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U.S. Department of Education
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NATIONAL CENTER FOR EDUCATION STATISTICS

Working Paper Series

Papers from the Early Childhood Longitudinal Studies Program Presented at the 2001 AERA and SRCD Meetings

Working Paper No. 2001-06 June 2001

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A New Teaching Tool: Computers and Technology in the Kindergarten Classroom

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Jerry West, National Center for Education Statistics

American Educational Research Association
April 10 - 14, 2001
Seattle, Washington

Background

Technology has the potential to enhance the achievement of all students, increase family involvement in their children's schooling, improve teachers' skills and knowledge, and improve school administration and management (U.S. Department of Education 1996). Students and teachers can benefit from the use of computers and technology in the classroom, beginning with the early grades such as kindergarten.

Interactive media such as computer software, CD-Rom, television and video, have been touted as excellent teaching tools. Specifically, interactive learning can come much more naturally with the use of computer applications and CD-Roms. There are various computer software and programs specifically designed to help structure beginning learners visual and auditory skills, enhance problem solving and basic mathematical concepts, and most importantly that allow children to monitor their own progress and development (Davis and Shade, 1997; Wartella, 2000).

This paper provides information on computer use by both public and private school kindergartners. Specifically, this paper describes how often kindergarten children use computers to learn reading, math, social studies and science concepts. Additionally, it examines potential barriers to kindergartners' use of computers such as, inadequate equipment and software and inadequate teacher training and continuing education.

Research Questions

- How frequently do kindergartners use computers in their classrooms for learning reading, mathematics, social studies and science?

- How adequate is the computer equipment and software in kindergarten classrooms?

- Does the adequacy of computer equipment and computer software relate to the frequency of children's computer use for learning?

- How many kindergarten teachers attend computer-related training and workshops?

- Does teachers' attendance in computer-related training and workshops relate to the frequency of children's computer use?

The Study

Information on computer availability, students use of computers in the classroom and the adequacy of computer software and equipment comes from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K).

In the fall of 1998, the U. S. Department of Education's National Center for Education Statistics (NCES) embarked on a study of the early education of young children. The ECLS-K captures information on these children, their families, teachers and schools. The design is guided by an ecological systems perspective, in which the child's physical, cognitive and socio-emotional development is considered across multiple contexts, including the home, classroom, school and community.

Across the life of the study, information from children and families is collected 6 times: fall and spring kindergarten, fall and spring first grade, spring third grade, and spring fifth grade. Information from teachers is collected 5 times: fall and spring kindergarten, spring first grade, spring third grade, and spring fifth grade. Information from schools is collected 4 times: spring kindergarten, spring first grade, spring third grade, and spring fifth grade.

The Sample

- This research uses data provided by 3,243 teachers from both public and private schools which offered full-day and part-day kindergarten programs.
- When appropriately weighted, the sample is representative of the 190,000 kindergarten teachers in the United States in the spring of 1999.

Table 1.—Percentage distribution of United States kindergarten teachers: Spring 1999

Characteristic	Population Percentage
Gender	
Male	4
Female	96
Race/ethnicity	
White, nonHispanic	82
Black, nonHispanic	8
Hispanic	6
Asian	2
Other	2
School type	
Public	80
Private	20

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Procedures

In the spring of 1999, the ECLS-K collected data from teachers through a self-administered questionnaire. The questionnaire captured information on the availability and use of computers by children in kindergarten classes. Teachers were asked how often children in their classroom use computers to learn reading, math, science and social studies concepts.

The teacher questionnaire also collected information on computer-related training and staff development activities. For example, teachers were asked if they participated in workshops on computer and technology use in the classroom during the academic year.

Additionally, teachers were asked to rate the adequacy of the computer equipment and software used by their class.

Measures

In the spring of the kindergarten year, teachers were asked:

- How often children in their classroom use computers to learn reading, math, science and social studies concepts. The items were scored as *(1) never, (2) once a month or less, (3) two or three times a month, (4) once or twice a week, (5) three or four times a week or (6) daily.*
- How adequate is the computer equipment and computer software used by their class. The items were scored as *(1) do not use at this grade level, (2) less than adequate, (3) always adequate.*
- Did they participate in workshops or in-service on computers and technology used in the classroom during the current academic year. The items were scored as *(1) yes or (2) no.*

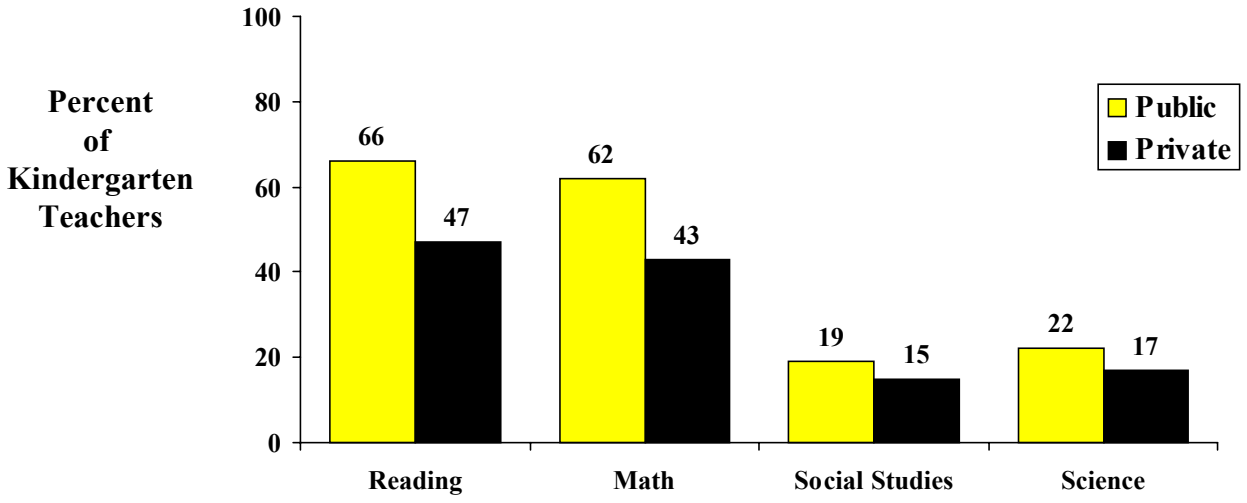
Summary of Results

(all results are significant at the .05 level, unless otherwise indicated)

How frequently do kindergartners use computers in their classrooms for learning reading, mathematics, social studies and science?

- Table 2 presents information on how frequently teachers report children in their classes using computers, by school type. Less than one-quarter of public and private school teachers report children in their classes using computers on a daily basis. Therefore, we made our comparisons based on use of computers at least once a week.
- In public schools, more than half the kindergarten teachers report children in their classes using computers at least once a week for learning reading (66%) and mathematics (62%) concepts. Less than one-quarter of public school kindergarten teachers report children using computers at least once a week for learning social studies (19%) and science (22%) concepts (figure 1).
- In private schools, a little less than half of the kindergarten teachers report children using computers at least once a week to learn reading (47%) and mathematics (43%); and, fewer private school kindergarten teachers report children using computers at least once a week to learn social studies (15%) and science (17%) (figure 1).
- Public school children are more likely than private school children to use computers at least once a week for learning reading, mathematics, social studies and science (figure 1).

Figure 1.—Percent of kindergarten teachers who reported children in their classes using computers for learning reading, math, social studies and science concepts at least once a week, by school type: Spring 1999



Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Summary of Results

(all results are significant at the .05 level, unless otherwise indicated)

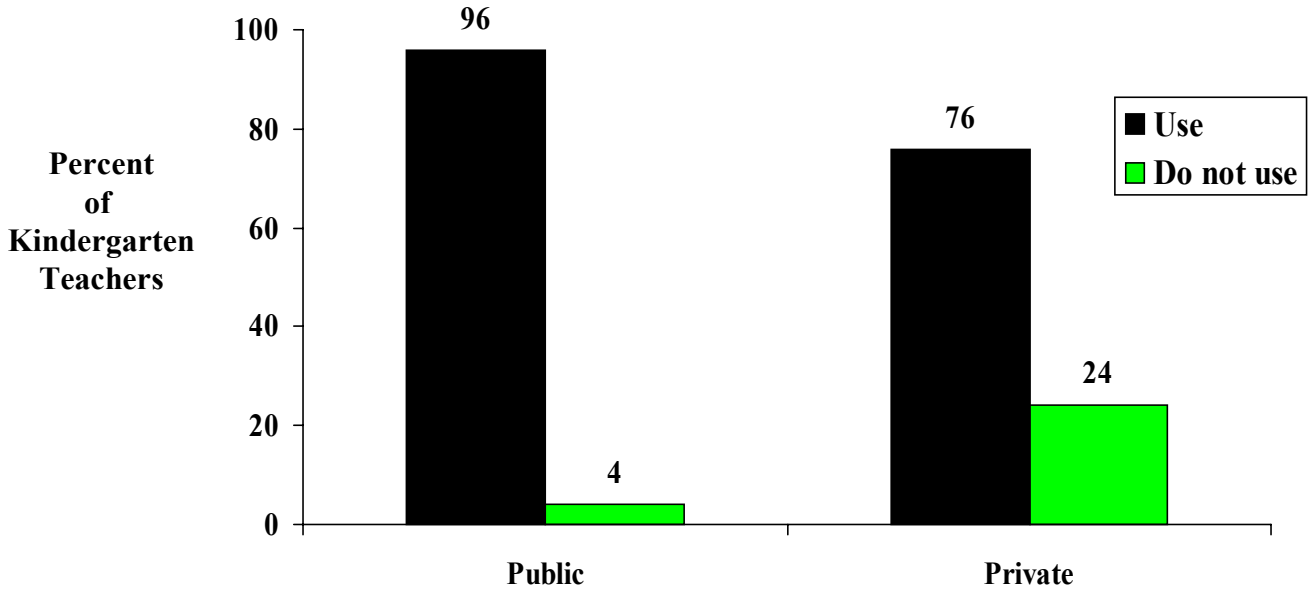
How adequate is the computer equipment in kindergarten classrooms?

(Teachers could rate their computer equipment as less than adequate, always adequate, or that computers are not used at this grade level. From this information, we could determine if teachers used computer equipment in their kindergarten classroom, and if they did use computer equipment, whether or not they considered it adequate.)

- In public schools, 96 percent of teachers reported using computer equipment. In private schools, 76 percent of kindergarten teachers reported using computer equipment (figure 2a).

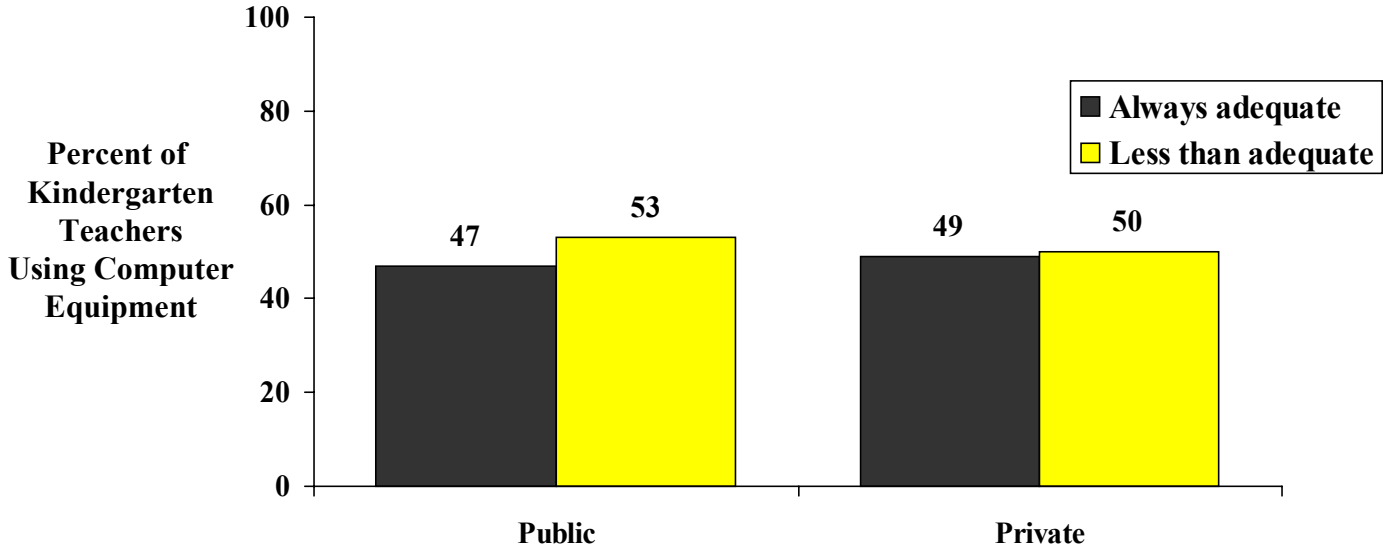
- Of the teachers who used computer equipment in their kindergarten classrooms, 47 percent of public school teachers and 49 percent of private school teachers felt the computer equipment was always adequate (figure 2b).

Figure 2a.—Teachers' use of computer equipment in the classroom, by school type: Spring 1999



Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Figure 2b.—Teachers' rating of the adequacy of their classroom's computer equipment, by school type: Spring 1999



Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Summary of Results

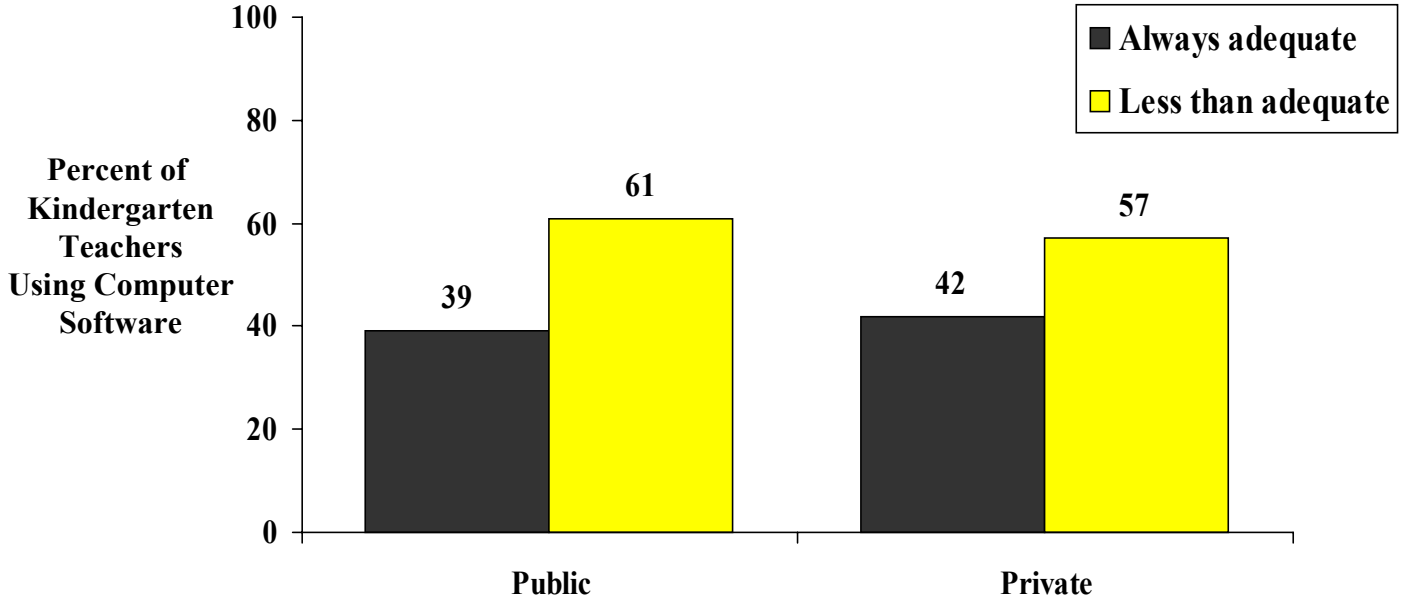
(all results are significant at the .05 level, unless otherwise indicated)

How adequate is the computer software in kindergarten classrooms?

(Teachers could rate their computer software as less than adequate, always adequate, or that computers are not used at this grade level. From this information, we could determine if teachers used computer software in their kindergarten classroom, and if they did use computer software, whether or not they considered it adequate.)

- Of the teachers who used computer software in their kindergarten classrooms, 39 percent of public school teachers and 42 percent of private school teachers felt the computer software was always adequate (figure 3).

Figure 3.—Teachers' rating of the adequacy of their classroom's computer software, by school type: Spring 1999



Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

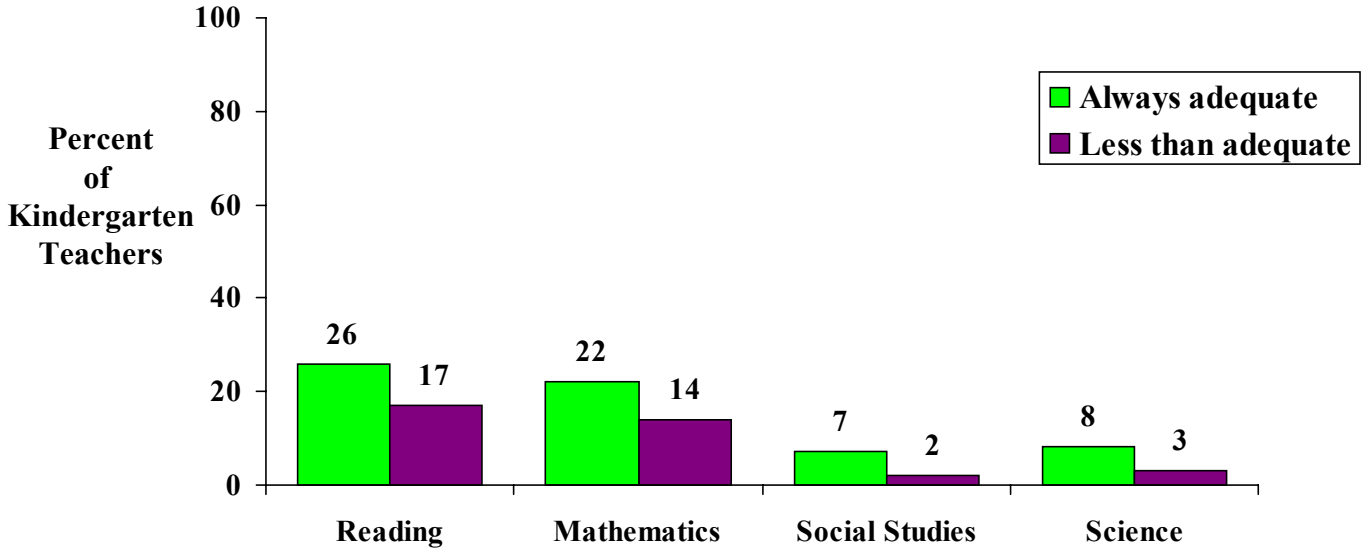
Summary of Results

(all results are significant at the .05 level, unless otherwise indicated)

Does the adequacy of computer equipment and computer software relate to the frequency of children's use of computers use for learning?

- When asked to rate the adequacy of computer equipment and software, public school kindergarten teachers who reported their computer equipment and software as *always adequate* are more likely to have children in their classes using computers **daily** than teachers who rated computer equipment and software as less than adequate (tables 4 and 5). Figure 4 illustrates these differences for public school teachers and computer equipment.

Figure 4.—Percent of public school kindergarten teachers whose children use computers **daily** to learn reading, mathematics, social studies and science, by adequacy of computer equipment: Spring 1999



Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

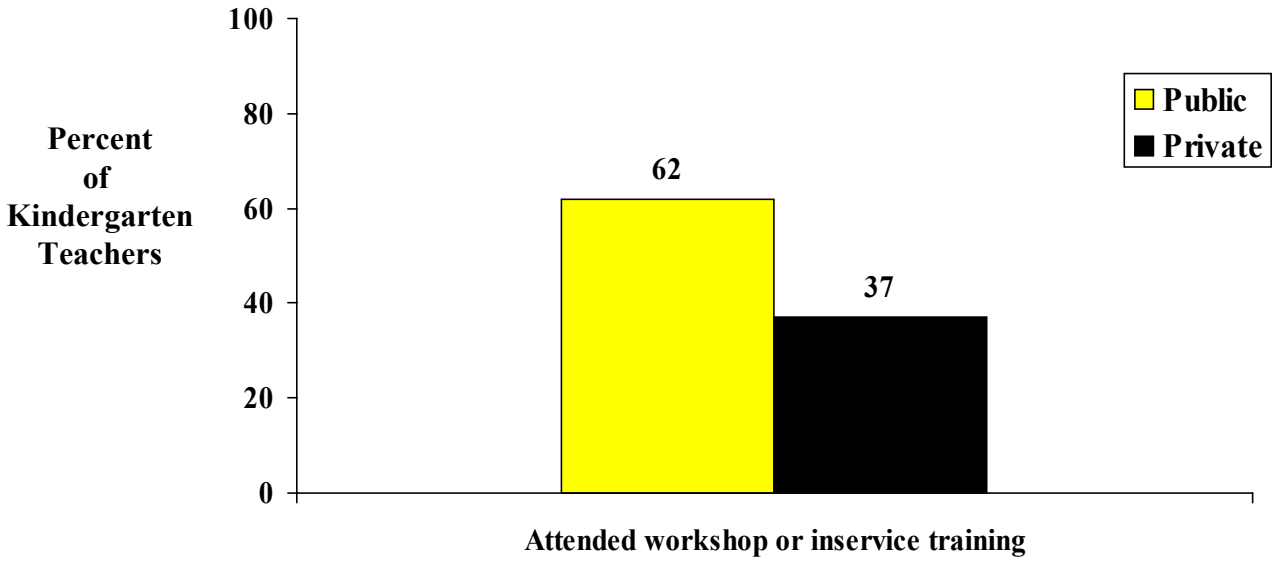
Summary of Results

(all results are significant at the .05 level, unless otherwise indicated)

How many kindergarten teachers attend computer-related training and workshops?

- Public school kindergarten teachers are more likely than private school kindergarten teachers to participate in computer-related workshops and training activities. Sixty-two percent of public school kindergarten teachers report participating in computer-related workshops and training. Only 37 percent of private school kindergarten teachers report participating in such activities (figure 5).

Figure 5.—Percent of public and private school kindergarten teachers who have attended workshops on computers in the classroom, by school type: Spring 1999



Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

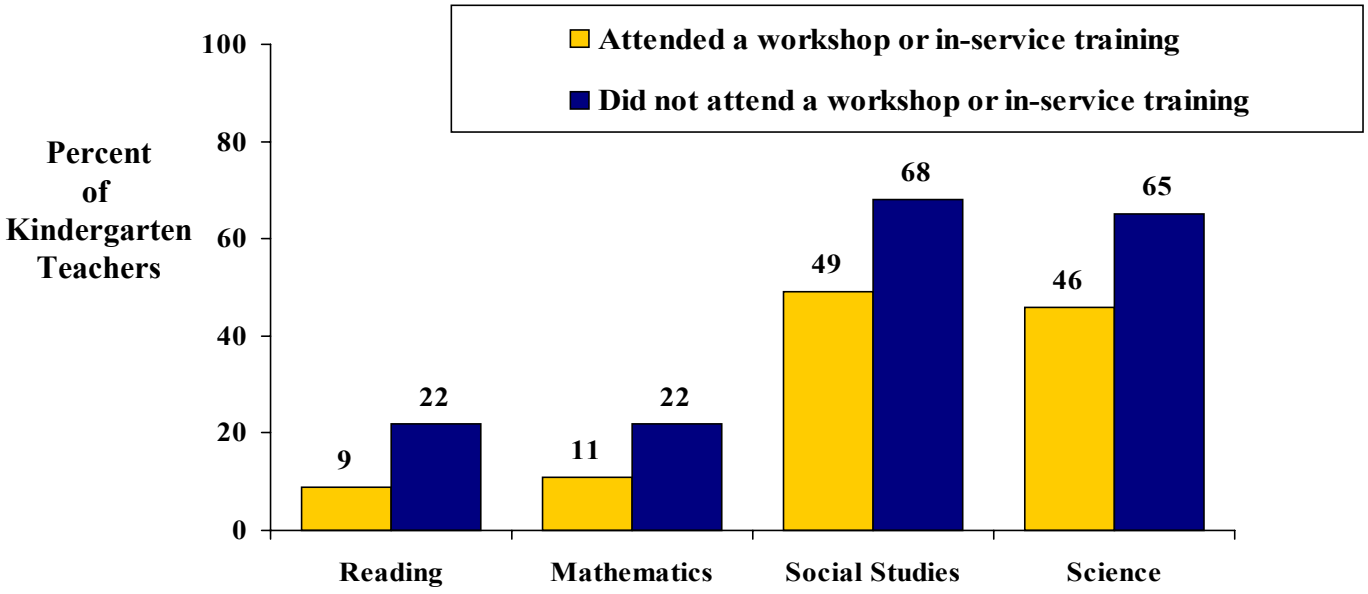
Summary of Results

(all results are significant at the .05 level, unless otherwise indicated)

Does teachers' participation in computer-related training and workshops relate to the frequency of children's computer use?

- Public school kindergarten teachers who ***have not*** attended computer-related training and workshops during the academic year are more likely to report that the children in their classes ***never*** use computers to learn reading, mathematics, social studies and science than do teachers who have attended computer-related training and workshops (tables 4 and 5). Figure 6 illustrates these differences for public school teachers.

Figure 6.—Percent of public school kindergarten teachers whose children **never** use computers to learn reading, mathematics, social studies and science, by teachers' attendance at a computer-related training and workshop: Spring 1999



Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Implications

- Optimally, children should learn in age-appropriate ways, and the future most likely includes computers in the classroom (Papert, 2000). In public schools, about two-thirds of teachers report that kindergartners use computers at least once a week for learning reading and about three-fifths use computers at least once a week for learning math. Technology will play an ever-increasing role in children's learning; therefore, future research needs to follow how this trend changes over time.

- Further research is needed to understand if the use of computers in early childhood education benefits children's learning.

- To use computers effectively in classrooms, teachers must have a certain level of computer literacy. This study confirms that the frequency with which children use computers for learning varies by whether teachers have attended some kind of computer related training. Therefore, it is important that teachers have adequate computer training.

- Future research is needed to understand the barriers to teachers appropriately incorporating computers and technology into their curriculum.

Tables

Table 2.—Percent of kindergarten teachers who reported children in their class using computers learning reading, math, social studies and science concepts, by frequency of use and school type: Spring 1999

	Public School Kindergarten Teachers						Private School Kindergarten Teachers					
	Never	Once a month	2-3 a month	1-2 a week	3-4 a week	Daily	Never	Once a month	2-3 a month	1-2 a week	3-4 a week	Daily
Reading	14	8	12	33	13	20	36	6	7	28	7	12
Mathematics	15	8	14	34	11	17	40	6	12	24	7	12
Social Studies	56	16	9	12	3	4	71	9	6	10	1	4
Science	53	15	10	14	3	5	67	11	6	11	2	4

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Table 3.—Percent of teachers who reported attending a training/workshop on computers and how adequate they find their computer equipment and software, by school type: Spring 1999

	Public	Private
Use of computer equipment		
Yes	96	76
No	4	24
If computer equipment is used, its adequacy		
Always adequate	47	49
Less than adequate	53	50
Use of computer software		
Yes	96	76
No	4	24
If computer software is used, its adequacy		
Always adequate	39	42
Less than adequate	61	57
Participated in in-service/workshops		
Yes	62	37
No	38	63

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Table 4.—Percent of public school kindergarten teachers who reported children using computers for learning reading and math concepts, by frequency of use by teacher training participation, computer equipment adequacy and computer software adequacy: Spring 1999

Characteristics	Reading						Math					
	Never	Once a month	2-3 month	1-2 week	3-4 week	Daily	Never	Once a month	2-3 month	1-2 week	3-4 week	Daily
Participation in trainings and workshops												
Yes	9	6	12	35	14	23	11	7	13	37	13	19
No	22	10	12	30	10	16	22	10	16	29	9	14
Adequacy of computer equipment												
Do not use	83	3	1	8	5	(*)	83	3	3	7	4	1
Less than adequate	16	10	14	33	10	17	17	11	16	34	9	14
Always adequate	7	6	11	35	16	26	8	6	13	37	14	22
Adequacy of computer software												
Do not use	79	4	1	9	5	2	80	3	4	7	4	2
Less than adequate	15	10	14	33	11	17	16	10	16	35	10	14
Always adequate	6	5	10	35	16	27	8	6	13	37	14	23

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Note: Teachers reported on the frequency with which children use computers for learning. The question did not specify that the computer use had to occur in the teacher's classroom. Therefore, teachers could report that they personally do not use computers in their classes, but a small percentage of children may still use computers for learning (they simply are in a location other than their primary classroom, such as a computer lab). Further, teachers can have computers in the classroom and not use them for instruction at the kindergarten grade level.

Table 5.—Percent of public school kindergarten teachers who reported children using computers for learning social studies and science concepts, by frequency of use by teacher training participation, computer equipment adequacy and computer software adequacy: Spring 1999

Characteristics	Social Studies						Science					
	Never	Once a month	2-3 month	1-2 week	3-4 week	Daily	Never	Once a month	2-3 month	1-2 week	3-4 week	Daily
Participation in trainings and workshops												
Yes	49	18	12	13	3	4	46	17	12	15	4	6
No	68	12	5	9	2	3	65	11	7	12	2	3
Adequacy of computer equipment												
Do not use	92	(*)	1	5	2	1	94	1	1	5	1	(*)
Less than adequate	63	15	8	10	2	2	60	15	9	12	2	3
Always adequate	46	18	12	14	4	7	43	17	12	16	5	8
Adequacy of computer software												
Do not use	91	(*)	1	5	1	2	93	1	1	5	1	1
Less than adequate	62	15	9	11	2	2	58	15	9	12	3	3
Always adequate	44	18	11	14	5	8	42	16	12	17	5	8

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Note: Teachers reported on the frequency with which children use computers for learning. The question did not specify that the computer use had to occur in the teacher's classroom. Therefore, teachers could report that they personally do not use computers in their classes, but a small percentage of children may still use computers for learning (they simply are in a location other than their primary classroom, such as a computer lab). Further, teachers can have computers in the classroom and not use them for instruction at the kindergarten grade level.

Table 6.—Percent of private school kindergarten teachers who reported children using computers for learning reading and math concepts, by teacher training participation, computer equipment adequacy and computer software adequacy: Spring 1999

Characteristics	Reading						Mathematics					
	Never	Once a month	2-3 month	1-2 week	3-4 week	Daily	Never	Once a month	2-3 month	1-2 week	3-4 week	Daily
Participation in trainings and workshops												
Yes	18	7	9	37	13	16	21	7	14	32	11	15
No	47	6	9	22	6	10	51	5	11	19	4	10
Adequacy of computer equipment												
Do not use	90	3	1	6	(*)	(*)	94	3	1	2	(*)	(*)
Less than adequate	24	11	11	32	10	12	30	8	13	28	9	13
Always adequate	16	4	12	37	12	19	18	5	18	33	8	18
Adequacy of computer software												
Do not use	90	3	1	6	(*)	(*)	94	3	1	2	(*)	(*)
Less than adequate	27	9	12	30	10	12	52	31	7	13	28	12
Always adequate	12	5	11	39	13	21	14	7	18	33	8	20

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Note: Teachers reported on the frequency with which children use computers for learning. The question did not specify that the computer use had to occur in the teacher's classroom. Therefore, teachers could report that they personally do not use computers in their classes, but a small percentage of children may still use computers for learning (they simply are in a location other than their primary classroom, such as a computer lab). Further, teachers can have computers in the classroom and not use them for instruction at the kindergarten grade level.

Table 7.—Percent of private school teachers who reported children using computers for learning social studies and science concepts, by teacher training participation, computer equipment adequacy and computer software adequacy: Spring 1999

Characteristics	Social Studies						Science					
	Never	Once a month	2-3 month	1-2 week	3-4 week	Daily	Never	Once a month	2-3 month	1-2 week	3-4 week	Daily
Participation in trainings and workshops												
Yes	64	12	9	13	1	2	57	17	9	13	1	3
No	75	7	5	8	1	4	73	7	4	9	3	4
Adequacy of computer equipment												
Do not use	95	4	(*)	(*)	1	(*)	97	(*)	(*)	4	(*)	(*)
Less than adequate	73	9	6	9	(*)	4	70	10	6	10	2	3
Always adequate	55	11	10	16	2	6	46	18	10	16	4	7
Adequacy of computer software												
Do not use	95	4	(*)	1	(*)	(*)	97	(*)	(*)	4	(*)	(*)
Less than adequate	73	7	7	11	(*)	3	71	9	6	11	1	2
Always adequate	51	14	10	15	3	8	41	21	10	15	4	9

* less than .5 percent

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999 Kindergarten Teacher Questionnaires, Public-use data file. U.S. Department of Education, National Center for Education Statistics.

Note: Teachers reported on the frequency with which children use computers for learning. The question did not specify that the computer use had to occur in the teacher's classroom. Therefore, teachers could report that they personally do not use computers in their classes, but a small percentage of children may still use computers for learning (they simply are in a location other than their primary classroom, such as a computer lab). Further, teachers can have computers in the classroom and not use them for instruction at the kindergarten grade level.

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Perspective

Children learn from new experiences and with time learn that expectations vary in different settings. In early childhood, transition-to-school describes the period in which children move from home to school or from preschool to kindergarten. Kindergarten functions as an introduction to the entire elementary and secondary school experience. It is a time for establishing competencies critical for successful school outcomes. The transition process is both transactional and developmental; children, families, schools, and communities interact socially to make school experiences supportive and responsive to the needs of children and their families. While some discontinuity of experience is a normal part of growing up, the ease with which children adjust to the new setting is of major concern (Love et al. 1992).

Parents and schools are encouraged to work together so all children can succeed in school. Research suggests that parental involvement in their children's education may help to explain differences in school outcomes (e.g., Comer 1985; Henderson 1987; Lee 1993; Nord, Brimhall, & West 1997) and some forms of parent involvement are more associated with children's performance than others (D'Agostino, Wong, Hedges, & Borman 1998).

Programs that enhance connections between the home and school and increase parent involvement with their children's education at school and home benefit both children and schools (Pianta & Walsh 1996; Ramey & Ramey 1994). Schools can provide opportunities for parents and children that facilitate positive relationships among children, families, teachers, and peers before and during the transition to kindergarten (Henderson 1987; Pianta & Walsh 1996). Transition activities that prepare both children and parents for the environmental and cultural differences that children will encounter in kindergarten include pre-enrollment orientation sessions for parents and their children, personal and written communications between the teachers and parents, and pre-enrollment home visits by teachers (Comer 1985; Love et al. 1992; Shore 1998). Once children are in school, schools can assure parents that they are welcome in their children's schools with invitations for families to attend school open houses, special events, and opportunities for parents to become involved in the school and classroom as volunteers. Other school-initiated transition-to-school activities to ease children's transition to kindergarten include having preschool children spend some time in the kindergarten classroom and shortening the school days at the beginning of the kindergarten year.

Information on the extent to which transition-to-kindergarten activities occur nationally is limited (e.g., Pianta et al. 1999; Love et al. 1992). In addition, not much is known about the association of such activities with parent involvement during the kindergarten year. This report first examines the degree to which transition-to-kindergarten activities offered by teachers or their schools are associated with various school characteristics. The school

characteristics of interest include school sector, race/ethnic diversity of the school, the prevalence of English language learners (ELLs) and the level of school poverty (i.e., the proportion of free/reduced lunch eligible students in the school). Secondly, the report looks at the relationship between the use of transition activities and parent involvement.

Research Questions

Specific research questions addressed by this paper include:

1. What types of transition-to-kindergarten activities do kindergarten teachers or their schools practice?
2. Does the use of various kindergarten transition activities differ by school characteristics?
3. Does the level of parent involvement in the kindergarten year differ by school characteristics?
4. What is the relationship between the use of transition-to-kindergarten activities and the level of parent involvement during kindergarten?

Data Source

Information on the types of transition-to-kindergarten activities practiced by kindergarten teachers or their schools is from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). All kindergarten teachers in the sampled schools were asked to participate in the study in the 1998-1999 school year, even if they did not have any children in their classrooms that were involved in the study. The sample for this report includes 2,826 public school and 417 private school kindergarten teachers for a total sample of 3,243 kindergarten teachers teaching full- or part-day kindergarten programs. In the spring of 1999, school administrators completed a self-administered questionnaire that collected information about their professional backgrounds and the characteristics of their schools. When appropriately weighted, the teacher sample is representative of about 190,200 kindergarten teachers in about 72,300 schools during the 1998-99 school year.

Data in this report are from the 1998 Fall and the 1999 Spring ECLS-K teacher questionnaires and the 1999 Spring school administrator questionnaire. All differences cited in this report are statistically significant at the .05 level with Bonferroni adjustment for multiple comparisons. The standard errors are reported in each of the tables.

Findings/Results

What types of transition-to-kindergarten activities do kindergarten teachers or their schools practice?

Kindergarten teachers were asked to identify whether they or their schools practiced any of six types of transition activities listed in the questionnaire. Activities included those held before children enrolled in kindergarten and those held after entry into kindergarten, such as:

- phoning or sending home information about the kindergarten program,
- preschoolers spending some time in the kindergarten classroom,

- parents and children visiting kindergarten prior to start of the school year,
- parents coming to an orientation before the kindergarten year,
- shortening the school days at the beginning of the kindergarten year, and
- teachers visiting the children's homes at the beginning of the kindergarten year.

In general, the teachers on average reported using about three of the six transition activities (table 1). The most common practices used by teachers to ease children's transition to kindergarten were phoning and sending information home about the kindergarten program, inviting parents and children to visit the kindergarten classroom prior to the start of the school year, and inviting parents to attend a pre-enrollment orientation. The least common activities that teachers reported that they or their schools practiced were the shortening of the school days at the start of the school year and home visitations by teachers at the beginning of the school year (figure 1, table 2).

Does the use of various transition-to-kindergarten activities differ by school characteristics?

The number and type of activities used to smooth children's entry into kindergarten differed by school characteristics. The mean number of activities practiced was associated with the characteristics of the school (table 1). Teachers in schools with low proportions of at-risk children reported using more activities compared with teachers in schools with higher proportions of at-risk children. For example, teachers in schools with less than 10 percent minority enrollments reported using the most transition activities (3.5) and those with 50 percent or higher minority enrollments used the fewest (2.6) activities. In addition, teachers in schools where less than 10 percent of the school population were English language learners (ELLs) reported using more transition activities than teachers in schools where 25 percent or more of the student population was ELL (3.2 activities vs. 2.2 to 2.6 activities).

The use of various transition activities was associated with characteristics of the school's student population. In general, significantly more teachers in schools with low proportions of children at-risk for academic problems reported using specific types of transition activities (table 2). For example, the majority (90 percent) of teachers in schools with less than 10 percent ELL enrollment reported phoning or sending home information about the kindergarten program compared with 76 percent of teachers in schools where 50 percent or more of the school's children were ELLs (figure 2). Significantly more teachers in schools with low proportions of minority enrollments and ELLs used activities to establish relationships between parents and teachers and between teachers and children early such as pre-enrollment visits for parents and children, preschoolers spending time in the kindergarten classroom, and parent orientations (figure 3).

Although less than half of all the teachers reported having preschoolers spend some time in the kindergarten classroom before entering kindergarten, more teachers in schools with low proportions of minority enrollments (less than 10 percent) used this strategy compared with teachers in schools with 25 percent or higher minority enrollments. The proportion of teachers reporting that they or their schools used transition activities was also related to school sector. Significantly higher proportions of teachers in Catholic schools reported telephoning or sending home information, hosting pre-enrollment visits by parents

and children, and shortening school days at the start of the kindergarten year compared with the proportions of teachers in public and other private schools.

Does the level of parent involvement during the kindergarten year differ by school characteristics?

The literature on early childhood education and development recommends frequent teacher-parent contact and opportunities for parents to participate with their children in the classroom. Kindergarten teachers in the ECLS-K study were asked to indicate the percent of children in their classes whose parents participated in school sponsored activities. The activities included teacher-parent conferences, school open houses or classroom parties, and art or music events or demonstrations. In addition, teachers were asked about the percent of children whose parents volunteered regularly in the classroom or school. The teachers rated the proportion of parents participating during the kindergarten year for each activity using a scale from 1 (no parents participating) to 5 (76 to 100 percent of parents participating) (table 3). For this study, the scale values were recoded to equal the midpoint of the range of percents in a particular category. For example, the scale value of "2" (1-25 percent of parents participating) was converted to a value of 13. This approach allows for a more meaningful interpretation of the level of parent involvement.

The levels of parent participation in a school-related activity was associated with the proportions of children in the school who are from lower-income families, are ELL, are minorities and attend public schools (table 4). Teachers working in schools with lower proportions of children eligible for free- or reduced-priced lunch[1] reported greater parent attendance at conferences, open houses, and art/music events (figure 4). In schools with 50 percent or higher of the children from low-income households, less than two-thirds of parents attended parent conferences, and less than one-half attended school open houses or art/music events and demonstrations. Similar patterns were found when parent attendance was examined in terms of the proportion of minority students in the school. With the exception of attendance at art/music events, the proportion of ELLs in the school was not significantly related to parent attendance. Over half of parents in schools with less than 10 percent ELL children attended such events compared with around 40 percent of parents in schools with higher ELL concentrations. Lastly, teachers working in Catholic schools reported the highest parent attendance in teacher-parent conferences and attendance at open houses and art/music events was higher in private schools than in public schools.

The proportion of parents volunteering regularly in the classroom or school was associated with the proportion of children eligible for free- or reduced-priced lunch (figure 4). As the proportion of children from low-income households in the school increased, the proportion of parent volunteers decreased. In addition, teachers working in schools with more than 25 percent minority enrollments reported lower percentages of parents volunteering during the kindergarten year. In schools with the lowest proportion of ELLs, about one-quarter of parents volunteered regularly compared with about 16 percent of parents in schools with higher proportions of ELLs. Regular parent volunteers were most

[1] The percent free/reduced lunch eligible variable has an item-level missing value rate of 26 percent; thus results should be interpreted with caution.

prevalent in private schools, where over a third of parents regularly helped in the school compared with about a fifth of parents whose children attend public schools.

What is the relationship between the use of transition-to-kindergarten activities and the level of parent involvement during kindergarten?

Several of the transition-to-kindergarten activities examined in this report were associated with greater parental involvement during children's kindergarten year (table 5). Teachers who reported that they or their school telephoned or sent home information about the kindergarten program indicated that a larger proportion of the children in their classrooms had parents who attended teacher-parent conferences, open houses or parties, and art/music events, and volunteered regularly in the classroom or school. The same pattern of parent involvement was found for teachers whose schools hosted pre-enrollment visits for parents and children, parent orientations, and had preschoolers spend some time in the kindergarten classroom (table 5).

Two transition activities that occur at the start of the school year were significantly associated with the level of parent involvement for some activities but not for all of them. Teachers who stated that they or another teacher visited the kindergartners' homes at the beginning of the year reported that parent attendance at music/art events and demonstrations was higher than in schools where the practice did not occur. Shortening the school day at the start of the year was associated with a higher level of regular parent volunteers in the classroom. These findings may be confounded with school sector, since both of these transition practices occurred more often in private schools than in public schools. Moreover, a minority of kindergarten teachers practiced these two activities.

Conclusions/Educational Implications

Transition is more than a one-time event. It takes time, preparation, and planning. All schools can help make each child's transition into kindergarten more successful by providing support before, during and after entry into kindergarten.

The findings describe the typical experience of children and families making the transition to kindergarten. The experience involves the use of a few practices such as the receipt of telephone calls or information about the kindergarten program, pre-enrollment visits by parents and children to the kindergarten classroom, and parent orientations. The number and types of activities practiced by the teachers and their schools varied according to the characteristics of the school. Teachers in schools with high proportions of children at-risk for academic problems reported using few of the practices and using practices that can be characterized as low intensity, group-oriented activities.

In general, the analyses of the relationship between the transition-to-school practices and level of parent involvement showed a positive association between transition practices and parent involvement in school-related activities during the school year. The significance of the relationship of transition-to-school practices with the levels of parent involvement in school-sponsored activities cannot be underrated.

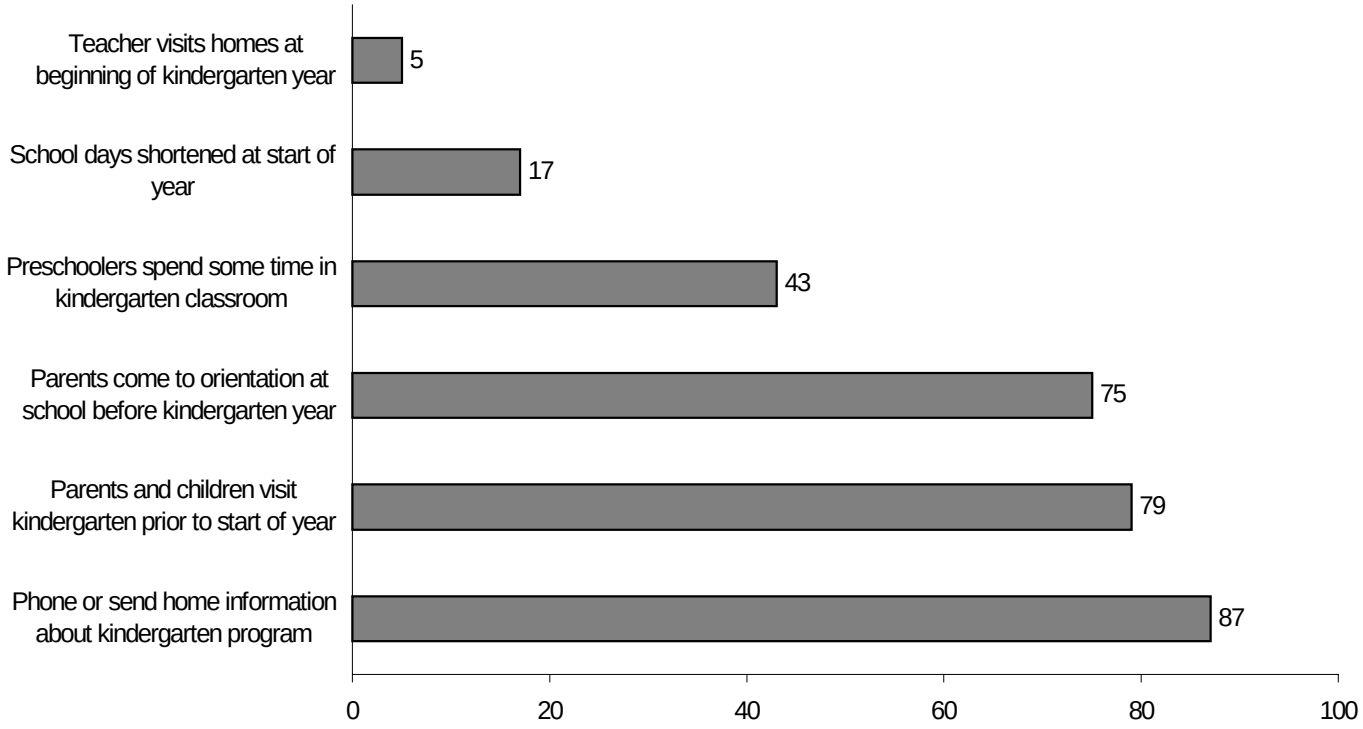
Table 1. – Mean number of transition-to-kindergarten activities used, by school characteristics: Kindergarten Year 1998-1999

Characteristic	Mean number of transition activities used	s.e.
All kindergarten teachers	3.0	.04
Percent ELL in school		
less than 10%	3.2	.05
10-24%	2.9	.12
25-49%	2.6	.14
50% or more	2.2	.18
Percent minority in school		
less than 10%	3.5	.06
10-24%	3.2	.08
25-49%	3.0	.12
50% or more	2.6	.07
Percent free/reduced lunch in school*		
less than 10%	3.2	.13
10-24%	3.2	.08
25-49%	3.2	.08
50% or more	2.9	.08
School sector		
Public	3.1	.05
Catholic	3.5	.11
Other private	3.1	.14

* This variable has an item-level missing value rate of 26 percent; thus results should be interpreted with caution.

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999: Base-year Public-use Data Files. U.S. Department of Education, National Center for Education Statistics.

Figure 1. – Percentage of kindergarten teachers reporting various transition-to-kindergarten activities: Kindergarten Year 1998-1999



Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999: Base Year Public-use Data Files. U.S. Department of Education, National Center for Education Statistics.

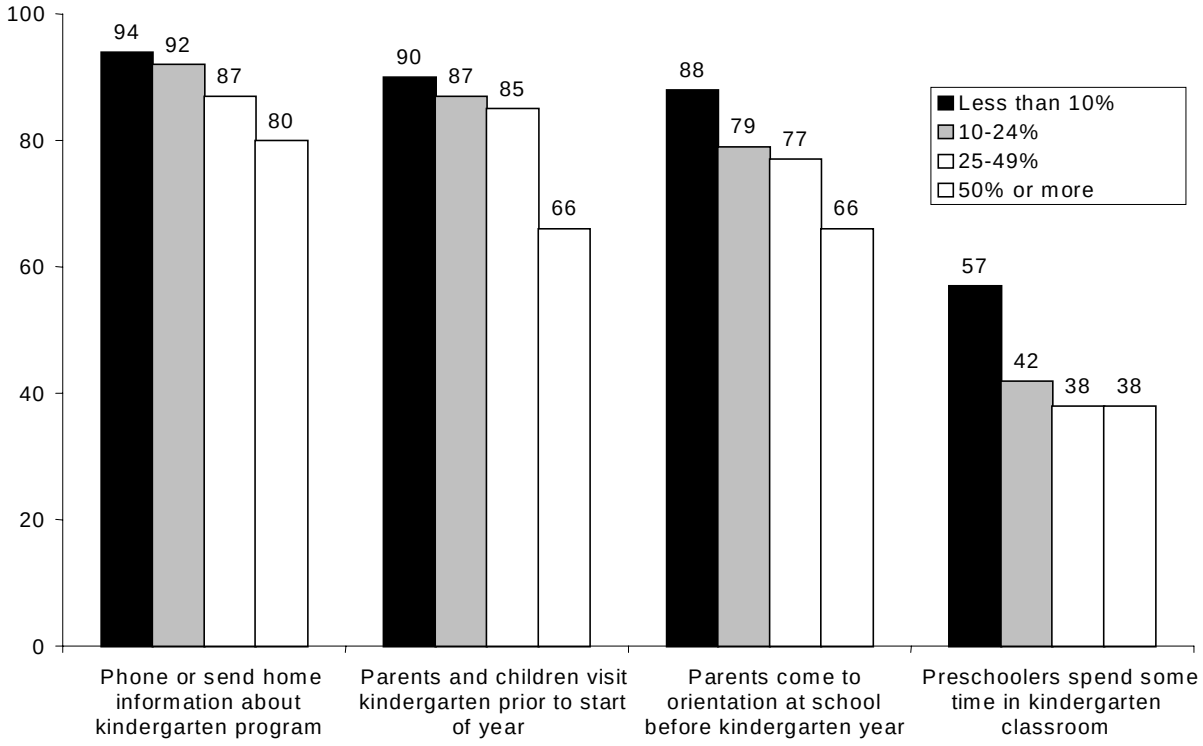
Table 2. – Percentage of kindergarten teachers reporting that various transition activities are held at the start of the school year for incoming kindergartners: Kindergarten Year 1998-1999

Characteristic	Phone or send home information about kindergarten program	s.e.	Parents and children visit kindergarten prior to start of year	s.e.	Parents come to orientation at school before kindergarten year	s.e.	Preschoolers spend some time in kindergarten classroom	s.e.	School days shortened at start of year	s.e.	Teacher visits homes at beginning of kindergarten year	s.e.
All kindergarten teachers	87	1.0	79	1.4	75	1.7	43	1.6	17	1.7	5	0.8
Percent ELL in school												
less than 10%	90	1.1	84	1.4	80	2.0	47	2.1	18	2.1	6	1.0
10-24%	84	3.2	81	4.0	73	4.4	32	4.5	16	5.5	6	3.7
25-49%	82	2.9	69	5.6	69	5.5	37	5.5	5	3.0	4	1.9
50% or more	76	4.4	45	7.1	58	8.9	38	6.1	8	4.4	1	1.0
Percent minority in school												
less than 10%	94	1.2	90	2.3	88	2.2	57	3.1	20	2.6	7	1.8
10-24%	92	2.0	87	2.1	79	3.2	42	5.1	19	3.9	5	2.2
25-49%	87	2.2	85	2.7	77	3.8	38	4.4	13	2.4	5	1.9
50% or more	80	1.8	66	3.1	66	3.6	38	2.8	15	2.8	4	1.0
Percent free/reduced lunch in school*												
less than 10%	91	1.9	87	2.1	77	4.0	46	4.1	21	3.3	7	2.0
10-24%	93	1.3	85	2.7	82	3.4	43	3.9	17	4.3	3	1.5
25-49%	89	1.9	88	2.0	84	2.7	51	4.5	10	2.2	5	2.5
50% or more	85	1.8	74	3.3	73	3.3	40	2.9	17	3.4	6	2.0
School sector												
Public	89	1.1	80	1.8	79	2.0	44	2.1	15	2.0	4	1.1
Catholic	95	1.7	90	2.5	80	4.5	51	4.1	40	5.7	4	3.3
Other private	84	3.2	87	2.5	70	4.6	50	4.5	16	3.8	12	2.7

* This variable has an item-level missing value rate of 26 percent; thus results should be interpreted with caution.

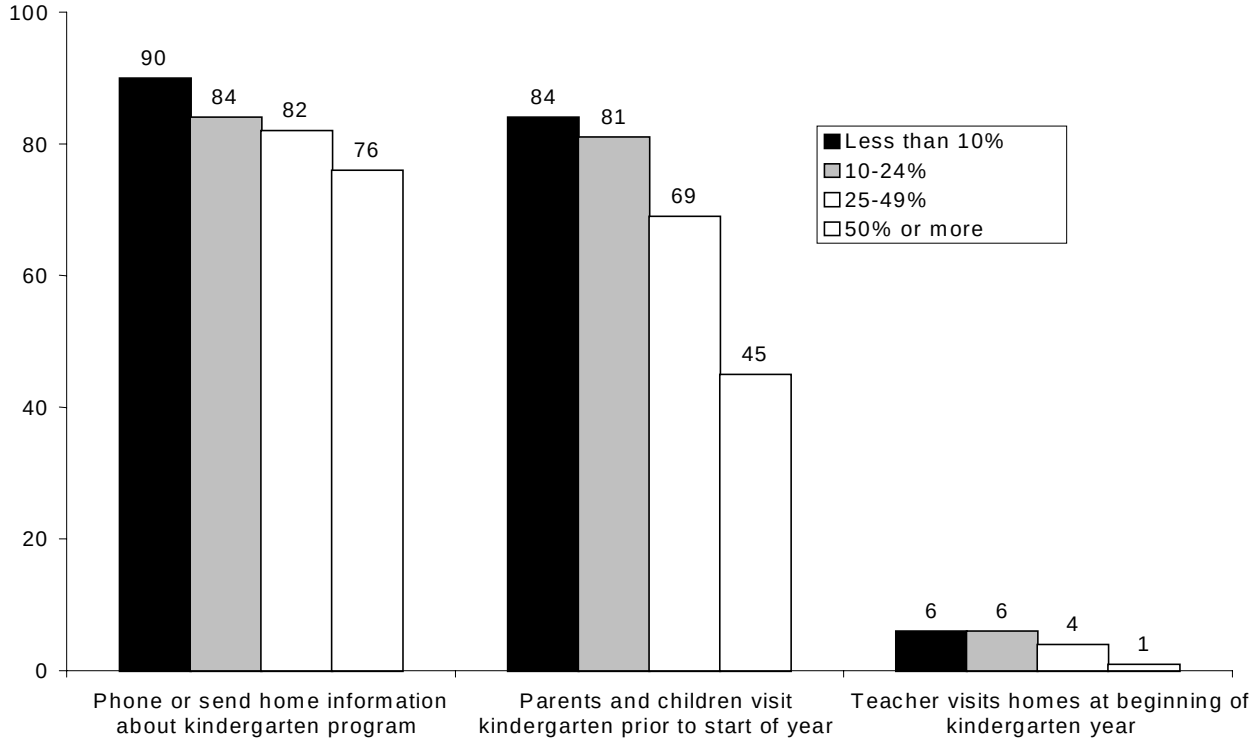
Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999: Base-year Public-use Data Files. U.S. Department of Education, National Center for Education Statistics.

Figure 2. – Percentage of kindergarten teachers reporting various transition-to-kindergarten activities, by percent of minority children in the school: Kindergarten Year 1998-1999



Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999: Base Year Public-use Data Files. U.S. Department of Education, National Center for Education Statistics.

Figure 3. – Percentage of kindergarten teachers reporting various transition-to-kindergarten activities, by percent of English language learners (ELLs) in the school: Kindergarten Year 1998-1999.



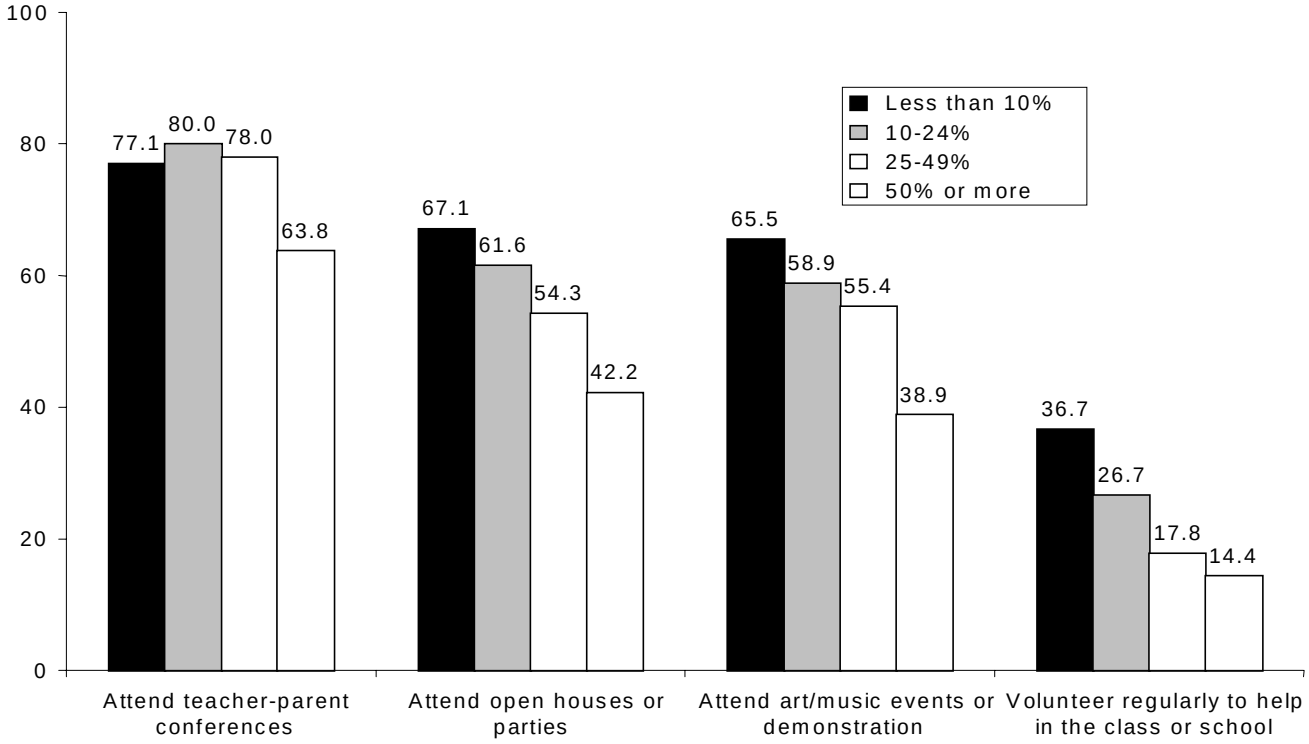
Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999: Base Year Public-use Data Files. U.S. Department of Education, National Center for Education Statistics.

Table 3 – Distribution of parental participation during the kindergarten year: Spring 1999

	Percent of parents participating during the kindergarten year									
Activity	None	s.e.	1-25%	s.e.	26-50%	s.e.	51-75%	s.e.	76% or more	s.e.
Attend teacher-parent conferences	1	0.2	8	0.8	10	0.9	15	0.9	66	1.5
Volunteer regularly to help in the classroom or school	13	1.0	59	1.1	14	0.8	8	0.5	6	0.6
Attend open houses or parties	1	0.1	22	1.1	23	0.9	24	1.0	31	1.2
Attend art/music events or demonstration	7	0.7	22	1.1	19	0.8	20	1.0	33	1.4

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999: Base-year Public-use Data Files. U.S. Department of Education, National Center for Education Statistics.

Figure 4. – Average percentage of parents participating in various activities during the kindergarten year, by the percent of children in the school eligible for free or reduced lunch*: Spring 1999



* This variable has an item-level missing value rate of 26 percent; thus results should be interpreted with caution.

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999: Base Year Public-use Data Files. U.S. Department of Education, National Center for Education Statistics.

Table 4 – Average percentage of parents participating in various activities during the kindergarten year, by various school characteristics: Spring 1999

Characteristic	Attend teacher-parent conferences	s.e.	Attend open houses or parties	s.e.	Attend art/music events or demonstration	s.e.	Volunteer regularly to help in the class or school	s.e.
All kindergarten teachers	72.4	0.87	53.6	0.79	50.9	0.99	23.2	0.56
Percent ELL in school								
less than 10%	73.0	1.10	55.4	1.05	54.8	1.11	25.4	0.75
10-24%	76.3	1.77	49.3	3.87	41.5	3.86	17.6	1.26
25-49%	70.1	2.53	45.4	2.44	37.5	2.97	15.4	1.11
50% or more	77.3	2.49	50.3	3.13	36.3	2.73	16.3	1.85
Percent minority in school								
less than 10%	78.2	2.12	63.9	1.82	64.3	1.95	29.7	1.52
10-24%	78.0	1.62	56.5	1.95	58.0	2.17	27.4	1.50
25-49%	73.7	1.70	52.0	2.43	47.5	2.02	21.3	1.57
50% or more	64.3	1.73	42.9	1.43	36.3	1.59	16.0	0.91
Percent free/reduced lunch in school*								
less than 10%	77.1	1.96	67.1	2.37	65.5	2.49	36.7	2.16
10-24%	80.0	2.04	61.6	2.41	58.9	3.29	26.7	1.66
25-49%	78.0	1.17	54.3	2.23	55.4	2.56	17.8	0.86
50% or more	63.8	1.74	42.2	1.31	38.9	1.59	14.4	0.72
School sector								
Public	72.1	1.04	51.5	0.99	48.2	1.21	20.3	0.55
Catholic	82.7	1.85	66.1	2.24	71.3	2.30	36.9	2.54
Other Private	74.7	2.23	62.9	2.47	63.2	2.64	36.0	2.60

* This variable has an item-level missing value rate of 26 percent; thus results should be interpreted with caution.

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999: Base-year Public-use Data Files. U.S. Department of Education, National Center for Education Statistics.

Table 5 – Average percent of parents participating in various activities, by transition-to-kindergarten activity: Kindergarten Year 1998-1999

Activity	Attend teacher-parent conferences	s.e.	Attend open houses or parties	s.e.	Attend art/music events or demonstration	s.e.	Volunteer regularly to help in the classroom or school	s.e.
Phone or send home information about kindergarten program								
YES	73.7	0.91	55.2	0.88	53.1	1.02	24.2	0.58
NO	64.5	2.11	43.6	2.02	38.5	2.60	17.4	1.96
Preschoolers spend some time in kindergarten classroom								
YES	75.6	0.95	57.3	1.23	56.5	1.48	25.4	0.93
NO	70.0	1.07	50.9	0.94	46.7	1.14	21.7	0.75
School days shortened at start of year								
YES	72.5	1.80	53.8	1.85	49.5	2.22	26.1	1.49
NO	72.5	0.91	53.6	0.86	51.3	1.05	22.7	0.60
Parents and children visit kindergarten prior to start of year								
YES	74.8	0.74	56.4	0.82	54.6	1.04	25.2	0.65
NO	63.4	2.02	43.4	1.52	37.5	1.49	15.4	0.84
Teacher visits homes at beginning of kindergarten year								
YES	73.8	3.64	58.7	4.07	62.3	3.00	29.4	3.47
NO	72.4	0.91	53.4	0.79	50.4	1.04	23.0	0.60
Parents come to orientation at school before kindergarten year								
YES	74.9	0.76	56.1	0.86	53.8	1.04	25.0	0.66
NO	65.3	1.85	46.1	1.54	42.6	1.61	17.7	1.20

Source: Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999: Base-year Public-use Data Files. U.S. Department of Education, National Center for Education Statistics.

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Is Time a Gift? Cognitive Performance of Kindergarten Children Who Repeat Kindergarten or Whose Entry is Delayed

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Background

Kindergartners are more sophisticated today, learning skills traditionally taught in first grade (Meisels, 1992; Shepard & Smith, 1988). While the kindergarten curriculum continues to escalate, policies and practices have emerged that are intended to increase children's chances for school success by giving them more time to develop and mature (e.g., changing age of entry requirements, transitional grades, readiness testing). Two such practices are retaining children for a second year of kindergarten and delaying the start of their first year of kindergarten.

These practices are grounded in the belief that time will allow children to be better prepared for school academically and socially. If kindergarten children do not achieve the knowledge, skills and social maturity deemed necessary for first grade, attending a second year of kindergarten will allow them the time to gain these skills - in hopes that retaining them now will prevent later school failure without negative social consequences (Dennebaum & Kulberg, 1994). Some parents, rather than enter their children in kindergarten when they are age-eligible, choose to delay their entry so that they will be ready for the kindergarten curriculum or have an advantage over their on-time younger classmates (Meisels, 1992; Shepard & Smith, 1988).

Retaining children for a second year of kindergarten may have short-term benefits. In their second year of kindergarten, children demonstrate higher reading and mathematics skills as compared to their first year in kindergarten (Butler & Handle, 1990) and to similar ability peers who are promoted (Mantzicopoulos, 1997; Mantzicopoulos & Morrison, 1992; Peterson et al., 1987). Similarly, early retention in grades one through three appears to help close the gap between children who repeat a grade and their classmates when demographic characteristics (e.g., age, mother's education) are considered (Alexander et al., 1994). The benefits of repeating a grade, however, appear to dissipate as children proceed through school. Children who are retained perform no differently or worse than their classmates in the years after retention (Butler & Handle, 1990; Dennenbaum & Kulberg, 1994; Graue & DiPerna, 2000; Mantzicopoulos & Morrison, 1992; Shepard, 1989).

Children whose entry is delayed a year may have a minimal advantage over their classmates early on. They are less likely to receive negative teacher feedback and less likely to be identified as not learning up to their capabilities or as having problems concentrating (Zill et al., 1997). However, actual cognitive performance in later elementary school may not differ between children whose entry is delayed and their classmates who enter on time (Cameron & Wilson, 1990; Graue & DiPerna, 2000) or those who repeat kindergarten when intelligence is considered (Kundert et al., 1995).

Research Questions

The kindergarten population

- What are the characteristics of children who repeat kindergarten, whose entry is delayed and who enter "on time" (that is, when age-eligible)?

Overall cognitive performance

- As they begin the school year, do children's overall reading and mathematics knowledge and skills differ by their enrollment status (i.e., on-time, repeating, delayed)?
- Are there differences in the acquisition of cognitive knowledge and skills across the kindergarten year by children's enrollment status?
- Does the relationship between children's enrollment status and their cognitive performance differ for groups of children with a higher incidence of retention and delayed entry?

Specific knowledge and skills

- As they begin the school year, do children's specific reading and mathematics knowledge and skills differ by their enrollment status?
- Are there differences in the acquisition of specific knowledge and skills across the year by children's enrollment status?
- Does the relationship between children's enrollment status and their specific knowledge and skills differ for groups of children with a higher incidence of retention and delayed entry?

The Study

Information on children's reading and mathematics knowledge and skills and their enrollment status comes from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS–K).

In the fall of 1998, the U. S. Department of Education's National Center for Education Statistics (NCES) embarked on a study of the early education of young children. The ECLS–K captures information on these children, their families, teachers and schools. The design is guided by an ecological systems perspective, in which the child's physical, cognitive and socio-emotional development is considered across multiple contexts, including the home, classroom, school and community.

Across the life of the study, children's reading and mathematics knowledge and skills are assessed 6 times: fall and spring kindergarten, fall and spring first grade, spring third grade, and spring fifth grade.

The Sample

This research presents information on children who are part of a nationally representative sample of approximately 22,000 children enrolled in about 1,000 kindergarten programs during the 1998-99 school year.

This research looks at the 16,314 children who completed the ECLS-K English cognitive battery in the both the fall and spring. When appropriately weighted, the sample is representative of the approximately 3,600,000 children enrolled in kindergarten in the fall of 1998. Based on parent reports, 5 percent of these children are repeating kindergarten; 7 percent of the kindergartners' entry was delayed a year; and 87 percent of kindergartners entered when age-eligible.

For details on the population of these children by child and family characteristics, see table 1.

Table 1. Percentage distribution of kindergartners, by child and family characteristics, by enrollment status: Fall 1998

Characteristics	Total	On-time Entry	Repeating	Delayed Entry
Child's sex				
Male	51	50	65	62
Female	49	50	35	38
Developmental difficulty				
Yes	15	14	30	19
No	85	86	70	81
Family socioeconomic status				
Bottom 20 percent	17	16	29	13
Middle 60 percent	62	62	57	62
Top 20 percent	21	21	14	25

Note: Estimates are based on kindergartners who were assessed in English.
Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, fall 1998 and spring 1999, Public-Use Base Year file.

Procedures

Children's reading and mathematics knowledge and skills were assessed in the fall and spring of the kindergarten year. The children were administered one-on-one assessments in their school. Trained assessors worked with the children in a quiet area with minimal distractions (e.g., in the school library as opposed to the classroom)[1].

During the fall of 1998, a computer-assisted telephone interview was used to ask parents questions about their family and their children's development.

[1] Procedures were developed to increase the participation of children with language problems and special needs (e.g., untimed assessment, allowing a child's assistant to be present). However, the ECLS–K cognitive assessment was designed to be administered in English. If the children's English skills were not adequate, they did not receive the ECLS–K's English cognitive assessment. If a child's home had a language other than English, children's English skills were determined through a language proficiency screener - the Oral Language Development Scale (OLDS) from the PreLAS 2000 (Duncan & DeAvila, 1998). Based on the English demands of the ECLS–K assessment and children's score on the OLDS, 7 percent of children were excluded from the English cognitive battery.

Measures

Child and family characteristics

Children's enrollment status was determined from two parent questionnaire items – (a) year of kindergarten attendance (e.g., first, second) and (b) timing of school entry (e.g., waited, when old enough). If the parent reported that this was the child's second or greater year of kindergarten, the child was defined as repeating kindergarten. If the parent reported that this was their child's first year of kindergarten, the timing question was examined. For these first-time kindergartners, if parents reported waiting to enroll their child even though they were age-eligible one year prior, the child was defined as delayed entry; if parents reported enrolling their child when old enough, the child was defined as on-time.

Family socioeconomic status (SES) was computed at the household level for the set of parents who completed the parent interview in the fall or spring. The SES variable reflects the socioeconomic status of the household at the time of data collection for spring-kindergarten (Spring 1999). The components used for the creation the SES were: father's education, mother's education, father's occupation, mother's occupation, and household income. SES is the average of the non-missing components, expressed as z-scores.

The presence of a developmental difficulty was ascertained from the children's parents. Children were considered to have a developmental difficulty if they (a) had received services or been in a program for children with disabilities or (b) had received a diagnosis for at least one of the following concerns: ability to pay attention, activity level, use of limbs, ability to communicate, difficulty hearing and understanding speech or difficulty seeing.

Child cognitive development

Children's cognitive development (reading and mathematics) was assessed directly in a one-on-one, untimed assessment. The cognitive battery used a two-stage approach. For each domain, the child was administered a routing test (the first stage), which determined a child's approximate skill level. After completing the routing test, the child was administered the appropriate skill level assessment for that domain (the second stage). For both reading and mathematics there were three level tests (low, middle, high).

Scores for each domain were developed using Item Response Theory (IRT). These scores can be compared regardless of which second stage form a student was administered. In both reading and mathematics, children have an overall scale score (one score reflecting performance in the entire domain) and five proficiency level probability scores (five separate scores referring to specific skills). The present research examines the first three proficiency levels, which cover skills that are typically part of the kindergarten curriculum.

Reading Proficiencies

- **Letter Recognition:** identifying upper and lower case letters by name
- **Beginning Sounds:** associating letters with sounds at the beginning of words
- **Ending Sounds:** associating letters with sounds at the ending of words

Mathematics Proficiencies

- **Numbers and Shapes:** identifying some one-digit numerals, recognizing geometric shapes, and one-to-one counting of up to ten objects
- **Relative Size:** reading all single-digit numerals, counting beyond ten, recognizing a sequence of patterns, and using nonstandard units of length to compare objects
- **Ordinality:** reading two-digit numerals, recognizing the next number in a sequence, identifying the ordinal position of an object, and solving simple word problems

Results

(all results are significant at the .05 level, unless otherwise indicated)

The kindergarten population

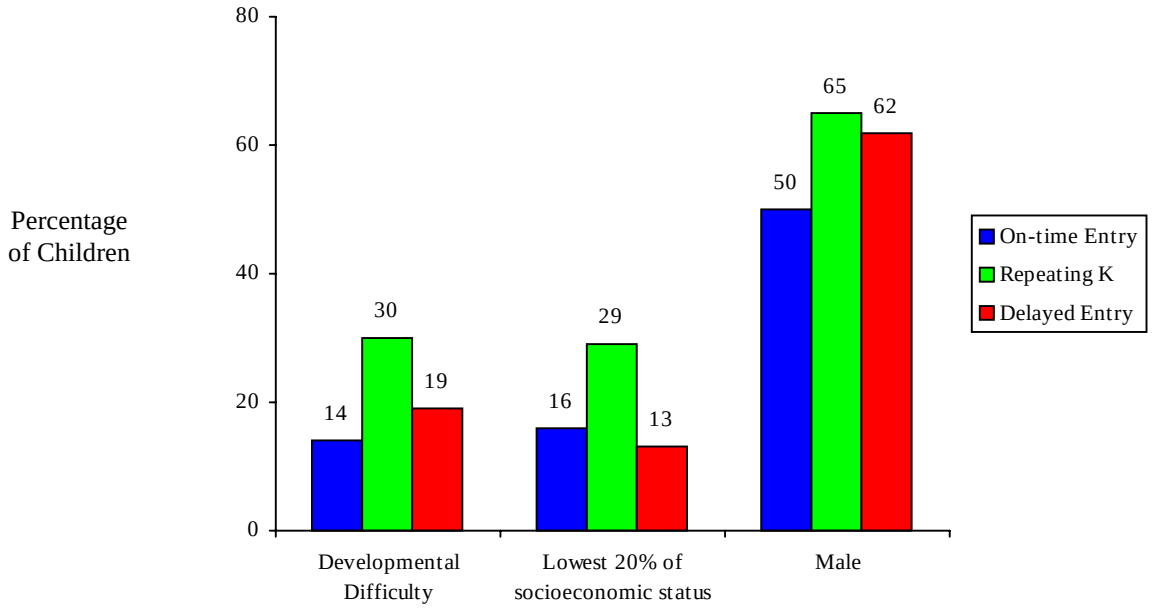
What are the characteristics of children who repeat kindergarten, whose entry is delayed and who enter "on time" (that is, when age-eligible)?

Kindergartners come from diverse backgrounds, but children who repeat kindergarten or whose entry is delayed are likely to have different characteristics than children who enter on time (figure 1 and table 1).

- Children who repeat kindergarten are more likely to come from a lower socioeconomic family than children whose entry is delayed or who enter on time.

- Children who repeat kindergarten or whose entry is delayed are more likely to be male and to have a developmental difficulty (e.g., attention problems) compared to children who enter for the first time, on time.

Figure 1. Percentage of kindergartners who have a developmental difficulty, are male or are from a lower socioeconomic status background, by enrollment status: Fall 1998.



Note: Estimates are based on kindergartners who were assessed in English.
Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, fall 1998 and spring 1999, Public-Use Base Year file.

Results

(all results are significant at the .05 level, unless otherwise indicated)

Overall cognitive performance

As they begin the school year, do children's overall reading and mathematics knowledge and skills differ by their enrollment status (i.e., repeating, delayed, on-time)?

- In the fall, children demonstrate similar overall reading and mathematics knowledge and skills, regardless of their enrollment status. Cognitive performance varies by less than one-third of a standard deviation[2] (table 2 and 3).

Are there differences in the acquisition of cognitive knowledge and skills across the kindergarten year by children's enrollment status?

- Across the school year, children who repeat kindergarten, whose entry is delayed and who enter on time gain reading and mathematics knowledge and skills at similar rates. While all three groups demonstrate similar gains, kindergartners whose entry is delayed exit kindergarten with slightly higher mathematics knowledge and skills (one-third of a standard deviation) than children who repeat kindergarten.

Does the relationship between children's enrollment status and their cognitive performance differ for children with a higher incidence of retention and delayed entry?

- As noted above, for the most part we see no differences (i.e., no difference is greater than one-third of a standard deviation) between children who repeat kindergarten, whose entry is delayed or who enter on time. One exception is spring mathematics performance, where children whose entry is delayed exit with higher skills than children who repeat kindergarten. The same pattern exists when we look at that relationship within gender. For example, males who repeat kindergarten perform the same as males whose entry is delayed and males who enter on time in all areas except for spring mathematics. When we look at the relationship within other groups (i.e., developmental difficulty, SES), no differences exist in overall cognitive performance in the fall or spring (table 2 and 3).

[2] Standard deviations for kindergarten reading scale scores are as follows: fall = 8, spring = 10. Standard deviations for kindergarten mathematics scale scores are as follows: fall = 7, spring = 9.

Table 2. Mean reading scale scores of kindergartners, by child and family characteristics, by enrollment status: Fall 1998 and Spring 1999

	On-time Entry			Repeating			Delayed Entry		
Characteristics	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change
Total	22	32	10	23	31	8	23	33	10
Child's sex									
Male	21	31	10	22	30	8	23	32	9
Female	23	33	10	25	33	8	23	33	10
Developmental difficulty									
Yes	20	29	9	22	28	7	22	30	8
No	22	33	10	24	32	8	24	33	10
Family socioeconomic status									
Bottom 20 percent	17	26	9	19	26	7	18	27	9
Middle 60 percent	22	32	10	23	31	8	22	32	9
Top 20 percent	27	38	11	32	41	9	28	38	10

Note: Estimates are based on kindergartners who were assessed in English. Change scores were computed for each child and then averaged. Due to rounding the difference between Fall and Spring means does not necessarily equal Change means.
Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, fall 1998 and spring 1999, Public-Use Base Year file.

Table 3. Mean mathematics scale scores of kindergartners, by child and family characteristics, by enrollment status: Fall 1998 and Spring 1999

	On-time Entry			Repeating			Delayed Entry		
Characteristics	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change
Total	20	28	8	20	27	7	22	30	8
Child's sex									
Male	19	28	8	20	27	7	22	30	8
Female	21	29	8	20	27	7	20	28	8
Developmental difficulty									
Yes	18	26	8	19	25	6	20	28	8
No	20	28	8	21	28	7	22	30	8
Family socioeconomic status									
Bottom 20 percent	15	22	7	16	23	6	16	23	8
Middle 60 percent	19	27	8	20	27	7	21	29	8
Top 20 percent	24	33	9	27	36	8	26	34	8

Note: Estimates are based on kindergartners who were assessed in English. Change scores were computed for each child and then averaged. Due to rounding the difference between Fall and Spring means does not necessarily equal Change means.
Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, fall 1998 and spring 1999, Public-Use Base Year file.

Results

(all results are significant at the .05 level, unless otherwise indicated)

Specific knowledge and skills

As they begin the school year, do children's specific knowledge and skills differ by their enrollment status?

- Children who repeat kindergarten and whose entry is delayed begin the school year with similar reading skills (i.e., letter recognition, understanding of the letter-sound relationship at the beginning and ending of words) as children who enter on time (table 4).

- Nearly all children begin the year able to recognize their numbers and shapes (92 to 95 percent). Consequently, we do not examine children's acquisition of this skill by enrollment status (table 5). For other mathematics skills we see a different pattern from the one we see for reading. Children whose entry is delayed demonstrate higher proficiency in relative size and ordinality than children who enter on time and children who repeat kindergarten.

Are there differences in the acquisition of specific knowledge and skills across the year by children's enrollment status?

- Children who enter on time and children whose entry is delayed acquire understanding of the letter-sound relationship at the beginning and ending of words at higher rates than children who repeat kindergarten.

- Children who enter on time acquire skills related to relative size at a slightly higher rate than children whose entry is delayed and who repeat kindergarten. This is interesting because the pattern of difference by enrollment status changes from fall to spring. By the end of the school year, on-time kindergartners narrow the gap with children whose entry is delayed (figure 2 and table 5).

- For the mathematical skill of ordinality, children who enter on time make similar gains as children whose entry is delayed but greater gains than children who repeat kindergarten.

Does the relationship between children's enrollment status and their specific knowledge and skills differ for children with a higher incidence of retention and delayed entry?

- Interesting patterns emerge when we examine the relationship between children's specific reading knowledge and skills and their enrollment status separately for groups of children defined by socioeconomic status and gender (table 4).

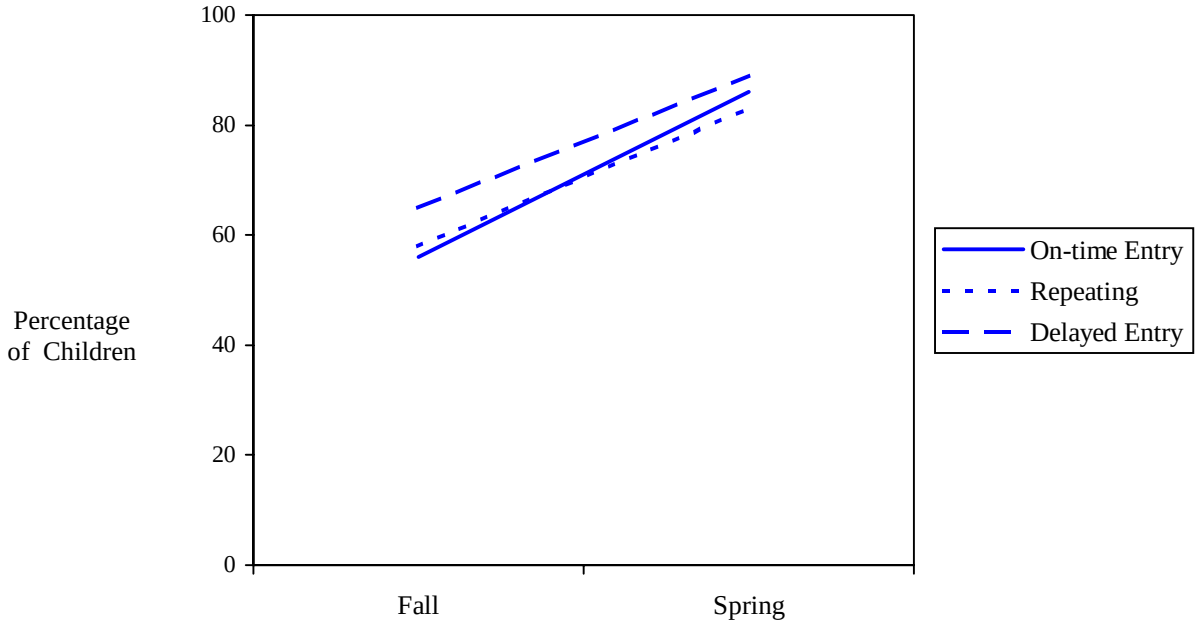
- Within the highest socioeconomic group (i.e., top 20 percent), children who repeat kindergarten start the year with higher proficiency than children who enter on time in understanding the letter-sound relationship at the beginning and ending of words. However, as found for all children, by the end of the kindergarten year children who enter on time from higher SES backgrounds close the gap on children who repeat kindergarten (i.e., spring proficiency is similar).

- For males, those whose entry is delayed begin the year with higher proficiency than children who enter on time in all three specific reading skills. But, like the general pattern, by the end of the year, boys whose entry is delayed perform similarly as boys who enter kindergarten on time.

- When we look at the relationship for children with developmental difficulties, no distinct, consistent patterns appear that are different from that noted above for specific reading knowledge and skills.

- When we look at the relationship between children's enrollment status and mathematics specific knowledge and skills for particular groups (e.g., males, development difficulty, lowest SES), no distinct, consistent patterns appear that are different from those noted above.

Figure 2. Percentage of kindergartners demonstrating proficiency of relative size, by enrollment status: Fall 1998 and Spring 1999.



Note: Estimates are based on kindergartners who were assessed in English.
Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, fall 1998 and spring 1999, Public-Use Base Year file.

Table 4. Percentage of kindergartners achieving specific reading knowledge and skills, by child and family characteristics, by enrollment status: Fall 1998 and Spring 1999

	Letter Recognition									Beginning sounds									Ending sounds								
	On-time Entry			Repeating			Delayed Entry			On-time Entry			Repeating			Delayed Entry			On-time Entry			Repeating			Delayed Entry		
Characteristics	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch
Total	65	94	29	68	91	23	68	93	25	29	72	43	33	66	32	33	72	39	16	52	35	19	47	28	20	54	34
Child's sex																											
Male	61	92	32	64	89	25	66	91	28	26	68	42	30	63	33	32	70	38	14	48	34	17	44	28	19	52	33
Female	69	95	26	74	94	21	71	96	24	32	76	43	40	72	31	36	76	40	18	56	37	24	53	29	21	57	36
Developmental difficulty																											
Yes	55	89	34	58	85	27	61	90	29	21	61	40	27	55	29	26	65	39	11	41	30	15	37	22	14	44	29
No	66	94	28	72	93	21	70	94	24	30	73	43	36	71	34	35	74	39	17	54	36	21	52	31	21	56	35
Family socioeconomic status																											
Bottom 20 percent	39	84	45	48	84	36	44	87	44	10	50	40	16	49	32	12	55	44	4	29	25	7	29	22	5	35	30
Middle 60 percent	64	94	30	72	92	20	67	93	26	27	72	45	33	69	36	29	70	41	14	51	37	17	49	32	16	51	35
Top 20 percent	85	99	14	89	99	10	84	97	13	50	87	36	69	89	20	54	86	32	32	70	38	50	78	28	36	70	34

Note: Estimates are based on kindergartners who were assessed in English. F=Fall; S=Spring; Ch=change. Change scores were computed for each child and then averaged. Due to rounding the difference between Fall and Spring means does not necessarily equal Change means.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, fall 1998 and spring 1999, Public-Use Base Year file.

Table 5. Percentage of kindergartners achieving specific mathematics knowledge and skills, by child and family characteristics, by enrollment status: Fall 1998 and Spring 1999

	Number and shape recognition									Relative size									Ordinality								
	On-time Entry			Repeating			Delayed Entry			On-time Entry			Repeating			Delayed Entry			On-time Entry			Repeating			Delayed Entry		
Characteristics	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch	F	S	Ch
Total	93	99	6	92	98	6	95	99	4	56	86	30	58	83	25	65	89	24	20	56	36	23	52	29	30	63	33
Child's sex																											
Male	92	99	7	92	98	6	95	99	4	55	86	31	57	83	26	65	89	23	21	55	35	22	52	30	32	64	33
Female	94	99	5	93	98	5	95	99	4	57	87	30	60	82	22	64	89	25	20	57	37	23	52	29	27	60	33
Developmental difficulty																											
Yes	89	98	9	89	97	8	94	97	3	46	80	34	50	76	26	60	83	24	15	46	32	17	42	25	23	54	32
No	94	99	6	94	99	5	95	100	5	58	88	30	62	86	24	66	90	24	21	58	36	25	56	31	32	65	33
Family socioeconomic status																											
Bottom 20 percent	83	97	14	86	98	11	85	99	14	31	71	40	40	72	32	34	76	41	6	31	26	9	32	22	8	37	29
Middle 60 percent	94	99	6	94	98	4	95	99	4	55	87	32	60	85	25	65	89	24	18	56	38	22	54	32	28	61	34
Top 20 percent	98	100	2	99	99	1	99	100	1	76	95	19	85	97	11	80	95	15	38	75	37	51	84	32	46	79	32

Note: Estimates are based on kindergartners who were assessed in English. F=Fall; S=Spring; Ch=change. Change scores were computed for each child and then averaged. Due to rounding the difference between Fall and Spring means does not necessarily equal Change means.
Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, fall 1998 and spring 1999, Public-Use Base Year file.

Summary

- According to this national study, 5 percent of children are retained in kindergarten and 7 percent experience a delayed entry. These figures are similar to previous retrospective national- (Zill et al., 1997) and state-level (Graue & DiPerna, 2000) accounts.

- As noted in previous research, children's enrollment status varies by child and family characteristics such as gender and socioeconomic status. We find that children who repeat kindergarten are more likely to be male, from lower socioeconomic backgrounds and to have a developmental difficulty than those who enter on time. Delaying children's entry has been noted to be a practice of more affluent families (e.g., Graue & DiPerna, 2000; Meisels, 1992). However, this research finds that children whose entry is delayed come from similar socioeconomic backgrounds as those who enter on time. This may be accounted for by our definition of socioeconomic status, which is more comprehensive than previous analyses.

- Children who repeat kindergarten, as a whole, begin their second year of kindergarten with cognitive knowledge and skills on par with their classmates who enter on time for the first time. Educational intervention, therefore, appears warranted. However, retention alone may not be the solution; for children who repeat kindergarten do not make the same gains in specific knowledge and skills as other children.

- Delaying children's entry may not provide the intended academic advantages. They begin school with similar overall cognitive knowledge and skills (i.e., reading and mathematics scale scores) as children who enter on time and children who repeat kindergarten. And in general, children whose entry is delayed gain overall cognitive knowledge and skills at a similar rate as other children. Across the school year, slight advantages exist in mathematics (less than half of a standard deviation) over children who repeat kindergarten.

- The relationship between children's enrollment status and their cognitive performance does not appear to differ for groups of children with a higher incidence of these two practices. One exception is socioeconomic status.

Implications

- Past work suggests that retaining children or holding them out a year does not produce lasting academic advantages, and the use of retention in particular may create potentially negative social consequences (e.g., Dennebaum & Kulberg, 1994; Shepard & Smith, 1988). This conclusion of no academic benefit is based on the interpretation of "no difference". It also depends on the group with which the child's performance is being compared and on the practice's intended purpose (e.g., delaying for advantage; retaining in order to allow the child to reach grade level).

- Similarity of performance (i.e., the existence of no difference) may be interpreted as a need for educational intervention for children whose entry is delayed or who repeat kindergarten. Their skills are similar to those of children who are developmentally a year younger. The finding that these children are achieving at grade level at the end of kindergarten (as compared to on-time classmates), albeit one year later, may support the effectiveness of these practices (Alexander et al., 1994).

- There remain many unknowns. How both of these groups of kindergartners are performing compared to their same-age peers who are now in first grade is unknown. Also we do not know their cognitive knowledge and skills one year earlier. Any change in their relative standing in grade (either kindergarten or first grade) as compared to their same-age peers is unknown. Compared to their same-grade peers, children who repeat kindergarten appear to begin to lose ground across the year (making fewer gains). And, children whose entry is delayed gain no advantage over their on-time classmates.

- Retention as a successful intervention is not a common conclusion in the research literature. These children do not make the same gains in specific cognitive skills during the year as younger first-time kindergartners. By the end of the year they are beginning to fall behind their other classmates in certain areas. Simply experiencing kindergarten a second time, therefore, does not appear to achieve the same rate of success. It should be noted that children who repeat kindergarten are twice as likely as children who enter on time to have a developmental difficulty. Following this, in cases where retention has led to higher achievement, children who repeat kindergarten attend schools that incorporate remediation through individualized education plans (Peterson et al., 1987). One alternative then could be to ensure the integration of children's diverse skills and needs into a curriculum geared toward the individual child (Bredekamp & Copple, 1997; Kagan, 1990; Shepard & Smith, 1986). Some suggest that promotion with remediation is a better solution (e.g., Peterson et al., 1987; Shepard, 1989).

- For children whose entry is delayed, we do not know what their skills were one year prior when they would have been age-eligible to begin school. One may need to consider the reasons for delaying a child, such as academic advantage or potential developmental difficulties. If the reason is the former, advantages do not seem to exist. In the latter case, children whose entry is delayed receive special education services at a higher rate than the general population (May et al., 1995). These developmental difficulties then may best be served by age-eligible entry and early service identification (May et al., 1995). In either example, one may question the practice of holding out as the best use of children's time.

Future Directions

- Previous research on small, local samples suggests that any minimal advantage older children have in the kindergarten year (either by repeating it or delaying entry) will dissipate in first grade and beyond (e.g., Graue & DiPerna, 2000; Mantzicopoulos & Morrison, 1992; Shepard, 1989). The longitudinal nature of the ECLS–K will provide a national picture of these children's development and educational experiences through fifth grade.

- We are still missing a national picture of children's cognitive performance for the year prior to their being retained. The ECLS–K will allow investigation of these first-time kindergartners (delayed and on-time entry) in the next school year (1999–2000). We can examine the cognitive development of children during their second year of kindergarten as compared to their first and as compared to their kindergarten classmates who are promoted to first grade.

- Previous work has suggested remediation to promote success for children who repeat kindergarten. The ECLS–K collects information on children's classrooms and schools from their teachers and school administrators. We can then examine longitudinally which classroom and school experiences appear most beneficial for children in general, as well as for children who repeat kindergarten or whose entry is delayed. For example, particular instructional practices may be better suited for one group than another.

- Another gap in the literature is a picture of the cognitive development and experiences of these children prior to school (most notably, for children whose entry is delayed). In the future such information will be available from the Early Childhood Longitudinal Study, Birth Cohort (ECLS–B), which will follow children's early experiences and development from birth through first grade.

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Kindergartners' Educational Progress in Reading: A Study of Language Minority and Non-Language Minority Children

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Background

Kindergarten represents a critical period in children's early school careers. It functions as an introduction to the entire elementary and secondary school experience. It is a time for establishing skills critical for success in school. Kindergartners in the 1990s are a very diverse group of children. They come from diverse backgrounds, racially, ethnically, socially, and economically. In 1997, 63 percent of the elementary and secondary enrollment was composed of White non-Hispanic students compared with 70 percent 11 years ago. From 1986 to 1997, the total minority enrollment rose from 30 percent to 36 percent of all students with the percentage of Hispanic students growing from 10 percent in 1986 to 14 percent in 1997 (Snyder 2000). Furthermore, a smaller percentage of children live in two parent families than was the case in the 1940s (Jones & Weinberg 2000). Today's kindergartners differ in the extent and types of early care and educational experiences that they have had prior to kindergarten (Zill et al. 1995).

Children enter school demonstrating a wide range of knowledge and skills (West, Denton, and Germino Hausken 2000) and at the end of the kindergarten year show gains in their skill levels (West, Denton, and Reaney 2000). Furthermore, West, Denton and Reaney (2000) found that the gains children make in specific reading and mathematical skills differ by child, family, and kindergarten program characteristics.

In 1999, about 17 percent of children between the ages of 5 and 17 lived in a home where a language other than English was spoken. Of these children, 5 percent were limited in their proficiency of English (Federal Interagency Forum on Child and Family Statistics, Forthcoming). Minority groups differ from each other and from mainstream cultures (Snow, Burns, & Griffin 1998). This paper focuses specifically on the gains in reading skills made by language minority and mainstream (i.e., non-language minority) children. It is important to look at these specific groups to determine if the children's progress in reading skills during the kindergarten year differs by the language(s) spoken in their homes. The following research questions are addressed:

- Are there differences in the reading skills of non-language minority children and two groups of language minority children (i.e., children from Spanish language homes and children from Asian language homes) when they enter kindergarten in the fall and at the end of the kindergarten year?

- What gains in reading do children make from the fall to the spring of their kindergarten year? Do the gains children make in reading differ by their home language status? Do the gains they make in reading differ by child, family, and school characteristics?

Data Source

The information on children's kindergarten reading skills comes from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). The children in the ECLS-K are a nationally representative sample of approximately 22,000 kindergartners enrolled in about 1,000 public and private kindergartens in the United States. These children attended both public (85 percent) and private (15 percent) kindergartens offering full day (55 percent) and part-day (45 percent) programs during the 1998-1999 school year. All kindergartners within the sampled schools were eligible for the sampling process, including language minority (i.e., children whose

home language is not English) and children with disabilities. The sample includes children from different racial-ethnic and socioeconomic backgrounds.

The ECLS-K implemented a two-step approach to ensure that assessment data from language minority children were valid and reliable. First, children's home language status was determined by field staff from school records or, if records were not available, from information provided by the children's teachers. Next, a brief English language screener, the Oral Language Development Scale (OLDS), was administered to those children who had a non-English language background. Performance on the OLDS was used to ascertain whether the children understood English well enough to take the ECLS-K Assessment Battery in English. Children who achieved the established cut score on the OLDS received the full assessment including the reading assessment. Children who did not received a reduced set of the ECLS-K assessments that did not include the reading assessment.[1]

The ECLS-K reading assessment sampled five levels of early reading skills that reflect an empirically based progression of skills and knowledge. The five levels include:

1. naming upper- and lower-case letters of the alphabet;
2. associating letters with sounds at the beginning of words;
3. associating letters with sounds at the end of words;
4. reading common sight words; and
5. reading short passages.

We have used proficiency probability scores in this report. The proficiency probability scores can be averaged to produce estimates of mastery rates within population subgroups.

The split half reliabilities of the item-cluster-based proficiency level scores are:

	Fall K	Spring K
Level 1	0.83	0.79
Level 2	0.76	0.76
Level 3	0.72	0.76
Level 4	0.78	0.77
Level 5	0.60	0.69

Source: U.S. Department of Education, National Center for Education Statistics (2000). *ECLS-K Base Year Public-Use Data Files and User's Manual.* Washington, DC: Author.

Comparisons made in this paper were tested for statistical significance. All differences cited are statistically significant at the .05 alpha level.

[1] See National Center for Education Statistics (2000). *Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 Base Year Public-Use Data Files and User's Manual*, (NCES 2001-029) for more information.

Sample

Estimates in this paper are based on children in the ECLS-K sample who had assessment scores from the ECLS-K Reading Assessment in English in both the fall of 1998 and spring of 1999 (table 1). Children from non-English speaking homes who did not achieve the established cut score on the OLDS were excluded from this analysis. Approximately 37 percent of children from Asian language speaking homes and approximately 53 percent of children from Spanish language speaking homes were not assessed in the fall of 1998.

Table 1. – Population percentages of children assessed in English in fall 1998 and spring 1999, by family and school characteristics, by language-minority status: Kindergarten Year, 1998-99

Characteristic	Non-language minority	Spanish language	Asian-language
Total	96	3	1
Socioeconomic status			
Lowest 20 percent	16	48	22
Middle 60 percent	63	46	46
Highest 20 percent	22	6	33
School sector			
Public	84	90	81
Private	16	10	19
Program type			
Full day	57	53	47
Part-day	43	47	53

NOTE: Estimates based on children assessed in English in both the fall and the spring of kindergarten. Approximately 37 percent of children from Asian language homes and approximately 53 percent children from Spanish language homes were not assessed in fall 1998.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999, Fall 1998 and Spring 1999. Public Use File.

Findings/Results

Differences in gains in reading proficiency between non-language minority children and children from Spanish language homes and children from Asian language homes in the fall and spring of the kindergarten year.

The percentages of children mastering each of the reading proficiency skills differed by the children's home language in the fall and in the spring of the kindergarten year (table 2, 3, and 4). In the fall of the kindergarten year, higher percents of non-language minority children and children from Asian language speaking homes mastered each of the reading proficiency levels than did children from Spanish language speaking homes. Similar percentages of non-language minority children and children from Asian language speaking homes had mastered the first three reading proficiency levels (i.e., letter names, beginning sounds, and ending sounds) in the fall of

kindergarten. Although less than 10 percent of all kindergartners could read sight words and passages in the fall, higher percentages of Asian language children could read sight words (7 percent) and short passages (4 percent) than either non-language minority (2 percent and less than 1 percent, respectively) or Spanish language children (less than 1 percent for either skill).

In the spring of the kindergarten year, the children gained reading skills regardless of the languages spoken in the home (table 2, 3, and 4). By spring, almost all of the kindergartners knew the letters of the alphabet. In addition, between 52 percent and 81 percent of the children knew beginning letter sounds and between 35 and 62 percent knew ending letter sounds.

However, gains in specific reading skills differed by the language spoken in the home. More non-language minority children (72 percent) and Asian language children (81 percent) gained skills in beginning sounds compared with 56 percent of Spanish language children (figure 1). The reading gains children made in each skill level differed by the language spoken in the home. Non-language minority children and Asian language children made larger gains in mastering the ending letter sound relationships (35 percent and 40 percent, respectively) and reading words (11 percent and 18 percent, respectively) compared with Spanish language children (29 percent ending sounds and 5 percent sight words).

Differences in children's gains in reading between the fall of their kindergarten year and the spring of their kindergarten year by family socioeconomic status and school characteristics.

Over the kindergarten year, children increased their skills in reading regardless of the languages spoken in the home. To understand the influence of the family and school characteristics, gains in children's reading skill proficiencies were examined by family socioeconomic status, school sector (public versus private) and kindergarten program type (full day versus part-day) (table 2, 3, and 4). The relationships between these characteristics and children's reading achievement were examined separately for each of the three language groups.

At each level of family socioeconomic status, the gains children made in each of the reading proficiency levels differed by the language spoken in the home. For example, for children at the lowest socioeconomic level, the gains in beginning sounds that children from Asian language-speaking homes made between the fall and spring were higher than the gains of children from non-language minority and Spanish language-speaking homes. Fifty-four percent of children from Asian language-speaking homes mastered beginning sound relationships compared with 39 percent of non-language minority children and 43 percent of Spanish language-speaking children. Among children in the middle socioeconomic level, the gains made by children mastering ending sounds between the fall and spring also differed by the language spoken in the home. Thirty-seven percent of non-language minority children and 43 percent of children from Asian language-speaking homes mastered ending sounds in the spring compared with 31 percent of children from Spanish language-speaking homes. Children's gains in this skill did not differ between children from non-language minority and Asian language-speaking homes, however.

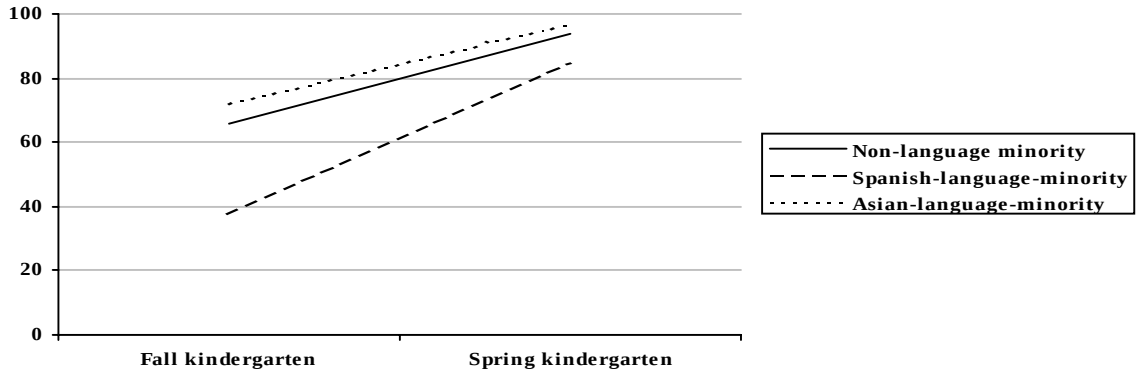
In the fall of the kindergarten year, the reading proficiency levels by children in each of the three groups differed by school sector. For example, between 69 to 87 percent of children attending private schools could identify the letters of the alphabet compared with 34 to 69 percent of children attending public schools. However, by the end of the kindergarten year, almost all of the children had mastered their letters regardless of the language spoken in the home and school

sector. Although, differences in the percentages of children mastering specific reading skills existed by school sector in the spring, these differences existed in the fall regardless of the language spoken in the home. Consequently, the differences in spring levels by school sector should be interpreted with caution because the percentages of children mastering each of these levels also differed in the fall.

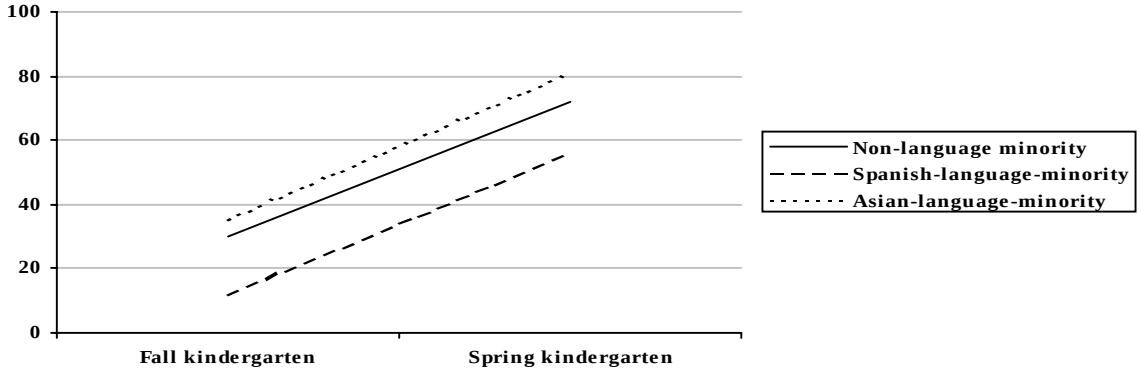
Schools use a variety of grouping arrangements to meet the needs of children and the community. Some schools offer kindergarten classes that meet for a full day, while others provide part-day programs. The percentages of children exhibiting specific reading skills in the fall and spring did not differ by the type of kindergarten program. The gains children made at each of the reading proficiency levels in the spring were not significantly different regardless of whether the kindergarten program met for a full day or part-day for all three language groups.

Figure 1. - Kindergartners' Educational Progress: A Study of Language Minority and Non-Language Minority Children

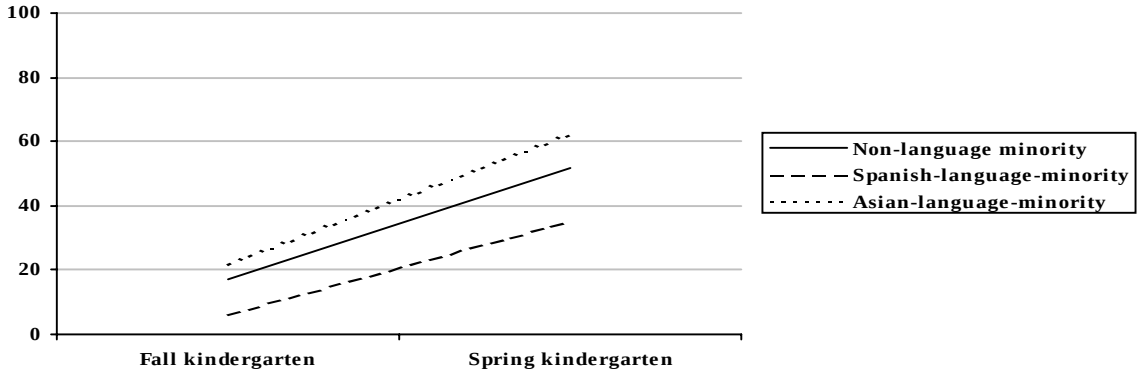
Letter Recognition



Beginning Sounds



Ending Sounds



Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99: Public-use Base-year.

Table 2.— Percentage of non-language-minority kindergartners demonstrating specific reading knowledge and skills, by family and kindergarten program characteristics: Fall 1998 and Spring 1999

Characteristic	Letter recognition			Beginning sounds			Ending sounds			Sight words			Words in context		
	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain
Total	66	94	28	30	72	42	17	52	35	2	13	11	*	4	3
Socioeconomic status															
Lowest 20 percent	41	84	43	10	49	39	4	29	25	*	3	3	*	*	*
Middle 60 percent	66	94	29	27	72	45	15	51	37	2	11	9	*	3	3
Highest 20 percent	84	98	14	51	86	35	33	70	38	6	25	19	2	9	7
School sector															
Public	63	93	30	27	69	43	15	49	35	2	11	9	*	3	3
Private	83	97	14	46	83	37	29	66	38	5	22	17	2	8	6
Program type															
Full day	67	94	28	30	73	42	17	53	36	2	14	12	*	4	4
Part-day	65	93	28	29	70	41	16	50	34	2	11	9	*	4	3

* Less than 1 percent.

NOTE: Estimates based on children assessed in English in both the fall and the spring of kindergarten.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999, Fall 1998 and Spring 1999. Public-Use file.

Table 3 .— Percentage of Spanish-language kindergartners demonstrating specific reading knowledge and skills, by family, and kindergarten program characteristics: Fall 1998 and Spring 1999

Characteristic	Letter recognition			Beginning sounds			Ending sounds			Sight words			Words in context		
	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain
Total	38	85	47	12	56	44	6	35	29	*	6	5	*	2	1
Socioeconomic status															
Lowest 20 percent	29	80	51	7	49	43	2	28	26	*	3	3	0	*	*
Middle 60 percent	42	87	45	15	59	44	7	38	31	*	7	7	*	2	2
Highest 20 percent	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
School sector															
Public	34	84	49	10	54	44	5	33	28	*	5	4	*	2	1
Private	69	92	23	28	72	44	15	54	39	1	15	13	*	3	3
Program type															
Full day	43	86	43	14	61	47	7	42	35	*	9	8	*	3	3
Part-day	32	82	51	9	50	40	4	27	23	*	3	2	*	*	*

* Less than 1 percent.

--- Less than 30 cases in the denominator. Too few cases for reliable estimate.

NOTE: Estimates based on children assessed in English in both the fall and the spring of kindergarten.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999, Fall 1998 and Spring 1999. Public-Use file.

Table 4. — Percentage of Asian-language kindergartners demonstrating specific reading knowledge and skills, by family, and kindergarten program characteristics: Fall 1998 and Spring 1999

Characteristic	Letter recognition			Beginning sounds			Ending sounds			Sight words			Words in context		
	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain
Total	72	97	24	35	81	45	22	62	40	7	25	18	4	12	8
Socioeconomic status															
Lowest 20 percent	51	96	45	17	71	54	7	48	40	*	11	10	*	2	1
Middle 60 percent	69	96	27	27	77	50	13	56	43	2	19	17	*	8	7
Highest 20 percent	91	98	7	59	93	33	42	79	36	19	44	25	11	26	15
School type															
Public	69	96	27	32	78	46	19	58	39	5	22	16	3	9	6
Private	87	100	13	48	93	45	32	76	44	15	40	25	9	26	17
Program type															
Full day	76	98	22	35	83	48	22	62	40	7	25	18	6	15	10
Part-day	69	95	26	36	79	43	21	59	38	5	22	17	3	10	7

* Less than 1 percent.

NOTE: Estimates based on children assessed in English in both the fall and the spring of kindergarten.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999, Fall 1998 and Spring 1999. Public-Use file.

Summary

There is widespread agreement that minority groups differ from each other and from mainstream cultures in several respects (Snow, Burns, & Griffin 1998). This paper presents a look at the differences in the reading proficiency skills exhibited by children from homes where a language other than English is spoken. It has found that gains in reading skills differed between mainstream (i.e., non-language minority children) and language minority children and between groups of language minority children. As with earlier reports on the kindergarten year, this report found that all kindergartners, regardless of their home language backgrounds begin the fall of the kindergarten year with a wide range of reading skills and increase those skills during the year. In the fall of the kindergarten year, children's reading proficiency skills differed by the language spoken in the home. By the end of the school year, reading skills continued to differ by the language spoken in the home (i.e., lower percentages of children from Spanish language-speaking homes start and end the school year mastering beginning reading skills). Moreover, regardless of their families' socioeconomic status, children from Spanish language-speaking homes lag behind their peers from non-language minority and Asian language-speaking homes.

The ECLS-K will follow these kindergartners through the fifth grade. Researchers will be able to track children's performance and the differences in their performance, not only by child and family characteristics but also by school characteristics. This report in combination with the future reports will help inform researchers, educators, teachers, parents, and policy makers on issues relevant to the education of young children.

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Standard Error Tables

Table 2a.— Standard errors for the percentage of non-language-minority kindergartners demonstrating specific reading knowledge and skills, by family, and kindergarten program characteristics: Fall 1998 and Spring 1999

Characteristic	Letter recognition			Beginning sounds			Ending sounds			Sight words			Words in context		
	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain
Total	0.8	0.4	0.6	0.8	0.9	0.6	0.5	0.9	0.6	0.1	0.5	0.4	0.1	0.2	0.2
Socioeconomic status															
Lowest 20 percent	1.5	1.0	1.4	0.7	1.4	1.2	0.3	1.2	1.0	0.1	0.4	0.3	0.1	0.1	0.1
Middle 60 percent	0.8	0.4	0.6	0.7	0.8	0.7	0.5	0.8	0.6	0.1	0.4	0.4	0.1	0.2	0.1
Highest 20 percent	0.8	0.2	0.7	1.0	0.7	0.8	0.9	1.0	0.8	0.4	0.9	0.7	0.2	0.5	0.4
School type															
Public	0.8	0.4	0.6	0.8	0.9	0.7	0.5	1.0	0.7	0.1	0.4	0.4	0.1	0.2	0.1
Private	1.2	0.4	1.0	1.8	1.1	1.1	1.4	1.4	0.8	0.6	1.4	1.1	0.3	0.7	0.6
Program type															
Full day	1.1	0.5	0.8	1.2	1.3	0.9	0.8	1.3	0.9	0.2	0.8	0.7	0.1	0.3	0.3
Part-day	1.2	0.5	0.9	1.1	1.1	0.7	0.7	1.2	0.7	0.2	0.5	0.4	0.1	0.2	0.2

NOTE: Estimates based on children assessed in English in both the fall and the spring of kindergarten.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999, Fall 1998 and Spring 1999. Public-Use file.

Table 3a.— Standard errors for the percentage of Spanish-language kindergartners demonstrating specific reading knowledge and skills, by family, and kindergarten program characteristics: Fall 1998 and Spring 1999

Characteristic	Letter recognition			Beginning sounds			Ending sounds			Sight words			Words in context		
	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain
Total	2.4	1.8	2.6	1.2	2.2	2.0	0.8	2.1	1.9	0.4	0.9	0.8	0.2	0.5	0.4
Socioeconomic status															
Lowest 20 percent	3.5	3.2	3.9	1.3	3.2	2.9	0.6	2.7	2.6	0.0	1.0	1.0	0.0	1.9	1.9
Middle 60 percent	3.1	2.1	3.2	1.9	2.9	2.6	1.2	2.3	2.1	0.3	1.5	1.5	0.0	0.9	0.9
Highest 20 percent	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
School type															
Public	2.5	2.0	2.9	1.2	2.6	2.1	0.8	2.0	1.9	0.4	0.8	0.7	0.3	0.4	0.3
Private	4.5	4.0	3.3	5.2	5.5	5.7	3.6	5.7	5.3	1.2	3.7	3.6	0.1	1.8	1.8
Program type															
Full day	2.9	2.8	2.9	1.8	3.3	2.8	1.2	3.1	2.8	0.6	1.6	1.5	0.0	0.8	0.8
Part-day	3.9	2.3	4.3	1.6	2.6	2.5	0.9	2.2	1.9	0.5	0.9	0.7	0.5	0.5	0.2

--- Less than 30 cases in the denominator. Too few cases for reliable estimate

NOTE: Estimates based on children assessed in English in both the fall and the spring of kindergarten.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999, Fall 1998 and Spring 1999. Public-Use file.

Table 4a.— Standard errors for the percentage of Asian-language kindergartners demonstrating specific reading knowledge and skills, by family, and kindergarten program characteristics: Fall 1998 and Spring 1999

Characteristic	Letter recognition			Beginning sounds			Ending sounds			Sight words			Words in context		
	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain	Fall	Spring	Gain
Total	2.5	1.0	2.4	2.8	1.9	2.6	2.2	2.4	2.1	1.3	2.4	2.0	1.0	1.6	1.3
Socioeconomic status															
Lowest 20 percent	4.4	1.6	4.5	2.8	3.8	3.9	1.4	4.5	4.4	0.7	3.9	3.8	0.6	0.9	0.7
Middle 60 percent	3.8	1.4	3.5	2.8	2.6	2.8	1.7	3.1	2.5	0.8	3.0	2.8	0.5	2.1	2.0
Highest 20 percent	2.7	2.1	2.2	5.0	2.1	4.9	4.2	2.7	3.5	3.3	4.9	3.6	2.8	3.8	2.5
School type															
Public	2.9	1.2	2.8	2.9	2.3	2.7	2.3	2.6	2.2	1.3	2.6	2.1	1.0	1.6	1.2
Private	3.9	0.0	3.9	6.6	1.8	6.3	5.7	4.0	5.4	4.1	5.8	4.6	3.2	4.7	4.0
Program type															
Full day	3.2	0.9	3.2	4.1	2.6	3.8	3.5	3.5	3.6	2.4	3.8	2.7	2.0	2.9	2.1
Part-day	4.1	1.8	3.8	4.0	3.1	3.6	2.9	3.5	2.6	1.5	3.2	2.6	1.0	1.9	1.6

NOTE: Estimates based on children assessed in English in both the fall and the spring of kindergarten.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999, Fall 1998 and Spring 1999. Public-Use file.

A Picture of Young Children's Development: Adapting Assessment Tools for a National Birth Cohort Study

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Society for Research in Child Development
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On the horizon is a new national study of the critical years before school – the Early Childhood Longitudinal Study, Birth Cohort (ECLS–B). For the first time, information will be available on children's earliest experiences with the family, health care, and child care which are essential building blocks for later development and school success. The ECLS–B's approach is unique in that it collects data in many developmental domains across the home, child care, and school environments. To accomplish this, the ECLS–B gathers information from various sources (e.g., parents, children, child care providers) using multiple methods (e.g., computer-assisted interviews, direct child assessments). The ECLS–B design requires reliable and efficient measures of children's growth and development. However, there are many demands associated with such a design. For example, to capture a holistic picture of children across multiple settings, a national field staff must complete multiple tasks in children's homes in the shortest amount of time possible. Consequently, these and other demands have impacted the selection of instruments. To directly assess children's development in a home setting, adaptations to existing instruments, such as shortened forms and videotaping, have proven necessary.

The Early Childhood Longitudinal Study, Birth Cohort

The U.S. Department of Education, National Center for Education Statistics (NCES) in collaboration with several health, education, and human services agencies is sponsoring the Early Childhood Longitudinal Study, Birth Cohort (ECLS–B). Along with NCES, the sponsoring federal agencies include the National Center for Health Statistics (NCHS), the National Institutes of Health (NIH), the U.S. Department of Agriculture (USDA), the Administration for Children, Youth and Families (ACYF), the Office of Special Education Programs (OSEP), the Maternal and Child Health Bureau/HRSA, the Office of the Assistant Secretary for Planning and Evaluation (ASPE), the Division of Nutrition and Physical Activity/CDC, and the Office of Minority Health/OPHS. Sponsoring Institutes from NIH are the National Institute of Child Health and Human Development (NICHD), the National Institute of Mental Health, the National Institute on Nursing Research, the National Institute on Aging, and the National Center on Minority Health Disparities.

The ECLS–B will select a national sample of approximately 16,000 children, born in the year 2001, and follow them from birth through first grade. The ECLS–B is part of a longitudinal studies program comprised of two cohorts—a birth cohort and a kindergarten cohort. Together, these cohorts provide the range and breadth of data required to more fully describe children's health, early learning, development, and education experiences. The birth cohort study (ECLS–B) focuses on those characteristics of children and their families, as well as children's early health care and in-home and out-of-home experiences, that influence children's first experiences with the demands of formal school, i.e., kindergarten and first grade. It provides important information about the way America raises, nurtures, and prepares its children for school. The kindergarten cohort study (ECLS–K) measures aspects of children's development and their environments (home and school) as they enter school for the first time and examines how these influence their academic achievement and experiences through the fifth grade.[1]

Unlike previous early childhood studies, the ECLS–B studies a national birth cohort through early childhood. Measures of early development are taken prospectively, rather than retrospectively, and

[1] This paper focuses on the ECLS birth cohort study (ECLS–B). More information on the ECLS kindergarten cohort study (ECLS–K) is available from NCES at the ECLS web site (http://nces.ed.gov/ecls). For the ECLS-K, base-year data were collected from a nationally representative sample of kindergartners attending public and private schools and early childhood programs in the fall of 1998. Follow-up waves 2, 3, and 4 were conducted in the spring of 1999, the fall of 1999, and the spring of 2000, respectively. Waves 5 and 6 will be conducted in Spring 2002 and Spring 2004, respectively.

these measures are more comprehensive, collecting data on children's physical, cognitive, social, and emotional development. In studying the whole child across these many domains, the ECLS–B includes measures on attachment, early health care and nutrition, language acquisition, and cognitive and social functioning. It captures information on the home, school, and child care environments in which children develop and learn. The ECLS–B can be used to effectively inform policies regarding children, their families, and their health, early care, and education.

The ECLS–B has two goals: descriptive and analytic. The study provides rich descriptive data on children's experiences in the home, child care, and school. In particular, four key issues are of interest: (1) children's health status at birth and at regular intervals thereafter, (2) children's growth and development, (3) children's transitions to out-of-home programs and schools, and (4) children's school readiness. The study also collects data that can be used to analyze the relationships between children's developmental outcomes and their family, health care, child care, school, and community. Data collected during the first year of life (around 9 months) serves as a baseline for examining how children's home environment, health status, health care, and early child care and education shape their development. The longitudinal nature of the study enables researchers to study children's physical, cognitive, social, and emotional growth and to relate trajectories of growth and change to variations in children's experiences.

Key Issues of Young Children's Development

A large number of issues and research questions pertaining to children's early care, health, and education can be studied with a national birth cohort sample. The four key areas addresses by the ECLS–B are described in more detail in the following paragraphs.

Children's Health Status. Children who are well-nourished and physically strong will be active learners and be better prepared for school[2]. Children's early growth, development, and readiness for learning are influenced by many health factors, but especially by their mother's prenatal behavior and the prenatal care she received. The ECLS–B, therefore, is interested in children's health status at birth and various points thereafter. The ECLS–B will describe the prevalence rates of several health conditions (e.g., asthma, ear infections, gastrointestinal problems) and practices (e.g., regular health and dental care, access to health insurance). Over the early childhood years, changes in children's health status due to health-related disabilities, acute childhood illnesses, chronic health conditions, and the care and treatment of reported illnesses or conditions affect their developmental well-being and in turn their preparedness for school.

Children's Growth and Development. Large numbers of young children have mothers in the labor force, live in poverty, live in single-parent households, have limited proficiency in English, have poor nutrition, and receive inadequate health care. These and other factors may contribute to the economic and social capital available to children through their families and communities, which in turn impacts children's growth and developmental trajectories.

[2] Kagan, S. L., Moore, E., & Bredekamp, S. (1995). *Reconsidering Children's Early Learning and Development: Toward Shared Beliefs and Vocabulary*. Washington, DC: National Education Goals Panel.

The ECLS–B is interested in children's development during the critical years before school. In these early years, children are quickly achieving developmental milestones that build upon one another. The study seeks to better understand children's physical, social, emotional, cognitive, and language development in relation to important influences in their lives. The ECLS–B studies these developments and the factors leading to optimal growth.

Transitions to Out-of-Home Programs and School. Children and adults are continually making transitions from one status to another. Of particular interest to the ECLS–B is the transition that occurs as young children go from being cared for exclusively by their parents to the care of other persons. For some children, this transition may occur shortly after birth, while for others, their first significant experience with adults other than their parents in a regular care and educational setting may be when they enter school for the first time. Other transitions include the transitions to a group-based early childhood program, the transition from preschool to school, and from kindergarten to first grade. The ECLS–B is especially interested in looking at these transitions and their impacts on different groups of children and families defined by race/ethnicity, socioeconomic status, language minority status, and family structure (e.g., single-parent families and teenage mothers).

School Readiness. The first of the national education goals, that all children will start school ready to learn (National Education Goals Panel 1994), has sparked renewed policy interest in children's preparation for school. For most children, the first formal school experience is kindergarten. In addition, before they reach the age of compulsory school attendance, large numbers of young children experience out-of-home care/education prior to starting first grade[3]. However, the nature of children's early experiences in and before kindergarten is quite variable, and the demands placed on children differ across programs. The ECLS–B examines children's preparation for school by prospectively studying the different characteristics of children, their families, and their out-of-home care and educational experiences. It is also critical to understand how the educational system prepares for and responds to children's diverse backgrounds and experiences.

ECLS–B Sample and Data Collection Schedule

The children sampled represent diverse racial/ethnic and socioeconomic backgrounds. Asian and Pacific Islander children, Chinese children, moderately low birth weight children (1500-2500 grams), very low birth weight children (under 1500 grams) and twins are oversampled. Table 1 shows the initial sample size numbers by three analytic sub-groups. There is also a special supplemental component to oversample American Indian children (with an initial sample size of 1,299).

[3] West, J., Hausken, E. G., Chandler, K., & Collins, M. (1992). *Experiences in Child Care and Early Childhood Programs of First and Second Graders*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Table 1. Initial sample sizes by child characteristics

	Number of Children
Race/Ethnicity	
White	7,728
Black	2,923
Hispanic	2,416
Chinese	705
Other Asian/Pacific Islander	1,779
Total	15,550
Plurality	
Twins	2,118
Non-Twins	13,433
Total	15,550
Birth Weight	
Very Low	2,543
Moderately Low	2,237
Normal	10,770
Total	15,550

Children are selected at birth and followed longitudinally through the end of first grade.[4] The first data collection occurs when the children are approximately nine months of age. Capturing data this soon after birth is important because much of the data collected at this time pertains to prenatal care and the health care of the mother and child during the first months of life. The data collections for the rest of the study are planned for when the children reach 18 months, 30 months, and 48 months of age. Data will also be collected when the children enter kindergarten and first grade. Exhibit 1 contains the proposed data collection schedule for the full-scale study and the field test.

ECLS–B Conceptual Model

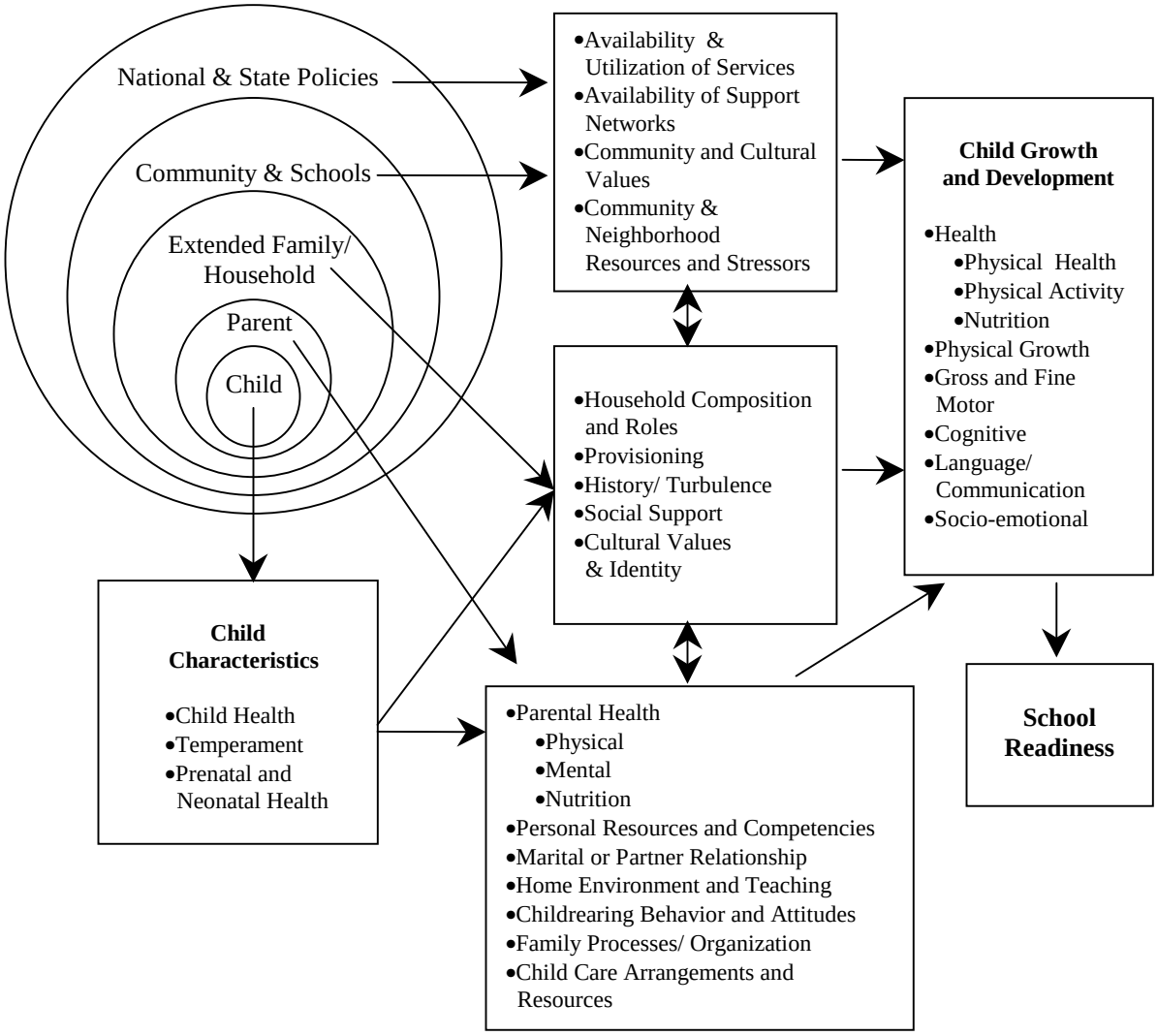
The design of the ECLS–B assumes that children's preparation for school begins at (or before) birth, continues until they enter school for the first time, and is reinforced by their early school experiences. It is guided by a framework of children's development, care, and schooling that emphasizes the interaction between the child, family, health care, child care and education programs, and community (see Figure 1). The ECLS–B recognizes the importance and inter-relatedness of factors that represent the child's health status, socio-emotional, and intellectual development.

As seen in Figure 1, children's growth, development, and health are key constructs influencing children's school readiness. In turn, children's growth and development are influenced by a multitude of variables at the family, community, and school level. The variables in this model aim to assess a range of family resources and risk factors that function as predictors or mediators of children's growth, development, and later school experiences. Each variable has a different influence (direct or indirect)

[4] Ideally the sample would be followed well beyond first grade. Whether or not this is feasible and affordable will be evaluated over the life of the study.

across contexts and across time. The ECLS–B follows changes in and the balance of resources and risk factors to study their relation to trajectories of growth. Resources (e.g., number of parents available to care for child, early family health practices) enhance growth and development and provide protection against environmental "insults" caused by risk factors. Risk factors (e.g., language minority status, persistent poverty) pose a threat to optimal development. The more resources and the fewer risk factors there are in the child's home environment, the better the prospects that the child will grow vigorously and develop needed skills and behaviors that prepare the child to learn and succeed in school.

Figure 1. ECLS–B Conceptual Framework



ECLS–B Data Collection Approach

It is important to examine children's development across a number of critical cognitive and noncognitive domains. It also is imperative that the different contexts in which development and learning occur be examined in detail in order to improve our understanding of why some children adjust easily to school and appear to make critical transitions without much difficulty while others experience varying degrees of difficulty.

The ECLS–B collects data on children's physical, socio-emotional, and cognitive development at multiple points in time. The study gathers information about children's homes, communities, health care, child care, and early childhood programs. As children reach school age, capturing data about their schools, classrooms, and their teachers will be equally important. To amass such a wide range of data, the ECLS–B uses multiple data collection methods and strategies. Figure 2 details the first two waves of data collection, highlighting the multiple methods and sources that are used to assess children's development and health and their home and child care experiences.

Key features of the study design are outlined below. NCES and the ECLS–B contractor, Westat of Rockville, Maryland, have worked with its federal partners and private researchers to develop methods and measures that can be used effectively and efficiently in the homes of young children across the nation.

Data Collection in the Home

The ECLS–B collects information on young children primarily through a home visit that is comprised of a number of different activities. In this endeavor, the ECLS–B national field staff are required to be "jacks of all trades". Before entering the home, they must locate and make contact with the children's families and gain the families' cooperation. Once in the home, field staff conduct interviews, drop off self-administered questionnaires, and complete observations as well as directly assess the children participating in the study. Exhibits 2 and 3 list the tasks field staff must complete while in the home or shortly after leaving the home.

The ECLS–B gathers information from children's parents – both mothers and fathers. Much of the information on children's development, family situation, home environment, and early care experiences is most efficiently obtained through indirect, parental reports. Field staff conduct a computer-assisted interview with the child's primary caregiver. Parents also complete a brief self-administered questionnaire that includes items on potentially sensitive topics such as the marital relationship and certain parental behaviors (e.g., criminal record, substance use).

It is expected that most primary respondents will be the child's mother; however, fathers play important roles in their children's lives, and the ECLS–B captures information about these roles directly from fathers. To avoid additional time in the home and potential burden on the family, a self-administered questionnaire is dropped off and completed by fathers living in the child's household. Field staff determine whether there is a resident father during the course of the interview with the child's primary caregiver.

To complement parental reports, additional information on children's development and home environment comes from observational data. As they interview parents and assess children, field staff must observe several aspects of the child's behavior and the home environment. Field staff then complete observation forms after leaving the family's home. Child observations include items from the Behavior

Rating Scale from the Bayley Scales of Infant Development (BSID-II) and the Carolina Record of Infant Behavior (CRIB). These observations provide information on varied behaviors, including children's attention span, object orientation, energy, and initiative. Additionally, items from the Home Observation for Measurement of the Environment (HOME) are included, providing a picture on the play environment, the child's receptive communication, and the parent's behavior (e.g., providing toys or activities for the child).

Although a significant amount of information on children's development comes from parental reports, these data are augmented with direct assessment data and videotaped interactions. Field staff administer direct child assessments with established instruments. The developmental assessment involves administering and scoring discrete items designed to measure children's early cognitive, physical, and language development. Field staff also videotape a parent-child interaction task, which will be then scored along the task's multiple dimensions post-visit by certified coders. And, field staff measure children's length, weight, and middle upper arm circumference.

From the above, it is apparent that during a home visit, estimated to last between 90 and 120 minutes, field staff complete many complex tasks. Operationally, adaptations to the assessment components have proven necessary to ensure the collection of high quality data on young children's development. The next section provides greater detail on the child assessment used during the ECLS–B home visit.

ECLS–B Direct Child Assessment

Mounting a national study of this scope requires strong baseline measures during the infant-toddler period. However, assessing infants and toddlers can be quite challenging. The ECLS–B direct child assessment relies on instruments considered "gold standards" in the field. However, adaptations have been necessary to take these instruments from a laboratory or clinic setting to a home setting. The ECLS–B child assessment, therefore, is designed for ease of and flexibility in administration while at the same time being psychometrically and substantively sound.

The components of the direct child assessment being used when children are 9- and/or 18-months are presented below. The ECLS–B direct child assessment features the Bayley Scales for Infant Development (BSID-II), the Nursing Child Assessment Teaching Scale (NCATS), and an attachment sort measure. These instruments, along with the physical measurements, provide a comprehensive picture of young children's development, while being cognizant of the burden on families and field staff.

Key Instruments of the ECLS–B Direct Child Assessment

Bayley Scales of Infant Development – II. When children are 9 and 18 months old, the ECLS–B uses a reduced-item set from the Bayley Scales of Infant Development – II (BSID-II). The Bayley is considered the gold standard for assessing early childhood development (ages 1 to 42 months). Children's cognitive development, as well as their receptive and expressive language skills, is assessed through the mental scale of the BSID-II. Children retrieve hidden toys and look at pictures books; their production of vowel-consonant combinations is noted. Fine and gross motor skills are assessed through the motor scale of the BSID-II. Children grasp small objects and are observed crawling and walking.

Nursing Child Assessment Teaching Scale (NCATS). At the 9- and 18-month data collections, the ECLS–B uses the Nursing Child Assessment Teaching Scale (NCATS). The NCATS is one scale from the Nursing Child Assessment Satellite Training (NCAST) that is designed to assess parent-child interaction (ages 0 to 36 months). Parents are asked to teach their child a task that she or he cannot do from a standard list using NCATS materials. Tasks include turning pages of a book and stacking blocks. The interaction is observed and coded along six subscales. The teaching scale provides information on child cues, parent responsiveness, and the fostering of socio-emotional and cognitive growth. It captures variables that are precursors to later social and cognitive development, such as attachment and language.

Massey Attachment Sort (MAS). When the children are 18 months old, the ECLS–B administers a measure of attachment. The formation of secure attachments with caregivers is a cornerstone of young children's socio-emotional development. The Massey Attachment Sort is an alternative to the laboratory-based Strange Situation measure. Parents and field staff work with a deck of cards and sort descriptions of parent/child behavior for how much it is like the child. Card descriptions include scenarios to assess the child's proximity to the parent and exploration behavior and the occurrence of differential responsiveness. Aspects of children's affect, sociability and independence are also assessed.

Need for Adaptation of Assessment Instruments

These assessment instruments are often used in laboratory or clinic settings. The ECLS–B administers the assessment in the child's home, which is more susceptible to distractions and interruptions. Several features of the study design impact the types of measures that can be used in a national birth cohort study conducted in a home setting. These include the background of a national field staff, the length of the home visit and the multiple, complex tasks that make up the home visit.

National field staff. As in other national studies, ECLS–B field staff have a wide range of experiences in varied fields. Many of the field staff have extensive backgrounds in administering survey instruments. They are skilled in gaining cooperation and interviewing respondents. However, the ECLS–B field staff is large, and most do not have an extensive knowledge base in child development. The ECLS–B requires a field staff of over 200 people. Training this many field interviewers requires instruments with clear administration and that involve only a basic understanding of children's development. The three ECLS–B assessment instruments require understanding of infant cognitive and language development, parent responsiveness, child cues, and attachment formation. Consequently, the ECLS–B instruments were selected for their use in other large-scale studies as well as for their ease in administration.

Limited time in the home. The ECLS–B home visit should take about 90 to 120 minutes. Approximately 35 minutes of this time is allotted for the direct child assessment (i.e., Bayley, NCATS and physical measurements). The Bayley was expected to take about 20 minutes. However, a field test of the 9-month ECLS–B data collection revealed that the Bayley assessment alone took an average of 40 minutes, double the estimated time. The parent interview also exceeded time expectations. The total time in home extended beyond two hours and often required multiple visits. Thus, the design placed too heavy a burden on the family, jeopardizing their participation in the study. Using the instruments, and in particular the Bayley, "as is" would not meet the needs of the ECLS–B.

Task requirements. The ECLS–B design features many different tasks. While in the home, one person must complete approximately eleven discrete tasks (see Exhibit 2). Each task has special skill requirements. While separately no one task is difficult, the total data collection protocol is complex. It was necessary to simplify these tasks in order to reduce the burden on field staff and to ensure the reliable and valid administration of all tasks.

ECLS–B Adaptations

The demands of the ECLS–B outlined above required adaptations to the existing instruments. To ensure the collection of high quality data, we have shortened and/or simplified the administration of the assessment instruments.

Bayley Scales of Infant Development – II. The Bayley Scales of Infant Development – II consists of a set of items ranging in developmental difficulty. The 9-month field test demonstrated that the full set of Bayley items could take in excess of 40 minutes. The ECLS–B contractor, Westat, has worked with experts to identify a reduced-item set that can be administered in less time and produce reliable, valid scores equivalent to the full set of Bayley items. The ECLS–B reduced-item Bayley for 9-month-olds takes approximately 25 minutes to administer. Items have been selected for their operational ease and psychometric properties. The number of items actually administered is fewer than the number of items scored. Multiple items can be scored from one administration, and, in the motor especially, several items can be scored from observation. There are fewer materials, and training can focus more attention on the individual items. The reduced-item Bayley has decreased the complexity for field staff and reduced the burden on children and their families.

Nursing Child Assessment Teaching Scale (NCATS). The Nursing Child Assessment Satellite Training is an entire package of instruments – including two scales to assess parent-child interaction as well as an intervention component for case management. Typically, a health or social service professional completes the NCATS via live coding (i.e., while the interaction occurs). While the interaction lasts only about five minutes, field staff need to observe and score 73 items of parent and child behavior. Given the other tasks ECLS–B field staff must learn and complete, live coding would limit the number of scales that could realistically be used, thereby reducing the amount of information that can be gathered. The ECLS–B, with funding from its ACYF co-sponsor, videotapes the parent-child interaction. Videotaping provides a more complete picture of this important interaction at a very young age. Tapes are then coded along all scales, providing richer information on early parent-child interactions. However, coding the tapes is not without its own problems. The interaction field staff tape must be of high quality to ensure valid coding. For example, field staff should tape the very beginning of the interaction and should not interrupt. The task of coding is further complicated by the coding staff's experience. Like the ECLS–B home visit field staff, ECLS–B NCATS coders do not, for the most part, possess an extensive background in child development. Training the coding staff to reach 90% reliability has proven difficult at times, often requiring additional training.

Massey Attachment Sort (MAS). The MAS was developed exclusively for the ECLS–B. To assess children's attachment, naturalistic observation, the Strange Situation, and the Attachment Q-Sort (AQS) are the commonly used measures for assessing and discussing toddlers' attachment relationships. These measures require a significant amount of time to complete and are fairly complex for a field staff.

The MAS can be completed in under 10 minutes. It uses the Method of Successive Sorts (MOSS) considered operationally easier than the Q-sort, which requires a present number of items per pile. The MAS features 39 AQS items, which have been edited to an elementary reading level. The MAS can be completed by respondents and field staff of varying backgrounds.

Current Status and Future Activities

NCES conducts field tests to ensure that the instruments and procedures used in its national studies are sound. The field test is designed to (1) provide a test of the sampling procedures; (2) revise and test questionnaire content; (3) test data collection procedures; and (4) test basic operations. The field test sample is designed to mimic the main study sample in that it covers four separate classes of respondents (parents, fathers, child care providers and children).

A field test of the ECLS–B instruments and procedures was conducted in the fall of 1999. Early in the field test, NCES and the ECLS–B contractor, Westat, found several problems surrounding the complexity of the home visit (e.g., multiple tasks), the amount of time required to complete the home visit, and the amount of burden the design placed on both the family and the field staff. As a result, NCES and Westat made modifications to the design, such as the adaptations discussed above and shortening the parent interview.

A second field test of the ECLS–B instruments and procedures began in September 2000. A new sample was drawn of 1062 children born between January and April 2000. Home visits were conducted, as proposed in the main study, when the children were 9 months old and will be conducted again when the children are 18 months of age. This field test is evaluating the changes made to the original data collection instruments and protocol, including the adaptations made to the direct child assessment.

The main study will begin in the fall of 2001. A sample of 16,000 infants will be drawn from all the children born in 2001. The sample will be selected on a flow basis, beginning with January 2001 births. Approximately equal numbers of infants will be sampled from each month. The first wave of data collection will commence in October, when children born in January reach 9 months of age, and will last until the following September (i.e., when December births turn 9 months old). The first reports of findings and the first public-use data files will be released in Spring 2003. The first release will include the 9-month (1) parent interview data, (2) child assessment data, and (3) father questionnaire data. NCES intends to release data on subsequent waves approximately one year after data collection ends.

Exhibit 1. ECLS–B Data Collection Schedule

Project Activity	Calendar Year								
	2000	2001	2002	2003	2004	2005	2006	2007	2008
Field Test									
Base-Year (9 mo. old)									
First Follow-up (18 mo. old)									
Second Follow-up (30 mo. old)									
Third Follow-up (48 mo. old)									
Fourth Follow-up (Kindergarten)									
Fifth Follow-up (1st Grade)									
Full Scale Collection									
Base-Year (9 mo. old)									
First Follow-up (18 mo. old)									
Second Follow-up (30 mo. old)									
Third Follow-up (48 mo. old)									
Fourth Follow-up (Kindergarten) [1]									
Fifth Follow-up (1st Grade) [2]									

[1] This collection is scheduled for the fall of the children's kindergarten year. Because of age requirements for school entry, the majority of children sampled in this study will be entering kindergarten in two different years.

[2] This collection is scheduled to occur when the children are in the first grade year. A decision has not yet been made as to whether or not data will be collected in the fall or spring. Because of age requirements for school entry, the majority of children sampled in this study will be in first grade in two different years.

Exhibit 2. ECLS-B data collection protocol in the home (9-month field test)

1. Introduce the study at the door, determine where child and parent live, determine best time for child and parent

2. Obtain informed consent, record on parent consent form

3. Conduct parent interview (computer assisted personal interviewing (CAPI) application, 18 sections, more than 800 items)

4. Ask parent to complete self-administered questionnaire (short paper questionnaire with sensitive items; time begun and ended entered in CAPI)

5. Conduct Bayley Scales of Infant Development (requires a large kit of toys stored in a special duffel on wheels; administered in a specified sequence; complex scoring task with guide and score sheet; basal and ceiling must be established)

6. Obtain informed consent for videotaping NCATS, record on videotape consent form (similar to parent consent form, but specific to videotaping)

7. Help parent choose a task for the NCATS (eligible tasks listed on a card; parent should choose lowest-numbered task child cannot do)

8. Videotape parent teaching child a NCATS task (requires videocamera and tape, power source, adequate light; interviewer must keep child's and parent's faces and at least upper bodies in viewer at all times; interviewer ends task at 5 minutes if parent has not already signaled completion)

9. Collect physical measurements (2 length measurements with mat and parent; 2 parent weights alone and 2 with child; 2 upper arm length measurements, mid-point calculations, and circumference measures with a tape measure; 2 head circumferences for very low birth weight babies)

10. Give parent the respondent incentive

11A. Prepare resident father package and leave package with mother **and/or**

11B. Prepare package for non-resident father, leave with mother (packages include a questionnaire, cover letter, return envelope, and payment in an experimental treatment)

** At 18-months, ask the parent to complete the child attachment sort (explain the task; set-up up the sorting board and cards; record parent sorting piles)

Exhibit 3. ECLS-B data collection protocol shortly after leaving the home (9-month field test)

1. Complete home observation (answer HOME-like items and enter into computer)

2. Complete child observation (answer BRS and CRIB items and enter into computer)

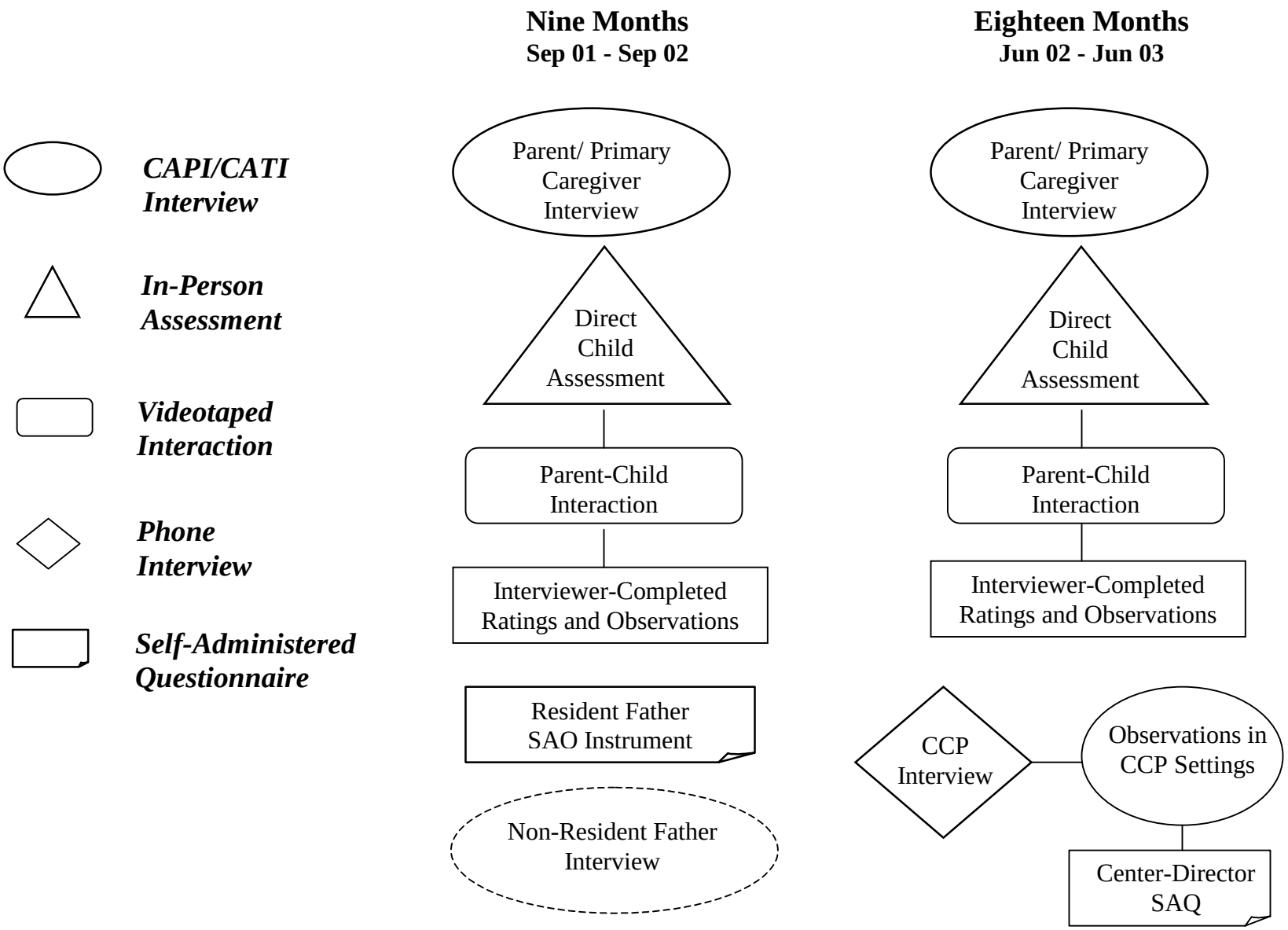
3. Complete Interviewer Remarks Questionnaire (answer questions on the home visit and enter into computer)

4A. Prompt for resident father self-administered questionnaire (phone follow-up if not received within two weeks) **and/or**

4B. Conduct CATI interview with non-resident father

** At 18-months, complete the child attachment sort

Figure 2. ECLS-B Multiple Methods - Instrument Design Map



Child Care Factors and Kindergarten Outcomes: Findings from a National Study of Children

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Background

Since the 1970s, there has been an increase in the participation rates of women in the workforce. This can be attributed to many factors, including the pursuit of higher education and careers, increases in the prevalence of single-parent families, the necessity of a dual income, and welfare reform (Hofferth, Shauman, Henke, & West, 1998; Vandell, 1998; Vandell & Wolfe, 2000). This trend has led many parents to consider alternative arrangements for the care of their children (Hayes, Palmer, & Zaslow, 1990; Hofferth, 1992; Howes & Hamilton, 1993; Leslie, Branson, & Anderson, 1989) and many researchers to examine the effects of child care on children's developmental outcomes (Belsky, 1984; Love, Schochet, & Meckstroth, 1996).

A plethora of research has demonstrated positive relationships between child care quality and children's outcomes (e.g., Burchinal, Roberts, Nabors & Bryant, 1996; Zaslow, 1991); however, there are likely other factors that relate to children's outcomes. Even though quality is frequently discussed as the more important factor (Howes & Hamilton, 1993), previous studies have suggested that the type of child care (e.g., center-based or family day care) and the age at which children first enter care may effect children's early development (e.g., Andersson, 1989). Consequently, this study will address the effect of the type of child care children received prior to kindergarten and the age at which they first entered care on their reading and mathematics knowledge and skills as they enter kindergarten.

Research Questions

- What is the distribution of children across different child care arrangements the year prior to kindergarten entry?

- Does being in a regular nonparental care arrangement the year prior to kindergarten relate to children's reading and mathematical knowledge and skills at kindergarten entry, while controlling for family socioeconomic status (SES)?

- Does being in a regular nonparental care arrangement the year prior to kindergarten relate to children's reading and mathematical knowledge and skills at kindergarten entry, within family SES (i.e., lowest 20 percent, middle 60 percent, highest 20 percent)?

Research Questions (continued)

- What is the average age at which children across the nation first enter child care?

- What is the relationship of the age children first enter care to their reading and mathematical knowledge and skills at kindergarten entry, while controlling for family SES?

The Study

Information on children's kindergarten reading and mathematics knowledge and skills comes from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K).

In the fall of 1998, the U. S. Department of Education's National Center for Education Statistics (NCES) embarked on a study of the early education of young children. The ECLS-K captures information on these children, their families, teachers and schools. The design is guided by an ecological systems perspective, in which the child's physical, cognitive and socio-emotional development is considered across multiple contexts, including the home, classroom, school and community.

Across the life of the study, children's reading and mathematics knowledge and skills are assessed 6 times: fall and spring kindergarten, fall and spring first grade, spring third grade, and spring fifth grade.

The Sample

- This research examines the developmental status of 18,097 children entering kindergarten in the U.S. in the fall of 1998.
- These children are part of a nationally representative sample of children enrolled in about 1,000 kindergarten programs during the 1998-99 school year.
- When appropriately weighted, the sample is representative of the 3,866,000 children enrolled in kindergarten in the fall of 1998.

Table 1. Distribution of U.S. kindergartners by child and family characteristics

Characteristic	Population Percentage
Gender	
Male	51
Female	49
Race/ethnicity	
White, non-Hispanic	57
Black, non-Hispanic	16
Hispanic	19
Asian	3
Other	4

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use data file.

Procedures

The ECLS-K gathered information on children's child care history and arrangements as part of a computer-assisted telephone interview with the children's parents. Measures of family SES were also obtained during the parent interview.

Information on children's cognitive development (i.e., mathematics and reading knowledge and skills) was measured through a one-on-one direct assessment. Trained assessors worked with the children in a quiet area with minimal distractions (e.g., in the school library as opposed to the classroom).*

*Procedures were developed to increase the participation of children with language problems and special needs (e.g., untimed assessment, allowing a child's assistant to be present). However, the ECLS-K cognitive assessment was designed to be administered in English. If the children's English skills were not adequate, they did not receive the ECLS-K's English cognitive assessment. If a child's home had a language other than English, children's English skills were determined through a language proficiency screener - the Oral Language Development Scale (OLDS) from the PreLAS 2000 (Duncan & DeAvila, 1998). Based on the English demands of the ECLS-K assessment and children's score on the OLDS, 7 percent of children were excluded from the English cognitive battery.

Measures

Children's cognitive development was assessed directly in a one-on-one, untimed assessment. The cognitive battery used a two-stage approach. For each domain, the child was administered a routing test (the first stage), which determined a child's approximate skill level. After completing the routing test, the child was administered the appropriate skill level assessment for that domain (the second stage). The reading and mathematics domains had three skill levels (low, middle, high). Scale scores for each domain were developed using Item Response Theory (IRT), which produced scores that can be compared regardless of which second stage form a child was administered.

The reading assessment included questions designed to measure basic skills (e.g., print familiarity, letter recognition, rhyming sounds), receptive vocabulary and comprehension. The mathematics assessment measured skills in conceptual knowledge, procedural knowledge and problem solving.

Family SES was calculated based on information about parental education level, parental occupation and household income.

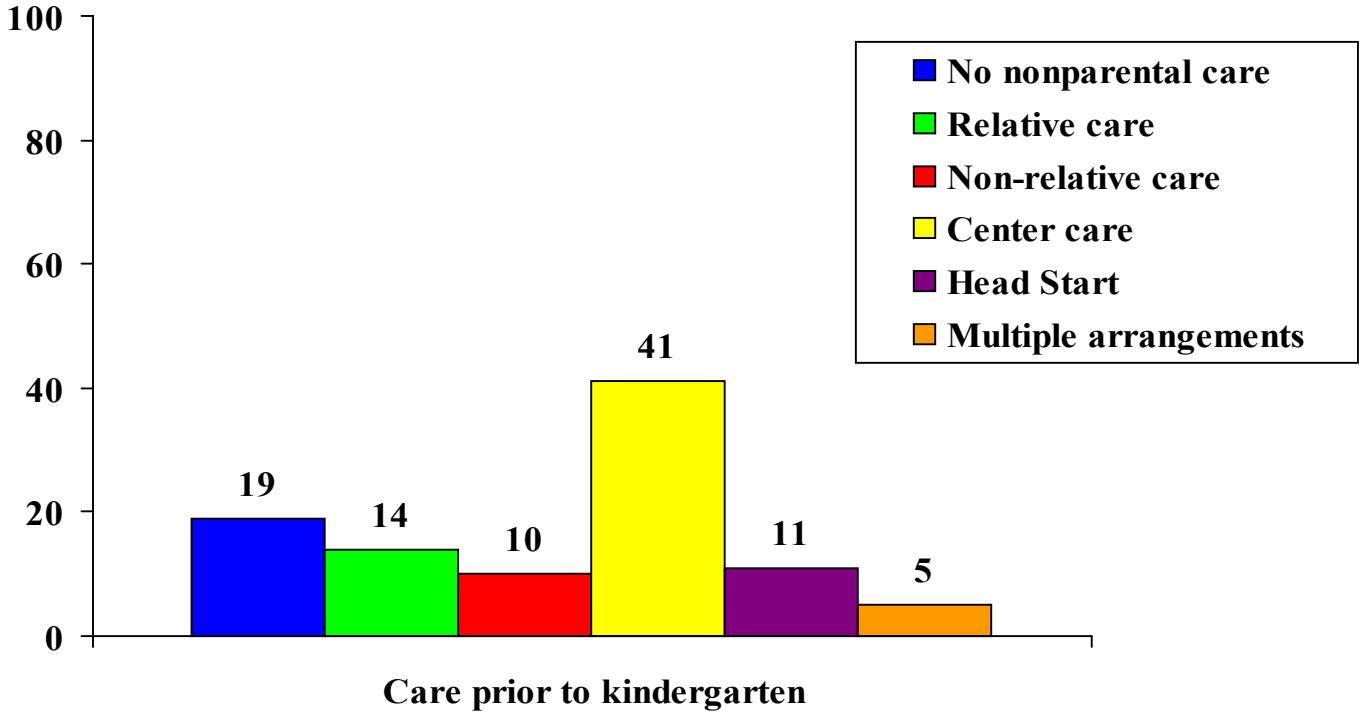
Results

What is the distribution of children across different child care arrangements the year prior to kindergarten entry?

- There were six types of child care identified for children enrolled in the ECLS-K study including no nonparental care, relative care (either in the child's home or someone else's home), non-relative care (either in the child's home or someone else's home), center-based care, Head Start*, and multiple care arrangements.
- Center-based care was the most frequently used primary care arrangement in the year prior to kindergarten (41 percent). This was followed by no nonparental care (19 percent), relative care (14 percent), Head Start (11 percent), non-relative care (10 percent), and multiple care arrangements (5 percent) (see figure 1).
- The type of care in which children are enrolled the year prior to kindergarten differs by characteristics, such as the socioeconomic status of the family. For example, children in low SES families (the lowest 20 percent of the SES distribution) are more likely not to be enrolled in a regular nonparental care arrangement the year prior to kindergarten than children in the other SES categories. And, children in the highest SES families (the highest 20 percent of the SES distribution) are more likely to be enrolled in a center-based care arrangement than children in the other SES categories. See table 2 for more detail on the distribution of children across these various types of primary care arrangements.

* Information about Head Start enrollment was obtained by parental report.

Figure 1. Percentage distribution of children's primary care arrangements the year prior to kindergarten



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use data file.

Table 2. Percentage distribution of children's primary type of care the year prior to kindergarten

Characteristic	No nonparental care	Relative Care	Non-relative Care	Center care	Head Start	Multiple arrangements
Total	19	14	10	41	11	5
Sex						
Male	20	14	9	42	10	5
Female	19	14	11	41	11	5
Race						
White	17	11	13	49	6	5
Black	14	18	4	34	23	8
Hispanic	29	17	8	28	14	5
Asian	21	18	4	43	10	4
Other	20	18	7	30	18	6
SES						
Lowest quintile 1	31	16	5	19	24	5
2	23	18	8	30	15	6
3	18	16	11	41	9	6
4	15	12	11	51	4	6
Highest quintile 5	10	7	14	64	1	4

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use data file.

Results (continued)

Does being in a regular nonparental care arrangement the year prior to kindergarten relate to children's reading and mathematical knowledge and skills at kindergarten entry, while controlling for family SES?

- Once the variation accounted for by SES was considered (see table 3, regression I and II, model 1), the presence of a care arrangement the year before kindergarten accounted for about 2 percent of the variance in children's reading and mathematics knowledge and skills at kindergarten entry (see table 3, regression I and II, model 2).
- To include the categorical variable *type of care* in the regression, we dummy coded each arrangement, with *no nonparental care* as the omitted category. The only type of care that made a significant contribution to the model was center-based care (see table 3, regression I and II). Children in non-Head Start center-based care arrangements are likely to score about 2 points higher on the reading and mathematics assessments than children not in care.

Table 3. Regression summary for type of child care, control variables, and math and reading knowledge and skills

	R^2	R^2 Change	Sig. of F Change	B
I. Reading Knowledge and Skills				
Model 1 – controls (SES)	.151	.151	.000	---
Model 2 – controls and type of care	.170	.019	.000	---
Relative	--	--	--	-.40
Nonrelative	--	--	--	.43
Head Start	--	--	--	-1.08
Center	--	--	--	2.19*
Multiple arrangements	--	--	--	.42
II. Math Knowledge and Skills				
Model 1 – controls (SES)	.192	.192	.000	---
Model 2 – controls and type of care	.207	.016	.000	---
Relative	--	--	--	-.19
Nonrelative	--	--	--	.93
Head Start	--	--	--	-.75
Center	--	--	--	1.87*
Multiple arrangements	--	--	--	.46

*p<.05.

NOTE: Primary type of care the year prior to kindergarten was dummy coded for these regressions. No nonparental care was the omitted category.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use data file.

Results (continued)

Does being in a regular nonparental care arrangement the year prior to kindergarten relate to children's reading and mathematical knowledge and skills at kindergarten entry, within family SES (i.e., lowest 20 percent, middle 60 percent, highest 20 percent)?

- To include the categorical variable *type of care* in the regression, we dummy coded each arrangement, with *no nonparental care* as the omitted category.

- **Low SES:** For children in the lowest 20 percent of SES, the presence of care (across all types) had no significant effect on children's reading and mathematics knowledge and skills (i.e., the overall regression model was not significant) (see table 4, regression I and II). However in terms of a specific type of care arrangement versus no care arrangement, children in center-based are likely to score about 2 points higher in reading and mathematics than children not in care.

Table 4. Regression summary for type of child care and math and reading knowledge and skills: Low SES children (lowest 20 percent)

	R^2	Sig. of F	B
I. Reading Knowledge and Skills	.022	.085	--
Relative	--	--	.12
Nonrelative	--	--	.47
Head Start	--	--	-.15
Center	--	--	1.96*
Multiple arrangements	--	--	.89
II. Math Knowledge and Skills	.017	.096	--
Relative	--	--	.32
Nonrelative	--	--	.50
Head Start	--	--	.31
Center	--	--	1.77*
Multiple arrangements	--	--	1.20

*p<.05.
NOTE: Primary type of care the year prior to kindergarten was dummy coded for these regressions. No nonparental care was the omitted category.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use data file.

Results (continued)

Does being in a regular nonparental care arrangement the year prior to kindergarten relate to children's reading and mathematical knowledge and skills at kindergarten entry, within family SES (i.e., lowest 20 percent, middle 60 percent, highest 20 percent)?

- **Middle SES:** For children in the middle 60 percent of SES, type of child care had a significant effect on children's reading and mathematics knowledge and skills (see table 5, regression I and II). In reading and math, children in center-based care are likely to score about 2 points higher than children in no care, and children in Head Start* are likely to score about 2 points lower than children in no care. Children in nonrelative care are likely to score 1.5 points higher in math than children in no care.

* Parents provided information about children's Head Start attendance. The ECLS-K also conducted an independent verification of whether the child actually attended Head Start. The verification study indicated that parent reports of attendance at Head Start were very similar to verified Head Start attendance. The two groups of children (those verified as attending Head Start and those identified by their parents as attending Head Start) are similar in terms of their poverty status, parent education, and race/ethnicity. However, it is important to remember that information about SES was measured while the children were in kindergarten and not while they were enrolled in Head Start. SES tends to be a "fluid" measure and may have changed between enrollment in Head Start and enrollment in kindergarten. Thus, these findings should be interpreted in context.

Table 5. Regression summary for type of child care and math and reading knowledge and skills: Middle SES children (middle 60 percent)

	R^2	Sig. of F	B
I. Reading Knowledge and Skills	.039	.000	--
Relative	--	--	-.60
Nonrelative	--	--	.98
Head Start	--	--	-2.08*
Center	--	--	2.41*
Multiple arrangements	--	--	.44
II. Math Knowledge and Skills	.039	.000	--
Relative	--	--	-.45
Nonrelative	--	--	1.46*
Head Start	--	--	-1.79*
Center	--	--	2.06*
Multiple arrangements	--	--	.50

*p<.05.
NOTE: Primary type of care the year prior to kindergarten was dummy coded for these regressions. No nonparental care was the omitted category.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use data file.

Results (continued)

Does being in a regular nonparental care arrangement the year prior to kindergarten relate to children's reading and mathematical knowledge and skills at kindergarten entry, within family SES (i.e., lowest 20 percent, middle 60 percent, highest 20 percent)?

- **High SES:** For children in the highest 20 percent of SES, the presence of a child care arrangement had a significant effect on children's reading and mathematics knowledge and skills (see table 6, regression I and II). Although the overall regression was significant for both reading and mathematics, no single type of care accounted for a significant amount of variation.

Table 6. Regression summary for type of child care and math and reading knowledge and skills: High SES children (highest 20 percent)

	R^2	Sig. of F	B
I. Reading Knowledge and Skills	.021	.028	--
Relative	--	--	-.17
Nonrelative	--	--	-.11
Head Start	--	--	-5.12
Center	--	--	2.56
Multiple arrangements	--	--	.72
II. Math Knowledge and Skills	.025	.010	--
Relative	--	--	-.16
Nonrelative	--	--	.44
Head Start	--	--	-5.73
Center	--	--	2.19
Multiple arrangements	--	--	.02

*p<.05.
NOTE: Primary type of care the year prior to kindergarten was dummy coded for these regressions. No nonparental care was the omitted category.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use data file.

Results (continued)

What is the average age at which children across the nation first enter child care?

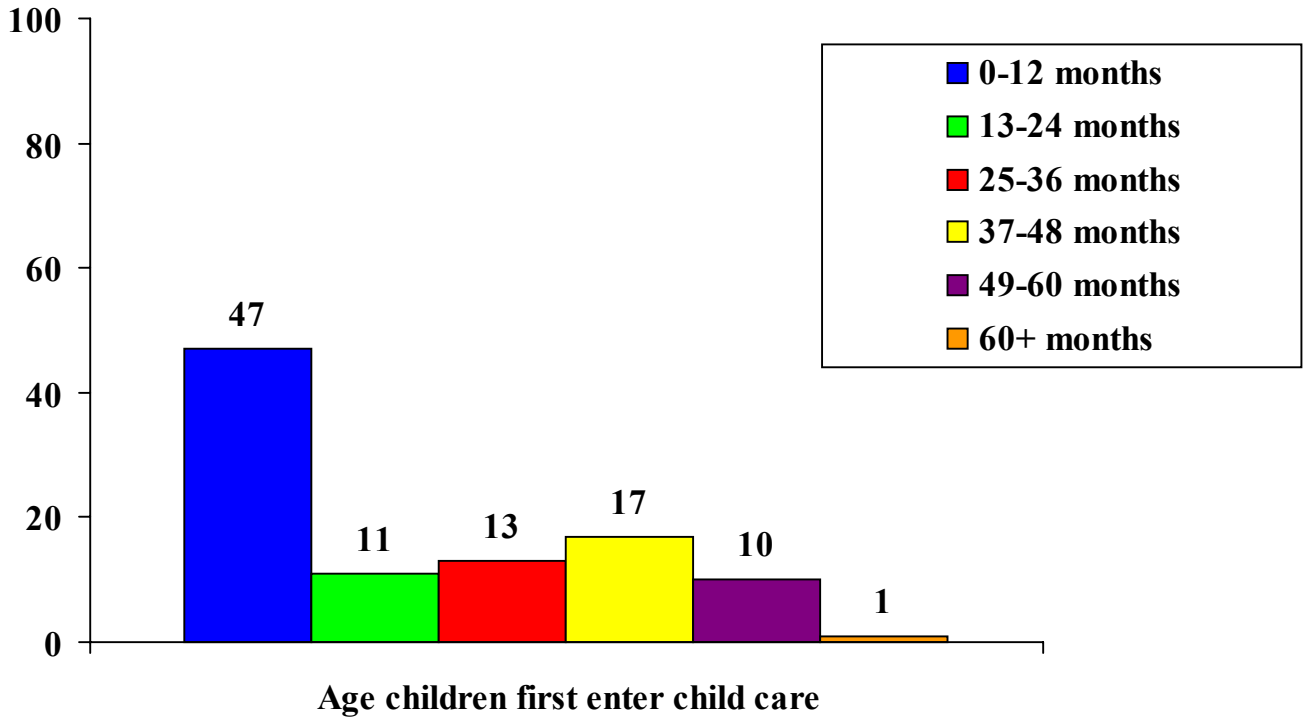
- About 81 percent of children enrolled in some type of regular nonparental care arrangement prior to entering kindergarten.

- Among kindergarten children who enrolled in child care, the average age children first entered care was about 2 years (M = 22 months).

- Almost half of children (47 percent) first entered a regular nonparental care arrangement before the age of one.

- See figure 2 for a detailed distribution of the age at which children across the nation first enter child care.

Figure 2. Percentage distribution of age at which children across the nation first enter a regular nonparental care arrangement



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use data file.

Results (continued)

What is the relationship of the age children first enter care to their reading and mathematical knowledge and skills at kindergarten entry, while controlling for family SES?

- Once the variation accounted for by SES was considered (see table 7, regression I and II, model 1), the age at which children entered non-parental care on a regular basis did not significantly relate to children's reading and mathematics knowledge and skills at kindergarten entry (see table 7, regression I and II, model 2).

Table 7. Regression summary for age of first entry into child care, control variables, and math and reading knowledge and skills

	R^2	R^2 change	Sig. of F change
I. Reading knowledge and skills			
Model 1 - controls (SES)	.150	.150	.000
Model 2 - controls and age of entry	.150	0	.907
II. Mathematics knowledge and skills			
Model 1 - controls (SES)	.185	.185	.000
Model 2 - controls and age of entry	.185	0	.779

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use data file.

Summary

- Enrollment in child care prior to kindergarten makes a difference to children's reading and mathematics knowledge and skills at kindergarten entry.

  - After the variation associated with SES is accounted for, the only type of child care that made a consistent positive difference to children's reading and mathematics knowledge and skills was center-based care.
  - Within the different levels of family SES, center-based care makes a difference for low and middle SES children; and, no single type of care appears to make a difference to high SES children.

- The age at which children first enter a regular nonparental care arrangement is not associated with their reading and mathematics knowledge and skills at kindergarten entry.

Conclusions

- This national study of children suggests that child care does not necessarily have detrimental effects on children's reading and mathematics knowledge and skills at kindergarten entry. In some cases, and for some groups of children, it is beneficial.

- Some contend that child care is detrimental for children's development, especially if they are placed in care at a very young age. However, previous studies have demonstrated that children enrolled in center-based care often do better than children enrolled in other types of care or no nonparental care, and that there are mixed results with regard to the effect of age of entry into child care on children's outcomes.

- Many parents enroll children in non-parental care (81 percent of children have had experience in a regular non-parental care arrangement prior to entering kindergarten). Enrollment is often due to necessity; however, some parents enroll their children for enrichment and socialization purposes.

- This study shows that children in center-based care perform better on reading and mathematics knowledge and skills at kindergarten entry and that age of entry into care does not have a significant effect on children's reading and mathematics knowledge and skills at kindergarten entry. This could be because nearly half of children are entering a regular nonparental care arrangement prior to one year of age, and may have experienced many child care settings prior to entering kindergarten.

Future Directions

Future research should continue to study more complex models, which:

- provide information about the quality of child care settings
- collect information across a variety of settings (not simply concentrating on center-based care)
- provide information on children's social, as well as cognitive outcomes
- result in a better understanding of what type of care works best for certain groups of children

Home Educational Activities, Literacy Resources and Kindergartners' Reading Knowledge and Skills

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Background

With the release of the National Education Goals in 1990, the public is becoming increasingly aware of the concept that *parents are children's first teachers*. We know that parents play a central role in young children's socialization and learning (Bredekamp & Kopple, 1997; Maccoby, 1992), and we also appreciate that children learn through interacting with others (Bandura, 1986) and young children thrive when they can actively participate in and construct their knowledge (Ginsburg & Opper, 1988). Therefore, it is extremely important for young children to directly experience activities such as reading and story telling and have ample access to books. Simple interactions, such as reading to children, may lead to greater reading knowledge and skills (Snow, Burns & Griffin, 1998; Nord, Lennon, Liu & Chandler, 2000).

This study will examine the relationship between children's home literacy environment (e.g., number of books in the home and frequency children are read to by a family member) and their reading knowledge and skills as they enter kindergarten.

Research Questions

- On average, what home educational activities (e.g., reading to children) and literacy resources (e.g., number of books in the home) are available to children as they enter kindergarten for the first time?
- What is the relationship of home educational activities and literacy resources to children's reading knowledge and skills at kindergarten entry?
- Does the relationship of educational activities and literacy resources to children's reading knowledge and skills at kindergarten entry exist for children in poverty as well as children not in poverty?

The Study

Information on children's kindergarten reading knowledge and skills comes from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K).

In the fall of 1998, the U. S. Department of Education's National Center for Education Statistics (NCES) embarked on a study of the early education of young children. The ECLS-K captures information on these children, their families, teachers and schools. The design is guided by an ecological systems perspective, in which the child's physical, cognitive and socio-emotional development is considered across multiple contexts, including the home, classroom, school and community.

Across the life of the study, children's reading knowledge and skills are assessed 6 times: fall and spring kindergarten, fall and spring first grade, spring third grade and spring fifth grade.

The Sample

- This research examines the developmental status of 17,219 children entering kindergarten for the first time.
- These children are part of a nationally representative sample of approximately 22,000 children enrolled in about 1,000 kindergarten programs during the 1998-99 school year.
- These children attended both public and private kindergartens, offering full-day and part-day programs.
- When appropriately weighted, the sample is representative of the 3,679,000 children enrolled in kindergarten for the first time in the fall of 1998.

Table 1. Distribution of kindergartners by child and family characteristics

Characteristic	Population Percentage
Sex	
Male	51
Female	49
Race/ethnicity	
White, non-Hispanic	61
Black, non-Hispanic	16
Hispanic	15
Asian	3
Other	5
Poverty	
At or above threshold	81
Below threshold	19

SOURE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-Use Base Year file .

Procedures and Measures

The Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K) gathered information on children's home educational activities and literacy resources as part of a computer-assisted telephone interview. The parent interview also collected information on the socioeconomic status of the family. The home educational activity items asked how often in a typical week (i.e., not at all, once or twice, three to six times, every day) a family member read to, told stories to and sang to the child. The literacy resource items asked about the number of children's books and children's records/ audio tapes/ CDs in the home.

Children's reading knowledge and skills were measured through an one-on-one direct assessment that included items on basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming sounds, word recognition), vocabulary and comprehension.* The cognitive battery used a two-stage approach. For each domain, the child was administered a routing test (the first stage), which determined a child's approximate skill level. After completing the routing test, the child was administered the appropriate skill level assessment for that domain (the second stage). The reading domain had three skill levels (low, middle, high). A reading scale score was developed using Item Response Theory (IRT), which produced scores that can be compared regardless of which second stage form a child was administered.

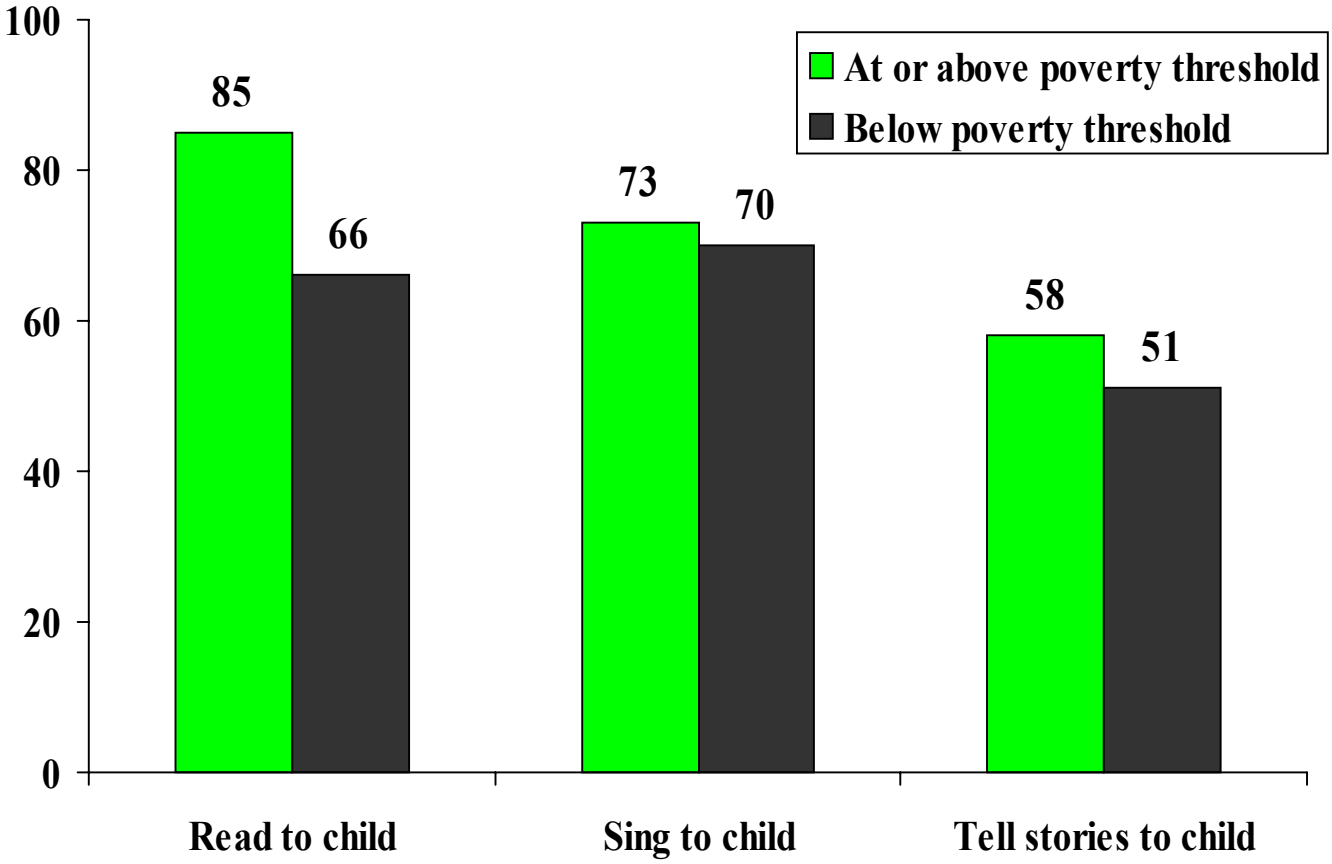
*Procedures were developed to increase the participation of children with language problems and special needs (e.g., untimed assessment, allowing a child's assistant to be present). However, the ECLS-K cognitive assessment was designed to be administered in English. If the children's English skills were not adequate, they did not receive the ECLS-K's English cognitive assessment. If a child's home had a language other than English, children's English skills were determined through a language proficiency screener - the Oral Language Development Scale (OLDS) from the PreLAS 2000 (Duncan & DeAvila, 1998). Based on the English demands of the ECLS-K assessment and children's score on the OLDS, 7 percent of children were excluded from the English cognitive battery.

Results

To identify the children who were somewhat deprived in the frequency with which they were read to, told stories, and sang to we collapsed the response categories into *less than three times a week* versus *three or more times a week*. The majority of parents report reading to their children (81 percent), singing to their children (72 percent) and telling stories to their children (56 percent) three or more times a week. A significantly larger percent of children at or above the poverty level are read to ($t=12.0$, $p<.05$), sung to ($t=2.5$, $p<.05$) and told stories to ($t=4.6$, $p<.05$) *three or more times a week* than children below the poverty level (figure 1, table 2). The largest difference between poor and non-poor children is in terms of the frequency with which they are read to by a family member.

The average family reported having 70 children's books in the home and 15 children's records/ audio tapes/ CDs. A significantly larger number of children below the poverty level had less than the average number of books in the home ($t=15.9$, $p< .05$) and less than the average number of records/ audio tapes/ CDs ($t=11.9$, $p<. 05$) than children at or above the poverty level (table 3).

Figure 1. Percentage of children read to, sung to, told stories to *more than* three times a week, by poverty status



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study Kindergarten Class of 1998-99, fall 1998, Public-Use Base Year file .

Table 2. Percentage of first-time kindergartners who were read to, sang to and told stories to by a family member, by poverty status

	Read to child		Sing to child		Tell stories to child	
	Less than three times a week	Three times a week or more	Less than three times a week	Three times a week or more	Less than three times a week	Three times a week or more
Total	19	81	28	72	44	56
At or above poverty level	15	85	27	73	42	58
Below poverty level	34	66	29	70	49	51

NOTE: These questions were originally asked on the following scale: not at all, once or twice a week, 3 to 6 times a week and every day. We collapsed the categories into: less than three times a week versus three times a week or more.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study Kindergarten Class of 1998-99, fall 1998, Public-Use Base Year file .

Table 3. Number of children's books and records/audio tapes/CDs in the home, by poverty status

	Children's books		Children's records/ audio tapes/ CDs	
	Less than 70	70 or more	Less than 15	15 or more
Total	56	44	56	44
At or above poverty level	50	50	54	46
Below poverty level	80	20	70	30

NOTE: These questions were originally asked on a continuous scale. Responses for books ranged from 0 to 200, with 70 as the average (sd = 59). Responses for tapes ranged from 0 to 100, with 15 as the average (sd = 17). To identify children who had less than the average number of books and tapes, we collapsed the categories into: books – less than 70 versus 70 or more, and records – less than 15 versus 15 or more.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study Kindergarten Class of 1998-99, fall 1998, Public-Use Base Year file .

Results, Continued

To explore the relationship between home educational activities and literacy environment to children's beginning kindergarten reading knowledge and skills, we created an index which counts whether children are read to (1 point), sang to (1 point), and told stories to (1 point) *three or more times a week*, whether they have the average number of books or more (1 point) and whether they have the average number of records/ audio tapes/ CDs or more (1 point). Therefore, children's scores on the index can range from 0 to 5 points. The higher the point total, the richer the home environment.

Children with a richer home literacy environment demonstrate higher levels of reading knowledge and skills (model 1, table 4). This relationship is found for children both above the poverty threshold and below the poverty threshold (models 2 and 3 respectively, table 4).

Table 4. Results from regression analysis of home literacy environment on children's reading knowledge and skills as they enter kindergarten

Model	R^2
I. All first-time kindergartners	.06*
II. First-time kindergartners above the poverty threshold	.05*
III. First-time kindergartners below the poverty threshold	.03*

* Significant at p<.05.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study Kindergarten Class of 1998-99, fall 1998, Public-Use Base Year file .

Implications

- Parents need to engage children in language rich activities such as reading, singing and telling stories. The provision of a rich literacy environment for children is equally important. This study supports these statements by showing the positive effect of a rich literacy environment on children's reading knowledge and skills as they begin formal schooling (i.e., kindergarten).

- Even though children in poverty are less likely to be read to, sang to and told stories to and are also less likely to have the average number of books and auditory materials in the home than children above the poverty threshold, these factors still have a positive effect on their reading knowledge and skills as they enter kindergarten. Therefore, the significance of families' early interactions with children cannot be underestimated. **All** children, economically advantaged and disadvantaged alike, benefit from a rich literacy environment in the home.

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The World as our Classroom: Enrichment Opportunities and Kindergartners' Cognitive Knowledge and Skills

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Background

Children's exploration of the world around them is essential for their cognitive and social growth. Children construct knowledge through directly acting upon objects and interacting with others (Bandura, 1978; Ginsburg & Opper, 1988). Some writers speak of the importance of providing children with enriching environments and learning opportunities such as visiting a library or museum, taking music lessons, or playing sports to help foster children's development (see Brown, 1999). Little empirical research exists, especially at the national level, on whether participation in such enrichment activities supports development and learning in the early childhood years.

The purpose of this study is (1) to describe kindergartners' participation in a variety of enrichment activities and (2) to examine whether children's level of participation in such activities relates to their cognitive knowledge and skills. We also examine this relationship for children whose access to such opportunities may differ or be more limited (e.g., children at greater risk for later school difficulty, children from rural areas) than children with greater resources or who are closer in proximity to places such as zoos or museums.

Research Questions

- What is the participation of kindergartners in a variety of enrichment activities?

- Do children's reading, general knowledge, and mathematics knowledge and skills differ by their level of participation in enrichment activities?

- Does the relationship between children's cognitive knowledge and skills and enrichment participation vary by urbanicity or by factors* which place children at risk for later school difficulty?

*In this study, risk factors are represented by a family risk factor index which includes less than high school parent education, single parent family, language minority household, and being below the poverty threshold.

The Study

Information on children's kindergarten reading, general knowledge, and mathematics knowledge and skills comes from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS–K).

In the fall of 1998, the U. S. Department of Education's National Center for Education Statistics (NCES) embarked on a study of the early education of young children. The ECLS–K captures information on these children, their families, teachers, and schools. The design is guided by an ecological systems perspective, in which the child's physical, cognitive, and socio-emotional development is considered across multiple contexts, including the home, classroom, school, and community.

Across the life of the study, children's cognitive knowledge and skills are assessed 6 times: fall and spring kindergarten, fall and spring first grade, spring third grade, and spring fifth grade.

The Sample

- This research presents information on children who are part of a nationally representative sample of approximately 22,000 children enrolled in about 1,000 kindergarten programs during the 1998-99 school year.
- The analyses presented here are based on 15,700 first-time kindergartners who completed the ECLS–K English cognitive battery in the spring. When appropriately weighted, the sample is representative of approximately 3 million children enrolled in kindergarten for the first time in the fall of 1998.
- For details on population percentages by child and family characteristics, see table 1.

Procedures

As part of the larger ECLS–K study, data were collected on children's reading, general knowledge, and mathematics knowledge and skills in the spring of the children's kindergarten year.

The children were administered one-on-one assessments in their school. Trained assessors worked with the children in a quiet area with minimal distractions (e.g., in the school library as opposed to the classroom)*.

Parents were asked questions about their family and their children's development in a computer-assisted telephone interview.

*Procedures were developed to increase the participation of children with language problems and special needs (e.g., untimed assessment, allowing a child's assistant to be present). However, the ECLS-K cognitive assessment was designed to be administered in English. If the children's English skills were not adequate, they did not receive the ECLS-K's English cognitive assessment. If a child's home had a language other than English, children's English skills were determined through a language proficiency screener - the Oral Language Development Scale (OLDS) from the PreLAS 2000 (Duncan & DeAvila, 1998). Based on the English demands of the ECLS-K assessment and children's scores on the OLDS, 5 percent of children were excluded from the English cognitive battery in the spring of the kindergarten year.

Measures

Children's participation in enrichment activities was ascertained from their parents. Parents were asked about two types of enrichment activities: family outings and extracurricular activities.

- Participation in family outings reflect whether in the past month children experienced an activity with a family member. Parents reported on five different activities: visiting a library, attending a play or concert, visiting a museum, going to the zoo or aquarium, and attending a sporting event.

- Extracurricular activities reflect children's participation in nine different activities in the spring of their kindergarten year: dance lessons, athletics, organized clubs (e.g., Scouts), music lessons, drama lessons, art lessons, organized performing arts (e.g., choir), craft lessons, and non-English instruction outside of school.

Level of participation in each type of enrichment was defined by the number of activities in which the child participated: zero, one, or two or more.

Measures (continued)

Children's cognitive development (reading, mathematics, general knowledge) was assessed directly in a one-on-one, untimed assessment. The cognitive battery used a two-stage approach. For each domain, the child was administered a routing test (the first stage), which determined a child's approximate skill level. After completing the routing test, the child was administered the appropriate skill level assessment for that domain (the second stage).

For both reading and mathematics there were three level tests (low, middle, high). For general knowledge there were two level tests. The reading domain consisted of basic skills (e.g., letter recognition), vocabulary and reading comprehension. The mathematics domain covered early skills involving number, shape and pattern as well as problem solving (e.g., addition). The general knowledge domain covered a range of science and social studies content.

Children's cognitive performance is reported here in terms of standardized scores (t-scores). The t-scores are norm-referenced, providing information on the achievement of groups of children (e.g., children with 2 or more risk factors) relative to that of the population as a whole. The t-scores have a mean of 50 and a standard deviation of 10.

Results

(all results are significant at the .05 level, unless otherwise indicated)

Kindergartners' participation in enrichment activities

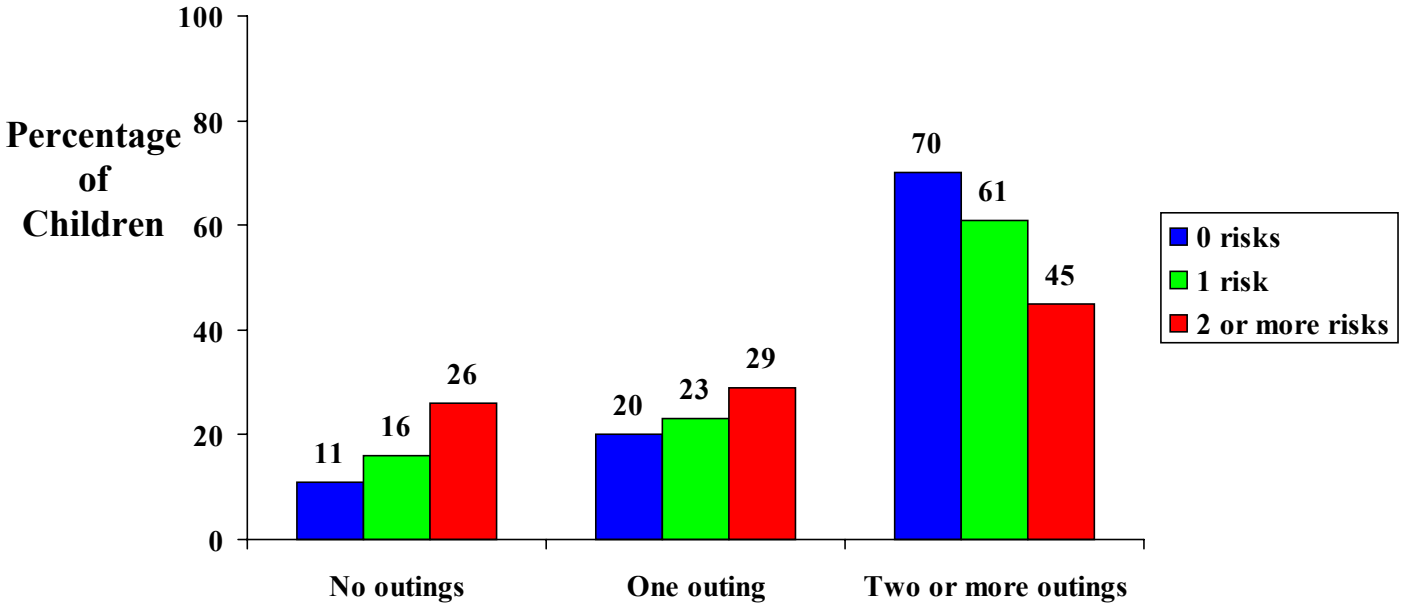
- In the spring of their kindergarten year, about two-thirds of children experienced two or more family outings in the past month (e.g., visit a library, go to the zoo) (table 2)*. Participation in family outings varies by the number of family risk factors and by urbanicity. The greater the number of risks, the fewer the family outings children experience (figure 1). Urban children are more likely than rural children to experience two or more family outings.**

- In the spring of their kindergarten year, a large number of children (two-thirds) are involved in at least one extracurricular activity (e.g., dance lessons, sports) (table 2). About one-third of children are involved in one activity; another third in two or more extracurricular activities, and about one-third of children are not involved in any such activities. Children's participation in extracurricular activities differs by the number of family risks and by urbanicity. The greater the number of risks, the fewer extracurricular activities children participate in. In fact, children with no risk factors are more than twice as likely to be involved in two or more extracurricular activities as compared to children with two or more risk factors (40 versus 15 percent) (figure 2). Urban children are more likely than rural children to participate in two or more extracurricular activities.

* Tables A and B detail children's participation in each family outing and extracurricular activity.

** For differences in participation by family risk index, we ran a linear regression. Statistical differences in participation by urbanicity were detected by using Bonferroni-adjusted t-tests.

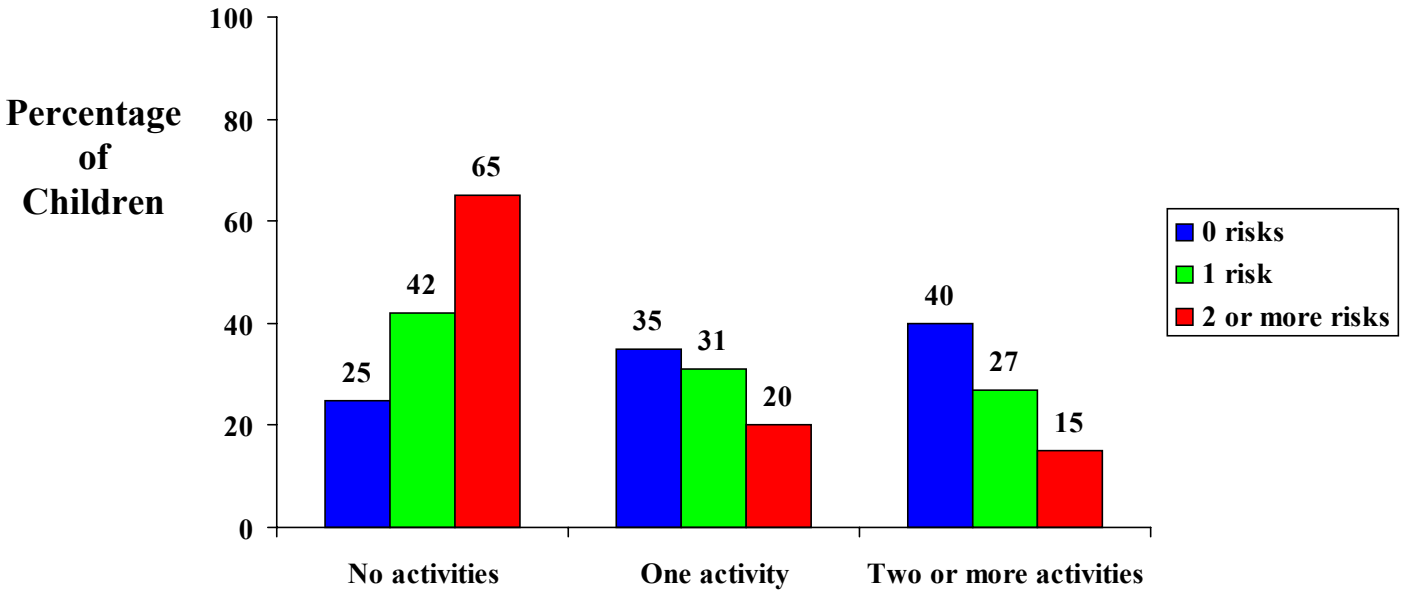
Figure 1. Percentage of first-time kindergartners participating in family outings, by family risk index



NOTE: Estimates are based on first-time kindergartners who were assessed in English. Family outings include visiting a library, attending a play or concert, visiting a museum, going to the zoo or attending a sporting event in the past month. Risk factors include less than high school parent education, single parent family, language minority household and being below the poverty threshold.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999, Base Year Public-Use File.

Figure 2. Percentage of first-time kindergartners participating in extracurricular activities, by family risk index



NOTE: Estimates are based on first-time kindergartners who were assessed in English. Extracurricular activities include dance, music, art or drama lessons, sports, organized clubs (e.g., Scouts), craft lessons, organized performing arts (e.g., choir) and non-English language instruction. Risk factors include less than high school parent education, single parent family, language minority household and being below the poverty threshold.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999, Base Year Public-Use File.

Results (continued)

(all results are significant at the .05 level, unless otherwise indicated)

Family outings and cognitive performance

- Kindergartners' reading, general knowledge, and mathematics knowledge and skills significantly vary by participation in family outings. Children experiencing more outings demonstrate higher cognitive knowledge and skills than those with less participation (table 3).*

- Within each risk group, children's reading, general knowledge, and mathematics knowledge and skills do not vary by their participation in family outings. In other words, the level of participation does not make a significant difference for children with a similar number of family risk factors.

- For children attending urban and suburban schools, their general knowledge performance varies by their participation in family outings but their reading and mathematics performance does not. Higher general knowledge is associated with experiencing a greater number of family outings. However, for children attending schools in rural area, their cognitive performance in reading, mathematics, and general knowledge does not significantly vary by their level of participation in family outings.

* For differences in children's cognitive knowledge and skills by level of enrichment participation, we ran linear regressions.

Results (continued)

(all results are significant at the .05 level, unless otherwise indicated)

Extracurricular activities and cognitive performance

- Kindergartners' reading, general knowledge, and mathematics knowledge and skills vary by participation in extracurricular activities. Those with higher participation in extracurricular activities demonstrate higher cognitive knowledge and skills (table 4).*

- Children with no risk factors who are in more extracurricular activities perform better in reading, mathematics, and general knowledge than children with similar backgrounds in fewer activities. For children with one risk factor, their general knowledge increases with greater participation, but their reading and mathematics performance does not. And, children at the greatest risk for later school difficulty (i.e., two or more risk factors) perform similarly, regardless of their participation in extracurricular activities.

- For children attending schools in urban and suburban areas, higher performance in reading, mathematics, and general knowledge is related to participation in more extracurricular activities. For children attending schools in rural areas, those with higher extracurricular participation perform better in general knowledge; however, their reading and mathematics performance does not vary by their level of participation.

* For differences in children's cognitive knowledge and skills by level of enrichment participation, we ran linear regressions.

Summary

- The majority of children engage in enrichment activities of varying types. Children's level of participation does vary by their risk for later school difficulty. Those at greater risk are less likely to be involved in enrichment activities. Participation does not differ greatly by whether they attend schools in or far away from a city.

- For the most part, children's participation in family outings (e.g., visiting a library, going to the zoo) does not appear to significantly impact their cognitive performance in kindergarten once children's risk for later school difficulty is considered.

- Greater participation in extracurricular activities (e.g., dance lessons, choir) is associated with higher cognitive knowledge and skills for many children. But children from rural areas and children at risk for later school difficulty do not appear to experience the same cognitive benefits from participation in extracurricular activities.

Implications and Limitations

- Parents are providing their children with many of the enrichment experiences that the literature suggests enhance children's opportunity for cognitive growth. Depending on the type of enrichment and, in some cases, on the children's family and living circumstances, these experiences appear to have an impact on children's cognitive knowledge and skills as early as kindergarten.

- Frequency of the activity may be key. For example, children's cognitive knowledge and skills are associated with their participation in extracurricular activities; whereas, no clear pattern emerges across different groups of children in terms of participation in family outings. Typically, children may engage in extracurricular activities on a weekly or bi-weekly basis, whereas family outings may tend to be less regular and frequent (e.g., monthly). Thus, level of exposure to enrichment may play a role in the relationship between children's cognitive knowledge and skills and participation in enrichment activities.

- The cognitive benefits of both types of enrichment appear to depend on the characteristics of the children and their families. For example, at-risk children (2 or more risk factors) do not seem to benefit from the enrichment experiences we studied. Whereas, children not at risk (0 risk factors), appear to benefit from participation in extracurricular activities. Further examination of the benefits of participation in enrichment is warranted. It will be important to understand what works for what groups of children.

- In this study, we were unable to measure certain aspects of enrichment opportunities such as the exact frequency of each experience, the quality of the enrichment experiences, or children and families' accessibility to these outings and activities. An examination of these variables may help to elucidate the role of enrichment opportunities in enhancing children's cognitive knowledge and skills.

Tables

Table 1. Percentage distribution of first-time kindergartners, by child and family characteristics: Spring 1999

	Population (in thousands)	**Percentage**
Total	3,031	100
Family risk index		
No risk factors	1,879	62
One risk factor	688	23
Two or more risk factors	464	15
Urbanicity		
Urban	1,413	47
Suburban	966	32
Rural	652	21

NOTE: Estimates are based on first-time kindergartners who were assessed in English. Risk factors include less than high school parent education, single parent family, language minority household and being below the poverty threshold.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999, Base Year Public-Use File

Table 2. Percentage distribution of first-time kindergartners' participation in enrichment activities, by child and family characteristics, by participation level: Spring 1999

	Family outings			**Extracurricular activities**		
	No outings	One outing	Two or more outings	No activities	One activity	Two or more activities
Total	14	22	64	35	32	33
Risk index						
No risk factors	11	20	70	25	35	40
One risk factor	16	23	61	42	31	27
Two or more risk factors	26	29	45	65	20	15
Urbanicity						
Urban	12	20	68	33	31	36
Suburban	15	22	63	36	32	32
Rural	18	25	57	38	34	28

NOTE: Estimates are based on first-time kindergartners who were assessed in English. Family outings include visiting a library, attending a play or concert, visiting a museum, going to the zoo or attending a sporting event in the past month. Extracurricular activities include dance, music, art or drama lessons, sports, organized clubs (e.g., Scouts), craft lessons, organized performing arts (e.g., choir) and non-English language instruction. Risk factors include less than high school parent education, single parent family, language minority household and being below the poverty threshold.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999, Base Year Public-Use File

Table 3. First-time kindergartners' mean cognitive t-scores, by child and family characteristics, by level of participation in family outings: Spring 1999

	Reading			Mathematics			General Knowledge		
	No outings	One outing	Two or more outings	No outings	One outing	Two or more outings	No outings	One outing	Two or more outings
Total	48	50	51	48	50	52	47	49	52
Risk index									
No risk factors	50	52	53	51	53	54	50	53	54
One risk factor	47	48	50	47	49	50	46	47	49
Two or more risk factors	44	45	45	44	45	46	41	43	44
Urbanicity									
Urban	49	51	52	49	51	52	47	49	52
Suburban	47	49	51	47	50	52	46	49	52
Rural	46	49	50	47	50	51	47	49	51

NOTE: Estimates are based on first-time kindergartners who were assessed in English. T-scores standardized distribution: Mean = 50 and SD = 10. Family outings include visiting a library, attending a play or concert, visiting a museum, going to the zoo or attending a sporting event in the past month. Risk factors include less than high school parent education, single parent family, language minority household and being below the poverty threshold.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999, Base-Year Public Use File

Table 4. First-time kindergartners' mean cognitive t-scores, by child and family characteristics, by level of participation in extracurricular activities: Spring 1999

	Reading			Mathematics			General Knowledge		
	No activities	One activity	Two or more activities	No activities	One activity	Two or more activities	No activities	One activity	Two or more activities
Total	47	51	53	48	52	54	46	52	54
Risk index									
No risk factors	50	52	55	50	53	55	50	54	56
One risk factor	47	49	52	47	50	52	46	49	51
Two or more risk factors	44	46	46	44	46	47	42	44	46
Urbanicity									
Urban	48	52	54	48	52	55	46	51	54
Suburban	46	51	53	47	52	54	46	52	55
Rural	46	50	51	47	51	52	47	51	53

NOTE: Estimates are based on first-time kindergartners who were assessed in English. T-scores standardized distribution: Mean = 50 and SD = 10. Extracurricular activities include dance, music, art or drama lessons, sports, organized clubs (e.g., Scouts), craft lessons, organized performing arts (e.g., choir) and non-English language instruction. Risk factors include less than high school parent education, single parent family, language minority household and being below the poverty threshold.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999, Base-Year Public Use File

Table A. Percentage distribution of first-time kindergartners' participation in family outings, by child and family characteristics: Spring 1999

	Family Outing				
	Visit a library	**Attend a play or concert**	**Visit a museum**	**Go to the zoo**	**Attend a sporting event**
Total	54	39	31	40	44
Family risk index					
No risk factors	58	42	34	41	49
One risk factor	50	40	31	41	40
Two or more risk factors	41	28	21	37	30
Urbanicity					
Urban	57	40	35	46	43
Suburban	53	38	31	39	45
Rural	49	37	23	29	45

NOTE: Estimates are based on first-time kindergartners who were assessed in English. Risk factors include less than high school parent education, single parent family, language minority household and being below the poverty threshold.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999, Base Year Public-Use File

Table B. Percentage distribution of first-time kindergartners' participation in extracurricular activities, by child and family characteristics: Spring 1999

	Extracurricular Activity								
	Dance	Sports	Scouts	Music	Drama	Art	Choir	Craft	Language
Total	17	47	14	8	2	7	15	11	6
Family risk index									
No risk factors	21	58	17	9	2	9	17	13	6
One risk factor	14	36	11	7	1	6	13	9	8
Two or more risk factors	7	18	7	4	1	5	10	6	5
Urbanicity									
Urban	20	48	14	9	2	9	15	12	7
Suburban	16	47	15	8	2	7	15	11	5
Rural	13	45	13	5	1	5	15	9	6

NOTE: Estimates are based on first-time kindergartners who were assessed in English. Risk factors include less than high school parent education, single parent family, language minority household and being below the poverty threshold.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Spring 1999, Base Year Public-Use File

Vulnerable Children and At-Risk Families: What Schools Offer Kindergartners and Their Families

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Background

Ready children need ready schools

- When we think about the approximately 4 million children entering kindergarten, policy makers and researchers alike tend to consider the concept of readiness.
- As we know from many years of research, readiness is an extremely complex construct. It is not simply a matter of preparing children.
- Educational readiness can be conceptualized in terms of the multiple facets of children, their families, their teachers and their schools.

- Each year, about 4 million children begin their school careers. And, each year parents across the U.S. wonder whether their child is ready to meet the new demands of school.
- Schools and teachers make preparations to receive and serve these children.
- In the early 1990's, a framework for school readiness was advanced by the National Educational Goals Panel. The framework broadened the way policy makers, educators, and the general public think about the construct of "readiness".
- In 1998, the National Educational Goals Panel published a report which outlines characteristics of ready schools.
- Both the framework for children and the framework for schools give special importance to the family. Parents are seen as their children's first teachers, and schools must reach out and provide children with learning environments which are rich in opportunity, possess adequate facilities and are safe.
- Thus, when thinking about children's readiness for school we need to consider the intersection of the child and their family with the classroom and the school.

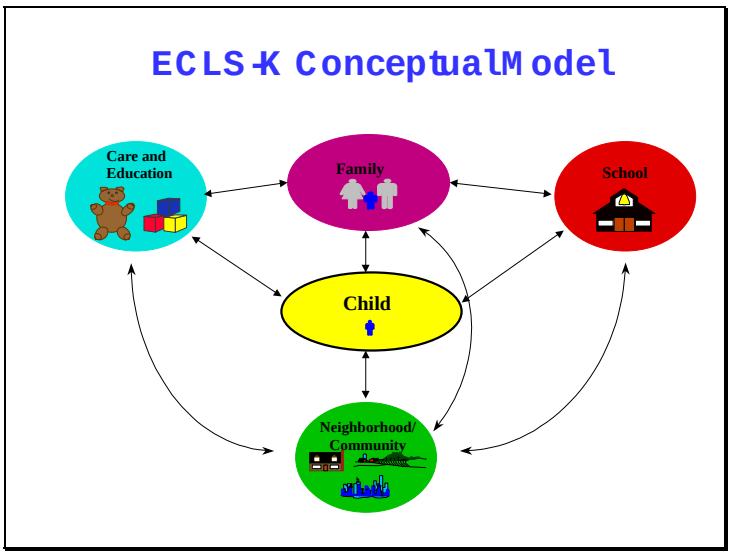
The Study

The Early Childhood Longitudinal Study,
Kindergarten Class of 1998-99

- The ECLS-K provides information on the ways children are prepared for school and how schools and early childhood programs affect the lives of the children who attend them.
- The ECLS-K provides national data on children's experiences and growth from kindergarten through the fifth grade; children's transitions to nonparental care and early school experiences.
- The ECLS-K provides data which informs research issues concerning the effects of a wide range of family, school, community, and individual variables on children's development, early learning, and early performance in school.

- The Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K) is the first study to follow a nationally representative sample of children from the beginning of their kindergarten year through the early elementary school years.

- The study is sponsored by the U.S. Department of Education, National Center for Education Statistics with support from USDA, ACYF, and NICHD.



The design of the ECLS-K is guided by a framework of children's development and schooling that emphasizes the interaction between the child and family, the child and school, the family and school, and the family, school, and community. The ECLS-K recognizes the importance of factors that represent the child's health status, socio-emotional and intellectual development, and incorporates factors from the child's family, community, and school-classroom environments. The study is particularly interested in the role that parents and families play in helping children adjust to formal school and in supporting their education through the primary and middle elementary grades. It is also interested in understanding how schools prepare for and respond to the diverse backgrounds and experiences of the children and families they serve.

The Study

The Early Childhood Longitudinal Study,
Kindergarten Class of 1998-99

Grade	Fall	Spring	School Year
Kindergarten	X	X	1998-99
First	X*	X	1999-2000
Third		X	2001-2002
Fifth		X	2003-2004

*Data collected from a 30 percent subsample

- Data are collected at 6 points in time: fall and spring of kindergarten; fall and spring of first grade; spring of third grade; and spring of fifth grade.
- At each data point, children are assessed and their parents interviewed.
- Teachers are questioned in each round, with one exception, fall first grade.
- School administrators are questioned in the spring of each school year when the study is in the field (i.e., spring 1999, spring 2000, spring 2002, spring 2004).

The Sample

- National probability sample
- Oversamples of Asian and Pacific Islander children, private schools and private school children.
- Base year sample sizes for the ECLS-K
  - –1,018 schools (both public and private)
  - –3,305 teachers
  - –20,929 children
  - –20,141 parents

- When appropriately weighted, the sample is representative of the 3.9 million children enrolled in kindergarten during the 1998-99 school year.

- This presentation focuses on the 3.3 million children enrolled in ***public*** school kindergarten programs during the 1998-99 school year.

Procedures

The data used in the analysis reported here come from:

- School Administrators and Classroom Teachers
- Direct Assessments of the ECLS-K Children
- Parent Interviews

School Administrators and Classroom Teachers: Information from schools and teachers was provided through a self-administered questionnaire to schools administrators and a separate one for classroom teachers.

Direct Assessment of the ECLS-K Children: Children's cognitive and motor ability was assessed in a one-on-one direct assessment at the beginning of the kindergarten year. Children were assessed in a quiet area within their school. For their motor skills, children were asked to perform specific fine and gross motor tasks (e.g., copying basic figures, hopping on one foot). For their cognitive knowledge and skills, the ECLS-K utilized a two-stage assessment design that captures information in reading, mathematics and general knowledge. For each domain, the child was administered a routing test (the first stage), which determined a child's approximate skill level. After completing the routing test, the child was administered the appropriate skill level assessment for that domain (the second stage). In this analysis we use information from the reading assessment.

Parent Interviews: Information on families was gathered through a computer-assisted interview. Interviews were conducted with the child's primary caregiver, who was usually the mother.

Research Questions

School facilities and the children and families served

- What facilities are found in public schools?
- Do vulnerable or at-risk children attend public schools which offer fewer facilities?

- This analysis addresses four questions about ready children, families and schools. Each question focuses on a particular aspect of ready schools and its relationship with the children and their families.
- A ready school offers an environment conducive to learning.
- It has facilities that are adequate to meet children's needs.
- Here, we use the ECLS-K to explore two questions:
  - What facilities are found in public schools?
  - Do the facilities vary by the population of children and families served by the school?
  - In other words, do all children, regardless of their personal and family background, have access to the same facilities?

Research Questions

Vulnerable children, in schools and classrooms

- Are vulnerable children more likely to attend schools and classrooms with multiple risk factors?

At-risk families, in schools and classrooms

- Are children from at-risk families more likely to attend schools and classrooms with multiple risk factors?

- In order to succeed in school, children need
  - a safe, warm environment in which to learn and
  - a teacher who is qualified and enjoys the job.
- These conditions may be especially important to children who are at the greatest risk, the vulnerable child.
- The ECLS-K is used to answer two questions about the schools and the classrooms of vulnerable children and at-risk families:
  - Are vulnerable children more likely to attend schools and classrooms with multiple risk factors?
  - Are children from at-risk families more likely to attend schools and classrooms with multiple risk factors?
  - Again, do all children, regardless of their personal and family backgrounds, have a safe, warm environment in which to learn and a teacher who is qualified and enjoys her job?

Measures

School facilities and the children and families served

- Classrooms
- Cafeteria
- Library
- Playground
- Gymnasium
- Auditorium
- Art room
- Music room
- Computer lab
- Multipurpose room

- School administrators were asked to provide information on the presence of specific facilities in the school. They provided information on the presence of:

  - Classrooms
  - Cafeteria
  - Library
  - Playground
  - Gymnasium
  - Auditorium
  - Art room
  - Music room
  - Computer lab
  - Multipurpose room

- The focus here is on whether these facilities are available to children. The ECLS-K also includes information on the adequacy of each of these facilities.

Measures (continued)

Vulnerable Children

- Demonstrates low cognitive knowledge and skills at kindergarten entry (lowest quartile in reading)
- Demonstrates low fine motor skills at kindergarten entry (lowest quartile on fine motor scale score)
- Demonstrates high externalizing problem behaviors at kindergarten entry (highest quartile on teacher rating)
- In low general health at kindergarten entry (fair or poor general health rating by parent on parent interview)

- When thinking about factors that make children vulnerable, it is important to consider not only their cognitive knowledge and skills, but also their physical skills, their social skills and their health and well-being.

- Therefore, in developing an index that indicates vulnerability in children we chose an attribute from each area.

  - For cognitive knowledge and skills, we defined a vulnerable child as one who scores in the lowest 25 percent in reading at the beginning of kindergarten.

  - For physical skills, we defined a vulnerable child as one who scores in the lowest 25 percent in their fine motor skills (e.g., copying basic figures) at the beginning of kindergarten.

  - For social skills, we defined a vulnerable child as one who, according to his/her teacher, demonstrates problem behaviors more frequently than his/her classmates (i.e., highest quartile on the problem behaviors scale) at the beginning of kindergarten.

  - For health and well-being, we defined a vulnerable child as one who is in fair or poor general health as he/she enters kindergarten.

- We used these factors in an index, because vulnerability can be conceptualized cumulatively. If children possess several of these factors, they may be at greater risk.

Measures (continued)

At-risk families

- Less than high school parental education
- Family below poverty threshold
- Non-English primary home language
- Single-parent household

- When conceptualizing what constitutes a family at-risk, we selected factors which a wealth of research has shown relates to children's performance in school.

- Therefore, as the components for the risk index, we selected

  - low parent education

  - poverty

  - language minority households and

  - single-parent households.

- Last year we released a report, *The Kindergarten Year*, which showed that children at-risk start kindergarten behind and remain behind. And, children with cumulative risks (2 or more factors), seem most vulnerable.

Measures (continued)

School risk factors

- Problem with tensions based on racial, ethnic, or religious differences
- Problem with garbage, litter, or broken glass in the street or road, on the sidewalks, or in yards
- Problem with selling or using drugs or excessive drinking in public
- Problem with gangs
- Problem with heavy traffic
- Problem with violent crimes like drive-by shootings
- Problem with vacant houses and buildings
- Problem with crime in the neighborhood
- Incidence of children bringing weapons to school
- Incidence of things being taken directly from children or teachers by force or threat of force at school or on the way to or from school
- Incidence of children or teachers being physically attacked or involved in fights

- A safe, warm and supportive environment is a precondition to learning, and ready schools offer such an environment.

- The ECLS-K database includes a number of items that indicate whether a school provides its students with a safe and secure learning environment.

- In this analysis we developed a simple index that counts the number of different problems a school possesses. The index ranges from no problems (zero) to 11 problems.

Measures (continued)

Classroom risk factors

- In a class with a teacher with 2 or fewer years teaching grades K through 5
- In a class with a teacher without a bachelor's degree or greater
- In a class with a teacher without certification
- In a class with a teacher who does not enjoy present teaching job

- Ready schools have a qualified teaching staff.

- When thinking about risk at a school level, we identified the safety of the school as an important construct. When thinking about risk at the classroom level, we looked toward characteristics of the teacher. At the classroom level, teachers shape the learning environment. And, having an experienced, qualified teacher who enjoys the job might help shape a positive classroom environment. Conversely, having a teacher without these characteristics, might put the classroom environment at risk.

- The four characteristics that are used to capture a ready teacher are

  - years teaching

  - education

  - certification

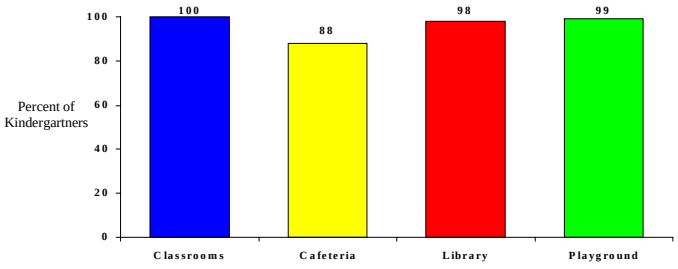
  - job enjoyment

Results

School facilities and the children and families served

What facilities do schools offer?

Figure 1. Percent of kindergartners who attend public schools with certain facilities



Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use file.

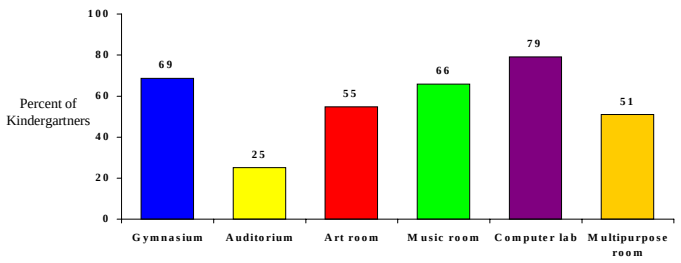
- Nearly all public schools have a cafeteria, library and playground.

Results

School facilities and the children and families served

What facilities do schools offer?

Figure 2. Percent of kindergartners who attend public schools with certain facilities

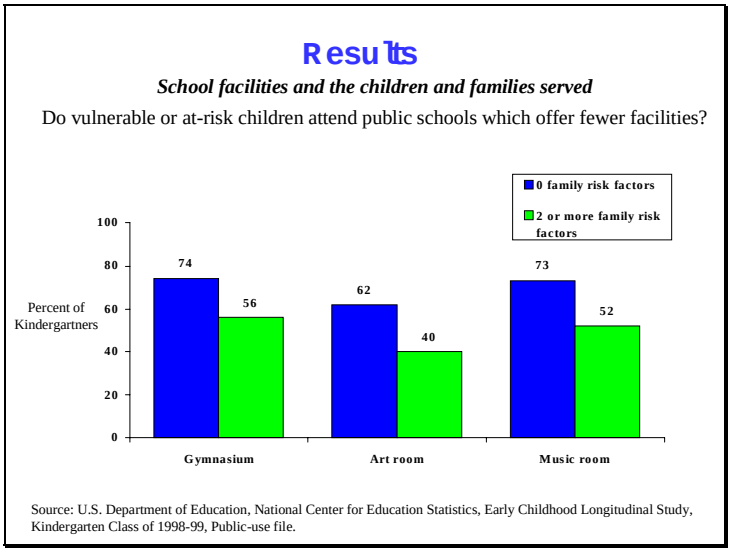


Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use file.

- A smaller percent of public schools have a gymnasium, art room or music room.

- Gymnasiums, art rooms and music rooms represent places where children broaden their educational experiences. Some conceptualize these kinds of activities as an added “extra” to a more core academically oriented curriculum. However, it is important for young children to actively experience learning in a variety of contexts through multiple modalities. Gymnasiums potentially provide room for physical activities, and to develop and refine physical skills.

- And, art and music rooms may broaden the young child’s educational experiences, potentially exposing them to a wider curricula and opportunity to learn.



- (note: comparisons described are significant at the .05 level)

- Children from at-risk families are less likely to attend public schools that provide special space for children to exercise and develop their bodies, and to develop and explore special talents.

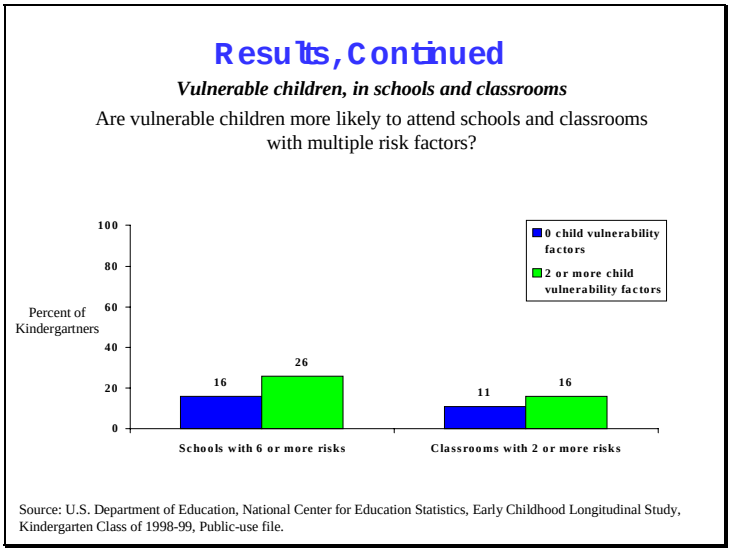
- These special spaces are more available to children whose families have increased resources. In other words, the more advantaged children attend schools that offer them opportunity to develop their skills in multiple domains and to explore a wider range of learning opportunities and situations.

Excerpt from Tables

Percent of kindergartners who attend public schools with certain facilities, by family factors

	Family Risk Factors		
School Facilities	0 risks	1 risk	2 or more risks
Classrooms	100	100	100
Cafeteria	88	88	91
Library	98	97	97
Play ground	100	99	98
Gymnasium	74	66	56
Auditorium	24	25	28
Art room	62	51	40
Music room	73	63	52
Computer lab	79	79	79
Multipurpose room	52	48	51

- This is a reformatted excerpt from tables 1 and 2.



- (note: comparisons described are significant at the .05 level)

- To address the question whether vulnerable children are more likely to attend school and classrooms with multiple risk factors, we collapsed the indexes (i.e., vulnerable children; at-risk families; at-risk schools; at-risk classrooms) into the following categories.

  - The vulnerability factors associated with children were collapsed into 0 risks, 1 risk, and 2 or more risks.

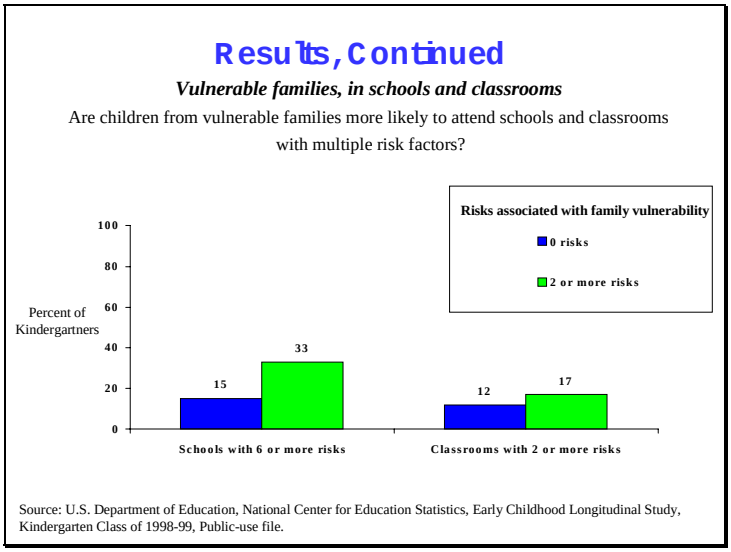
  - There were more risk factors associated with schools than with children or with classrooms, so school risk factors were collapsed into 0 risks, 1 to 2 risks, 3 to 5 risks, and 6 or more risks.

  - Risk factors associated with the kindergarten classroom were collapsed into 0 risks, 1 risk, and 2 or more risks.

- Children with more risks (2 or more) are less likely to attend public schools that provide a warm safe environment than children with no risks.

  - Vulnerable children are more likely to attend schools with the most risk factors (6 or more).

  - Vulnerable children are also slightly more likely to be in classrooms with the most risk factors (2 or more).



- (note: comparisons described are significant at the .05 level)

- Similar to the child vulnerability factors, the risk factors we identified for families were collapsed into 0 risks, 1 risk and 2 or more risks.

- Families at greater risk (2 or more risk factors) are more likely to send their children to schools with higher risks than families with no risks. These schools are unlikely to be able to offer the safe, warm and supportive environment that characterizes a ready school.

  - Children who come from at-risk families are more likely to attend schools with the most risk factors (6 or more).

  - Children who come from at-risk families are also more likely to be in classrooms with the most risk factors (2 or more).

Excerpt from Tables

Percent of public school kindergartners with school and teacher risk factors, by child and family factors

Characteristic	Schools				Teachers		
	0	1 or 2	3 to 5	6 or more	0	1	2 or more
Vulnerable child factors							
0 risks	29	34	21	16	39	49	11
1 risk	27	29	23	21	36	51	13
2 or more risks	25	25	24	26	35	49	16
At-risk family factors							
0 risks	28	36	22	15	39	50	12
1 risk	28	25	23	25	35	51	14
2 or more risks	29	17	21	33	34	49	17

- This is a reformatted excerpt from table 4.

Summary

- Nearly all public schools in the United States provide their beginning school population (i.e., kindergartners) with the facilities that are most basic to learning.
- Fewer of these schools provide separate spaces that potentially broaden children's educational experiences. These extra spaces are not as often available to the most vulnerable children, coming from the most disadvantaged families.
- Children who are most vulnerable and those who are from the most disadvantaged families are most likely to attend schools that have problems, which threaten the desired safe and secure learning environment.

Future Research

Ten Keys to Ready Schools (National Education Goals Panel)

- Ready schools smooth the transition between home and school.
- Ready schools strive for continuity between early care and education programs and elementary schools.
- Ready schools are committed to the success of every child.
- Ready schools are committed to the success of every teacher and every adult who interacts with the child during the school day.
- Ready schools introduce or expand approaches that have been shown to raise achievement.
- Ready schools are learning organizations that alter practices and programs if they do not benefit children.
- Ready schools serve children in communities.
- Ready schools take responsibility for results.
- Ready schools have strong leadership.

- The ECLS-K provides information on the "Ten Keys to Ready Schools" outlined by the National Education Goals Panel.

- Future research will continue to explore the relationship of characteristics of ready schools to the children and families they serve.

- For more information, you can download our base-year and first grade instrumentation from the web site—http://www.nces.ed.gov/ecls.

Tables

Table 1.—Percent of kindergartners who attend public schools with certain facilities, by child and family vulnerability factors

	Classrooms	Cafeteria	Library	Playground	Gymnasium
Total	100	88	98	99	69
Vulnerable child factors					
0	100	88	98	99	72
1	100	88	97	99	71
2 or more	100	89	97	99	68
Vulnerable family factors					
0	100	88	98	100	74
1	100	88	97	99	66
2 or more	100	91	97	98	56

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use Base-Year data file.

Table 2.—Percent of kindergartners who attend public schools with certain facilities, by child and family vulnerability factors

	Auditorium	Art room	Music room	Computer lab	Multipurpose room
Total	25	55	66	79	51
Vulnerable child factors					
0	25	60	72	79	52
1	23	55	66	79	48
2 or more	27	52	62	79	47
Vulnerable family factors					
0	24	62	73	79	52
1	25	51	63	79	48
2 or more	28	40	52	79	51

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use Base-Year data file.

Table 3.—Percent distribution of public school kindergartners, family, school and teacher characteristics

Characteristic	
Vulnerable child factors	
0	48
1	31
2 or more	21
Vulnerable family factors	
0	55
1	24
2 or more	21
Vulnerable child in a vulnerable family	
0 and 0	36
Middle	58
2 or more and 2 or more	6
School risk factors	
0	28
1 or 2 risks	29
3 to 5 risks	22
6 or more	21
Teacher risk factors	
0	37
1	50
2 or more	13

Souce: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use Base-Year data file.

Table 4.—Percent of public school kindergartners with school and teacher risk factors, by child and family vulnerability factors

	School risk factors				Teacher risk factors		
	0 risks	1 or 2 risks	3 to 5 risks	6 or more	0 risks	1 risk	2 or more
Vulnerable child factors							
0 risks	29	34	21	16	39	49	11
1 risk	27	29	23	21	36	51	13
2 or more	25	25	24	26	35	49	16
Vulnerable family factors							
0 risks	28	36	22	15	39	50	12
1 risk	28	25	23	25	35	51	14
2 or more	29	17	21	33	34	49	17
Vulnerable child in a vulnerable family							
0 family and 0 child	29	38	21	13	40	49	11
Middle	27	29	23	21	36	51	13
2 or more family and 2 or more child	27	17	21	35	31	50	19

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998-99, Public-use Base-Year data file.

Listing of NCES Working Papers to Date

Working papers can be downloaded as pdf files from the NCES Electronic Catalog (http://nces.ed.gov/pubsearch/). You can also contact Sheilah Jupiter at (202) 502–7444 (sheilah_jupiter@ed.gov) if you are interested in any of the following papers.

Listing of NCES Working Papers by Program Area

No.	Title	NCES contact
Baccalaureate and Beyond (B&B)		
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
Beginning Postsecondary Students (BPS) Longitudinal Study		
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
1999–15	Projected Postsecondary Outcomes of 1992 High School Graduates	Aurora D'Amico
2001-04	Beginning Postsecondary Students Longitudinal Study: 1996-2001 (BPS:1996/2001) Field Test Methodology Report	Paula Knepper
Common Core of Data (CCD)		
95–12	Rural Education Data User's Guide	Samuel Peng
96–19	Assessment and Analysis of School-Level Expenditures	William J. Fowler, Jr.
97–15	Customer Service Survey: Common Core of Data Coordinators	Lee Hoffman
97–43	Measuring Inflation in Public School Costs	William J. Fowler, Jr.
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
1999–03	Evaluation of the 1996–97 Nonfiscal Common Core of Data Surveys Data Collection, Processing, and Editing Cycle	Beth Young
2000–12	Coverage Evaluation of the 1994–95 Common Core of Data: Public Elementary/Secondary School Universe Survey	Beth Young
2000–13	Non-professional Staff in the Schools and Staffing Survey (SASS) and Common Core of Data (CCD)	Kerry Gruber
Data Development		
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
2000–16b	Lifelong Learning NCES Task Force: Final Report Volume II	Lisa Hudson
Decennial Census School District Project		
95–12	Rural Education Data User's Guide	Samuel Peng
96–04	Census Mapping Project/School District Data Book	Tai Phan
98–07	Decennial Census School District Project Planning Report	Tai Phan
Early Childhood Longitudinal Study (ECLS)		
96–08	How Accurate are Teacher Judgments of Students' Academic Performance?	Jerry West
96–18	Assessment of Social Competence, Adaptive Behaviors, and Approaches to Learning with Young Children	Jerry West
97–24	Formulating a Design for the ECLS: A Review of Longitudinal Studies	Jerry West
97–36	Measuring the Quality of Program Environments in Head Start and Other Early Childhood Programs: A Review and Recommendations for Future Research	Jerry West
1999–01	A Birth Cohort Study: Conceptual and Design Considerations and Rationale	Jerry West
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
2001–02	Measuring Father Involvement in Young Children's Lives: Recommendations for a Fatherhood Module for the ECLS-B	Jerry West
2001–03	Measures of Socio-Emotional Development in Middle Childhood	Elvira Hausken
2001–06	Papers from the Early Childhood Longitudinal Studies Program: Presented at the 2001 AERA and SRCD Meetings	Jerry West

No.	Title	NCES contact
Education Finance Statistics Center (EDFIN)		
94–05	Cost-of-Education Differentials Across the States	William J. Fowler, Jr.
96–19	Assessment and Analysis of School-Level Expenditures	William J. Fowler, Jr.
97–43	Measuring Inflation in Public School Costs	William J. Fowler, Jr.
98–04	Geographic Variations in Public Schools' Costs	William J. Fowler, Jr.
1999–16	Measuring Resources in Education: From Accounting to the Resource Cost Model Approach	William J. Fowler, Jr.
High School and Beyond (HS&B)		
95–12	Rural Education Data User's Guide	Samuel Peng
1999–05	Procedures Guide for Transcript Studies	Dawn Nelson
1999–06	1998 Revision of the Secondary School Taxonomy	Dawn Nelson
HS Transcript Studies		
1999–05	Procedures Guide for Transcript Studies	Dawn Nelson
1999–06	1998 Revision of the Secondary School Taxonomy	Dawn Nelson
International Adult Literacy Survey (IALS)		
97–33	Adult Literacy: An International Perspective	Marilyn Binkley
Integrated Postsecondary Education Data System (IPEDS)		
97–27	Pilot Test of IPEDS Finance Survey	Peter Stowe
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
2000–14	IPEDS Finance Data Comparisons Under the 1997 Financial Accounting Standards for Private, Not-for-Profit Institutes: A Concept Paper	Peter Stowe
National Assessment of Adult Literacy (NAAL)		
98–17	Developing the National Assessment of Adult Literacy: Recommendations from Stakeholders	Sheida White
1999–09a	1992 National Adult Literacy Survey: An Overview	Alex Sedlacek
1999–09b	1992 National Adult Literacy Survey: Sample Design	Alex Sedlacek
1999–09c	1992 National Adult Literacy Survey: Weighting and Population Estimates	Alex Sedlacek
1999–09d	1992 National Adult Literacy Survey: Development of the Survey Instruments	Alex Sedlacek
1999–09e	1992 National Adult Literacy Survey: Scaling and Proficiency Estimates	Alex Sedlacek
1999–09f	1992 National Adult Literacy Survey: Interpreting the Adult Literacy Scales and Literacy Levels	Alex Sedlacek
1999–09g	1992 National Adult Literacy Survey: Literacy Levels and the Response Probability Convention	Alex Sedlacek
2000–05	Secondary Statistical Modeling With the National Assessment of Adult Literacy: Implications for the Design of the Background Questionnaire	Sheida White
2000–06	Using Telephone and Mail Surveys as a Supplement or Alternative to Door-to-Door Surveys in the Assessment of Adult Literacy	Sheida White
2000–07	"How Much Literacy is Enough?" Issues in Defining and Reporting Performance Standards for the National Assessment of Adult Literacy	Sheida White
2000–08	Evaluation of the 1992 NALS Background Survey Questionnaire: An Analysis of Uses with Recommendations for Revisions	Sheida White
2000–09	Demographic Changes and Literacy Development in a Decade	Sheida White
National Assessment of Educational Progress (NAEP)		
95–12	Rural Education Data User's Guide	Samuel Peng
97–29	Can State Assessment Data be Used to Reduce State NAEP Sample Sizes?	Steven Gorman
97–30	ACT's NAEP Redesign Project: Assessment Design is the Key to Useful and Stable Assessment Results	Steven Gorman
97–31	NAEP Reconfigured: An Integrated Redesign of the National Assessment of Educational Progress	Steven Gorman
97–32	Innovative Solutions to Intractable Large Scale Assessment (Problem 2: Background Questionnaires)	Steven Gorman
97–37	Optimal Rating Procedures and Methodology for NAEP Open-ended Items	Steven Gorman

No.	Title	NCES contact
97–44	Development of a SASS 1993–94 School-Level Student Achievement Subfile: Using State Assessments and State NAEP, Feasibility Study	Michael Ross
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
1999–05	Procedures Guide for Transcript Studies	Dawn Nelson
1999–06	1998 Revision of the Secondary School Taxonomy	Dawn Nelson
National Education Longitudinal Study of 1988 (NELS:88)		
95–04	National Education Longitudinal Study of 1988: Second Follow-up Questionnaire Content Areas and Research Issues	Jeffrey Owings
95–05	National Education Longitudinal Study of 1988: Conducting Trend Analyses of NLS-72, HS&B, and NELS:88 Seniors	Jeffrey Owings
95–06	National Education Longitudinal Study of 1988: Conducting Cross-Cohort Comparisons Using HS&B, NAEP, and NELS:88 Academic Transcript Data	Jeffrey Owings
95–07	National Education Longitudinal Study of 1988: Conducting Trend Analyses HS&B and NELS:88 Sophomore Cohort Dropouts	Jeffrey Owings
95–12	Rural Education Data User's Guide	Samuel Peng
95–14	Empirical Evaluation of Social, Psychological, & Educational Construct Variables Used in NCES Surveys	Samuel Peng
96–03	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
98–06	National Education Longitudinal Study of 1988 (NELS:88) Base Year through Second Follow-Up: Final Methodology Report	Ralph Lee
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
1999–05	Procedures Guide for Transcript Studies	Dawn Nelson
1999–06	1998 Revision of the Secondary School Taxonomy	Dawn Nelson
1999–15	Projected Postsecondary Outcomes of 1992 High School Graduates	Aurora D'Amico
National Household Education Survey (NHES)		
95–12	Rural Education Data User's Guide	Samuel Peng
96–13	Estimation of Response Bias in the NHES:95 Adult Education Survey	Steven Kaufman
96–14	The 1995 National Household Education Survey: Reinterview Results for the Adult Education Component	Steven Kaufman
96–20	1991 National Household Education Survey (NHES:91) Questionnaires: Screener, Early Childhood Education, and Adult Education	Kathryn Chandler
96–21	1993 National Household Education Survey (NHES:93) Questionnaires: Screener, School Readiness, and School Safety and Discipline	Kathryn Chandler
96–22	1995 National Household Education Survey (NHES:95) Questionnaires: Screener, Early Childhood Program Participation, and Adult Education	Kathryn Chandler
96–29	Undercoverage Bias in Estimates of Characteristics of Adults and 0- to 2-Year-Olds in the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
96–30	Comparison of Estimates from the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
97–02	Telephone Coverage Bias and Recorded Interviews in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97–03	1991 and 1995 National Household Education Survey Questionnaires: NHES:91 Screener, NHES:91 Adult Education, NHES:95 Basic Screener, and NHES:95 Adult Education	Kathryn Chandler
97–04	Design, Data Collection, Monitoring, Interview Administration Time, and Data Editing in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97–05	Unit and Item Response, Weighting, and Imputation Procedures in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97–06	Unit and Item Response, Weighting, and Imputation Procedures in the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
97–08	Design, Data Collection, Interview Timing, and Data Editing in the 1995 National Household Education Survey	Kathryn Chandler
97–19	National Household Education Survey of 1995: Adult Education Course Coding Manual	Peter Stowe
97–20	National Household Education Survey of 1995: Adult Education Course Code Merge Files User's Guide	Peter Stowe

No.	Title	NCES contact
97–25	1996 National Household Education Survey (NHES:96) Questionnaires: Screener/Household and Library, Parent and Family Involvement in Education and Civic Involvement, Youth Civic Involvement, and Adult Civic Involvement	Kathryn Chandler
97–28	Comparison of Estimates in the 1996 National Household Education Survey	Kathryn Chandler
97–34	Comparison of Estimates from the 1993 National Household Education Survey	Kathryn Chandler
97–35	Design, Data Collection, Interview Administration Time, and Data Editing in the 1996 National Household Education Survey	Kathryn Chandler
97–38	Reinterview Results for the Parent and Youth Components of the 1996 National Household Education Survey	Kathryn Chandler
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98–03	Adult Education in the 1990s: A Report on the 1991 National Household Education Survey	Peter Stowe
98–10	Adult Education Participation Decisions and Barriers: Review of Conceptual Frameworks and Empirical Studies	Peter Stowe
National Longitudinal Study of the High School Class of 1972 (NLS-72)		
95–12	Rural Education Data User's Guide	Samuel Peng
National Postsecondary Student Aid Study (NPSAS)		
96–17	National Postsecondary Student Aid Study: 1996 Field Test Methodology Report	Andrew G. Malizio
2000–17	National Postsecondary Student Aid Study:2000 Field Test Methodology Report	Andrew G. Malizio
National Study of Postsecondary Faculty (NSOPF)		
97–26	Strategies for Improving Accuracy of Postsecondary Faculty Lists	Linda Zimbler
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
2000–01	1999 National Study of Postsecondary Faculty (NSOPF:99) Field Test Report	Linda Zimbler
Postsecondary Education Descriptive Analysis Reports (PEDAR)		
2000–11	Financial Aid Profile of Graduate Students in Science and Engineering	Aurora D'Amico
Private School Universe Survey (PSS)		
95–16	Intersurvey Consistency in NCES Private School Surveys	Steven Kaufman
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Schools and Staffing Survey (SASS)		
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94–02	Generalized Variance Estimate for Schools and Staffing Survey (SASS)	Dan Kasprzyk
94–03	1991 Schools and Staffing Survey (SASS) Reinterview Response Variance Report	Dan Kasprzyk
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94–06	Six Papers on Teachers from the 1990–91 Schools and Staffing Survey and Other Related Surveys	Dan Kasprzyk

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95–01	Schools and Staffing Survey: 1994 Papers Presented at the 1994 Meeting of the American Statistical Association	Dan Kasprzyk
95–02	QED Estimates of the 1990–91 Schools and Staffing Survey: Deriving and Comparing QED School Estimates with CCD Estimates	Dan Kasprzyk
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95–09	The Results of the 1993 Teacher List Validation Study (TLVS)	Dan Kasprzyk
95–10	The Results of the 1991–92 Teacher Follow-up Survey (TFS) Reinterview and Extensive Reconciliation	Dan Kasprzyk
95–11	Measuring Instruction, Curriculum Content, and Instructional Resources: The Status of Recent Work	Sharon Bobbitt & John Ralph
95–12	Rural Education Data User's Guide	Samuel Peng
95–14	Empirical Evaluation of Social, Psychological, & Educational Construct Variables Used in NCES Surveys	Samuel Peng
95–15	Classroom Instructional Processes: A Review of Existing Measurement Approaches and Their Applicability for the Teacher Follow-up Survey	Sharon Bobbitt
95–16	Intersurvey Consistency in NCES Private School Surveys	Steven Kaufman
95–18	An Agenda for Research on Teachers and Schools: Revisiting NCES' Schools and Staffing Survey	Dan Kasprzyk
96–01	Methodological Issues in the Study of Teachers' Careers: Critical Features of a Truly Longitudinal Study	Dan Kasprzyk
96–02	Schools and Staffing Survey (SASS): 1995 Selected papers presented at the 1995 Meeting of the American Statistical Association	Dan Kasprzyk
96–05	Cognitive Research on the Teacher Listing Form for the Schools and Staffing Survey	Dan Kasprzyk
96–06	The Schools and Staffing Survey (SASS) for 1998–99: Design Recommendations to Inform Broad Education Policy	Dan Kasprzyk
96–07	Should SASS Measure Instructional Processes and Teacher Effectiveness?	Dan Kasprzyk
96–09	Making Data Relevant for Policy Discussions: Redesigning the School Administrator Questionnaire for the 1998–99 SASS	Dan Kasprzyk
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96–11	Towards an Organizational Database on America's Schools: A Proposal for the Future of SASS, with comments on School Reform, Governance, and Finance	Dan Kasprzyk
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96–23	Linking Student Data to SASS: Why, When, How	Dan Kasprzyk
96–24	National Assessments of Teacher Quality	Dan Kasprzyk
96–25	Measures of Inservice Professional Development: Suggested Items for the 1998–1999 Schools and Staffing Survey	Dan Kasprzyk
96–28	Student Learning, Teaching Quality, and Professional Development: Theoretical Linkages, Current Measurement, and Recommendations for Future Data Collection	Mary Rollefson
97–01	Selected Papers on Education Surveys: Papers Presented at the 1996 Meeting of the American Statistical Association	Dan Kasprzyk
97–07	The Determinants of Per-Pupil Expenditures in Private Elementary and Secondary Schools: An Exploratory Analysis	Stephen Broughman
97–09	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
97–10	Report of Cognitive Research on the Public and Private School Teacher Questionnaires for the Schools and Staffing Survey 1993–94 School Year	Dan Kasprzyk
97–11	International Comparisons of Inservice Professional Development	Dan Kasprzyk
97–12	Measuring School Reform: Recommendations for Future SASS Data Collection	Mary Rollefson
97–14	Optimal Choice of Periodicities for the Schools and Staffing Survey: Modeling and Analysis	Steven Kaufman
97–18	Improving the Mail Return Rates of SASS Surveys: A Review of the Literature	Steven Kaufman
97–22	Collection of Private School Finance Data: Development of a Questionnaire	Stephen Broughman
97–23	Further Cognitive Research on the Schools and Staffing Survey (SASS) Teacher Listing Form	Dan Kasprzyk
97–41	Selected Papers on the Schools and Staffing Survey: Papers Presented at the 1997 Meeting of the American Statistical Association	Steve Kaufman
97–42	Improving the Measurement of Staffing Resources at the School Level: The Development of Recommendations for NCES for the Schools and Staffing Survey (SASS)	Mary Rollefson

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97–44	Development of a SASS 1993–94 School-Level Student Achievement Subfile: Using State Assessments and State NAEP, Feasibility Study	Michael Ross
98–01	Collection of Public School Expenditure Data: Development of a Questionnaire	Stephen Broughman
98–02	Response Variance in the 1993–94 Schools and Staffing Survey: A Reinterview Report	Steven Kaufman
98–04	Geographic Variations in Public Schools' Costs	William J. Fowler, Jr.
98–05	SASS Documentation: 1993–94 SASS Student Sampling Problems; Solutions for Determining the Numerators for the SASS Private School (3B) Second-Stage Factors	Steven Kaufman
98–08	The Redesign of the Schools and Staffing Survey for 1999–2000: A Position Paper	Dan Kasprzyk
98–12	A Bootstrap Variance Estimator for Systematic PPS Sampling	Steven Kaufman
98–13	Response Variance in the 1994–95 Teacher Follow-up Survey	Steven Kaufman
98–14	Variance Estimation of Imputed Survey Data	Steven Kaufman
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
98–16	A Feasibility Study of Longitudinal Design for Schools and Staffing Survey	Stephen Broughman
1999–02	Tracking Secondary Use of the Schools and Staffing Survey Data: Preliminary Results	Dan Kasprzyk
1999–04	Measuring Teacher Qualifications	Dan Kasprzyk
1999–07	Collection of Resource and Expenditure Data on the Schools and Staffing Survey	Stephen Broughman
1999–08	Measuring Classroom Instructional Processes: Using Survey and Case Study Fieldtest Results to Improve Item Construction	Dan Kasprzyk
1999–10	What Users Say About Schools and Staffing Survey Publications	Dan Kasprzyk
1999–12	1993–94 Schools and Staffing Survey: Data File User's Manual, Volume III: Public-Use Codebook	Kerry Gruber
1999–13	1993–94 Schools and Staffing Survey: Data File User's Manual, Volume IV: Bureau of Indian Affairs (BIA) Restricted-Use Codebook	Kerry Gruber
1999–14	1994–95 Teacher Followup Survey: Data File User's Manual, Restricted-Use Codebook	Kerry Gruber
1999–17	Secondary Use of the Schools and Staffing Survey Data	Susan Wiley
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
2000–10	A Research Agenda for the 1999–2000 Schools and Staffing Survey	Dan Kasprzyk
2000–13	Non-professional Staff in the Schools and Staffing Survey (SASS) and Common Core of Data (CCD)	Kerry Gruber
2000–18	Feasibility Report: School-Level Finance Pretest, Public School District Questionnaire	Stephen Broughman

Third International Mathematics and Science Study (TIMSS)

2001–01	Cross-National Variation in Educational Preparation for Adulthood: From Early Adolescence to Young Adulthood	Elvira Hausken

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No.	Title	NCES contact
Adult education		
96–14	The 1995 National Household Education Survey: Reinterview Results for the Adult Education Component	Steven Kaufman
96–20	1991 National Household Education Survey (NHES:91) Questionnaires: Screener, Early Childhood Education, and Adult Education	Kathryn Chandler
96–22	1995 National Household Education Survey (NHES:95) Questionnaires: Screener, Early Childhood Program Participation, and Adult Education	Kathryn Chandler
98–03	Adult Education in the 1990s: A Report on the 1991 National Household Education Survey	Peter Stowe
98–10	Adult Education Participation Decisions and Barriers: Review of Conceptual Frameworks and Empirical Studies	Peter Stowe
1999–11	Data Sources on Lifelong Learning Available from the National Center for Education Statistics	Lisa Hudson
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
2000–16b	Lifelong Learning NCES Task Force: Final Report Volume II	Lisa Hudson
Adult literacy—see Literacy of adults		
American Indian – education		
1999–13	1993–94 Schools and Staffing Survey: Data File User's Manual, Volume IV: Bureau of Indian Affairs (BIA) Restricted-Use Codebook	Kerry Gruber
Assessment/achievement		
95–12	Rural Education Data User's Guide	Samuel Peng
95–13	Assessing Students with Disabilities and Limited English Proficiency	James Houser
97–29	Can State Assessment Data be Used to Reduce State NAEP Sample Sizes?	Larry Ogle
97–30	ACT's NAEP Redesign Project: Assessment Design is the Key to Useful and Stable Assessment Results	Larry Ogle
97–31	NAEP Reconfigured: An Integrated Redesign of the National Assessment of Educational Progress	Larry Ogle
97–32	Innovative Solutions to Intractable Large Scale Assessment (Problem 2: Background Questions)	Larry Ogle
97–37	Optimal Rating Procedures and Methodology for NAEP Open-ended Items	Larry Ogle
97–44	Development of a SASS 1993–94 School-Level Student Achievement Subfile: Using State Assessments and State NAEP, Feasibility Study	Michael Ross
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
Beginning students in postsecondary education		
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
2001-04	Beginning Postsecondary Students Longitudinal Study: 1996-2001 (BPS:1996/2001) Field Test Methodology Report	Paula Knepper
Civic participation		
97–25	1996 National Household Education Survey (NHES:96) Questionnaires: Screener/Household and Library, Parent and Family Involvement in Education and Civic Involvement, Youth Civic Involvement, and Adult Civic Involvement	Kathryn Chandler
Climate of schools		
95–14	Empirical Evaluation of Social, Psychological, & Educational Construct Variables Used in NCES Surveys	Samuel Peng
Cost of education indices		
94–05	Cost-of-Education Differentials Across the States	William J. Fowler, Jr.

No.	Title	NCES contact
Course-taking		
95–12	Rural Education Data User's Guide	Samuel Peng
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
1999–05	Procedures Guide for Transcript Studies	Dawn Nelson
1999–06	1998 Revision of the Secondary School Taxonomy	Dawn Nelson
Crime		
97–09	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
Curriculum		
95–11	Measuring Instruction, Curriculum Content, and Instructional Resources: The Status of Recent Work	Sharon Bobbitt & John Ralph
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
Customer service		
1999–10	What Users Say About Schools and Staffing Survey Publications	Dan Kasprzyk
2000–02	Coordinating NCES Surveys: Options, Issues, Challenges, and Next Steps	Valena Plisko
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
Data quality		
97–13	Improving Data Quality in NCES: Database-to-Report Process	Susan Ahmed
Data warehouse		
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
Design effects		
2000–03	Strengths and Limitations of Using SUDAAN, Stata, and WesVarPC for Computing Variances from NCES Data Sets	Ralph Lee
Dropout rates, high school		
95–07	National Education Longitudinal Study of 1988: Conducting Trend Analyses HS&B and NELS:88 Sophomore Cohort Dropouts	Jeffrey Owings
Early childhood education		
96–20	1991 National Household Education Survey (NHES:91) Questionnaires: Screener, Early Childhood Education, and Adult Education	Kathryn Chandler
96–22	1995 National Household Education Survey (NHES:95) Questionnaires: Screener, Early Childhood Program Participation, and Adult Education	Kathryn Chandler
97–24	Formulating a Design for the ECLS: A Review of Longitudinal Studies	Jerry West
97–36	Measuring the Quality of Program Environments in Head Start and Other Early Childhood Programs: A Review and Recommendations for Future Research	Jerry West
1999–01	A Birth Cohort Study: Conceptual and Design Considerations and Rationale	Jerry West
2001–02	Measuring Father Involvement in Young Children's Lives: Recommendations for a Fatherhood Module for the ECLS-B	Jerry West
2001–03	Measures of Socio-Emotional Development in Middle School	Elvira Hausken
2001–06	Papers from the Early Childhood Longitudinal Studies Program: Presented at the 2001 AERA and SRCD Meetings	Jerry West
Educational attainment		
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico

No.	Title	NCES contact
Educational research		
2000–02	Coordinating NCES Surveys: Options, Issues, Challenges, and Next Steps	Valena Plisko
Employment		
96–03	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
2000–16b	Lifelong Learning NCES Task Force: Final Report Volume II	Lisa Hudson
2001–01	Cross-National Variation in Educational Preparation for Adulthood: From Early Adolescence to Young Adulthood	Elvira Hausken
Engineering		
2000–11	Financial Aid Profile of Graduate Students in Science and Engineering	Aurora D'Amico
Faculty – higher education		
97–26	Strategies for Improving Accuracy of Postsecondary Faculty Lists	Linda Zimbler
2000–01	1999 National Study of Postsecondary Faculty (NSOPF:99) Field Test Report	Linda Zimbler
Fathers – role in education		
2001–02	Measuring Father Involvement in Young Children's Lives: Recommendations for a Fatherhood Module for the ECLS-B	Jerry West
Finance – elementary and secondary schools		
94–05	Cost-of-Education Differentials Across the States	William J. Fowler, Jr.
96–19	Assessment and Analysis of School-Level Expenditures	William J. Fowler, Jr.
98–01	Collection of Public School Expenditure Data: Development of a Questionnaire	Stephen Broughman
1999–07	Collection of Resource and Expenditure Data on the Schools and Staffing Survey	Stephen Broughman
1999–16	Measuring Resources in Education: From Accounting to the Resource Cost Model Approach	William J. Fowler, Jr.
2000–18	Feasibility Report: School-Level Finance Pretest, Public School District Questionnaire	Stephen Broughman
Finance – postsecondary		
97–27	Pilot Test of IPEDS Finance Survey	Peter Stowe
2000–14	IPEDS Finance Data Comparisons Under the 1997 Financial Accounting Standards for Private, Not-for-Profit Institutes: A Concept Paper	Peter Stowe
Finance – private schools		
95–17	Estimates of Expenditures for Private K–12 Schools	Stephen Broughman
96–16	Strategies for Collecting Finance Data from Private Schools	Stephen Broughman
97–07	The Determinants of Per-Pupil Expenditures in Private Elementary and Secondary Schools: An Exploratory Analysis	Stephen Broughman
97–22	Collection of Private School Finance Data: Development of a Questionnaire	Stephen Broughman
1999–07	Collection of Resource and Expenditure Data on the Schools and Staffing Survey	Stephen Broughman
2000–15	Feasibility Report: School-Level Finance Pretest, Private School Questionnaire	Stephen Broughman
Geography		
98–04	Geographic Variations in Public Schools' Costs	William J. Fowler, Jr.
Graduate students		
2000–11	Financial Aid Profile of Graduate Students in Science and Engineering	Aurora D'Amico
Imputation		
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
Inflation		
97–43	Measuring Inflation in Public School Costs	William J. Fowler, Jr.

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Institution data		
2000–01	1999 National Study of Postsecondary Faculty (NSOPF:99) Field Test Report	Linda Zimbler
Instructional resources and practices		
95–11	Measuring Instruction, Curriculum Content, and Instructional Resources: The Status of Recent Work	Sharon Bobbitt & John Ralph
1999–08	Measuring Classroom Instructional Processes: Using Survey and Case Study Field Test Results to Improve Item Construction	Dan Kasprzyk
International comparisons		
97–11	International Comparisons of Inservice Professional Development	Dan Kasprzyk
97–16	International Education Expenditure Comparability Study: Final Report, Volume I	Shelley Burns
97–17	International Education Expenditure Comparability Study: Final Report, Volume II, Quantitative Analysis of Expenditure Comparability	Shelley Burns
2001–01	Cross-National Variation in Educational Preparation for Adulthood: From Early Adolescence to Young Adulthood	Elvira Hausken
Libraries		
94–07	Data Comparability and Public Policy: New Interest in Public Library Data Papers Presented at Meetings of the American Statistical Association	Carrol Kindel
97–25	1996 National Household Education Survey (NHES:96) Questionnaires: Screener/Household and Library, Parent and Family Involvement in Education and Civic Involvement, Youth Civic Involvement, and Adult Civic Involvement	Kathryn Chandler
Limited English Proficiency		
95–13	Assessing Students with Disabilities and Limited English Proficiency	James Houser
Literacy of adults		
98–17	Developing the National Assessment of Adult Literacy: Recommendations from Stakeholders	Sheida White
1999–09a	1992 National Adult Literacy Survey: An Overview	Alex Sedlacek
1999–09b	1992 National Adult Literacy Survey: Sample Design	Alex Sedlacek
1999–09c	1992 National Adult Literacy Survey: Weighting and Population Estimates	Alex Sedlacek
1999–09d	1992 National Adult Literacy Survey: Development of the Survey Instruments	Alex Sedlacek
1999–09e	1992 National Adult Literacy Survey: Scaling and Proficiency Estimates	Alex Sedlacek
1999–09f	1992 National Adult Literacy Survey: Interpreting the Adult Literacy Scales and Literacy Levels	Alex Sedlacek
1999–09g	1992 National Adult Literacy Survey: Literacy Levels and the Response Probability Convention	Alex Sedlacek
1999–11	Data Sources on Lifelong Learning Available from the National Center for Education Statistics	Lisa Hudson
2000–05	Secondary Statistical Modeling With the National Assessment of Adult Literacy: Implications for the Design of the Background Questionnaire	Sheida White
2000–06	Using Telephone and Mail Surveys as a Supplement or Alternative to Door-to-Door Surveys in the Assessment of Adult Literacy	Sheida White
2000–07	"How Much Literacy is Enough?" Issues in Defining and Reporting Performance Standards for the National Assessment of Adult Literacy	Sheida White
2000–08	Evaluation of the 1992 NALS Background Survey Questionnaire: An Analysis of Uses with Recommendations for Revisions	Sheida White
2000–09	Demographic Changes and Literacy Development in a Decade	Sheida White
Literacy of adults – international		
97–33	Adult Literacy: An International Perspective	Marilyn Binkley
Mathematics		
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings

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1999–08	Measuring Classroom Instructional Processes: Using Survey and Case Study Field Test Results to Improve Item Construction	Dan Kasprzyk
Parental involvement in education		
96–03	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
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2001–06	Papers from the Early Childhood Longitudinal Studies Program: Presented at the 2001 AERA and SRCD Meetings	Jerry West
Participation rates		
98–10	Adult Education Participation Decisions and Barriers: Review of Conceptual Frameworks and Empirical Studies	Peter Stowe
Postsecondary education		
1999–11	Data Sources on Lifelong Learning Available from the National Center for Education Statistics	Lisa Hudson
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
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Postsecondary education – persistence and attainment		
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
1999–15	Projected Postsecondary Outcomes of 1992 High School Graduates	Aurora D'Amico
Postsecondary education – staff		
97–26	Strategies for Improving Accuracy of Postsecondary Faculty Lists	Linda Zimbler
2000–01	1999 National Study of Postsecondary Faculty (NSOPF:99) Field Test Report	Linda Zimbler
Principals		
2000–10	A Research Agenda for the 1999–2000 Schools and Staffing Survey	Dan Kasprzyk
Private schools		
96–16	Strategies for Collecting Finance Data from Private Schools	Stephen Broughman
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Public schools		
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1999–02	Tracking Secondary Use of the Schools and Staffing Survey Data: Preliminary Results	Dan Kasprzyk
2000–12	Coverage Evaluation of the 1994–95 Public Elementary/Secondary School Universe Survey	Beth Young

No.	Title	NCES contact
2000–13	Non-professional Staff in the Schools and Staffing Survey (SASS) and Common Core of Data (CCD)	Kerry Gruber
Public schools – secondary		
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
Reform, educational		
96–03	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
Response rates		
98–02	Response Variance in the 1993–94 Schools and Staffing Survey: A Reinterview Report	Steven Kaufman
School districts		
2000–10	A Research Agenda for the 1999–2000 Schools and Staffing Survey	Dan Kasprzyk
School districts, public		
98–07	Decennial Census School District Project Planning Report	Tai Phan
1999–03	Evaluation of the 1996–97 Nonfiscal Common Core of Data Surveys Data Collection, Processing, and Editing Cycle	Beth Young
School districts, public – demographics of		
96–04	Census Mapping Project/School District Data Book	Tai Phan
Schools		
97–42	Improving the Measurement of Staffing Resources at the School Level: The Development of Recommendations for NCES for the Schools and Staffing Survey (SASS)	Mary Rollefson
98–08	The Redesign of the Schools and Staffing Survey for 1999–2000: A Position Paper	Dan Kasprzyk
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97–09	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
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98–08	The Redesign of the Schools and Staffing Survey for 1999–2000: A Position Paper	Dan Kasprzyk
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Staff – nonprofessional		
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State		
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Statistical methodology		
97–21	Statistics for Policymakers or Everything You Wanted to Know About Statistics But Thought You Could Never Understand	Susan Ahmed
Students with disabilities		
95–13	Assessing Students with Disabilities and Limited English Proficiency	James Houser
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96–17	National Postsecondary Student Aid Study: 1996 Field Test Methodology Report	Andrew G. Malizio
97–15	Customer Service Survey: Common Core of Data Coordinators	Lee Hoffman
97–35	Design, Data Collection, Interview Administration Time, and Data Editing in the 1996 National Household Education Survey	Kathryn Chandler
98–06	National Education Longitudinal Study of 1988 (NELS:88) Base Year through Second Follow-Up: Final Methodology Report	Ralph Lee
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
98–16	A Feasibility Study of Longitudinal Design for Schools and Staffing Survey	Stephen Broughman
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Teachers		
98–13	Response Variance in the 1994–95 Teacher Follow-up Survey	Steven Kaufman
1999–14	1994–95 Teacher Followup Survey: Data File User's Manual, Restricted-Use Codebook	Kerry Gruber
2000–10	A Research Agenda for the 1999–2000 Schools and Staffing Survey	Dan Kasprzyk
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98–08	The Redesign of the Schools and Staffing Survey for 1999–2000: A Position Paper	Dan Kasprzyk
Teachers – opinions regarding safety		
98–08	The Redesign of the Schools and Staffing Survey for 1999–2000: A Position Paper	Dan Kasprzyk
Teachers – performance evaluations		
1999–04	Measuring Teacher Qualifications	Dan Kasprzyk
Teachers – qualifications of		
1999–04	Measuring Teacher Qualifications	Dan Kasprzyk
Teachers – salaries of		
94–05	Cost-of-Education Differentials Across the States	William J. Fowler, Jr.
Training		
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
2000–16b	Lifelong Learning NCES Task Force: Final Report Volume II	Lisa Hudson
Variance estimation		

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Violence		
97–09	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
Vocational education		
95–12	Rural Education Data User's Guide	Samuel Peng
1999–05	Procedures Guide for Transcript Studies	Dawn Nelson
1999–06	1998 Revision of the Secondary School Taxonomy	Dawn Nelson