its children and families, they are *all* working to improve the quality of early childhood education, including center-based care. By legislative mandate, partnerships spend at least 70% of their funds on child care. Statewide, about half of this amount is spent on child care subsidies for poor or working class families and about half on child care quality improvement activities, both in centers and family child care homes. Activities to improve child care include enhanced subsidies for higher child care quality or higher teacher education, license upgrades, on-site technical assistance, quality improvement and facility grants, teacher education scholarships, and teacher salary supplements.

This report focuses on Smart Start's effect on center-based child care quality as measured directly in classrooms and through indicators of quality such as teacher education, turnover, and licensing status. Data on child care quality were first gathered in 1994 in the pioneer partnerships. Through preschool classroom observations and interviews with child care directors, the Smart Start evaluation team has periodically examined child care quality in these partnerships. Findings reported following the 1996 wave of data collection (e.g., Bryant, Maxwell, Burchinal, & Lowman, 1997; Bryant, Maxwell, & Burchinal, 1999) documented that preschool child care quality had improved over the first three years of Smart Start in the pioneer partnerships and that Smart Start funding and participation were related to those improvements.

In 1999 we conducted a third wave of child care quality data collection in order to address the following questions:

1) Has the quality of child care continued to improve over time?
2) Has center participation in Smart Start-funded activities changed over time?
3) Has the proportion of Smart Start partnership expenditures for child care-related activities changed over time?
4) Has the relationship between Smart Start funding or participation and classroom quality been maintained?
5) Have teacher and center characteristics related to quality changed over time?
6) Have other center characteristics such as services provided and inclusion of children with disabilities changed over time?

We reported the answer to the first question in June 2000, that indeed quality was continuing to improve (Bryant, 2000). This report includes complete results of the third wave of quality data collection.

Study Description

Sample

Data for this study were gathered from samples of child care centers in the 12 pioneer partnerships: Burke, Caldwell, Cleveland, Cumberland, Davidson, Halifax, Hertford, Jones, Mecklenburg, Orange, Stanly, and Region A (a partnership comprised of 7 western counties and the Qualla boundary). Complete details about the sampling procedures for the 1994 and 1996 studies are included in a previous report (Bryant, Maxwell, Burchinal, & Lowman, 1997). Briefly, in 1994 we visited 184 child care centers with half randomly selected from the county's list of licensed centers and half selected specifically because they were participating in Smart Start-funded activities. Analyses of major center characteristics, including quality, showed no differences in results based on sampling strategy, so we did not use this sampling strategy again. Instead, in 1996 we revisited all the centers that were still operating and added an additional random sample to achieve a total sample of 188 centers.

In 1999, all centers visited in 1996 were asked to participate in another visit in order to investigate longer-term changes over time in center characteristics and quality. Nine percent (17) were no longer in business. Of the 170 that could be contacted, 35 (21%) did not agree to participate. Thus, the 1999 sample included 135 centers, all of whom were visited in 1996. Sixty-seven (67) of these centers participated in all 3 years of data collection.

Of the centers invited to participate in the study, 75% agreed to do so in 1994; 68% in 1996; and 79% in 1999. These are satisfactory rates relative to other child care studies, equal to or higher than participation rates in two often-cited child care observation studies with large samples (the Cost, Quality, and Outcomes Study, 1995; and the NICHD Early Child Care Research Network, 1996).

Table 1 includes information about the types of child care centers included in the study. These samples were not drawn to be representative of the state distribution of types of center, but the full range of child care types did participate in the study. The highest number of programs were independent child care programs and the second most frequent group was church-sponsored programs. The samples also included Head Start, public preschool, franchised child care and other types of programs. Both non-profit and for-profit programs were included.

Table 1. *Distribution of Types of Centers Participating in the Study by Year*

	1994	**1996**	**1999**
	n = 167	*n* = 187	*n* = 135
Facility Type			
Independent	47%	42%	44%
Church Sponsored	20%	22%	22%
Head Start	11%	14%	12%
Franchise	4%	7%	7%
Public Preschool	4%	3%	3%
Developmental Day Care	2%	0%	0%
Combination or Other	11%	12%	13%
Profit Status			
Non-profit	57%	59%	63%

Note: Information about center type is missing for some centers because these data were gathered from director interviews and not all questions were always answered.

Procedures

One randomly selected preschool classroom was visited in each center. Trained research assistants collected observational data and interviewed the classroom teacher and center director. We provided participating directors and teachers with a $20 gift certificate for their help. Observers were trained to an inter-rater agreement standard of at least 85%. Data collector reliability was monitored throughout the study and re-training provided to observers if reliability fell below 85%.

Child care quality measure. The *Early Childhood Environment Rating Scale* (ECERS, Harms & Clifford, 1980) is a well-established measure of child care quality that assesses seven general areas: personal care routines, furnishings and display for children, language-reasoning experiences, fine and gross motor activities, creative activities, social development, and adult needs. Scores on each of 37 items can range from 1 to 7, with the overall mean score used as a global measure of the developmental appropriateness or quality of the classroom. To be consistent with other research, the adult needs items were not included in the overall classroom quality scores. An overall score from 1 to 2.9 is considered poor quality; scores from 3 to 4.9 are considered medium quality; and scores of 5 or greater are considered good to excellent quality. Although a revised version of the ECERS was published in 1998, we continued to use the original ECERS so that results can be compared over time on the same measure.

Director and teacher interviews. The procedures for interviewing directors and teachers were the same across all three years of data collection. Data collectors interviewed center directors to obtain information about center characteristics and services. This interview included a checklist of 14 different Smart Start funded activities, most of them related to quality improvement, that the director or center teaching staff might have participated in during the past year. A Smart Start participation index for each center was created by summing the total number of activities. The teachers in the observed classrooms were asked to provide basic demographic information about themselves and to rate beliefs about developmentally appropriate classroom practices. Both interviews were conducted after the observation, so the observers' classroom ratings were based only on what they saw in the classroom and not biased by knowledge of center activities related to quality improvement.

Smart Start partnership child care-related expenditures. For each of the pioneer partnerships, the percentage of total expenditures spent on child care-related activities (Percent Funding for Child Care) was calculated using data from the North Carolina Partnership for Children (NCPC). From the NCPC list of 1998-99 expenditures, FPG

researchers coded each activity as child care-related or not. Child care-related activities included enhanced subsidies for children attending centers with higher quality or with better educated teachers, subsidies for low-income or special needs families (not tied to quality or education), license upgrades, on-site technical assistance, quality improvement and facility grants, teacher education scholarships, teacher salary supplements, teacher workshops, center resources (such as lending libraries), substitute pools, improvement of services in centers for children with disabilities, health-related activities in centers, and creating new spaces. We used a slightly more restricted definition of "child care-related" for this study than does NCPC in order to maintain consistency with categorization of activities in previous rounds of our child care studies.

Analyses. Testing for changes over time—from 1994 to 1996 to 1999—was conducted using Hierarchical linear mixed models (HLM). Each model included year and county as independent variables with a contrast statement that tested for changes in the outcome variable over time. The *p*-value for this contrast statement is reported in the far-right column of each table relating to changes over time. If the *p*-value is less than 0.05 it indicates that the mean value of the outcome of interest differs between at least 2 of the study years.

General linear models were used to examine the relationships between center/classroom characteristics (e.g., class size, lead teacher education, accreditation status) and quality in 1999. These models included 1999 classroom quality as the outcome variable with the center/classroom characteristic of interest and county as predictors. County was included to make the results more generalizable to the overall population.

An HLM model was used to evaluate the relationship between the number of Smart Start Activities participated in and percent of funds spent on child care, and concurrent classroom quality for all 3 years (see Appendix A). A general linear model was used to examine the effect of the number of Smart Start Activities participated in and percent of funds spent on child care in 1996, and classroom quality in 1999.

Results

Question 1: Changes over Time in Quality

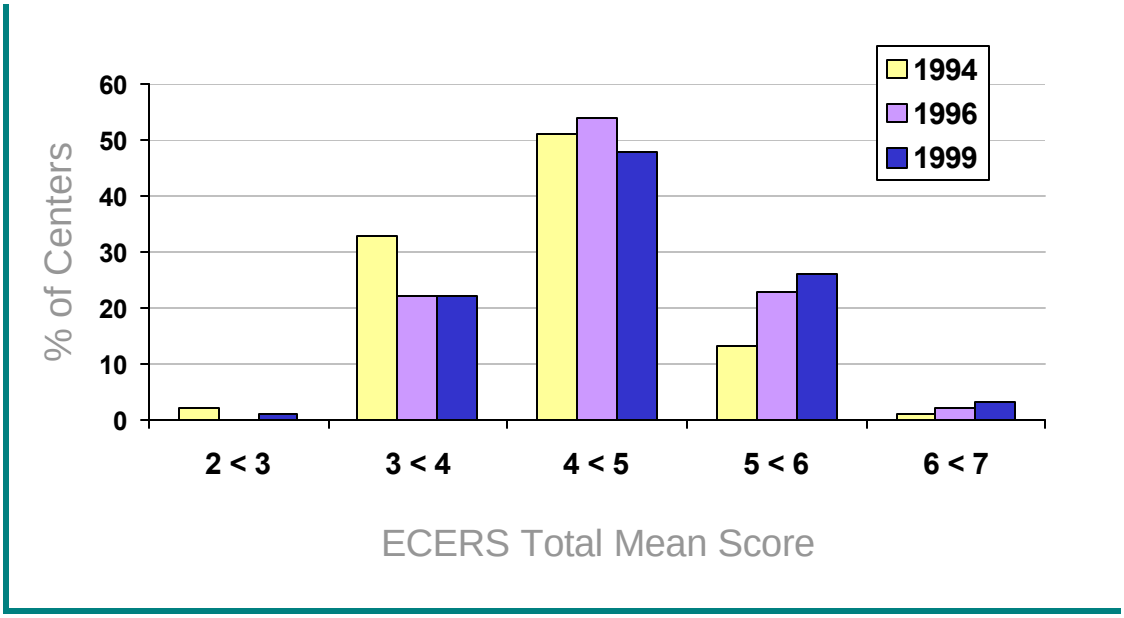
Extensive research shows that better child care quality is related to better child outcomes (e.g., Bryant, Burchinal, Sparling, & Lau, 1994; Peisner-Feinberg, et al, 2001). We examined changes over time in observed classroom quality to learn about progress toward the Smart Start goal that children enter school prepared for success.

In classrooms we visited, the ECERS total mean scores increased significantly from 1994 to 1999. The overall increase was statistically significant ($p < 0.001$) and the amount of the increase from 1994 to 1999 (approximately one-half of the standard deviation of .64) is considered a meaningful improvement in social sciences research. Most of the increase was accounted for by the statistically significant difference from 1994 to 1996. The increase from 1996 to 1999 was not statistically significant. The ECERS mean scores were 4.3 in 1994, 4.5 in 1996, and 4.6 in 1999.

Why did more change occur between 1994 and 1996 than between 1996 and 1999? Perhaps quality improvements that may have been easier and less expensive to make (e.g., purchase of classroom materials, room arrangement, maintaining a regular classroom schedule) were made in the early years of Smart Start. Other improvements that may be more difficult to make, take more time to make, or are possible only with substantial training and investment (e.g., implementation of developmentally appropriate child-centered activities, physical improvements to the facility, increased teacher education levels) have been addressed throughout the Smart Start years and are continuing to be addressed. Their effects on quality are perhaps more incremental and seen in slow but steady improvement, such as seen from 1996 to 1999.

Another way to see that child care quality improved across time is presented in Figure 1. A score of 5 or higher on the ECERS is considered "good to excellent" quality. In 1994, only 14% of the child care centers provided good to excellent quality care, while in 1996, 25% of the centers provided good to excellent quality care. In 1999, 29% of the centers provided good to excellent quality care. This continued increase in observed quality of care in the Smart Start pioneer partnerships is good news for children and families. However, about 70% of the centers were still providing "medium" quality care in 1999, representing the majority of preschoolers in center-based care. Ensuring that every child in North Carolina has access to high quality care requires continued work.

Figure 1. *Distribution of ECERS Scores for Three Years of Child Care Observations*



It may be useful for program planning purposes to examine the quality changes in more detail. Scores on five of the six subscales of the observational rating scale increased significantly over the three years (see Table 2). The subscales with the lowest 1994 mean ratings were Language and Reasoning and Social Development. The magnitude of the increases in mean scores over time for both of these subscales was substantial, approximately one-half a standard deviation. Two other subscales showed increases of similar magnitude: Fine/Gross Motor and Creative Activities. The Personal Care subscale is the only scale not to have increased over time.

Table 2. *Observed Quality in Preschool Classrooms over Time*

ECERS Score or Subscale Score		1994 Sample *n* = 177-180	1996 Sample *n* = 185-188	1999 Sample *n* = 133	Overall *p*-value[a]
Total Score	Mean	4.3	4.5	4.6	
	SD	0.64	0.69	0.74	<0.001
	Range	(2.5-6.3)	(3.0-6.3)	(2.5-6.2)	
Personal Care	Mean	4.5	4.5	4.5	
	SD	0.84	0.98	0.99	N.S.
	Range	(2.0-6.8)	(2.0-6.6)	(2.0-6.4)	
Furnishings & Display	Mean	4.2	4.5	4.5	
	SD	0.79	0.78	0.90	0.016
	Range	(2.4-7.0)	(2.8-7.0)	(2.6-6.6)	
Language & Reasoning	Mean	4.1	4.5	4.6	
	SD	0.97	1.04	1.05	<0.001
	Range	(1.5-6.8)	(1.8-6.5)	(2.0-7.0)	
Fine/Gross Motor	Mean	4.5	4.7	4.8	
	SD	0.54	0.63	0.65	<0.001
	Range	(3.0-6.2)	(3.2-6.5)	(3.4-6.3)	
Creative Activities	Mean	4.3	4.7	4.7	
	SD	0.70	0.76	0.80	<0.001
	Range	(2.4-6.6)	(2.4-6.6)	(3.0-6.7)	
Social Development	Mean	3.8	4.3	4.3	
	SD	0.89	0.94	1.02	<0.001
	Range	(1.8-6.7)	(2.2-6.5)	(1.4-7.0)	

Note. The Ns vary somewhat for each score because if more than 1 item on a subscale is missing, a mean is not calculated. If more than 6 items are missing overall, a total mean score is not calculated.

[a]Overall *p*-values for tests of differences in percentages across 1994, 1996 and 1999 samples. A *p*-value less than 0.05 is considered statistically significant. N.S. = not significant.

Questions 2 and 3: Changes Over Time in Partnerships' Child Care-Related Expenditures and Centers' Participation in Smart Start

The pioneer partnerships had participated in Smart Start for six years at the time of the 1999 data collection. Were patterns changing in their child-care related expenditures (Funding for Child Care) or in centers' involvement in the quality improvement activities funded by the partnerships (Smart Start Participation)? Since 1996 partnerships have been legislatively required to spend at least 70% of their funds on child care. Across the state, partnerships now spend about half of this amount on child care subsidies for poor or

working class families and about half on child care quality improvement activities, both in centers and family child care homes. Activities to improve child care include enhanced subsidies for higher child care quality or higher teacher education, on-site technical assistance, quality improvement and facility grants, teacher education scholarships, and teacher salary supplements. These activities lead to license upgrades and improved quality. Before 1996 there was considerable variability across partnerships in their child care-related expenditures, and there has continued to be some variation among partnerships since the 1996 legislative mandate. Across the three years of the study, the mean percentage spent on child care-related activities decreased slightly (69% in 1994; 67% in 1996; 65% in 1999), using our definition of child care-related activities.

Center participation in Smart Start-funded activities is quite high, with 97% of the 1999 sample reporting participation in at least one activity (see Table 3). Center participation in Smart Start activities has increased statistically significantly across time, up from an average of 5 activities in 1994 to 6 activities in 1996 to 7 activities in 1999 ($p < 0.001$). These samples may be somewhat biased in favor of Smart Start participation if centers that chose to participate in an initiative such as Smart Start were also more likely to agree to participate in a research study about quality of care.

Participating in Smart Start-funded training workshops was the most frequently reported activity across the three data collection periods. The percentage of centers receiving on-site technical assistance, using lending libraries, receiving funds to achieve a higher level of licensing, and receiving funds to improve services for children with disabilities increased by more than 10% from 1994 to 1999. The percentage of centers receiving higher subsidy rates that were *not* tied to higher standards decreased from 1994 to 1999, as did the percent of centers using Smart Start-funded teacher substitute pools. These activities and changes in rates of participation may reflect local partnership programming decisions based on local or statewide policy decisions, program effectiveness, or program popularity.

Table 3. *Percentage of Centers Participating in Various Smart Start Activities over Time*

Smart Start Activity	1994 *n* = 166	1996 *n* = 187	1999 *n* = 134
Any type of Smart Start activity/benefit	95%	94%	97%
Training workshops	82%	83%	87%
Funds to improve quality by purchasing new equipment or renovating	71%	70%	69%
On-site technical assistance	40%	58%	66%
Funds to improve quality by purchasing educational materials	64%	63%	65%
Lending library	31%	51%	61%
Funds to attend training activities	49%	53%	55%
Programs to increase staff wages	28%	35%	54%
Higher subsidy rate because they meet higher standards	27%	29%	34%
Higher subsidy rate (not tied to higher standards)	44%	35%	30%
Funds to achieve a higher level of licensing	15%	26%	26%
Funds to improve services for children with disabilities	11%	11%	22%
Transportation services	21%	18%	22%
Funds to achieve NAEYC accreditation	9%	13%	14%
Teacher substitute pool	18%	20%	10%
Enrichment activities	-	-	48%

Question 4: Effects of Smart Start Funding and Participation on Quality and Improvements

Findings reported following the first two waves of data collection in 1994 and 1996 (Bryant, Maxwell, Burchinal, & Lowman, 1997) documented that preschool child care quality improved in the pioneer partnerships and that Smart Start funding and participation were related to those improvements. With an additional year of data, do we see similar relationships?

We used two variables from both the 1996 and 1999 datasets (Percent Funding for Child Care and Smart Start Participation) to predict child care quality in the 1999 sample. The results for Smart Start Participation showed that participation in 1999 but not participation in 1996, significantly predicted classroom quality in 1999 (r = 0.26, p <0.003). In other words, current participation in Smart Start-funded efforts predicted current quality, but previous participation did not. Previous participation only predicted previous quality. The results for funding showed that Percent Funding for Child Care, whether in 1996 or 1999, did not predict 1999 child care quality. [Appendix A contains a complete description of the regression analyses concerning the effects of funding and participation on quality.]

The fact that current participation is most predictive of current quality--regardless of previous participation--may be explained in a number of ways. First, any ongoing technical assistance that might have immediate effects (e.g. new materials, new techniques) would be seen better with concurrent observations. Second, to the extent that centers had staff turnover, many of the 1999 teaching staff were not working at the center in 1996 and therefore did not benefit directly from earlier technical assistance activities. Third, centers that were currently participating in child care-related activities may also have been those that were striving toward (and accomplishing) quality improvements. Other factors might also explain the influence of current participation on quality. The important conclusion is that one cannot count on previous quality improvement efforts to be effective indefinitely. Continuous quality improvement activities are needed.

The Smart Start Participation score used in this analysis (the simple sum of the number of Smart Start-funded activities each center had participated in) includes a few activities that early childhood professionals would not believe were related to classroom quality (e.g., a higher subsidy rate not tied to quality standards, transportation,), although the activities or services might be important for other reasons. The participation score also includes two activities that, in theory, should have only a modest effect on quality (e.g., lending library,

teacher substitute pool). Interestingly, when we dropped these items from the Participation score, we found very similar results—more participation was related to higher quality. Our conclusion is that one or two activities, regardless of what they are, probably would not affect quality, but that several activities in conjunction, especially when being implemented by centers that are striving to become better, are most likely to improve quality.

The fact that Percent Funding for Child Care was no longer a predictor of center quality (as it had been in 1996) is most likely explained by the lack of variance in this factor. In 1996, there was more variability in Percent Funding for Child Care. Partnerships' response to the legislative mandate has been to allocate at least 70% of their funds on child care-related activities, so counties are generally very similar in this characteristic.

Question 5: Teacher and Center Characteristics—Have Other Quality Indicators Changed Over Time?

Various center and teacher characteristics are often used as predictors of classroom quality or indicators of quality: teacher education, compensation, and turnover; group size and adult/child ratio; and center licensing and accreditation. Have these indicators of quality improved over time in North Carolina's pioneer partnerships?

Teacher Education and Participation in T.E.A.C.H.®

Teacher education levels are important predictors of child care quality; that is, teachers with more formal education generally provide more appropriate care for children (e.g., Whitebook, Howes, & Phillips, 1989). We asked about teacher education levels (high school diploma and Associates', Bachelors', and Masters' or higher degrees) and education/degrees in early childhood education (early childhood or related field) in the centers visited.

As seen in Table 4, the percentage of child care teachers in our sample who had a bachelors degree varied significantly, first increasing in 1996 then decreasing in 1999. Although we were in the same centers in 1996 and 1999, random selection sometimes chose different teachers and teacher turnover had occurred. The percentage of teachers who had at least some college or community college coursework increased significantly from 1994 to 1999. The percentage of teachers with a high school education or less decreased statistically significantly over time. The increase in college and community college coursework may reflect the supports that most centers in our sample offered across all three years of the study such as covering the full or partial cost of training as a benefit for teachers and offering extra pay or time off for training. Making progress towards a BA degree when

working full time can continue for many years, although this indicator (the BA degree) only changes when the actual degree is awarded. The increase in the number of teachers with some college coursework suggests that the state requirement for teachers to have a North Carolina Credential has been effective. All lead teachers in licensed child care centers were required as of 1998 to obtain a North Carolina Credential which consists of 6 hours of college coursework in early childhood. The adoption of the star-rated licensing system has also focused attention on education because centers can achieve higher license ratings with higher proportions of degreed teachers.

The T.E.A.C.H.® (Teacher Education and Compensation Helps) program provides education scholarships and support for education-related release time for child care teachers. The center director agrees to increase the salary of each participating teacher or provide a bonus when the education courses are completed. The percentage of centers with at least one staff member participating in T.E.A.C.H.® across the three samples increased significantly (see Table 4). This mirrors data from Child Care Services Association showing that T.E.A.C.H.® participation has increased significantly over the years, with over 4,900 scholarships provided to teachers in every county last year.

Table 4. *Changes in Lead Teacher Education and T.E.A.C.H.® Participation over Time*

Education	1994 *n* = 184	1996 *n* = 188	1999 *n* = 135	Overall *p*-value[a]
Bachelor's degree or higher	15%	18%	11%	<0.001
Some college or community college coursework (but without a Bachelor's degree)	50%	58%	70%	<0.001
High school education or less	35%	24%	18%	<0.001
Centers with at least 1 staff member participating in T.E.A.C.H.	42%	45%	67%	<0.001

[a]Overall *p*-values for tests of differences in percentages across 1994, 1996 and 1999 samples.

Teacher Compensation: Salaries and Benefits

Adequate and fair compensation for child care providers is critical in attracting and maintaining quality staff. Several studies of child care have found that teacher salaries and benefits are highly related to child care quality (Cost, Quality, & Child Outcomes Study Team, 1995; Phillips, Mekos, Scarr, McCartney, & Abbott-Shim, 2000; Phillipsen, Burchinal, Howes, & Cryer, 1997). From 1994 to 1999, salaries for child care center teachers in our samples increased but continued to be low. The median center-wide typical salary for lead

teachers in 1999 was $6.83 per hour (about $14,000 annually) compared to $6.00 per hour in 1996 and $5.75 an hour in 1994 (see Table 5). [The median is the middlemost score in a distribution.] These typical salary rates represent a 3.7% annual increase over the 5-year period from 1994 to 1999. This rate of increase is lower than nationally-cited average salary increases during the 1990s of a little more than 4% annually. A recent statewide child care workforce study in North Carolina showed that median wages were about $7.50 an hour in 2001, indicating a continuing increase just barely at the rate of inflation (Russell, Lyons, Grigoriciuc, & Lowman, 2002).

According to 2000 census data, annual household median income in North Carolina was just under $39,000, which is $18.75 per hour for a 40-hour week and 52 weeks per year. If a lead teacher is head-of-household, her household earnings from child care employment are about one-third of NC's median household income. Teacher salaries clearly need to continue to be a focus for improvement through Smart Start and other early childhood or economic efforts.

Benefits such as paid maternity leave, sick leave, or personal leave; full or partial cost of retirement contributions; and full or partial cost of insurance are an important part of professional compensation. The mean number of benefits offered by centers increased significantly across the years of the study (see Table 5). The percentage of centers offering yearly cost of living raises, full/partial cost of health insurance, and full/partial cost of life insurance for lead teachers also showed statistically significant increases. Overall there was a positive trend toward an increasing percentage of centers offering all benefits listed in Table 6, which is good news for child care staff and the children they serve because turnover should decrease.

Table 5. *Changes in Teacher Salaries and Benefits over Time*

	1994 *n* = 157-166	1996 *n* = 179-187	1999 *n* = 129-135	Overall *p*-value[a]
Salaries and Benefits				
Median typical hourly wage for lead teachers (Range)	$5.75 ($4.25-16.71)	$6.00 ($3.75-14.95)	$6.83 ($4.74-21.54)	<0.001
Mean number of benefits (Range)	10.6 (2-17)	11.4 (2-17)	12.2 (4-18)	<0.001
Types of Benefits				
Extra pay/time off for meetings outside work hours	70%	77%	77%	N.S.
Paid maternity leave	19%	21%	21%	N.S.
Paid sick/personal leave	67%	74%	79%	N.S.
Reduced child care fees	66%	72%	69%	N.S.
Yearly cost of living raise	62%	56%	71%	0.013
Retirement plan (fully or partially paid)	33%	37%	48%	0.060
Health insurance (fully or partially paid)	52%	61%	62%	0.033
Dental insurance (fully or partially paid)	20%	26%	27%	N.S.
Life insurance (fully or partially paid)	41%	50%	58%	0.001
Disability insurance (fully or partially paid)	28%	36%	42%	N.S.

Note: The number of respondents (N) is different for some variables because some of the centers visited did not respond to all questions.

[a]Overall *p*-values for tests of differences in percentages across 1994, 1996 and 1999 samples. N.S. = not significant.

Teacher Turnover

Keeping teacher turnover low is key to providing high quality care (e.g., Cost, Quality, and Child Outcomes Study Team, 1995). Having warm relationships with consistent caregivers fosters children's development. When caregivers change frequently, they cannot get to know each child and his or her unique learning styles. The mean turnover of lead teachers in the centers we visited was 29% in 1994 and 32% in both 1996 and 1999. These figures are remarkably similar to the recently reported turnover rate of 31% reported for full-time child care staff in NC (Russell, Lyons, Grigoricius, & Lowman, 2002). We asked

separate questions about turnover among assistant teachers and found that the mean rate doubled from 32% to 64% between 1994 and 1999. This trend should be of concern to parents and directors.

Because mean turnover is skewed by some very high rates in a few centers, median turnover may be a more accurate measure. The median annual turnover rate for lead teachers across all centers in this study was 18% in 1994, 20% in 1996 and 17% in 1999; and for assistant teachers across all centers in this study, 8% in 1994, 14% in 1996 and 20% in 1999. These turnover rates are well below national figures for child care teachers and somewhat below elementary school teacher rates. The low turnover rates in our samples may be related to some self-selection, that is, centers that agreed to participate might have had more stable staffs. Almost all centers were participating in a variety of Smart Start-funded some designed specifically to reduce turnover.

Notably, about 40% of child care centers did not have *any* teachers leave during the previous year. However, some centers reported rates of teacher turnover that represent the total teaching staff being replaced multiple times in one year.

Group Size and Teacher-Child Ratios

Children's care is more likely to be developmentally appropriate if there are fewer children in the class (i.e., smaller group sizes) and more teachers per children (i.e., better teacher-child ratios; e.g., Cost, Quality, and Child Outcomes Study Team, 1995). Group sizes for infants were slightly smaller in the 1999 and 1996 samples than in the 1994 sample (see Table 6), although not significantly improved. The mean class size for infants was 8, which is the class size recommended by the National Association for the Education of Young Children (NAEYC). The range, however, indicates that some infant classrooms have very large numbers of babies. Average group size for toddlers increased slightly in the 1999 sample and group size for preschoolers remained essentially the same across the three years. The range of class sizes for toddlers and preschoolers indicates that some classes are so large they are out of compliance with regulations.

Teacher-child ratios for infants and preschoolers were the same in the 1994, 1996 and 1999 samples, and teacher-child ratio for toddlers actually increased (worsened) significantly in 1999. For both class size and teacher-child ratios the average centers in these samples meet acceptable standards. For the average to be at the recommended level, then we know that a fairly large number of centers have ratios and group sizes above average.

Table 6. *Changes in Classroom Ratios and Group Sizes Over Time*

	1994 *n* = 65-160	1996 *n* = 73-179	1999 *n* = 79-127	Overall *p*-value[a]
Class Size				
For infants (Birth –11 mos.)	7.9	6.8	7.1	N.S.
(mean and range)	(2.0-23.0)	(2.0-14.0)	(2.0-16.0)	
For toddlers (12 – 35 mos.)	9.6	9.7	10.5	0.056
(mean and range)	(3.5-26.3)	(3.5-30.5)	(4.0-22.0)	
For preschoolers (36 – 60 mos.)	15.0	14.0	15.0	N.S.
(mean and range)	(4.5-31.0)	(5.0-35.0)	(3.0-30.5)	
Teacher:Child Ratio				
For infants	1:4.1	1:4.0	1:3.9	N.S.
(mean and range)	(1:1-1:9)	(1:2-1:8)	(1:1.3-1:10)	
For toddlers	1:5.7	1:5.7	1:6.4	<0.001
(mean and range)	(1:2-1:12)	(1:2-1:12)	(1:25-1:12)	
For preschoolers	1:9.4	1:8.9	1:8.9	N.S.
(mean and range)	(1:3-1:18)	(1:2-1:18)	(1:2-1:18)	

Note: The number of respondents (N) is low for some variables because some of the centers visited did not enroll infants or toddlers.

[a]Overall *p*-values for tests of differences in percentages across 1994, 1996 and 1999 samples. N.S. = not significant.

Center License Type and Accreditation

State licensing level and national accreditation are global indicators of quality. Before implementation of the 5-star rating system in 2000, centers with a North Carolina AA license had to meet more stringent state licensing standards than the minimum center licensing A standards. Over time, the percentage of centers in our samples that were licensed at the higher AA level increased from 38% in 1994 to 49% in 1996 to 59% in 1999 (see Table 7). This steady increase in AA-licensed centers is additional evidence that the quality of child care was improving in these Smart Start counties.

This is the last report in which A or AA license status can be used as an indicator of quality. In 2000, NC began a 5-tiered licensing system with more stars for centers that meet higher standards. Quality improvement in future years will need to be documented by comparison to the baseline year 2001 distribution of 1, 2, 3, 4, and 5-star centers.

Table 7. *Changes in Child Care Center Quality Indicators Over Time*

License Type	1994 *n* = 184	1996 *n* = 188	1999 *n* = 135	Overall ***p*-value**[a]
AA	38%	49%	59%	<0.001
A	55%	45%	33%	<0.001
GS exempt	5%	4%	3%	N.S.
Other license type	1%	1%	4%	N.S.
Centers accredited by NAEYC	6%	7%	15%	0.023

[a]Overall *p*-values for tests of differences in percentages across 1994, 1996 and 1999 samples.

Accreditation from NAEYC is often cited as an indicator of quality center care. Becoming accredited is a 2-year process and not many centers undergo the self-study and hard work necessary to become accredited. However, the percent of centers in our samples voluntarily accredited by NAEYC more than doubled since the beginning of Smart Start, from 6% to 15% (see Table 7). This again is evidence that child care quality continues to improve, although many centers do not yet meet these very high standards of quality.

Summary

The main changes from 1994 to 1999 in child care quality indicators in this North Carolina sample of child care centers include:

- More teachers had some college coursework and fewer teachers had only a high school degree;
- More centers were participating in T.E.A.C.H.®;
- Typical teacher salaries increased over time but not faster than inflation;
- More centers were offering more benefits to teachers with significant jumps in the number of centers offering retirement plans and health and life insurance;
- Median teacher turnover has remained steady at 17-20%;
- Group sizes and teacher-child ratios have remained fairly constant; and
- More centers have achieved a higher level of NC child care license and twice as many have become nationally accredited.

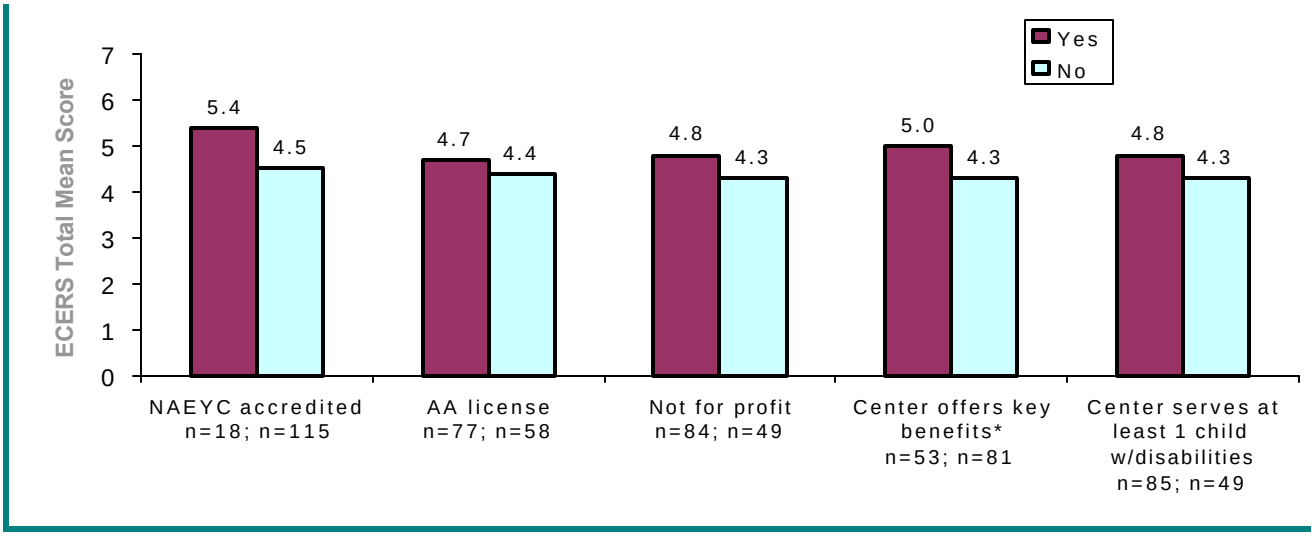
Relationships with Classroom Quality

A logical follow-up question to these significant changes over time is whether any (or all) of them are related to actual classroom quality as we observed it in these centers. Among the

indicators measured at the center level, teacher salary (the "typical" salary among all teachers at the center), teacher benefits, and assistant teacher benefits were all strongly correlated with observed classroom quality (r = 0.42, 0.39, and 0.44, respectively). Child care centers that offered key benefits (i.e., paid sick/personal leave, full/partial cost of retirement plan, and full/partial cost of health insurance) were of higher observed quality than center that did not offer the key benefits ($p < 0.001$; see Figure 2).

Other study variables significantly related to child care quality are presented in Figure 2. ECERS mean scores were statistically significantly higher in centers that were NAEYC accredited compared to centers that were not NAEYC accredited ($p < 0.001$). Quality was also significantly higher in centers with an AA license compared to those with an A license ($p = 0.019$). Centers with a nonprofit status had significantly higher ECERS total mean scores than for-profit centers ($p = 0.004$).

Figure 2. *1999 Child Care Center Quality Indicators (*N = *133)*



*Key benefits include: paid sick/personal leave, full/partial cost of retirement plan, and full/partial cost of health insurance.

Question 6: Changes over Time in Other Center Characteristics

Serving Poor Children and Children with Disabilities

Most centers in the 1999 sample served children who received government subsidies, providing opportunities for many children from low-income families to participate in preschool programs (see Table 8). The percentage of centers serving subsidized children increased significantly from 1994 to 1999 and the mean percentage of subsidized children served by the centers also increased significantly. In addition, the percentage of centers serving children with disabilities significantly increased from 1994 to 1999. This suggests

that there were more opportunities in these communities for young children with disabilities to be served in settings with typically developing children (see Table 8).

Table 8. *Changes Over Time in Children Served by Centers*

Center Characteristic	1994 *n* = 166	1996 *n* = 187	1999 *n* = 135	Overall ***p*-value**[a]
Centers serving children who receive government subsidies	89%	92%	97%	0.005
Mean percentage of subsidized children per center (range)	44% (1%-100%)	44% (1%-100%)	55% (0%-100%)	<0.001
Centers serving at least 1 child with a disability	41%	47%	63%	<0.001

[a]Overall *p*-values for tests of differences in percentages across 1994, 1996 and 1999 samples.

Centers enrolling a child with a disability were of higher quality than centers not serving children with disabilities ($p < 0.001$; see Figure 2). Higher quality centers may be more able to provide needed adaptations for children with disabilities and therefore tend to attract and enroll these children. There was no statistically significant relationship between the quality of care and the percentage of children from low-income families in the center (i.e., those whose families received child care subsidies). In the communities from which these sample were drawn, children from lower-income families seem to have access to the same quality of care as do children from higher-income families. Research suggests that quality of care for low-income children should be *higher* than it is, however, if we want to support their development. Mean quality scores obtained in this study continue to represent *medium* quality of care, while *good* quality is needed to assure that children are healthy and ready to learn (e.g., Cost, Quality, and Child Outcomes Study Team, 1995) -- the goal of Smart Start.

Screening Services

In addition to funds for quality improvements in early childhood programs, Smart Start provides a number of child and family supports via child care programs. This section reports changes over time in the number and/or frequency of these services.

More child care centers in the 1999 sample provided vision, hearing, dental, speech/language, and developmental screenings to children compared to the 1996 and 1994 samples (see Table 9) and the increases are statistically significant overall. The substantial increases in percentage of screening programs is likely due to Smart Start efforts to improve local screening services to identify and treat children's problems as early

as possible. Early identification and treatment of children's problems can help assure that children with special needs come to school prepared to succeed.

Table 9. *Percentage of Centers Offering Specific Services over Time*

Services	1994 *n* = 162-166	1996 *n* = 185-187	1999 *n* = 135	Overall ***p*-value**[a]
Child Screening Services				
Vision screening	51%	60%	82%	<0.001
Hearing screening	47%	64%	77%	<0.001
Dental screening	31%	47%	59%	<0.001
Speech/language screening	59%	68%	80%	<0.001
Developmental screening/assessment	59%	57%	68%	0.026
Other Services Provided by Centers				
Meals	91%	95%	95%	N.S.
Transportation	53%	56%	58%	N.S.
Weekend care	1%	1%	1%	N.S.
Evening care	5%	7%	7%	N.S.
24 hour care	1%	2%	1%	N.S.
Part-time care	49%	59%	49%	0.003
Before/after school care	52%	53%	54%	N.S.
Sick-child care	2%	3%	1%	N.S.

[a]Overall *p*-values for tests of differences in percentages across 1994, 1996 and 1999 samples. N.S. = not significant.

Support for Parent Work Schedules

While the support services discussed above are important improvements for families and children, improvements in other supports for parent work schedules have not been evident. The percentages of centers offering transportation, part-time care, or before/after school care have remained steady. Among this particular sample of centers, there have been no increases over time in the percentage offering weekend, evening (after 6 p.m.), or sick-child care.

Resources for Teaching Staff

Directors reported increased resources and supports available for staff and centers to serve children with disabilities in 1999 compared to 1994 and 1996, including training, on-site

consultation, resource materials, and financial incentives (see Table 10). These increases in resources and supports were statistically significant. When asked about the challenges of serving children with disabilities, directors most frequently reported staff concerns about the characteristics of a child with disabilities (e.g., disability is too severe), staff uncertainty about their own abilities to serve children with disabilities, the possible need to modify their program or facility, and concern that their class sizes were too large. The responses in 1999 were not significantly different than in 1994 or 1996.

Table 10. *Serving Children with Special Needs: Resources, Supports, and Difficulties*

Centers Reporting:	**1994** *n* = 165	**1996** *n* = 185-186	**1999** *n* = 135	**Overall *p*-value**[a]
Resources and Supports				
Training focusing on children with disabilities	64%	77%	84%	<0.001
On-site consultation from specialists	71%	75%	84%	0.009
Resource materials	60%	75%	82%	<0.001
Financial incentives	22%	28%	34%	0.039
Difficulties				
Inadequate staff training	38%	30%	32%	N.S.
Class sizes too large	33%	29%	28%	N.S.
Resistance among families of currently enrolled children	5%	8%	10%	N.S.
Resistance among staff	12%	12%	13%	N.S.
Initial staff uncertainty in abilities	31%	26%	37%	N.S.
Special resources or services not available	12%	6%	7%	N.S.
Facility or program would need modifications	25%	27%	30%	N.S.
Characteristic of child with disability presents problem (e.g., disability too severe)	31%	29%	40%	0.047

[a]Overall *p*-values for tests of differences in percentages across 1994, 1996 and 1999 samples. N.S. = not significant.

Conclusions and Implications

Child care quality is improving in the pioneer partnerships and in North Carolina overall. In 1999 more child care centers in the pioneer partnerships were providing care of higher quality for young children compared to 1994. We saw quality improvement in both classroom observations and changes in indicators of quality such as more centers with a higher license status and more teachers with some college education. The number of centers that achieved national accreditation since 1994 more than doubled in these partnerships. A center's level of participation in Smart Start-funded quality improvement activities was highly related to the level of classroom quality, which suggests that Smart Start has contributed to the increase in quality.

Across the state the percentage of centers licensed at the highest level increased from 1993 to 2001 (19% AA licensed centers in 1993 compared to 23% 4-star and 5-star licensed centers in 2001). Another sign of statewide quality improvement is that the number of NC centers accredited by NAEYC, the largest national early childhood organization, rose from 28 in 1992 to 170 in 2000.

Quality improved in each dimension of classroom care and education (e.g. language/reasoning, creative activities, gross motor) except for personal care. Although the area of social development improved, it remained the lowest subscale in 1999. Both social development and basic handwashing, toileting, and safety of children continue to need attention. In reality, quality improvement efforts need to continue for all aspects of child care. While it is positive that the number of high-quality classrooms ($\geq$ 5 on ECERS) doubled since Smart Start began, a large percentage were still below the level of quality that North Carolina desires for all of its children. Most child care centers provide "medium" quality care that generally does not create the learning environment needed to maximize children's development and help ensure that they enter school healthy and prepared to succeed. Much work remains.

Almost all centers in the study participated in at least one Smart Start quality improvement activity, and the average number of activities per center increased steadily over the years (from 5 to 6 to 7). This is a sign that local partnerships are doing a good job reaching out to centers in their quality improvement efforts. In fact, these activities are likely to be one of the main reasons for NC's overall quality increase as we found a positive relationship between the number of Smart Start activities in which a center had participated and the observed quality of care.

Many of the activities being funded, such as on-site training and mentoring and purchase of educational materials, are of the type that should improve quality. Child care centers in the 1999 sample were also more likely to employ better educated teachers, provide higher compensation and more benefits for teachers, and have more teachers participating in the T.E.A.C.H.® program. The quality improvement activities in combination with T.E.A.C.H.® and other education support programs seem to have helped teachers and assistant teachers become more developmentally appropriate in their classroom teaching. However, because this was not an experimentally controlled study, a definitive answer to the question of which types of quality improvement activities might yield the greatest gains in quality awaits a study in which those types of inputs can be controlled.

In the future we would not necessarily expect to see continued increases in the overall numbers of quality improvement activities offered by partnerships as they seem to be refining their types of activities to focus on those that work best in their counties. Such a focus on effectiveness (rather than raw numbers) may lead to a reduction in the number of different types of quality improvement. Of course, the budget cuts of the past year may also be causing some retrenchment in quality improvement activities. Future research may shed some light on this issue.

Our finding that current participation in quality improvement activities--but not past participation--was predictive of current classroom quality has important policy implications. It suggests that North Carolina cannot cut back its quality improvement efforts and hope to rest on the positive effects of earlier work. Partially because of teacher turnover and partially because early childhood teachers need to stay abreast of the latest developments in education, continuous efforts are needed to maintain a high level of classroom quality to enhance children's growth and development.

It is clear that salaries and benefits have a great deal to do with the level of teacher and assistant teacher turnover in the field of early childhood. Although salaries of teachers in North Carolina increased over the 5 years of this study, they did not even keep pace with inflation and continue to be very low. Even with the low salaries, teacher turnover in these centers was below the statewide average. This may be due in part to some of the benefits staff received from their centers and Smart Start. Possibly, the types of centers that are willing to participate in a research study might be somewhat more stable in their staffing than other centers. Nevertheless, 20% annual teacher turnover and 50% annual turnover among assistant teachers cannot be good for children.

It is somewhat surprising that classroom quality improvements in this sample were achieved without a concomitant reduction in teacher turnover rates, teacher-child ratios, or group size and without significant salary increases. We wonder how long the positive changes can continue without making structural changes in some of the basic building blocks of high quality early childhood programs.

Over the years of the study, more child care centers served more children from low-income families and more children with disabilities. There seem to be increasing opportunities for children in North Carolina to receive early educational experiences in integrated settings. More child care centers are now providing developmental screenings to children, enabling the child care system to catch problems early and to begin early intervention for children in need of speech or developmental therapies.

Limitations of this study. While these data show that quality has improved over time in North Carolina and that participation in Smart Start was significantly related to quality, it is a correlational study. Without assigning some counties or centers to participation in Smart Start and some counties to a control group, we cannot directly prove that Smart Start caused the increases. However, the relationships between variables suggest that Smart Start has played an important role. Another limitation of the study is the diversity of the sample. It is possible that these pioneer counties may be different than other partnerships in some way that relates to their ability to make quality improvements. Whether these results would hold up in other counties is unknown, although because we found these results in a study of 18 counties that cover the range of geographic and economic diversity of North Carolina, we believe that similar results would likely be found in other NC counties.

Summary. North Carolina demonstrated its commitment to young children by creating Smart Start in 1993. Since then, the first set of partnerships have worked hard to improve the quality of child care as a way of ensuring that all children enter school healthy and prepared to succeed. The information provided in this report shows that these Smart Start partnerships have been successful in improving the quality of child care and that this improvement is related to participation in Smart Start quality improvement activities. Partnerships should be encouraged and supported in their continuing efforts to improve the quality of North Carolina's early childhood programs.

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Appendix

Appendix A: Description of the Prediction Models

Hierarchical linear mixed models (HLM) and general linear models (GLM) were run to examine the relationship between quality and Smart Start participation and expenditures for child care activities. The HLM model was used to examine the concurrent relationship between Smart Start participation and expenditures, and quality. The model included data from all 3 years and used the ECERs mean total (without Adult Need Items) as the dependent variable. The model contained the following independent variables: proportion of Smart Start funds spent on child care activities, the number of Smart Start activities that the center participated in, year, and county. The results of the model are presented in Table 11. Overall quality increased significantly from 1994 to 1996, but the difference between 1996 and 1999 was not statistically significant.

The model also indicates an overall effect on quality for Smart Start participation but not for percent of partnership Smart Start funds expended on child care and related activities. A second set of hierarchical linear mixed models was also run using the 67 centers that were visited in each of the three waves (3-year repeated sample). Results were the same as results using all data.

Table 11. *HLM Analyses of Concurrent Child Care Quality as a Function of Year, Proportion of Partnership Funds Spent on Child Care, and Number of Smart Start Activities Participated*

HLM Results	***B***	***SE***	c^2	***p***
Intercept	4.67	0.24	16.46	<0.001
Year				
1994	-	-	-	-
1996	0.18	0.06	3.10	0.002
1999	0.15	0.08	2.063	0.042
% Spent	0.00	0.001	-0.61	N.S.
# Participated 1994-1999	0.03	0.01	3.49	<0.001

N.S. = not significant.

A general linear model was used to examine the relation between previous participation and expenditures and quality in 1999. The dependent variable was the 1999 ECERS mean total (without Adult Needs Items). The model included the following independent variables:

proportion spent on child care activities in 1996, proportion spent on child care activities in 1999, the number of Smart Start programs that the center participated in 1996, the number of Smart Start programs that the center participated in 1999, the two interactions between proportion spent and number of Smart Start activities, and county. The full model showed no interaction between Smart Start participation and percent spent on Smart Start child care activities. Results indicated that 1999 child care quality was predicted by Smart Start participation in 1999 (concurrent participation) but that 1996 participation had no significant effect on quality in 1999 (see Table 12).

Table 12. *Effects of Previous and Concurrent Proportion of Funds Spent on Child Care, and Number of Smart Start Activities Center Participated In on Quality in 1999*

GLM Results	***B***	***SE***	c^2	***p***
Intercept	3.09	2.52	1.5	N.S.
% Spent 1996	0.04	0.03	1.65	N.S.
# Participated 1996	0.00	0.02	0.02	N.S.
% Spent 1999	-0.02	0.05	0.14	N.S.
# Participated 1999	0.05	0.02	4.95	0.026

N.S. = not significant.