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Early Childhood Longitudinal Study
Kindergarten Class of 1998-99

Full-day and Half-day Kindergarten in the United States

Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99

U.S. Department of Education
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June 2004

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Executive Summary

A major trend in kindergarten programs that has occurred in the past few decades is an increase in the prevalence of kindergarten classes that meet for the entire school day rather than just a part of the day. The increase has been attributed to various social, economic and educational factors. Increases in the number of single parent households and households with both parents working are commonly cited as important factors contributing to the need for full-day programs (e.g., Gullo 1990; Morrow, Strickland, and Woo 1998). Arranging childcare during the workday is less costly and less complicated for these families when the child is in school for the whole day rather than half of the day. Another rationale in support of full-day kindergarten is that children who have spent some of their pre-kindergarten years in nursery school classes or child care arrangements (often full-day) are ready for the cognitive, social and physical demands of a full-day kindergarten (Gullo 1990). Proponents of full-day kindergarten also emphasize the potential educational benefit—teachers have more time to get to know their children and individualize their instruction, and children have more time to acquire the early academic skills taught in kindergarten (Morrow, Strickland and Woo 1998). In some cases, the move to full-day classes has been made to provide sufficient time for children to complete kindergarten curriculum that has become increasingly rigorous (Shepard and Smith 1988).

The differences between these two types of kindergarten programs have been the subject of a good deal of research as the move to full-day programs has been implemented at the state and local levels (e.g., Cryan et al. 1992; Elicker and Mathur 1997; Fusaro 1997; Gullo 2000; Morrow, Strickland and Woo 1998). Not until the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K) has the opportunity been available to describe full-day and half-day kindergarten differences at the national level. This report examines differences between full-day and half-day kindergarten across the United States using ECLS-K data from schools, teachers, parents and kindergarten children. This report describes the schools, both public and private, that offer these programs and the children who attend them. It also describes many characteristics of public school full-day and half-day kindergarten classes, including specific curriculum differences between the program types. The report ends with an examination of the cognitive gains public school children make in full-day and half-day classes during the kindergarten year.

Schools that offer full-day and half-day kindergarten

In the 1998–99 school year, 61 percent of all U.S. schools that have a kindergarten program offer at least one full-day kindergarten class and 47 percent offer at least one half-day class (table A1).[1] These percents, however, are not uniform across different school types. Full-day programs are most prevalent in Catholic schools (figure A).

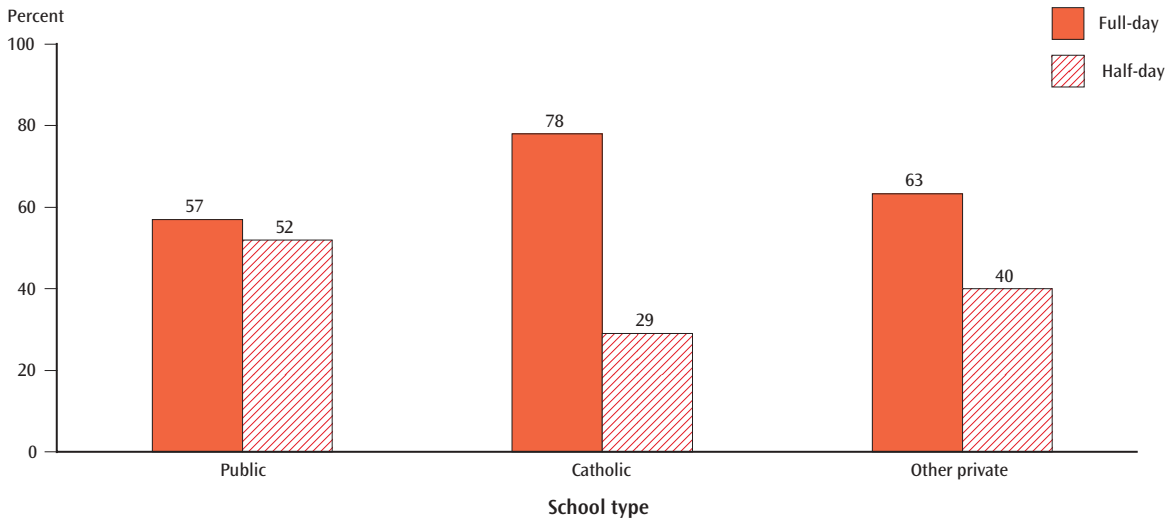
Among public schools, there is a strong regional difference—84 percent of public schools in the southern region[2] of the country provide a full-day program. Full-day kindergarten is also more prevalent in public schools located in cities (64 percent) and in small towns or rural areas (63 percent) compared with suburban or large town areas (46 percent). The percent of schools that offer full-day programs is also related to schools' enrollment of children that are at-risk for school failure.[3] Both private and public schools that serve high concentrations of minority children are more likely to provide full-day programs compared to those that serve low concentrations of minority children. Additionally, full-day programs are more likely to be offered

[1]Estimates here and elsewhere in the executive summary are not adjusted by other child, class or school variables unless noted.

[2]The southern region of the country includes: DE, DC, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, and TX.

[3]The term "at-risk" refers to children who belong to a socio-demographic group that, on average, performs lower on measures of academic achievement compared to other groups. Black and Hispanic children, low-income children, and children from non-English speaking families are "at-risk" for school failure (e.g., U.S. Department of Education 2001; West, Denton and Reaney 2001).

Figure A. Percent of U.S. schools that offer full-day and half-day kindergarten programs, by school type: 1998–99



NOTE: The percent of schools offering full-day and half-day programs sums to more than 100 because some schools have both full-day and half-day classes. Estimates only pertain to schools with a kindergarten program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

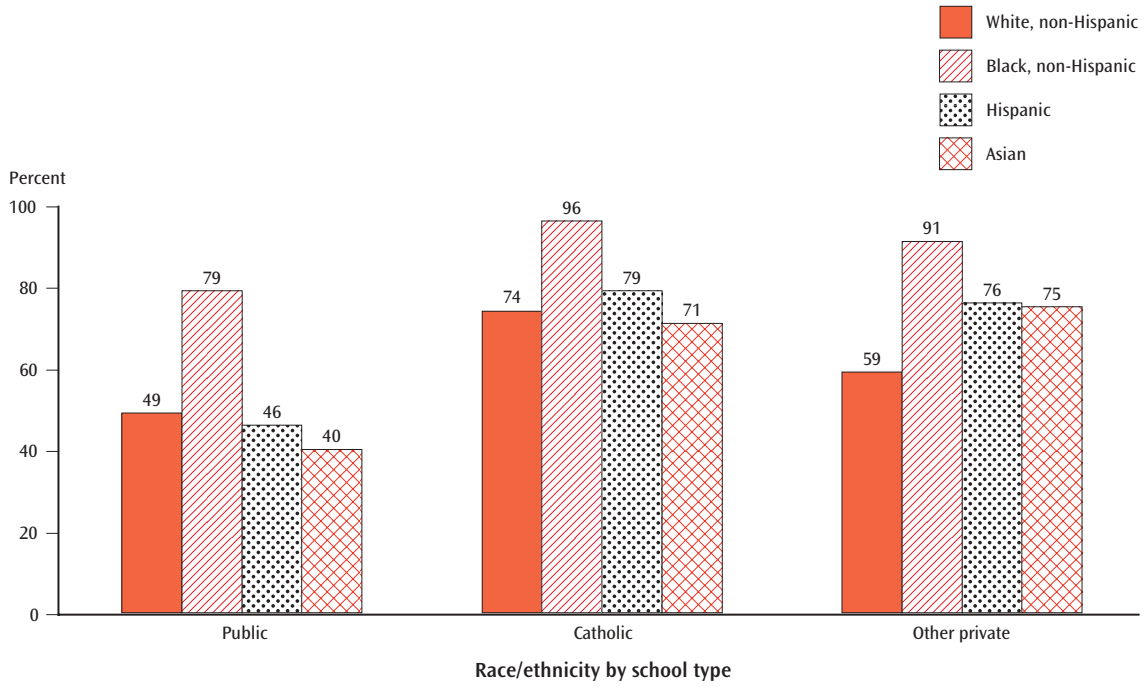
in public schools where at least half of the enrollment is comprised of low-income children (69 percent) than in schools with fewer low-income children (48 percent).

Children enrolled in full-day and half-day kindergarten

Overall, 56 percent of kindergarten children attend a full-day program; 54 percent of public school kindergarten children attend a full-day program and 67 percent of private school children do. In public schools, 79 percent of Black kindergarten children are attending full-day programs; this is a higher rate than is found for White, Asian or Hispanic public school kindergartners (figure B). Additionally, public school kindergartners whose family income is below the federal poverty threshold attend full-day programs at a higher rate (62 percent) than those from more affluent families (51 percent). The findings for Black children and economically disadvantaged children are consistent with the common rationale for offering full-day programs: to ease the child care needs of families who are least able to afford quality after-school programs, and to provide "at-risk" children with more time during the kindergarten year to acquire the beginning reading and mathematics skills necessary to succeed in school (e.g., Gullo 1990; Morrow, Strickland and Woo 1998). However, not all "at-risk" groups of children are attending full-day programs at relatively high rates. Compared to 79 percent of Black public school kindergarten children and 62 percent of public school kindergartners living in poverty attending full-day kindergarten, 46 percent of public school Hispanic kindergartners and 45 percent of public school kindergartners from homes where English is not the primary language attend full-day programs.

Among private schools, 77 percent of kindergartners in Catholic schools and 65 percent in other private schools attend a full-day program. Black children in Catholic and other private schools are more likely to attend a full-day program compared to White children (figure B) but poverty status and home language are not related to full-day enrollment rates in these schools.

Figure B. Percent of U.S. kindergarten children enrolled in a full-day program, by race/ethnicity and school type: 1998–99



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire, Kindergarten Teacher Questionnaires, and Parent Interviews, Base-Year Public-Use Data Files.

Class composition and structure in full-day and half-day public kindergartens

Differences in the composition of public full-day kindergarten classes compared to half-day classes mirror the patterns seen in some of the child-level enrollment findings. The average percentage of minority children in full-day classes (46 percent) is higher than that for half-day classes (35 percent). Thirty percent of full-day classes have more than 75 percent minority enrollment compared to 19 percent of half-day classes. The same pattern in not evident for limited-English proficient students.

A smaller percent of full-day classes are taught by White teachers, but the majority of both full-day and half-day classes are taught by White teachers (80 and 87 percent, respectively). A larger percent of full-day classes are taught by Black teachers (10 percent) compared to half-day classes (2 percent). Teachers in full-day classes are more likely than teachers in half-day classes to have their teaching certificate in the area of early childhood education.

The average number of children in full-day classes (20.3) is higher than is found in half-day classes (19.1). Thirty-nine percent of full-day classes have between 21 and 25 children compared to 26 percent of half-day classes, but very large classes (more than 25 children) are uncommon in both full-day (10 percent) and half-day programs (7 percent). Classroom instructional aides are more prevalent in full-day classes. Sixty-one percent of full-day classes and 44 percent of half-day classes have an aide who works for at least an hour per day directly with the children on instructional tasks.

Instructional activities in full-day and half-day public kindergarten classes

Teachers in full-day kindergarten classes organize for instruction in much the same way as teachers in half-day classes. Full-day kindergarten classes spend, on average, more time each day than half-day classes on teacher-directed whole class, small group, and individual activities and they spend

more time on child-selected activities. When the total amount of time available in these classes is taken into account, however, the percent of total class time spent in each type of activity is similar for full-day and half-day classes. The strategies that teachers use for grouping children for instruction are also examined. Mixed-level groups are the most common grouping strategy in both types of classes. Full-day classes, however, are more likely than half-day classes to use achievement groups at least once a week for reading instruction (62 percent vs. 50 percent) and for mathematics instruction (42 percent vs. 32 percent).

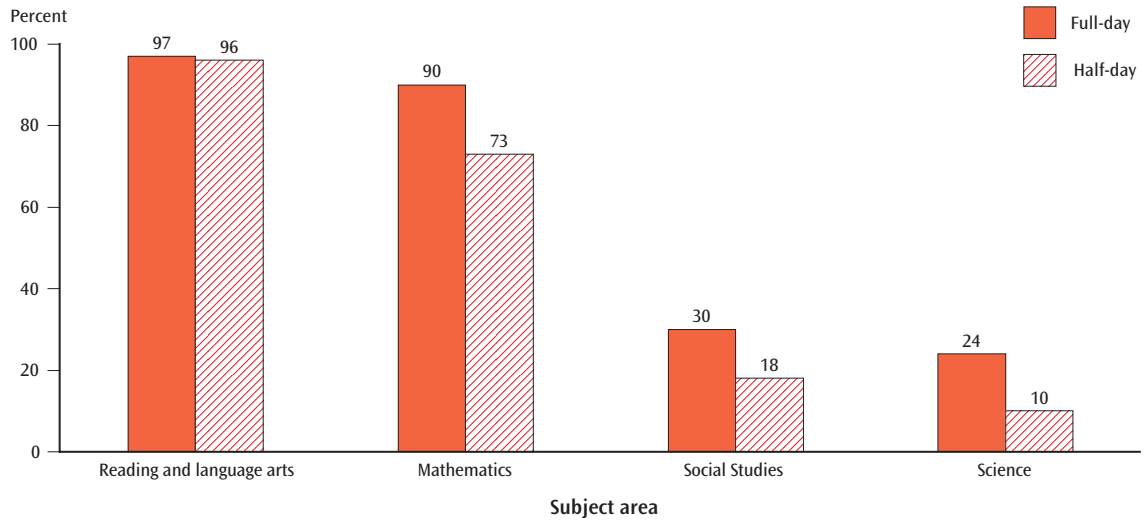
A large majority of both full-day and half-day classes have reading and language arts activities every day (97 and 96 percent, respectively) (figure C). However, full-day classes are more likely to spend time each day on other subjects—math, social studies, and science, compared with half-day classes. Among the four art and music subjects that teachers were questioned about—art, music, dance/creative movement, and theater/creative dramatics—only art is done every day in a larger percent of full-day classes (30 percent) compared to half-day classes (21 percent). Music is taught daily in a smaller percentage of full-day classes (30 percent) compared to half-day classes (36 percent).

The relative order of the skills and activities that children spend time on within the domains of reading/language arts and mathematics is very similar for full-day and half-day classes; the most commonly reported skills and activities in full-day classes are generally the most common in half-day classes. Almost all specific skills and activities are more frequently covered daily in full-day classes compared with half-day classes with some of the exceptions being those done daily by a majority of both types of classes (e.g., calendar activities and counting out loud).

To illustrate some differences in the daily curriculum covered in public kindergarten full-day and half-day classes, figures D and E show the percentage of these classes that work on common kindergarten activities and skills every day. Figure D presents a selection of the most commonly reported reading/language arts activities and skills and compares the percent of full-day and half-day classes that do these every day. Figure E compares the percent of full-day and half-day classes that spend time each day on common mathematics skills and activities.

While there are many skills and activities that a larger percent of full-day classes spend time on each

Figure C. Percent of U.S. public kindergarten classes that spend time each day on various academic subject areas, by program type: Spring 1999

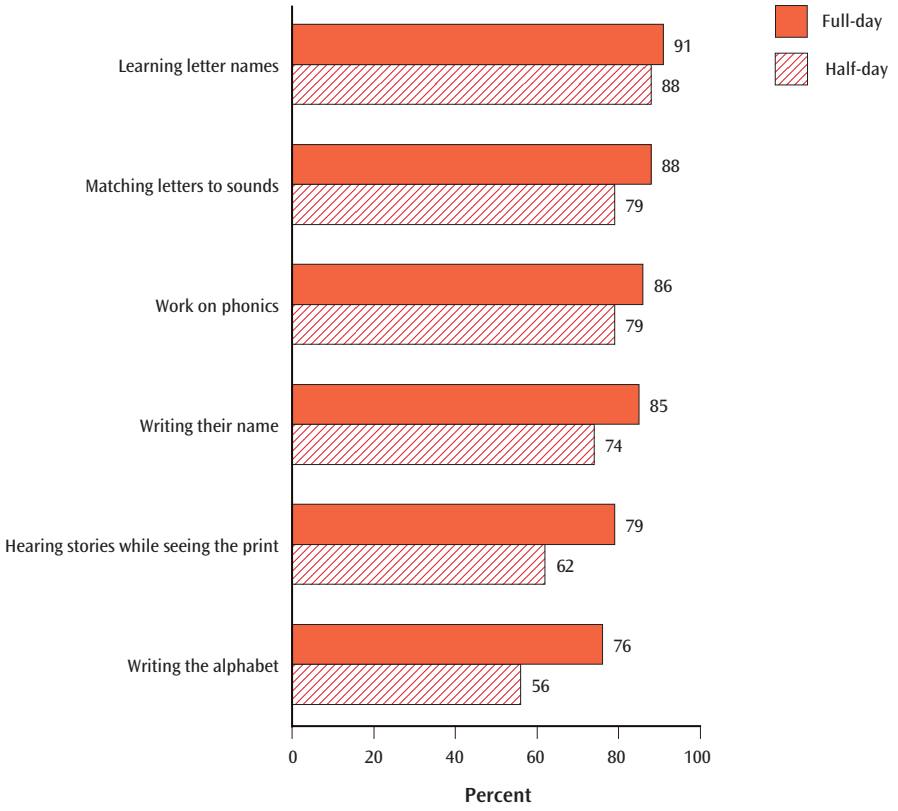


SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

day compared with half-day classes, these differences may simply be attributed to the fact that full-day classes have the time to devote to a greater number of separate skills and activities. The differences in the percent of classes that spend time on specific skills and activities *at least weekly* (either daily or weekly) may be a more useful comparison for describing differences in the curricular focus between full-day and half-day kindergarten classes. Within the reading/language arts domain (reading, writing, and expressive and receptive language), the percent of full-day classes that engage in a skill or activity at least weekly exceeds the percent of half-day classes for 19 out of the 36 skills and activities examined. Some of the reading activities and skills that are more likely to be part of at least a weekly routine in full-day classes are typically considered more advanced than the traditional kindergarten reading curriculum (e.g., reading aloud fluently, reading multi-syllable words, and alphabetizing).[4] Nine out of the 11 writing skills and activities are done weekly in more full-day classes compared to half-day classes (e.g., writing in journal, writing stories and reports, and conventional spelling). Among the 37 skills and activities examined in the mathematics domain, there are 29 in which the percentage of full-day classes engaging in the skill or activity at least weekly exceeds the percent of half-day classes. Many of these are activities or skills that involve solving mathematics problems

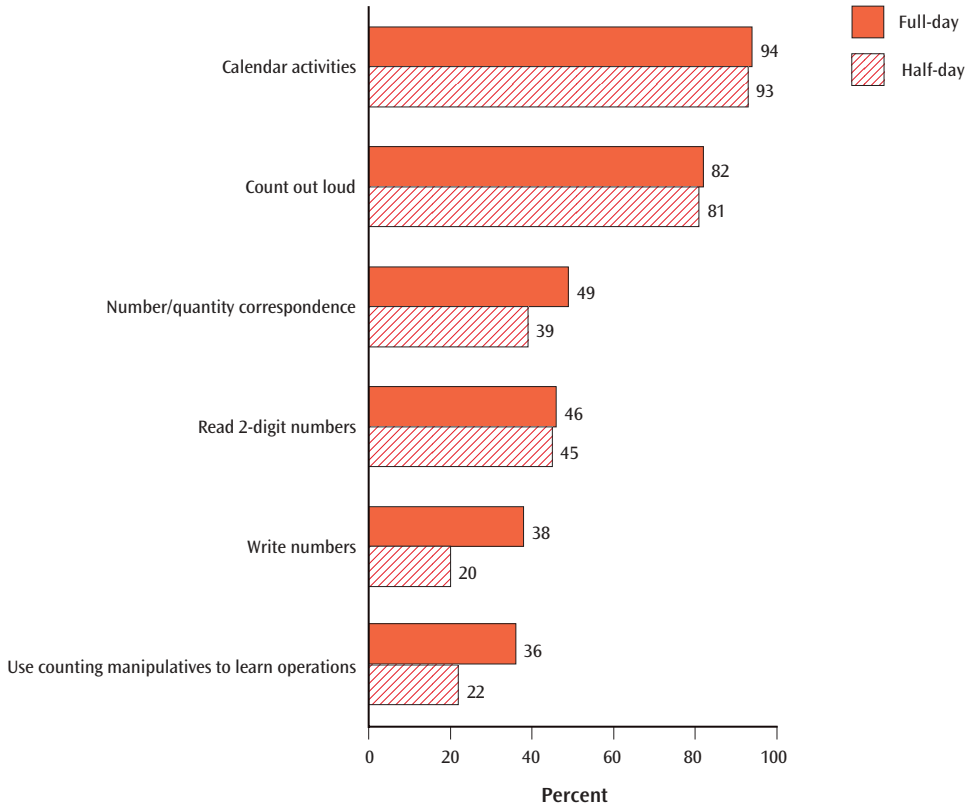
[4]Comparisons of public school kindergarten and first-grade activities and skills show that a higher percent of first-graders compared to kindergartners engage in these at least once a week (reading aloud fluently, 98 vs. 44 percent; reading multi-syllable words, 84 vs. 36 percent; and alphabetizing, 66 vs. 18 percent) (unpublished tables, ECLS-K longitudinal kindergarten-first-grade Public-Use Data File, NCES 2002–148).

Figure D. Percent of U.S. public kindergarten classes that work daily on various reading/language arts activities and skills, by program type: Spring 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

Figure E. Percent of U.S. public kindergarten classes that work daily on various mathematics activities and skills, by program type: Spring 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

(e.g., explain how a math problem is solved, solve real-life math problem, and solve math problems on the chalkboard). Additionally, some of these mathematics skills and activities are ones more typically part of a first-grade curriculum (e.g., recognizing fractions, telling time, and writing numbers from 1–100).[5]

Children in full-day kindergarten classes are spending some of the time focused on learning many of the same things and doing many of the same types of learning activities as those in half-day classes, but some full-day kindergarten classes are spending the "extra time" during the day exposed to more advanced reading, writing, and mathematics skills.

Full-day and half-day children's gains in cognitive skills and knowledge

The ECLS-K children were assessed in reading/language arts and mathematics in the fall and in the spring of the kindergarten year. The achievement gains made during the year are compared for English-speaking, first-time kindergartners in full-day and half-day public kindergarten classes. Given the non-experimental, pretest-posttest design of the study, there is no way to determine if the samples were equivalent in all important ways at the beginning of the kindergarten year. This is a research design limitation which makes it impossible to draw causal conclusions from the data.

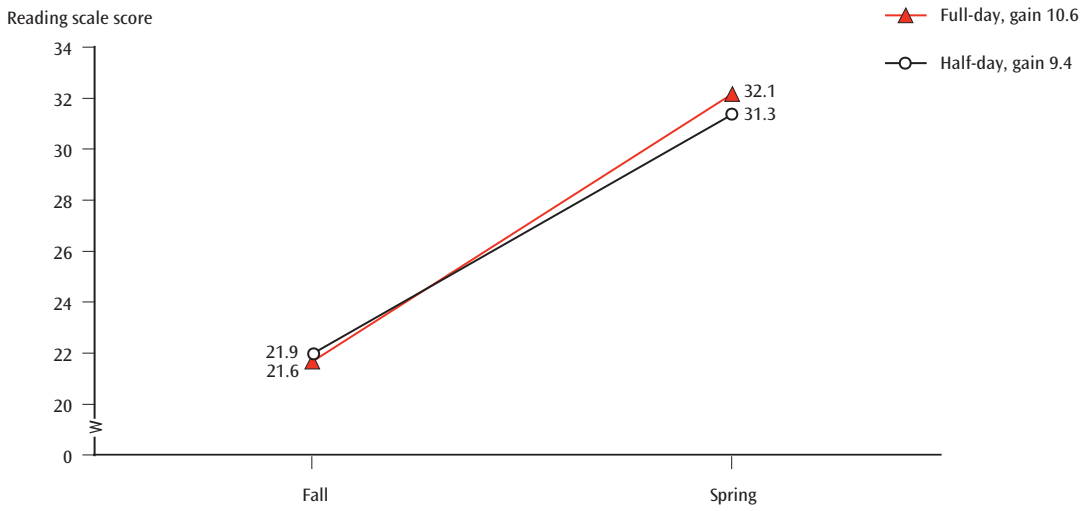
[5]Comparisons of public school kindergarten and first-grade activities and skills show that a higher percent of first-graders compared to kindergartners engage in these activities and skills at least once a week (recognizing fractions, 32 vs. 6 percent; telling time, 72 vs. 40 percent; and writing numbers from 1–100, 41 vs. 18 percent) (unpublished tables, ECLS-K longitudinal kindergarten-first-grade Public-Use Data File, NCES 2002–148).

The children enrolled in a full-day program make greater gains in reading language arts over the course of the kindergarten year compared to those in half-day classes (figure F). Additionally, full-day kindergartners make greater gains in mathematics achievement during the year compared to half-day kindergartners (figure G).

The differences in achievement gains associated with program type are not only apparent when simple comparisons of gains are made (figures F and G), they persist when the comparisons take into account other important child and class characteristics. Findings from a multi-level regression analysis indicate that children in full-day classes make greater gains in both reading and mathematics compared to those in half-day classes *after* adjusting for gain score differences associated with race/ethnicity, poverty status, fall achievement level, sex, class size, amount of time for subject area instruction, and the presence of an instructional aide. The positive effect associated with full-day programs after accounting for these other variables represents a difference in the reading gain scores of about 32 percent of a standard deviation. Findings from this analyses indicate that children in very large classes (25+) make gains in reading that are slightly smaller than those made by children in medium size classes (18–24). Furthermore, there is not a differential effect associated with class size by program type—a smaller class size does not mitigate the difference in gains found between children in half-day and full-day programs. Additionally, the presence of a classroom aide is not associated with differences in reading gain scores among White children in either half-day or full-day programs; however, Black children in full-day classes with an aide make greater reading gains compared to Black children in full-day classes without an aide.

After accounting for the same class and child characteristics as for reading, children in full-day programs make gains in mathematics that represent about 22 percent of a standard deviation more than the gains made by children in half-day programs. For mathematics achievement, no other child or class variables interact with program type, which indicates that the greater gains associated with full-day programs are consistent for children with various socio-demographic backgrounds and across other classroom characteristics.

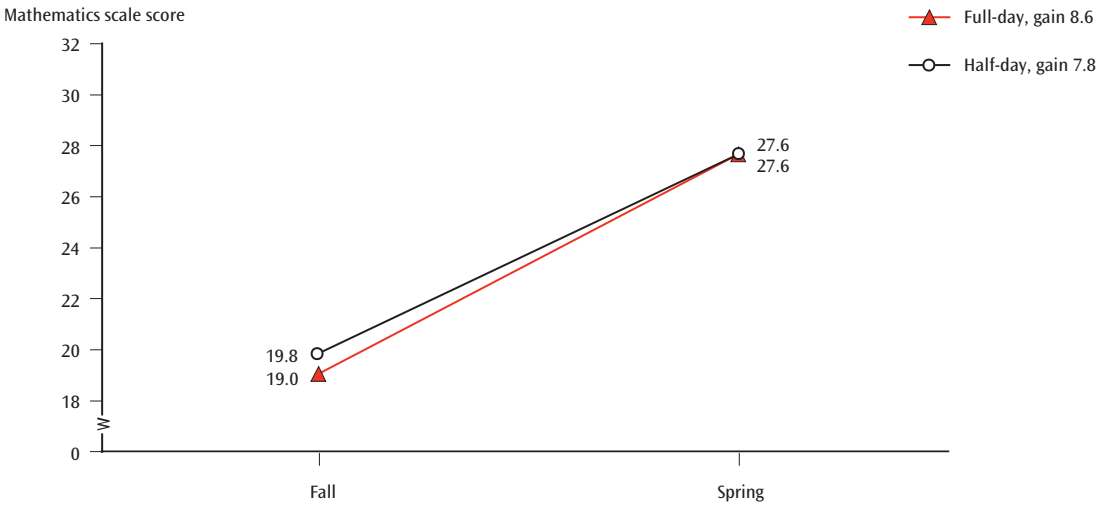
Figure F. Public school first-time kindergartners' mean reading gain scores, by program type: Fall 1998 to spring 1999



NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (not a transitional or multi-grade class) who are assessed in English in both the fall and the spring. Only children with the same teacher in both the fall and spring are included in the analysis. Detail may not sum to totals because of rounding. The scores are simple means and are unadjusted for a number of other factors that are related to performance.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaire and Child Assessments, Base-Year Public-Use Data File.

Figure G. Public school first-time kindergartners' mean mathematics gain scores, by program type: Fall 1998 to spring 1999



NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (not a transitional or multi-grade class) who are assessed in mathematics in both the fall and the spring. Only children with the same teacher in both the fall and spring are included in the analysis. Detail may not sum to totals because of rounding. The scores are simple means and are unadjusted for a number of other factors that are related to performance.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaire and Child Assessments, Base-Year Public-Use Data File.

The focus of this report is broad; it describes many differences associated with full-day and half-day kindergarten in the United States. This report provides descriptive information about the public and private schools that offer full-day and half-day kindergarten programs and the children that attend them. This report also provides information about the teachers in public full-day and half-day kindergarten classes, how they organize their classes for instruction and the time they spend on many instructional activities and skills. The final chapter of findings presents results that support previous research on full-day kindergarten and the greater achievement gains in reading and mathematics made by children in full-day compared to half-day programs. It is the intention of this report to provide a broad picture of full-day and half-day kindergarten in the United States and to spur other researchers to use the rich array of child, parent, classroom and school information available in the ECLS-K data to further examine aspects of full-day and half-day kindergarten and associated relationships.

Chapter 1: Introduction

This report presents findings from the first year of the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K). Its focus is on descriptive comparisons of full-day and half-day kindergarten in the United States. It describes the public and private schools that offer full-day and half-day kindergarten and the children enrolled in these programs. Taking a closer look at public school kindergarten, it details the curriculum and instructional practices found in each type of program. Additionally, results of analyses examining the relationships between program type and the gains that public school children make in reading and mathematics during the kindergarten year are presented.

The advantages and disadvantages of a longer school day for kindergarten children have been discussed widely and there has been a good deal of research comparing full-day and half-day kindergarten. This introduction begins with a brief overview of the policy issues surrounding full-day kindergarten and highlights of findings from related research. A description of the ECLS-K data used in this report is presented next, followed by a description of the way in which the findings are organized.

Full-day and Half-day Kindergarten

Findings from the U.S. Census Bureau's Current Population Survey show that in the early 1970s less than 20 percent of all kindergartners attended a full-day program (figure 1). Full-day enrollment has been on a steady increase ever since. The ECLS-K data show that in the 1998–99 school year 56 percent of all kindergarten children attended a full-day program.

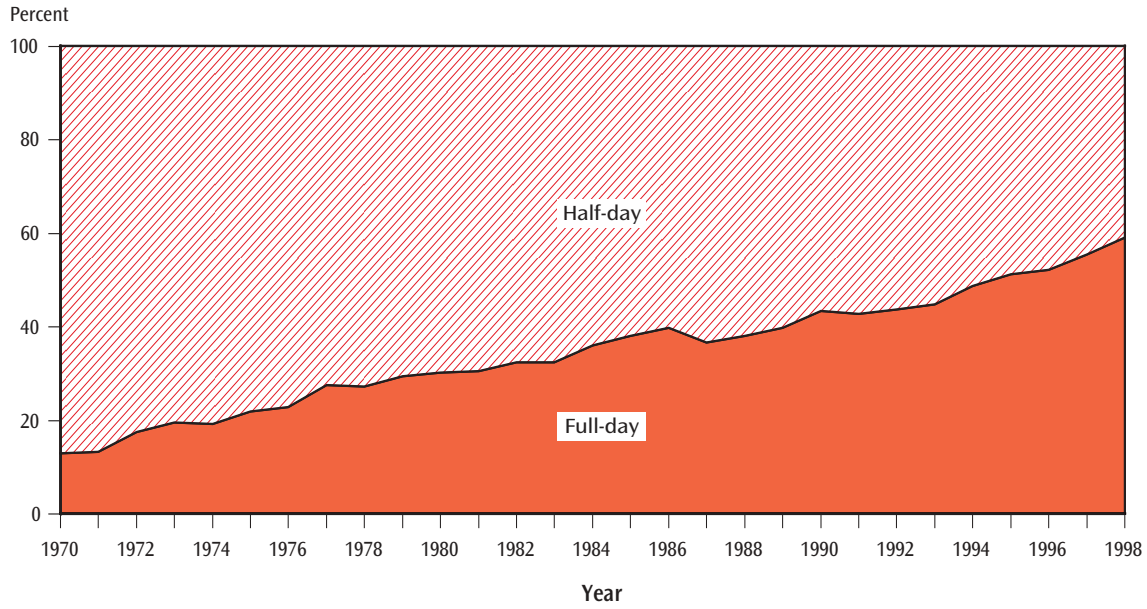
The increase in the prevalence of full-day kindergarten programs in the United States over the past few decades has been attributed to various social, economic and educational factors. Increases in the number of single parent households and households with both parents working are commonly cited as important factors contributing to the need for full-day programs (e.g., Gullo 1990; Morrow, Strickland, and Woo 1998). Arranging child care during the workday is less costly and less complicated for these families when the child is in school for the whole day rather than half of the day. Additionally, providing a full-day kindergarten program may reduce the number of settings a child attends during the time his or her parents are at work thereby increasing the consistency of care for the child. Another rationale in support of full-day kindergarten is that children who have spent some of their pre-kindergarten years in nursery school classes or child care arrangements (often full-day placements) are ready for the cognitive, social and physical demands of a full-day of kindergarten (Gullo 1990).

A main rationale for providing full-day kindergarten is to increase the time available for learning kindergarten skills and for developing appropriate social skills necessary for school success, especially for children "at risk" for school failure.[6] Proponents of full-day kindergarten emphasize the potential educational benefit—teachers have more time to get to know their children and individualize their instruction, and children have more time to acquire the early academic skills taught in kindergarten (Morrow, Strickland, and Woo 1998). In some cases, the move to more full-day classes has been made to provide sufficient time for children to complete more rigorous kindergarten curricula (Shepard and Smith 1988).

School resources are considered when decisions are being made about whether to provide full-day or half-day kindergarten programs. While a single teacher in one classroom can teach two half-day kindergarten classes of children, converting to full-day classes with similar class sizes requires two teachers and building space for two kindergarten classrooms. Limitations of these resources can influence a

[6]The term "at-risk" refers to children who belong to a socio-demographic group that, on average, performs lower on measures of academic achievement compared to other groups. Black and Hispanic children, low-income children, and children from non-English speaking families are "at-risk" for school failure (e.g., U.S. Department of Education 2001; West, Denton and Reaney 2001).

Figure 1. Percent of kindergarten children enrolled in a full-day program, 1970 through 1998



SOURCE: U.S. Department of Commerce, Bureau of the Census, October Current Population Surveys, 1970 to 1998.

district's or school's decision to provide full-day kindergarten. There is, however, a savings in transportation costs by offering full-day programs since it eliminates the need for bussing in the middle of the day.

State legislation aimed to increase access to full-day kindergarten has been proposed and debated in a number of statehouses over the past few years. In a review of state policies regarding full-day kindergarten, Galley (2002) found that 25 states and the District of Columbia provide funds for full-day kindergarten programs in the districts that offer it. Eight states (Louisiana, Mississippi, Alabama, Georgia, North Carolina, South Carolina, West Virginia, and Hawaii) and the District of Columbia require some or all of their districts to provide full-day kindergarten (Galley 2002). Because of the higher cost of full-day kindergarten programs, some local school districts target resources for full-day programs in those schools that serve neighborhoods with high concentrations of low income or minority students. State and federal funding earmarked for "at-risk" students is often used to supplement local funding for full-day kindergarten teachers. A 1993 survey of public school kindergarten teachers found that they were more likely to be teaching in a full-day program than a half-day program if their class had a high concentration of minority children or if their school was located in a high-poverty area (Heaviside and Farris 1993).

As the prevalence of full-day kindergarten programs has increased over the years there has been growing interest in the effect of full-day kindergarten on children's academic achievement. The research generally, but not uniformly, suggests that full-day kindergarten programs compare favorably to half-day programs in terms of children's academic achievement (Fusaro 1997) and their development of social skills (Elicker and Mathur 1997). This has been found to be true most notably for minority children (Karweit 1989). The academic benefits of a full-day program have also been shown to last into first grade (Cryan et al. 1992) and beyond (Gullo 2000).

The potential benefits of a longer kindergarten day can be attributed to the increased amount of time children spend at school, but perhaps more importantly to the *way* in which the extra time is spent. Some researchers have suggested that longer school days for kindergartners will not have a positive impact unless the time is spent in developmentally and individually appropriate learning

environments (e.g., Morrow, Strickland, and Woo 1998). These authors recommended that full-day kindergarten programs take advantage of the longer day by providing child-centered, developmentally appropriate activities and offering a balance of small group, large group, and individual activities. Other researchers (e.g., Hirsch 1996) suggest a content-centered curriculum for this age group in order to prepare children academically. Class time should be focused strategically on the specific academic skills appropriate to prepare children for the next educational step. A full-day program, from this perspective, offers additional time to expose children to these skills and therefore has the potential to maximize the benefits associated with this type of instruction.

While there is evidence that full-day kindergarten can have a positive influence on children's school success, there remains a need for studies that focus on *how* time is spent in full-day and half-day classes in order to better understand the potential benefit. There has not been an opportunity to compare differences in full-day and half-day kindergarten instructional practices and curriculum focus at the national level until the ECLS-K. Chapter 4, section 2 of this report, is devoted to comparisons of teacher reports of the frequency that a wide variety of classroom activities and specific skills are covered in public school full-day and half-day kindergarten classes. Chapter 5 investigates associations between the length of the kindergarten day in conjunction with other child and program characteristics and children's cognitive outcomes.

Data Source

This report contains findings from a national study of kindergartners, their schools, classroom, teachers and families. In the fall of 1998, the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), sponsored by the U.S. Department of Education, National Center for Education Statistics (NCES), began following a nationally representative sample of about 22,000 kindergartners. The ECLS-K includes nationally representative samples of schools offering kindergarten, kindergarten teachers, and kindergarten classrooms.

About 1,200 public and private schools offering kindergarten programs were selected to participate in the ECLS-K. The sample of schools included schools offering kindergarten and some combination of grades one to grade twelve. Early childhood programs that offer kindergartens in addition to programs for preschoolers were also selected to participate. All the kindergarten teachers in the sampled schools were selected to participate. Data about the children, their families and their teachers were collected in the fall of 1998 and again in the spring of 1999. Data about the schools were collected from school administrators in the spring of 1999. Details about the sample design and implementation of the study can be found in the *ECLS-K Base-Year Public-Use Data File User's Manual* (National Center for Education Statistics 2001).

The tables on the following pages present the final sample sizes, population counts and national estimates of the percentage distributions of various school-level (table 1) and child-level (table 2) characteristics. These characteristics are reported for the 1998–99 school year. About 72,000 U.S. schools offer kindergarten. Sixty-five percent are public schools, 9 percent are Catholic schools, and 25 percent are other types of private schools (table 1). Of the 3.9 million children enrolled, about 85 percent attend public school, 6 percent are in Catholic school, and 9 percent are in other private schools (table 2). Fifty-seven percent of these children are White, 17 percent are Black, 19 percent are Hispanic and 3 percent are Asian (table 2). Table 3 provides sample counts and population estimates for public school kindergarten classes. There are approximately 178,000 public school kindergarten classes—24 percent of these classes have a minority enrollment of more than 75 percent and 8 percent enroll a majority of students who are limited-English proficient (LEP).

Table 1. Sample sizes, population counts, and percentage distribution of U.S. schools with kindergartens, by various characteristics: Spring 1999

School characteristics	Sample	National estimates	
	Number	Number	Percentage distribution
All schools	866	72,000	100
School sector			
Public	630	47,000	65
Catholic	105	7,000	10
Other private	131	18,000	25
Region			
Northeast	154	15,000	21
Midwest	228	18,000	26
South	286	22,000	30
West	198	16,000	23
Location			
Large and mid-sized cities	385	27,000	37
Suburbs/large town	286	27,000	37
Small town and rural	195	19,000	26
School minority enrollment			
Less than 10%	302	28,000	39
10–24%	162	14,000	19
25–49%	144	11,000	16
50–75%	90	7,000	9
75% or more	152	11,000	16
Low-income concentration in public schools[1]			
0–49%	348	26,000	56
50% or more	280	21,000	44

[1]The school's concentration of low-income children is based on a composite of free and reduced-priced lunch eligibility and participation in a "school-wide" Title I program. This is calculated only for public schools.

NOTE: Sample detail may not sum to totals because of missing data. Population detail may not sum to totals because of rounding. Estimates only pertain to schools with a kindergarten program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire, Base-Year Public-Use Data File.

Table 2. Sample sizes, population counts, and percentage distribution of U.S. kindergartners, by various school and child characteristics: Spring 1999

Child characteristics	Sample	National estimates	
	Number	Number	Percentage distribution
All kindergartners	21,260	3,864,000	100
School sector			
Public	16,665	3,290,000	85
Catholic	2,350	220,000	6
Other private	2,245	353,000	9
Region			
Northeast	3,915	695,000	18
Midwest	5,263	893,000	23
South	7,094	1,440,000	37
West	4,988	835,000	22
Location			
Large and mid-sized cities	8,782	1,468,000	38
Suburbs/large town	8,193	1,595,000	41
Small town and rural	4,285	801,000	21
School minority enrollment			
Less than 10%	6,374	1,121,000	29
10–24%	3,604	696,000	18
25–49%	3,374	645,000	17
50–74%	2,293	491,000	13
75% or more	5,062	889,000	23
Child's sex			
Male	10,866	2,009,000	52
Female	10,381	1,855,000	48
Mother's education			
Less than high school	2,825	618,000	16
High school diploma or equivalent	5,993	1,198,000	31
Some college, including vocational/technical	6,364	1,236,000	32
Bachelor's degree or higher	4,628	811,000	21
Primary language spoken in home			
Non-English	2,783	464,000	12
English	17,224	3,400,000	88
Child's race/ethnicity			
White, non-Hispanic	11,741	2,202,000	57
Black, non-Hispanic	3,210	645,000	17
Hispanic	3,762	734,000	19
Asian	1,364	116,000	3
Hawaiian Native/Pacific Islander	220	19,000	1
American Indian/Alaska Native	379	66,000	2
More than one race, non-Hispanic	514	81,000	2
Diagnosed disability			
Yes	2,568	580,000	15
No	15,500	3,284,000	85
First time kindergartner			
Yes	17,219	3,671,000	95
No	850	193,000	5

See notes at the end of table.

Table 2. Sample sizes, population counts, and percentage distribution of U.S. kindergartners, by various school and child characteristics: Spring 1999—Continued

Child characteristics	Sample	National estimates	
	Number	Number	Percentage distribution
Household income			
Below poverty threshold	4,236	889,000	23
At or above poverty threshold	15,905	2,975,000	77
Child's age at kindergarten entry			
4 yrs, 8 mos — 4 yrs, 11 mos	1,969	336,000	9
5 yrs, 0 mos — 5 yrs, 3 mos	6,478	1,190,000	31
5 yrs, 4 mos — 5 yrs, 7 mos	6,488	1,194,000	31
5 yrs, 8 mos — 5 yrs, 11 mos	4,935	923,000	24
6 yrs, 0 mos — 6 yrs, 7 mos	1,215	220,000	6

NOTE: Sample detail may not sum to totals because of missing data. Population detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Parent Interviews, Base-Year Public-Use Data Files.

Table 3. Sample sizes, population counts, and percentage distribution of U.S. public kindergarten classrooms, by various characteristics: Spring 1999

Classroom characteristics	Sample	National estimates	
	Number	Number	Percentage distribution
All public school kindergarten classes	3,352	178,000	100
Class size			
Up to 15	316	26,000	15
16–20	1,294	78,000	44
21–25	992	59,000	33
More than 25	293	15,000	9
Class percent minority			
0–10%	675	52,000	29
11–25%	461	32,000	18
26–75%	811	52,000	29
75% or more	829	43,000	24
Class percent limited English proficient			
0%	1,240	111,000	62
1–10%	386	27,000	15
11-50%	455	29,000	16
50% or more	279	14,000	8
Regular instructional aide			
Yes	1,337	94,000	53
No	1,200	84,000	47
Teacher's education			
Bachelor's	1,907	109,000	61
Master's	1,052	57,000	32
Education specialist/doctoral degree	199	12,000	7
Teacher's certification			
Early childhood education	1,773	96,000	54
Elementary education	2,846	157,000	88
Certification type			
Full certification	2,838	157,000	88
Other certification	393	21,000	12
Average years teaching kindergarten			
Less than 3	879	46,000	26
3 to 9	1,173	64,000	36
10–19	863	46,000	26
20+	380	21,000	12

NOTE: Sample detail may not sum to totals because of missing data. Population detail may not sum to totals because of rounding. For teachers' certification, detail sum to more than 100 because teachers can hold both types of certificates.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

Organization of Findings

Findings from the ECLS-K pertaining to full-day and half-day kindergarten are organized into four chapters. Chapters two, three and four are organized by their unit of analysis. Chapter two describes public and private *schools* that offer full-day and half-day kindergarten programs and chapter three describes the *children* attending these programs. Chapters four and five deal exclusively with public school kindergarten, where 85 percent of kindergarten children attend. Chapter four describes the composition of public school full-day and half-day kindergarten *classes* and provides details about the instructional practices and curriculum focus in each. The fifth chapter presents the results of analyses of the gains public school children who attend full-day and half-day kindergarten make in reading/language arts and mathematics during the kindergarten year, examining differences in gains attributable to school, class and child-level characteristics. The contents of these chapters are described below along with the research questions examined in each.

Chapter 2: Schools with full-day and half-day kindergarten programs

a) What percent of U.S. schools offer full-day and half-day kindergarten programs and does this differ by school characteristics?

Chapter two describes *schools* that offer full-day and half-day kindergarten programs. The prevalence of full-day and half-day programs is compared across school type, region of the country, urbanicity, percent minority enrollment in the school, and in public schools, the concentration of low-income children.

Chapter 3: Children enrolled in full-day kindergarten programs

a) What percent of U.S. kindergarten children are enrolled in a full-day kindergarten program and does this differ by school characteristics?

b) What percent of U.S. kindergarten children are enrolled in a full-day kindergarten program and does this differ by child and family characteristics?

Chapter three describes the *children* enrolled in these programs. The percent of children who attend full-day and half-day kindergarten is compared across the school characteristics provided in chapter two. Additionally, the percent of children in full-day and half-day kindergarten is compared by child characteristics—sex, race/ethnicity, first time kindergartner or repeater, whether or not the child has been diagnosed with a disability, age at entry to kindergarten; and by family characteristics—primary language, poverty status, and mother's education.

Chapter 4: Full-day and half-day public school kindergarten classes

Chapter four provides a comparison of public school full-day and half-day *classrooms*. The chapter is divided into two sections.

4.1: Classroom characteristics

a) Do U.S. public school full-day and half-day kindergarten classes differ in terms of minority student enrollment or limited-English proficiency enrollment?

b) How do teachers in U.S. public full-day and half-day kindergarten programs compare?

c) Do U.S. public school full-day and half-day kindergarten classes differ in terms of class size or the presence of a classroom aide?

A classroom composition section describes characteristics of the children and teachers in these classes as well as information about class size and instructional aides in these classes.

4.2: Classroom instructional practices

a) How much time do U.S. public school full-day and half-day kindergarten classes spend in different classroom organizations?

b) How frequently do U.S. public school full-day and half-day kindergarten classes use various grouping strategies for reading/language arts and mathematics instruction?

c) How often do U.S. public school full-day and half-day kindergarten classes spend time on various subject areas?

d) *How often do U.S. public school full-day and half-day kindergarten classes spend time on specific reading/language arts activities and skills?*

e) *How often do U.S. public school full-day and half-day kindergarten classes spend time on specific mathematics activities and skills?*

The second section in chapter four is about the instructional practices used in full-day and half-day kindergarten classes. This section provides details about how these classrooms are organized for instruction and the grouping strategies employed by these teachers. This section also provides information about the amount of instructional time devoted to various academic and arts subjects as well as specific reading/language arts and mathematics skills and activities.

Chapter 5: Cognitive gains of public school children in full-day and half-day kindergarten classes

a) *Do public school children who attend full-day kindergarten make larger reading achievement gains than children who attend half-day programs?*

b) *Do public school children who attend full-day kindergarten make larger mathematics achievement gains than children who attend half-day?*

The fifth chapter presents the results of analyses of the gains public school children who attend full-day and half-day kindergarten make in reading/language arts and in mathematics during the kindergarten year. Hierarchical analyses examine differences in gains between full-day and half-day kindergartners while accounting for other school, class and child-level characteristics that are examined in chapters 2–4.

Chapter 2:

Schools Offering Full-day and Half-day Kindergarten Programs

This chapter examines the characteristics of U.S. schools that offer full-day and half-day kindergarten programs. Full-day and half-day status for each school is based on questionnaires completed by the kindergarten teachers in the ECLS-K schools. Schools were classified into two non-mutually exclusive groups—those with at least one full-day class and those with at least one half-day class. Sixty-one percent of all U.S. schools with a kindergarten program offer at least one full-day kindergarten class and 47 percent offer at least one half-day class (table A1).[7] Fifty-three percent offer *only* full-day classes, 39 percent offer *only* half-day classes and 7 percent offer at least one half-day *and* one full-day kindergarten class (not in tables).[8] The distribution of schools offering full-day and half-day kindergarten programs is not uniform across all school characteristics. The remainder of this chapter examines whether schools offer full-day or half-day programs by school type (public, Catholic or other private), region (Northeast, Midwest, South, or West), location (large/mid-sized cities, large town/suburban, or small town/rural), and percent minority enrollment.[9] Additionally, for public schools, the prevalence of full-day and half-day programs is compared for schools with high and low concentrations of students from low-income households. Figures displaying these data are included in this chapter. Tables showing the percent of schools that offer full-day and half-day kindergarten programs by each of these school characteristics are found in appendix A (tables A1 and A2).[10] A summary of these findings is presented below. Differences noted in the text are statistically significantly different (alpha =.05) and the difference is at least 5 percentage points.

[7]Estimates here and elsewhere in the report are not adjusted by other child, class, or school variables unless noted.

[8]Standard errors for these estimates are 2.30, 2.38, and 1.03, respectively.

[9]Variables used in the analyses are defined in Appendix D.

[10]The school weight, S2SAQW0 on the ECLS-K base-year Public-Use Data File, is used to calculate estimates in this chapter.

What percent of U.S. schools offer full-day and half-day kindergarten programs and does this differ by school characteristics?

- Sixty-seven percent of private schools offer a full-day kindergarten program compared to 57 percent of public schools (table A2). A larger percent of Catholic schools offer full-day kindergarten (78 percent) compared to other private schools (63 percent) or to public schools (57 percent). Public schools are more likely to offer a half-day program (52 percent) compared to Catholic schools (29 percent) or other private schools (40 percent) (figure 2).

- A larger percent of public schools in the South offer full-day kindergarten (84 percent) compared to public schools in other regions of the country (57 percent in the Midwest, 38 percent in the West, and 37 percent in the Northeast) and a larger percent of public schools in the Midwest offer full-day kindergarten compared to those in the Northeast (figure 3). Similar differences are not detected among private schools (table A2).

- Full-day kindergarten is more prevalent in public schools in cities (64 percent) and in small towns/rural areas (63 percent) compared with suburban/large town areas (46 percent) (figure 4). Additionally, a larger percent of public schools in suburban/large town areas (62 percent) offer a half-day program compared to small town/rural areas public schools (43 percent). Apparent differences by location type are not significant for private schools (table A2).

- Full-day programs are more likely to be offered in schools with higher concentrations of minority children (figure 5).

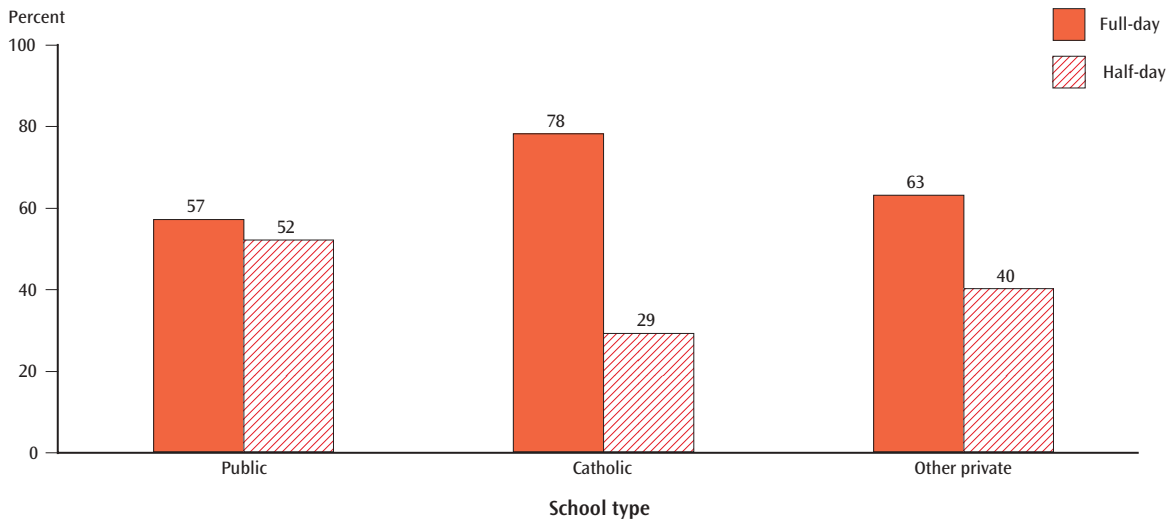
  - More public schools with at least 75 percent minority enrollment offer full-day kindergarten (76 percent) compared to schools with less than 25 percent minority enrollment (48 to 44 percent).

  - Among private schools, those with the highest concentration of minority children (at least 75 percent minority enrollment) are more likely to offer full-day kindergarten (93 percent) than schools with a minority enrollment of less than 10 percent (54 percent).

- Full-day programs are more likely to be offered in public schools where at least half of the enrollment is comprised of low-income children.[11] Sixty-nine percent of public schools with a high concentration of low-income children offer full-day kindergarten compared to 48 percent of schools with fewer low-income children (figure 6).

[11]A school's concentration of low-income children is a composite variable that is created to account for the high level of missing information about free and reduced-priced lunch eligibility from the ECLS-K schools. This composite is not created for private schools because the variables making up this composite are about programs primarily used by public schools. See the Methodology and Technical Notes (Appendix C) in this report for more details.

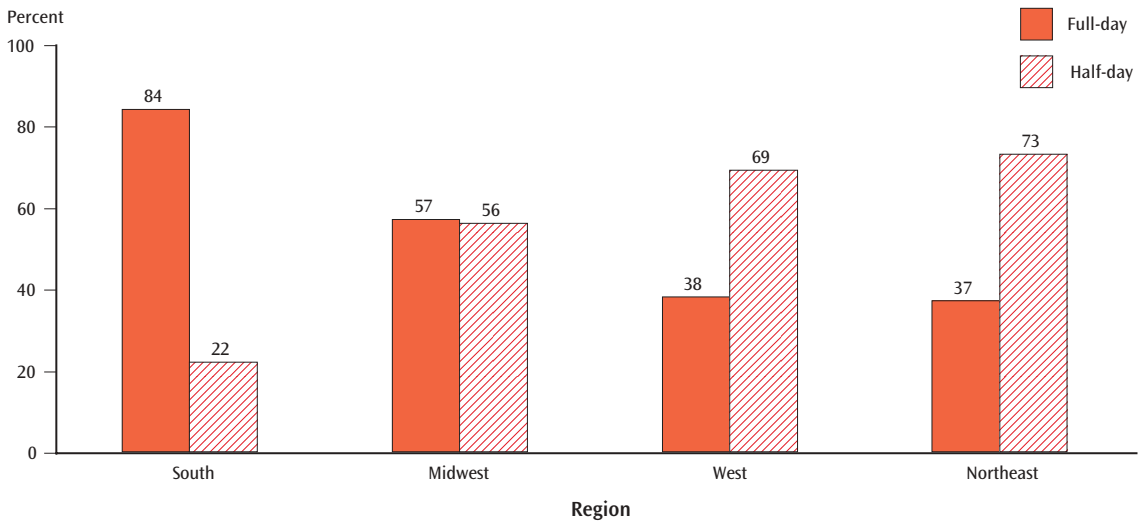
Figure 2. Percent of U.S. schools that offer full-day and half-day kindergarten programs, by school type: 1998–99



NOTE: The percent of schools offering full-day and half-day programs sums to more than 100 because some schools have both full-day and half-day classes. Estimates only pertain to schools with a kindergarten program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

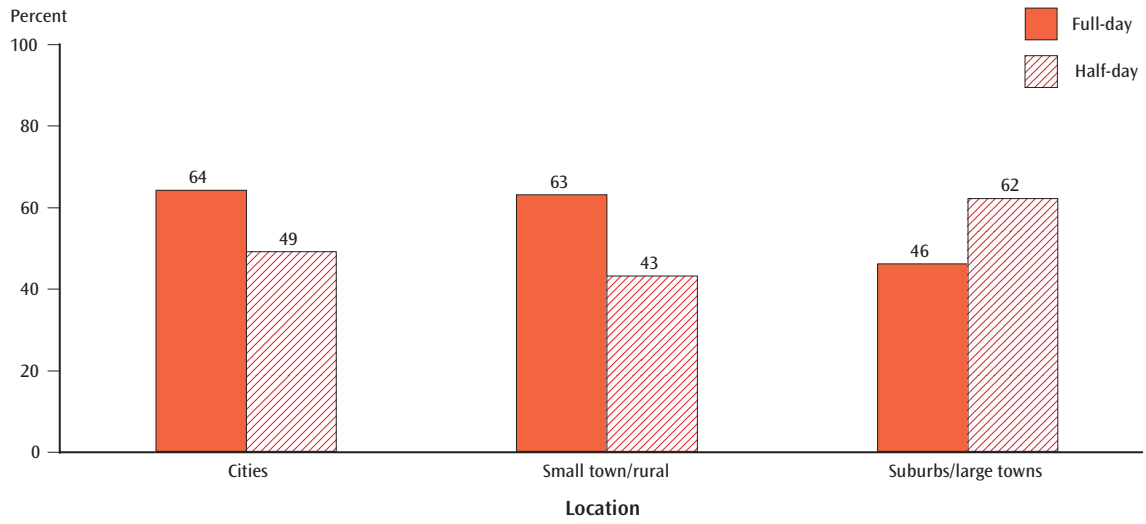
Figure 3. Percent of U.S. public schools that offer full-day and half-day kindergarten programs, by region: 1998–99



NOTE: The percent of schools offering full-day and half-day programs sums to more than 100 because some schools have both full-day and half-day classes. Estimates only pertain to schools with a kindergarten program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

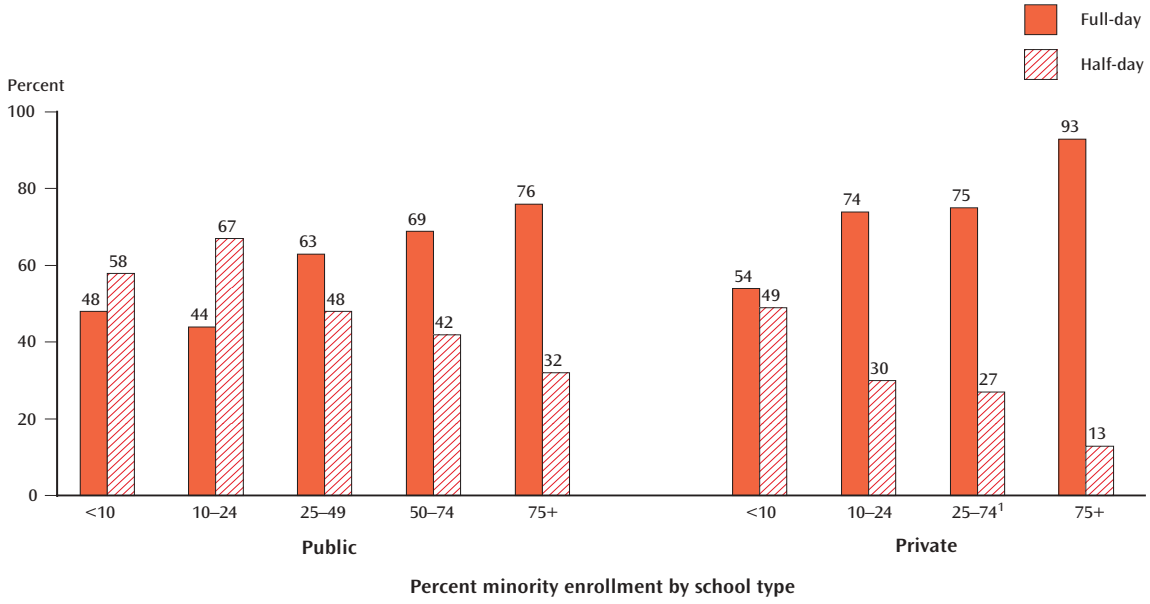
Figure 4. Percent of U.S. public schools that offer full-day and half-day kindergarten programs, by location: 1998–99



NOTE: The percent of schools offering full-day and half-day programs sums to more than 100 because some schools have both full-day and half-day classes. Estimates only pertain to schools with a kindergarten program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Figure 5. Percent of U.S. schools that offer full-day and half-day kindergarten programs, by percent minority enrollment and school type: 1998–99

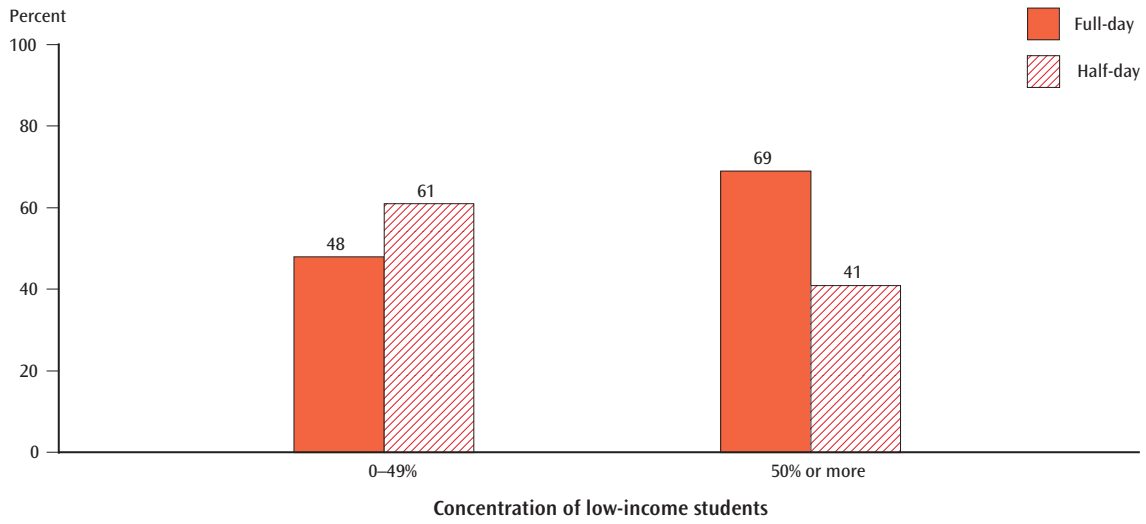


[1]The categories 25–49 percent and 50–74 percent were collapsed for private schools. Reporting standards were not met for separate estimates.

NOTE: The percent of schools offering full-day and half-day programs sums to more than 100 because some schools have both full-day and half-day classes. Estimates only pertain to schools with a kindergarten program. All children who are not identified as White, non-Hispanic are classified as minority children.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Figure 6. Percent of U.S. public schools that offer full-day and half-day kindergarten programs, by low-income concentration: 1998–99



NOTE: The percent of schools offering full-day and half-day programs sums to more than 100 because some schools have both full-day and half-day classes. Estimates only pertain to schools with a kindergarten program. A school's concentration of low-income children is based on the percent of its students who are eligible for free or reduced-priced lunch, and in the case of missing data, the school's participation in a "school-wide" Title I program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Chapter 3:

Children Enrolled in Full-day and Half-day Kindergarten Programs

While the previous chapter examined the percent of schools that offer full-day and half-day kindergarten programs, this chapter examines enrollment in full-day and half-day kindergarten at the child level. This chapter describes the characteristics of kindergarten children enrolled in full-day and half-day programs. Because each kindergartner is enrolled in either a full-day or a half-day program, estimates are presented for children in full-day programs. Estimates for half-day enrollment can be derived by subtracting the full-day estimates from 100. Children's full-day or half-day status is determined from questionnaires completed by their teachers. Characteristics of the children and their families are collected during interviews with their parents/guardians.

Overall, 56 percent of kindergarten children attend a full-day program and 44 percent attend a half-day program (table A3). This chapter includes two sets of estimates. The first set of estimates compares the percent of children in a full-day program by the same school characteristics found in the previous chapter, although the estimates are at the child level[12] rather than at the school level (table A3). The second set of estimates compares the percent of children in a full-day program by child and family characteristics (table A4). Thus, the percent of children in full-day programs is compared by sex, race/ethnicity, whether or not the child is attending kindergarten for the first time or repeating kindergarten, whether or not the child has been diagnosed with a disability, and age of entry to kindergarten. Comparisons are also made by mother's education, primary home language, and household poverty status.[13] A summary of these findings is presented below. Differences noted in the text are statistically significantly different (alpha =.05), and the difference is at least 5 percentage points.

[12]The child weight, C2CW0 on the ECLS-K Base-Year Public-Use Data File, is used to calculate the estimates in this chapter.

[13]Variables used in the analyses are defined in Appendix D.

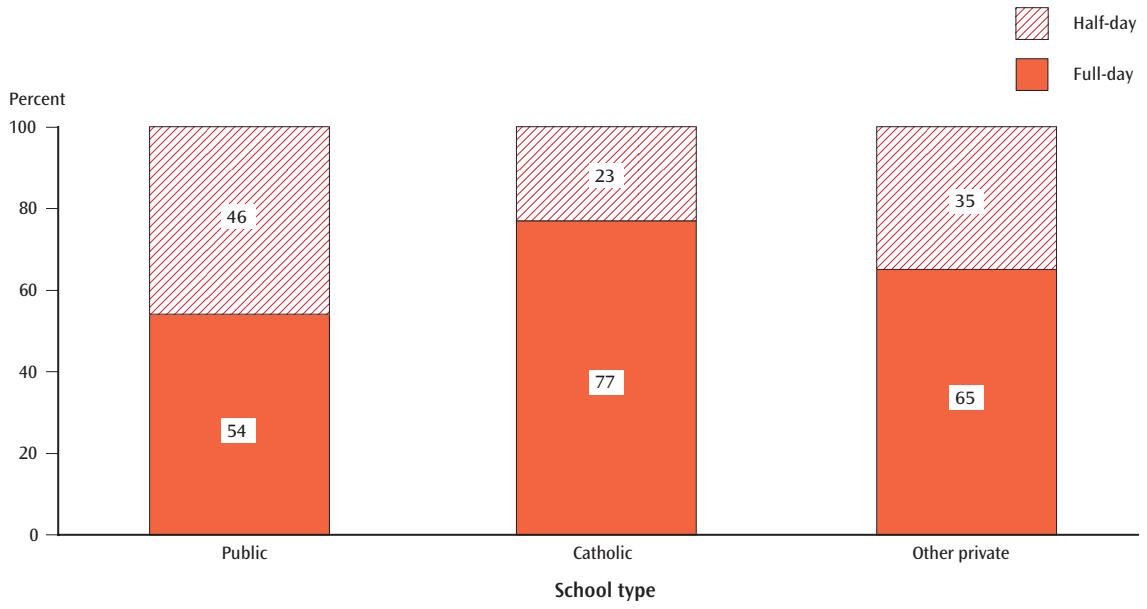
What percent of U.S. kindergarten children are enrolled in a full-day kindergarten program and does this differ by school characteristics?

School characteristics

- Fifty-four percent of public school kindergartners attend a full-day program (table A3) and 70 percent of all private school kindergartners attend a full-day program (not in tables).[14] A larger percent of kindergartners in Catholic schools attend a full-day program (77 percent) compared to those in public schools (54 percent) (figure 7).
- A larger percent of kindergarten children in the South attend a full-day program (82 percent) compared with children in other regions of the country (48 in the Northeast, 47 percent in the Midwest, and 31 percent in the West) (table A3).
  - Similar regional differences exist for public school kindergartners. Eighty-three percent of these children in the South attend a full-day program compared to 41 percent in the Northeast, 45 percent in the Midwest and 23 percent in the West (figure 8).
  - While full-day enrollment is more prevalent in Catholic schools overall, a larger percent of Catholic school kindergartners in the South attend a full-day program (93 percent) compared to 52 percent in the West (figure 8).
  - A different regional pattern is found for other types of private schools. Kindergarten children in the West and South are more likely to attend a full-day program (79 and 70 percent, respectively) compared to the Midwest (38 percent) (figure 8). Among kindergarten children in the West, the highest percent of full-day enrollment is for children from these other private schools (79 percent).
- Public school kindergarten children in suburban and large town schools are less likely to attend a full-day program (45 percent) compared with children who attend schools in large and mid-sized cities (59 percent) or small towns and rural areas (65 percent) (table A3).

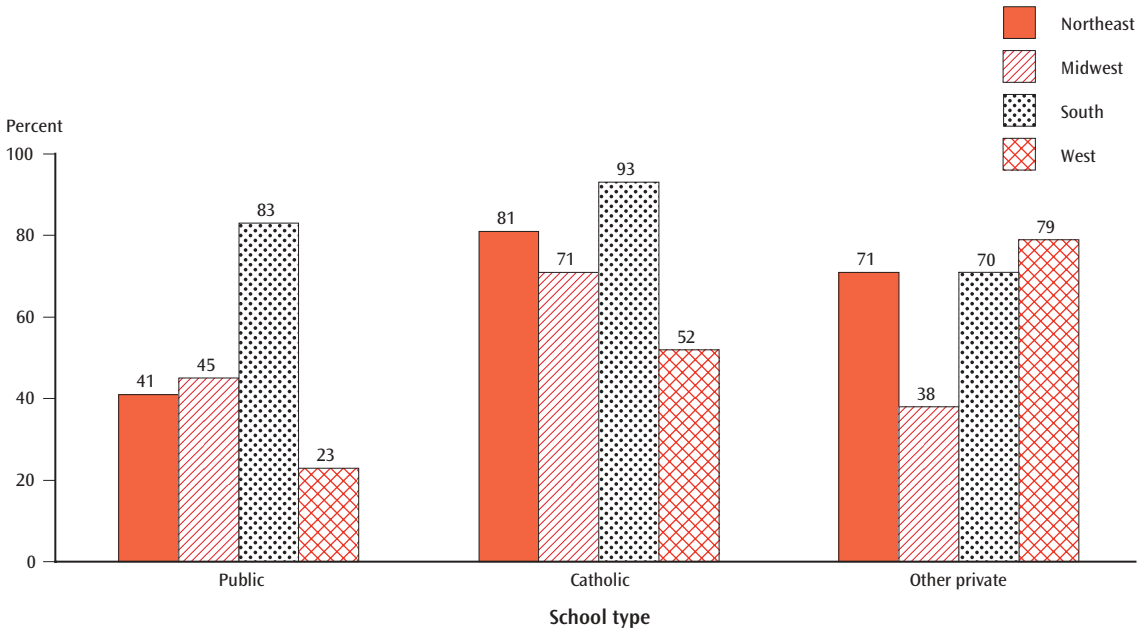
[14]The standard error for this estimate is 3.09.

Figure 7. Percent of U.S. kindergarten children enrolled in full-day and half-day programs, by school type: 1998–99



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Figure 8. Percent of U.S. kindergarten children enrolled in a full-day program, by region and school type: 1998–99



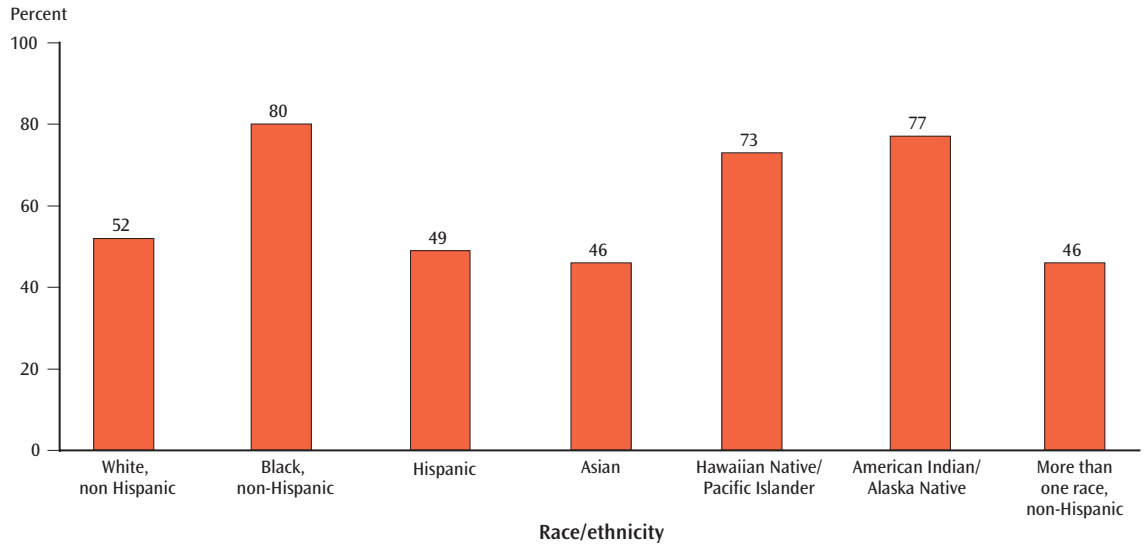
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

What percent of U.S. kindergarten children are enrolled in a full-day kindergarten program and does this differ by child and family characteristics?

Race/ethnicity

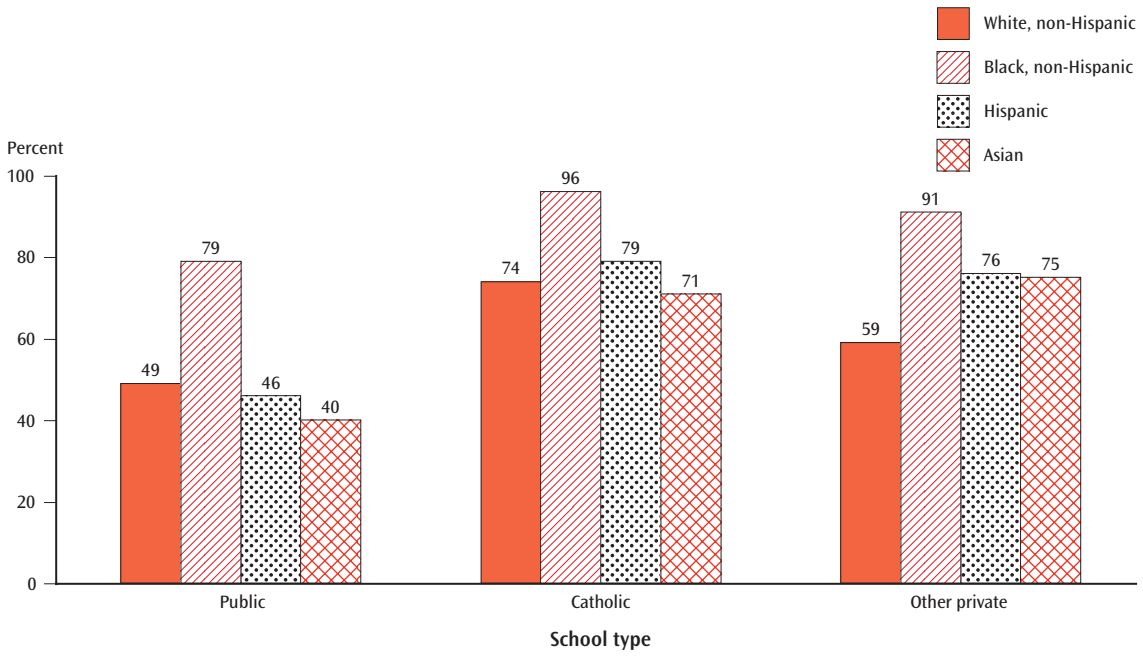
- The percent of kindergartners enrolled in full-day kindergarten differs by race/ethnicity. Overall, 80 percent of Black children attend a full-day program—a larger percent than White (52 percent), Hispanic (49 percent), Asian (46 percent), or multiracial children (46 percent). Additionally, American Indian and Alaska Native kindergarten children are more often in a full-day program (77 percent) compared to Hispanic, Asian and multiracial children (49, 46, and 46 percent, respectively) (figure 9) (table A4).
- Figure 10 contains the full-day enrollment for the four largest racial/ethnicity groups separately for public and private schools. A larger percent of Black students enrolled in public schools attend a full-day program (79 percent) compared to public school White (49 percent), Hispanic (46 percent), or Asian (40 percent) kindergartners. The percent of Black kindergarten children enrolled in a full-day program is larger than it is for White children for both Catholic school kindergartners (96 vs. 74 percent) and other private schools kindergartners (91 vs. 59 percent).

Figure 9. Percent of U.S. kindergarten children enrolled in a full-day program, by race/ethnicity: 1998–99



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire, Kindergarten Teacher Questionnaires, and Parent Interviews, Base-Year Public-Use Data Files.

Figure 10. Percent of U.S. kindergarten children enrolled in a full-day program, by race/ethnicity and school type: 1998–99

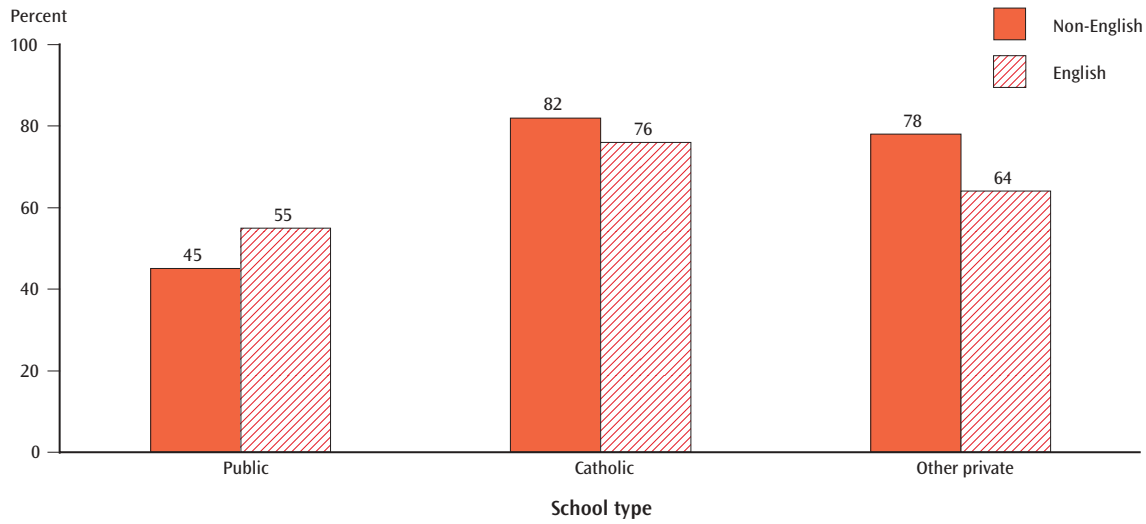


SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire, Kindergarten Teacher Questionnaires, and Parent Interviews, Base-Year Public-Use Data Files.

Poverty status and home language

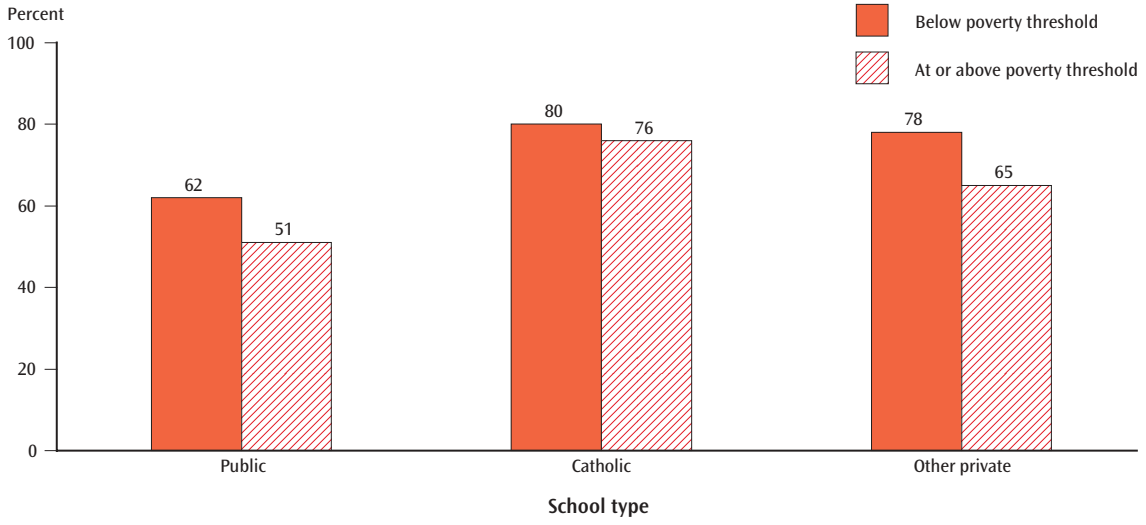
- Overall, a larger percent of kindergartners from English speaking homes attend a full-day program (57 percent) compared with those from non-English speaking homes (48 percent) (table A4). This relationship is significant for public school kindergartners (55 vs. 45 percent) (figure 11). Apparent differences for Catholic and other private school children are not statistically significant possibly due to the small sample sizes and relatively large standard errors associated with estimates for non-English speaking private school children.
- Overall, 63 percent of kindergarten children living below the poverty threshold are enrolled in a full-day program compared with 55 percent that come from households at or above the poverty line (table A4). Again, this relationship exists for children in public schools (62 percent vs. 51 percent) (figure 12). In Catholic schools the observed difference is less that the 5 percentage point criterion for significance, and the apparent difference in other private schools is not statistically significant possibly due to the small sample sizes and relatively large standard errors associated with estimates for private school children living below the poverty threshold.
- While public school kindergarten full-day enrollment is more prevalent among children living below as compared to those living at or above the poverty threshold, this relationship holds for public school kindergarten children from English speaking homes, but not for children from homes where English is not the primary language. Among children from English speaking homes, 68 percent of the children in poverty are in a full-day class compared to 52 percent for those not in poverty. Among children from homes where English is not the primary language, the observed difference is less than the 5 percentage point criterion for significance (figure 13).

Figure 11. Percent of U.S. kindergarten children enrolled in a full-day program, by primary home language and school type: 1998–99



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire, Kindergarten Teacher Questionnaires, and Parent Interviews, Base-Year Public-Use Data Files.

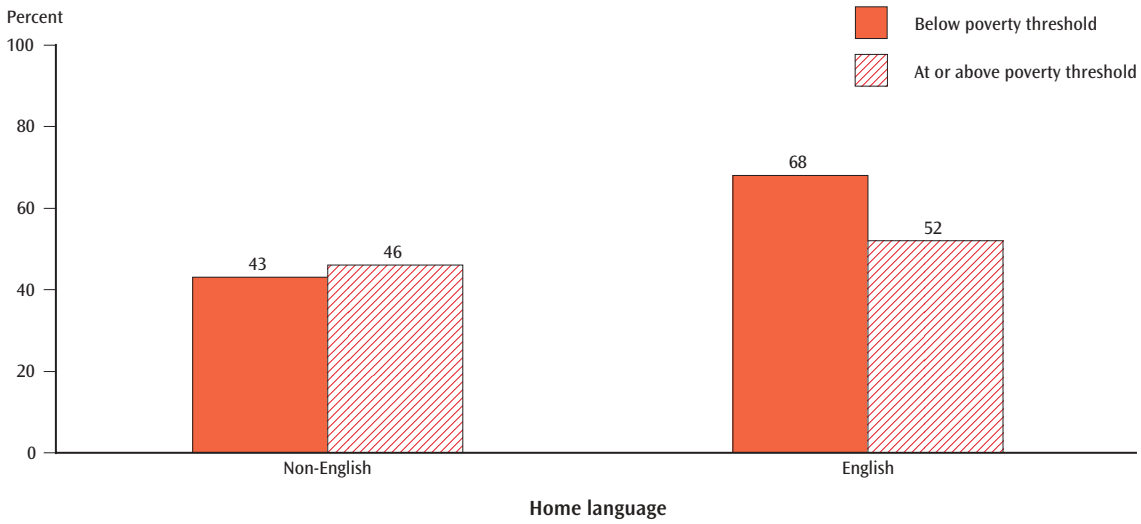
Figure 12. Percent of U.S. kindergarten children enrolled in a full-day program, by poverty status and school type: 1998–99



NOTE: Poverty status is determined by comparing the child's household income to the national poverty threshold.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire, Kindergarten Teacher Questionnaires, and Parent Interviews, Base-Year Public-Use Data Files.

Figure 13. Percent of public school kindergarten children enrolled in a full-day program, by poverty status and primary home language: 1998–99



NOTE: Poverty status is determined by comparing the child's household income to the national poverty threshold.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire, Kindergarten Teacher Questionnaires, and Parent Interviews, Base-Year Public-Use Data Files.

Chapter 4:

Full-day and Half-day Public School Kindergarten Classes

Eighty-five percent of kindergartners in the United States attend public school. In order to describe the characteristics of the classrooms that these children attend, this chapter looks specifically at kindergarten classes in U.S. public schools. It describes and compares various classroom characteristics and instructional practices for full-day and half-day public school kindergarten classes. The unit of analysis is the kindergarten class; morning and afternoon kindergarten classes that are taught by the same teacher are represented separately.[15] While 60 percent of public school kindergarten *teachers* in 1998–99 teach a full-day class (Germino-Hausken, Walston, and Rathbun, 2003), 51 percent of public school kindergarten *classes* meet for a full day and 49 percent meet for a half-day.[16]

This chapter is divided into two sections. Section 4.1 describes the composition and structure of full-day and half-day public school kindergarten classes. The compositions of full-day and half-day classes are compared in terms of minority enrollment and percent of the class that is limited-English proficient (LEP). This section also presents a description of the characteristics and qualifications of the teachers of full-day and half-day classes. Additionally, full-day and half-day kindergarten classes are compared in terms of class size and whether or not the teacher has an instructional aide. Tables showing the percent of full-day and half-day public kindergarten classes by each of these characteristics are found in appendix A (tables A6, A7 and A8).

Section 4.2 looks at how children in public school full-day and half-day kindergarten classrooms spend time during their school day. It describes a wide range of classroom instructional practices, including: how children are organized for instruction, the grouping strategies teachers use for reading/language arts and mathematics instruction, the frequency that various subject areas are taught and the frequency with which children in these classes are engaged in specific activities and work on specific skills in the areas of reading/language arts and mathematics. Teachers responding to a self-administered questionnaire provided information on the class characteristics described in this chapter. The complete set of tables for section 4.2 is found in Appendix A (tables A10 through A25). Differences between half-day and full-day kindergartens noted in the text are statistically significantly different (alpha =.05), and the difference is at least 5 percentage points.

4.1 Composition and Structure of Public Kindergarten Classes

Minority and LEP enrollment

As described in chapter two of this report, public schools with high concentrations of minority children are more likely to offer full-day programs compared with other schools. Here, class-level minority enrollment information is compared for full-day and half-day classes. Additionally, the percent of children in these classes who are limited-English proficient are compared for full-day and half-day classes.

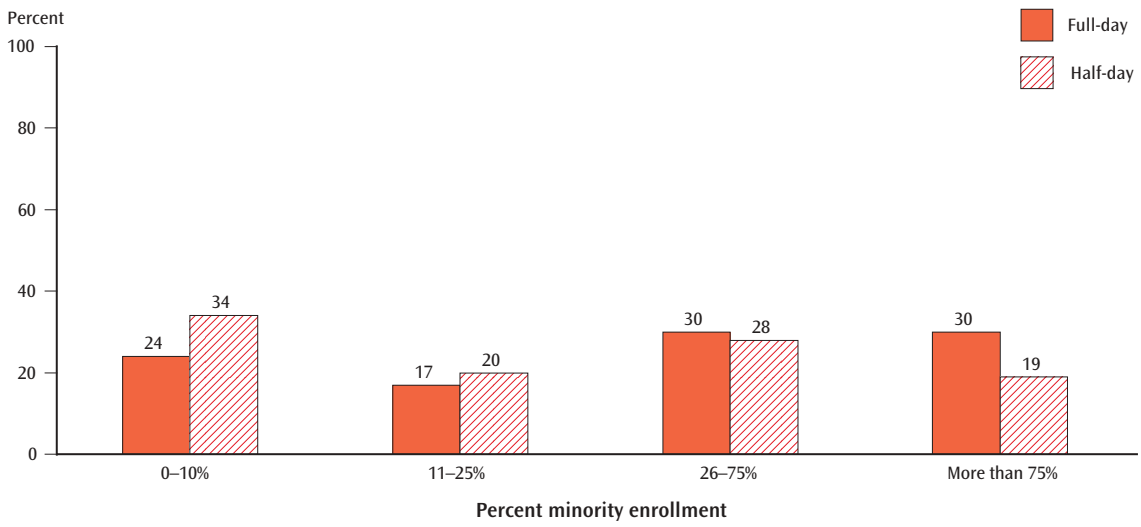
[15]The teacher weight, B2TWO on the ECLS-K Base-Year Public-Use Data File, is used to calculate estimates presented in this chapter.

[16]Sixty percent of kindergarten teachers have a full-day class, 24 percent have one half-day class, and 16 percent have two half-day classes (morning and afternoon). The percent of kindergarten *classes* that are full-day is equal to (60÷(60+24+16+16))/100 or 51 percent.

Do U.S. public school full-day and half-day kindergarten classes differ in terms of minority student enrollment or limited-English proficiency enrollment?

- The average percent minority enrollment is higher in public school full-day kindergarten classes (46 percent) than in half-day classes (35 percent) (not in tables).[17]
- Full-day classes are more likely to have a high minority enrollment. Thirty percent of full-day classes have more than 75 percent minority enrollment compared with 19 percent of half-day classes (figure 14).
- The same pattern in not evident for limited-English proficient students. On average, 9 percent of children in full-day classes and 13 percent of children in half-day classes are LEP (not in tables).[18] The difference between the percent of full-day compared to half-day classes with more than 50 percent of students limited-English proficient is less than the 5 percent criterion for significance (6 vs. 10 percent, respectively) (table A6).

Figure 14. Percentage distribution of minority enrollment in U.S. public kindergarten classes, by program type: 1998–99



NOTE: Detail may not sum to 100 because of rounding. All children who are not identified as White, non-Hispanic are classified as minority children.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

[17]Standard errors for these estimates are 2.94 and 2.04, respectively.

[18]This is not a statistically significant difference; standard errors for these estimates are 2.16 and 1.71, respectively.

Teacher characteristics

This section looks at the characteristics of teachers in full-day and half-day public school kindergarten classes. The race/ethnicity distribution of half-day and full-day kindergarten classroom teachers is presented as well as the percent of these teachers who have various levels of education, areas of certification (an early childhood education and/or an elementary education certificate), and years of experience teaching kindergarten.

The certification of the teachers is also compared for full-day and half-day classes. Certification by the state in which one teaches typically includes requirements for a bachelor's degree, special courses, clinical experiences, and often some type of formal testing. Over 80 percent of public schools in the United States require teaching certificates of teacher applicants (Gruber et al. 2002). Teachers who report having a temporary, probational, provisional, or emergency certificate, or those who report having an alternative certification program are grouped into the category "other" for this analysis.[19]

How do teachers in U.S. public full-day and half-day kindergarten programs compare?

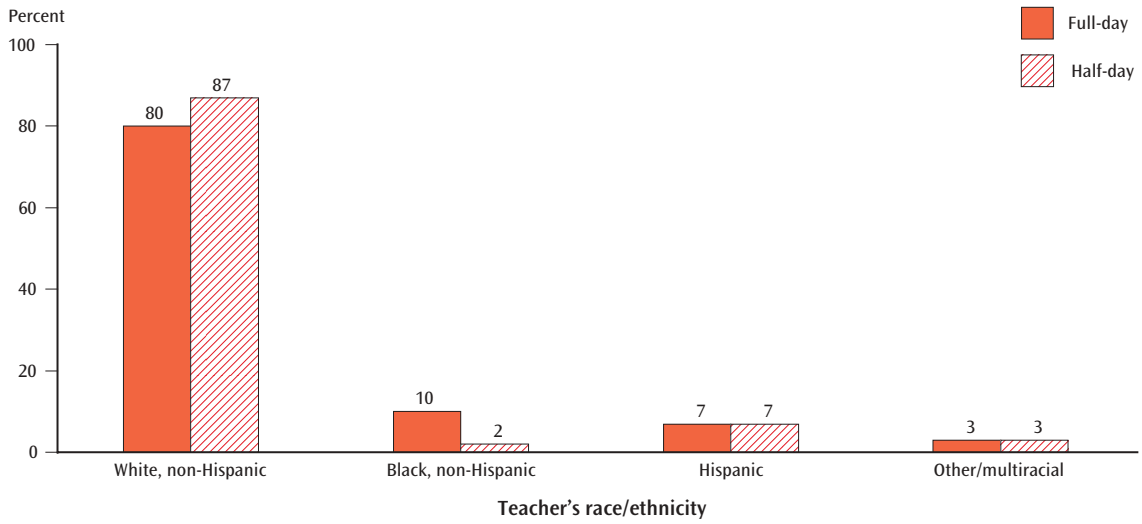
- The majority of full-day and half-day classes are taught by White teachers, but a smaller percent of full-day classes are taught by White teachers (80 percent) compared with half-day classes (87 percent). A larger percent of full-day classes are taught by Black teachers (10 percent) compared with half-day classes (2 percent). Seven percent of both full-day and half-day classes are taught by Hispanic teachers and 3 percent of both types of classes are taught by teachers of other racial backgrounds (figure 15).
- A majority of both full-day and half-day kindergarten classes are taught by teachers whose highest level of education is a Bachelor's degree (62 and 60 percent, respectively). At each level of education the observed difference between the percent of full-day compared to half-day classes is less than the 5 percentage point difference established for substantive significance (figure 16). Thirty-one percent of full-day classes and 33 percent of half-day classes are taught by teachers whose highest degree is a Master's and 7 percent of both full-day and half-day classes are taught by teachers with a doctorate or educational specialist degree.[20]
- A larger percent of full-day kindergarten classes are taught by teachers with an early childhood education certificate (61 percent) compared with half-day classes (47 percent). A majority of both full-day and half-day classes are taught by teachers with an elementary education certificate (85 and 90 percent, respectively) (figure 17).
- Both full-day and half-day kindergarten classes have teachers with an average of 9 years experience teaching kindergarten (not in tables).[21] About 26 percent of both full-day and half-day classes have teachers with less than 3 years kindergarten teaching experience and about 12 percent of both types of classes have teachers with 20 or more years kindergarten teaching experience. There is a significant difference in the percent of full-day classes (23 percent) and half-day classes (29 percent) that have a teacher with between 10 and 19 years of kindergarten teaching experience.
- Approximately 9 out of 10 classes of both half-day and full-day classes are taught by teachers with full certification (table A7).

[19]The ECLS-K does not include teachers with probationary certificates in its estimate of teachers with full certification because probationary certificates were grouped along with temporary and emergency certification on the ECLS-K questionnaire. Published reports based on the 1999–2000 Schools and Staffing Survey (e.g., Seastrom et al. 2002) have treated teachers with probationary certificates as certified. Data from the 1999–2000 SASS indicate that 3 percent of public school kindergarten teachers in 1999–2000 who were certified had a probationary certificate.

[20]The size of the standard errors of the estimates for BA and MA yield an inconclusive test for both differences and similarities.

[21]Standard errors for these estimates are 0.25 and 0.29, respectively.

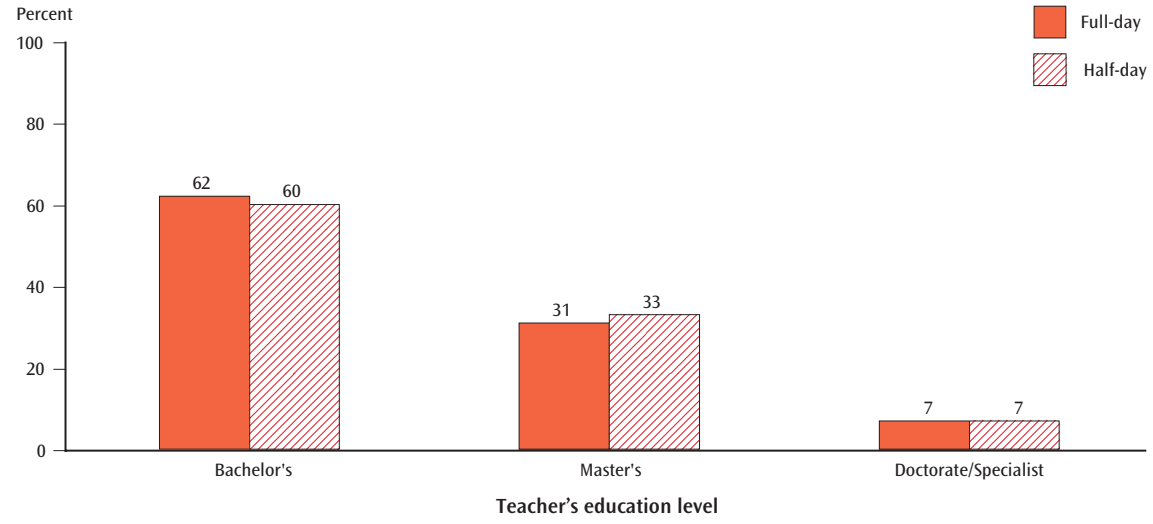
Figure 15. Percentage distribution of U.S. public kindergarten classes taught by teachers of different race/ethnicities, by program type: 1998–99



NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

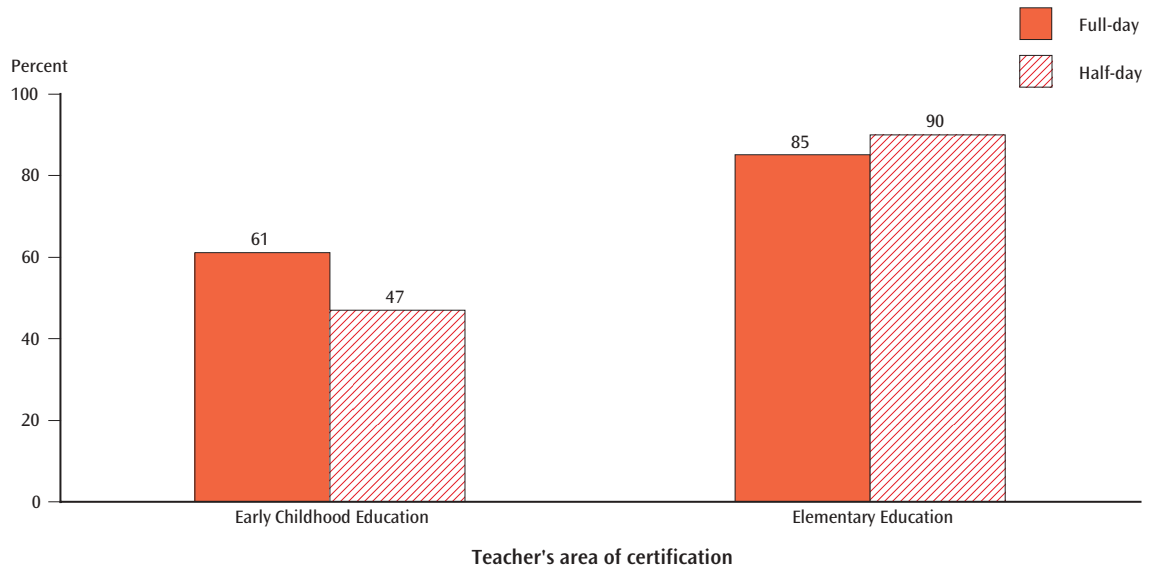
Figure 16. Percentage distribution of U.S. public kindergarten classes taught by teachers with various levels of education, by program type: 1998–99



NOTE: Less than 0.5 percent of public school kindergarten teachers have less than a bachelor's degree as their highest level of education.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

Figure 17. Percent of U.S. kindergarten classes taught by teachers with different areas of certification, by program type: 1998–99



Note: Detail sum to more than 100 because teachers can hold both types of certificates.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

Class size and classroom aides

This section compares the class sizes and the percent of classes with instructional aides for full-day and half-day public school kindergarten programs. Efforts to provide kindergarten programs that give children an optimal environment for academic growth include decreasing class size and providing classroom instructional aides. These strategies can have substantial costs for schools but are aimed at decreasing the adult-student ratio in the class and thereby increasing the time and personal attention available for each child in the kindergarten classroom.

Not all authors conclude that the current class size studies necessarily show a positive effect for children in smaller classes (Hanushek 1999; Finn and Achilles 1999). In general, however, the literature provides evidence that children in smaller classes often make greater academic gains compared to those in larger classes (Grissmer 1999; Nyhan and Alkadry 1999; Achilles, Harmon, and Egelson 1995). There is additional evidence that smaller class sizes in early grades lead to achievement gains that can last for years (Finn, Gerber, Achilles, and Boyd-Zaharias 2001; Molnar et al. 1999; Nye, Hedges, and Konstantopoulos, 1999).

Instructional aides are used in some classrooms to assist teachers with a variety of instructional activities and lower the student-adult ratio in the classroom. Teacher aides can offer support to teachers in the classroom by working directly with children in small groups or individually. However, the presence of classroom aides has been shown to have only a very small effect on reading achievement in the primary grades (Gerber et al. 2001). Gerber et al. argue that having an aide in the classroom is not nearly as effective at improving achievement as reducing class size.

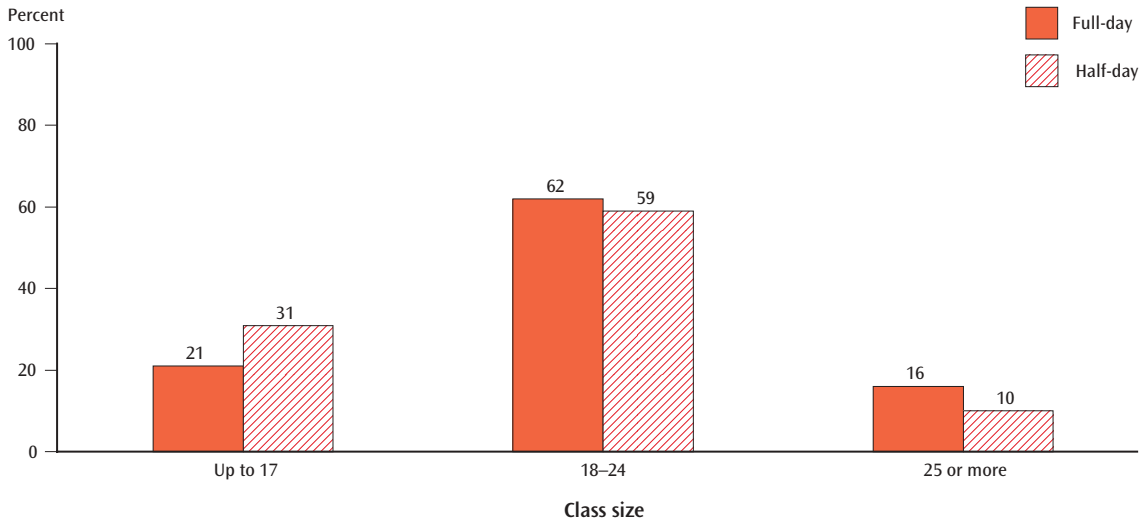
In the ECLS-K, kindergarten teachers are asked to report the number of children in each of their classes and to provide information about three types of paid classroom aides—regular, special education and English as a second language (ESL) aides. Information about the aides in the class was collected in the spring of 1999. For this report, a class is identified as having one of these three types of aides if the aide is paid (as opposed to a volunteer), works directly with children on instructional tasks and spends at least an hour per day in the classroom.[22]

[22]While the focus here is on classes where a paid aide works directly with the children on instructional tasks, the ECLS-K database also includes information about the time paid aides spend on non-instructional work. The ECLS-K data also include information about paid aide's primary language, English proficiency, highest level of education and their certification.

Do U.S. public school full-day and half-day kindergarten classes differ in terms of class size or the presence of a classroom aide?

- Public school full-day kindergartens have, on average, 20.3 children in the class, higher than the average class size for half-day classes (19.1) (not in tables).[23]
- The class size difference is most notable for particular class size groupings (figure 18). Full-day classes are less likely to have 17 or fewer students (21 percent) compared with half-day classes (31 percent) and full-day classes are more likely to have 25 or more students (16 percent) compared with half-day classes (10 percent) (figure 18).
- Full-day kindergarten classes are more likely to have a regular classroom aide (61 percent) compared with half-day programs (44 percent). Thirteen percent of full-day and half-day classes have a special education aide. Full-day and half-day classes have similar numbers of ESL aides, relatively speaking (9 and 7 percent, respectively) (figure 19).

Figure 18. Percentage distribution of class sizes (number of children) for U.S. public kindergarten classes, by program type: 1998–99

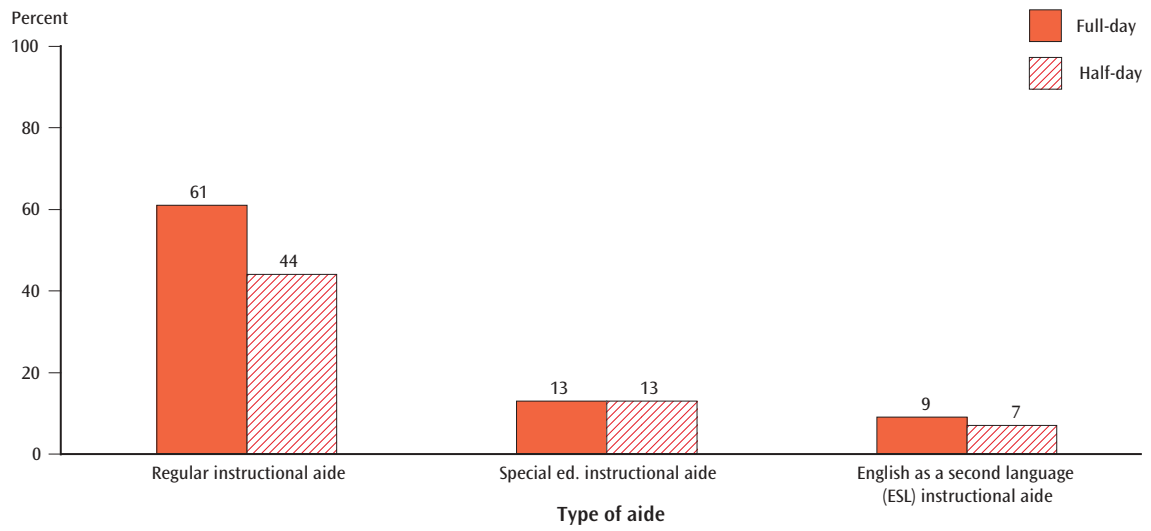


NOTE Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-year Public-Use Data File.

[23]Standard errors for these estimates are 0.31 and 0.34, respectively.

Figure 19. Percent of U.S. public kindergarten classes with a classroom aide, by type of aide and program type: Spring 1999



NOTE: A class is classified as having an aide if the aide spends at least 1 hour per day in the class working directly with students.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

4.2 Instructional Practices and Curricular Focus

This section describes how children in full-day and half-day kindergarten classes spend time during their school day. Children in full-day kindergarten have more time at school each day than those in half-day classes so an obvious and important question is, "What are full-day kindergarten children doing during this 'extra' time?" The potential benefits of a longer kindergarten day can be attributed to the overall increase in the amount of time children spend at school, but more importantly to the *way* in which the additional time is used. How teachers organize their classes for instruction and the grouping strategies they use are compared to investigate whether full-day and half-day classes differ in terms of how the children in these classes are taught. The frequency with which these classes spend time working on specific instructional activities and skills helps describe the difference between full-day and half-day classes in terms of curriculum and instructional goals. The instructional practices and curricular focus items are based on teachers' report. As a result, there may be possible response bias due to social desirability.

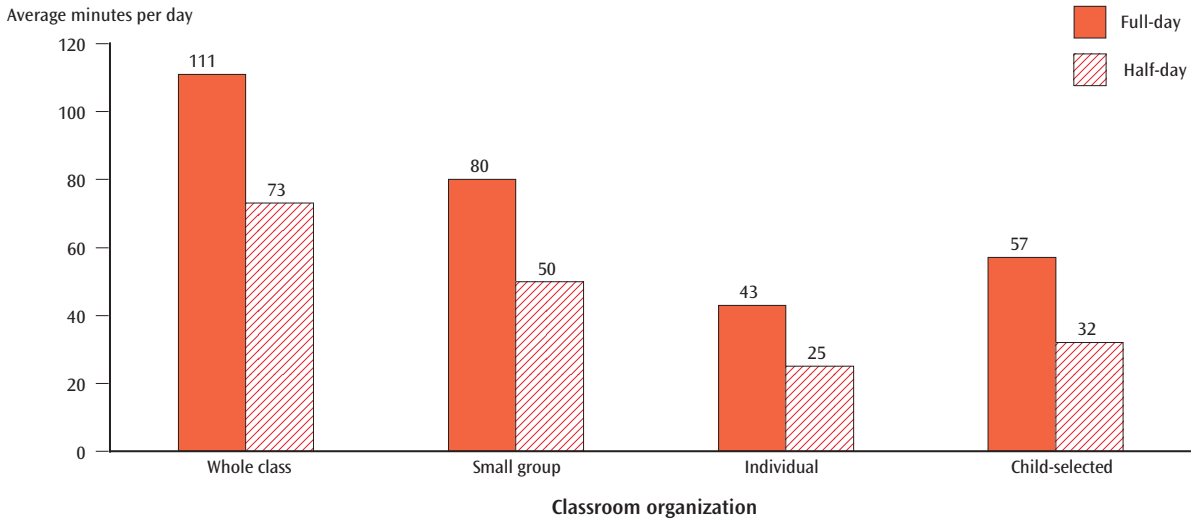
Classroom organization

In the spring of the kindergarten year, teachers reported the amount of time per day their students spend in different types of teacher-directed activities—whole class, small group and individual—and the amount of time per day students spend in child-selected activities. Whole class teacher-directed activities may involve active movement, discussion or listening activities; what distinguishes this type of classroom organization from the others is that the teacher initiates and leads the activity and the entire class is involved simultaneously. Small group and individual teacher-directed activities are also structured and led by the teacher and in some cases may occur concurrently with child-selected activities. Child-selected activities in kindergarten include learning centers that the children freely choose or other sorts of "free" time activities. The time spent in these different arrangements is compared both in terms of actual number of minutes and in terms of the percent of the available class time that is devoted to these activities.

How much time do U.S. public school full-day and half-day kindergarten classes spend in different classroom organizations?

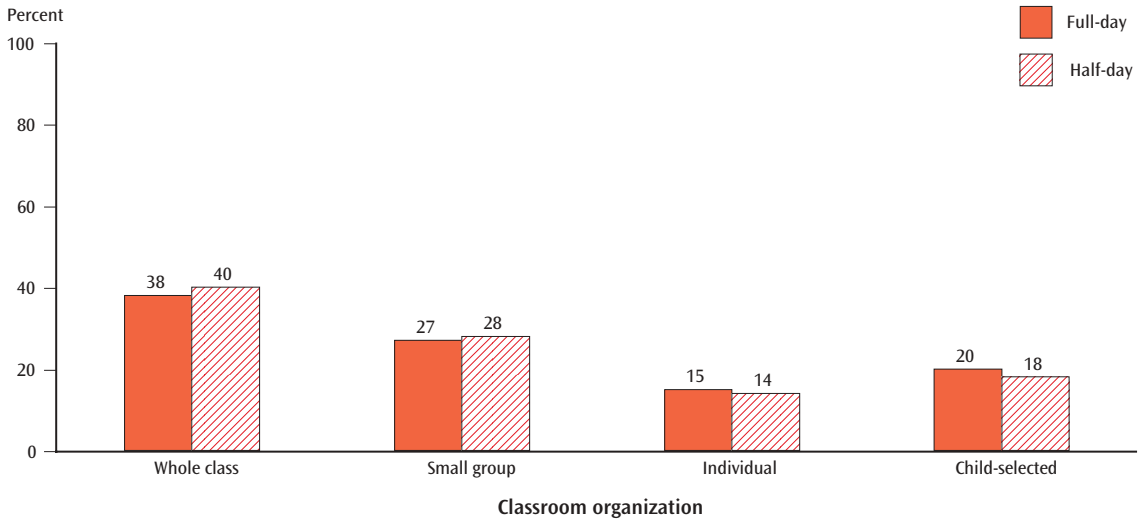
- On average, full-day kindergarten classes spend almost 4 hours per day in some type of teacher-directed activity—1 hour and 51 minutes in whole class, 1 hour and 20 minutes in small group, and 43 minutes in teacher-directed individual activities. Full-day classes spend almost another hour (57 minutes) on child-selected activities (figure 20).
- Half-day kindergarten classes typically spend about 2 1/2 hours per day in some type of teacher directed activity—1 hour and 13 minutes in whole class, 50 minutes in small group, and 25 minutes in teacher-directed individual activities. They spend, on average, another 32 minutes on child-selected activities (figure 20).
- While full-day classes spend more time than half-day classes organized in each of the teacher-directed or the child-selected activities, the *percent* of their total time in each type of activity is similar between full-day and half-day classes (figure 21).

Figure 20. Average minutes per day U.S. public kindergarten classes spend in various classroom organizations, by program type: Spring 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

Figure 21. Average percent of class time U.S. public kindergarten classes spend in various classroom organizations, by program type: Spring 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

Grouping strategies

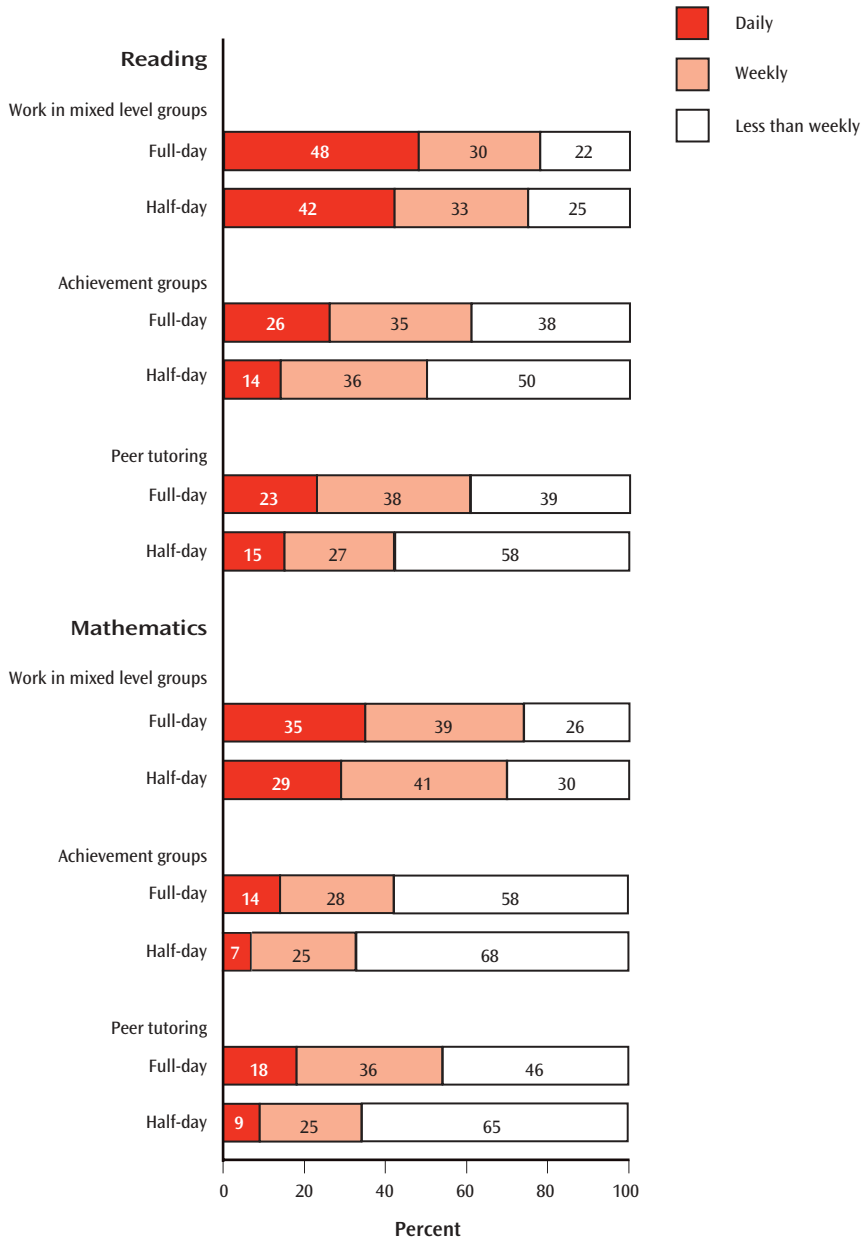
During the time of day when children are grouped together for instructional activities, there are various strategies teachers use for creating these groupings. "Mixed-level groups" consist of children of various ability levels working together and "achievement groups" are formed so that children of similar ability levels in a particular subject area work together on skills best suited to their current skill level. "Peer tutoring" is a strategy of grouping children with the specific goal of having higher-level students assist lower-level students with a learning activity. The frequency that teachers use these various grouping strategies for activities in reading/language arts and mathematics instruction are compared for full-day and half-day classes. Here, and throughout the rest of this chapter, the frequencies reported by teachers are collapsed into three categories: 1) daily, 2) weekly ("*two or three times a week*" and "*once a week*"), and 3) less than weekly ("*once a month*," "*two or three times a month*" and "*never*"). At times, percents for "daily" and "weekly" are added together to report a percent for "at least weekly".[24]

[24]These percents are obtained by adding the non-rounded percents so they may differ slightly from what would be obtained by adding the rounded numbers found in the figures and tables.

How frequently do U.S. public school full-day and half-day kindergarten classes use various grouping strategies for reading/language arts and mathematics instruction?

- Mixed-level grouping is used daily for reading instruction in a higher percent of full-day classes (48 percent) compared to half-day classes (42 percent). Mixed-level grouping is used more often (i.e., on a daily basis) than achievement groups or peer tutoring for reading instruction in both full-day (48 vs. 26 and 23 percent, respectively) and half-day classes (42 vs. 14 and 15 percent, respectively) (figure 22).
- Mixed-level grouping is also the most common daily grouping method for mathematics instruction in full-day and in half-day classes, but is used every day more often in full-day classes (35 vs. 29 percent).
- While achievement grouping and peer tutoring are less commonly used in reading and mathematics, a larger percent of full-day classes than half-day classes use these strategies either on a daily basis or on at least a weekly basis compared to half-day classes. Teachers in full-day classes are more likely than half-day classes to use achievement groups at least once a week for reading instruction (62 percent vs. 50 percent) and for mathematics instruction (42 percent vs. 32 percent).

Figure 22. Percentage distribution of the frequency that U.S. public kindergarten classes use various grouping strategies for reading and mathematics instruction, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

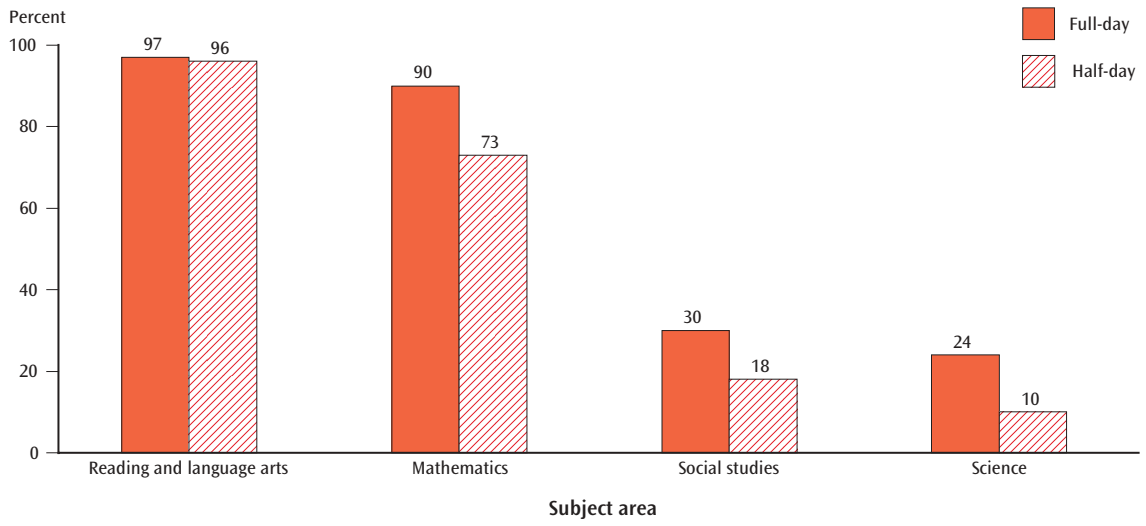
Subject areas

Teachers provide information about the frequency they teach various broad subject areas and how many minutes per day they spend in subject areas (on those days the subject area is taught). Figure 23 shows the percent of full-day and half-day classes that spend time each day on the academic subjects, reading/language arts, mathematics, science, and social studies and figure 24 shows these percents for various music and arts subjects. The number of minutes per day full-day and half-day classes spend on reading instruction (figure 25) and mathematics instruction (figures 26) is also compared.

How often do U.S. public school full-day and half-day kindergarten classes spend time on various subject areas?

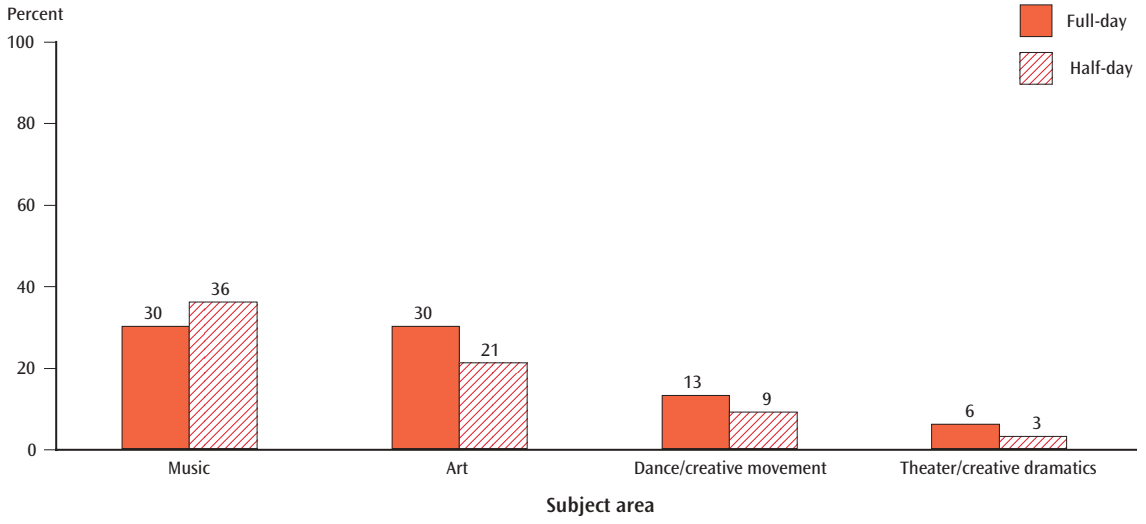
- A large majority of both full-day and half-day classes spend time each day on reading and language arts activities (97 and 96 percent, respectively) (figure 23).
- Other academic subjects, however, are more likely to be taught every day in full-day classes. Compared with half-day classes, a larger percent of full-day classes spend time each day on mathematics (90 vs. 73 percent), social studies (30 vs. 18 percent), and science (24 vs. 10 percent).
- A larger percent of full-day classes have art as part of their daily activities (30 percent) compared with half-day classes (21 percent) (figure 24).
- Music is part of the daily routine for a smaller percent of full-day classes (30 percent) compared to half-day classes (36 percent). This is a notable departure from many of the results reported in this chapter in which full-day classes are more likely than half-day classes to include an activity on a daily basis.
- As shown in figure 25, the amount of time per day spent on reading and language arts activities (on days when reading is taught) differs for full-day and half-day classes. Thirty-one percent of full-day classes spend more than an hour and a half on reading per day compared to 10 percent of half-day classes. Sixty-four percent of half-day classes spend an hour or less on reading compared to 32 percent of full-day classes.
- Not only do more full-day classes have mathematics daily compared to half-day classes, the amount of minutes per day spent on mathematics (on days when mathematics is taught) differs as well (figure 26). Twenty-one percent of full-day classes spend more than an hour doing mathematics activities compared to 9 percent of half-day classes. Forty-nine percent of half-day classes spend less than half an hour per day compared to 19 percent of full-day classes.

Figure 23. Percent of U.S. public kindergarten classes that spend time each day on various academic subject areas, by program type: Spring 1999



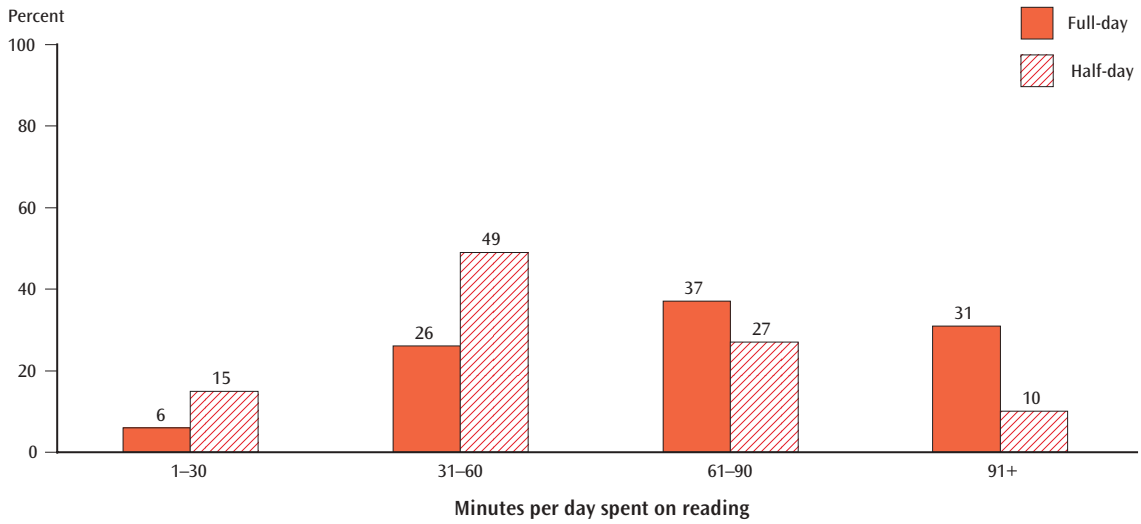
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

Figure 24. Percent of U.S. public kindergarten classes that spend time each day on various music and art subject areas, by program type: Spring 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

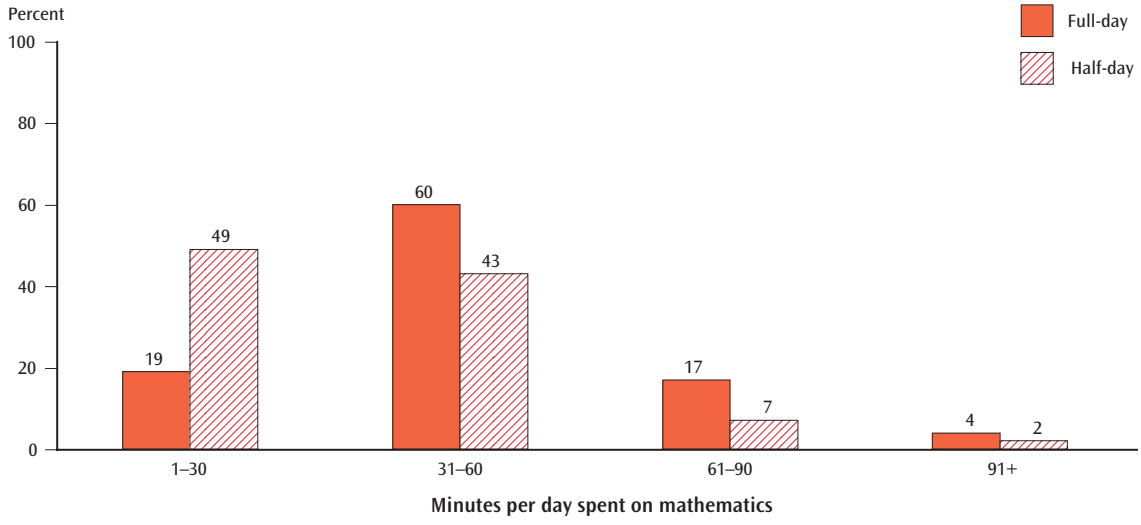
Figure 25. Percentage distribution of the amount of time per day U.S. public kindergarten classes spend on reading instruction, by program type: Spring 1999



NOTE: 'Minutes per day' refers to the time spent per day on those days when reading is taught. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

Figure 26. Percentage distribution of the amount of time per day U.S. public kindergarten classes spend on mathematics instruction, by program type: Spring 1999



NOTE: 'Minutes per day' refers to the time spent per day on those days when mathematics is taught. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

Reading/language arts activities and skills

Teachers participating in the ECLS-K were asked how frequently they use various reading and language arts activities and teach various reading and language arts skills. Curriculum specialists and teachers helped develop these questionnaire items to be used for the kindergarten and first grade years of the ECLS-K. The activities and skills cover a wide difficulty range. While many of the activities reflect a typical kindergarten curriculum, others that appear in this section may be considered advanced for kindergarten. The skills are those that children in kindergarten through the early primary grades are typically learning and some of the skills may be considered advanced for kindergarten.

These items were presented to the teachers separately under the headings "reading/language arts skills" and "reading/language arts activities." The percent of full-day and half-day classes that engage in each of these activities and skills daily, weekly, or less than weekly is presented in Appendix B. The items are grouped into six categories; reading activities (figure B1), reading skills (figure B2), writing activities (figure B3), writing skills (figure B4), receptive/expressive language activities (figure B5), and receptive/expressive language skills (figure B6).[25] To illustrate some differences in the daily curriculum covered in public kindergarten full-day and half-day classes, figure 27 presents a selection of the most commonly reported reading/language arts activities and skills and compares the percent of full-day and half-day classes that do these every day.

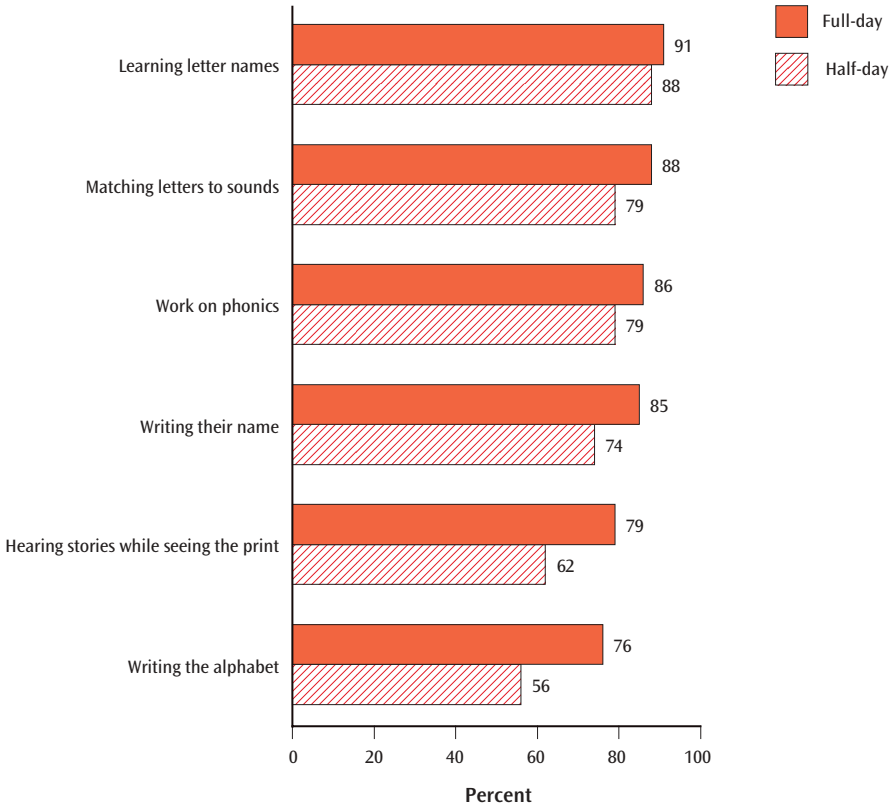
[25]The reader may note that in a few cases a skill and the activity used to teach that skill have a similar meaning (e.g., the reading skill, letter recognition, is very similar to the reading activity, learning letter names). The skill and the activity are reported separately even though their meaning and the frequency estimates associated with each are very closely related. The complete wording of the activities and skills items can be found at http://nces.ed.gov/ecls/kindergarten/questionnaires.asp.

How often do U.S. public school full-day and half-day kindergarten classes spend time on specific reading/language arts activities and skills?

- The relative order of the skills and activities that children spend time on within the domains of reading/language arts is very similar for full-day and half-day classes; the most commonly reported skills and activities in full-day classes are generally the most common in half-day classes (figures B1 to B6).
- Learning letter names and matching letters to sounds are frequently taught in kindergarten whether the class meets for a full-day or a half-day. Recognizing the names of letters in the alphabet is taught daily in 91 percent of full-day classes and 88 percent of half-day classes. Matching letters to sounds is taught daily more often in full-day classes (88 percent) compared to half-day classes (79 percent) (figure 27).
- Compared to half-day classes, a larger percent of children in full-day classes spend time each day writing their name (86 vs. 74 percent) and writing the alphabet (76 vs. 56 percent) (figure 27).
- Teachers in both full-day and half-day classes often read aloud to their children while showing them the printed words. A larger percent of full-day classes, however, do this every day (79 percent) compared to half-day classes (62 percent) (figure 27).
- Almost all specific reading/language arts skills and activities are more frequently covered daily in full-day classes compared with half-day classes with some of the exceptions being those done daily by a majority of both types of classes (e.g., learning letter names) (figures B1 to B6).
- The percent of full-day classes that engage in a skill or activity *at least weekly* (daily or weekly) exceeds the percent of half-day classes for 19 out of the 36 reading/language arts skills and activities examined (figures B1 to B6). Some of the reading activities and skills that are more likely to be part of at least a weekly routine in full-day classes are typically considered more advanced than the traditional kindergarten reading curriculum (e.g., reading aloud fluently, reading multi-syllable words, and alphabetizing).[26]
- Nine out of the 11 writing skills and activities are done weekly in more full-day classes compared to half-day classes (e.g., writing in journal, writing stories and reports, and conventional spelling) (figures B3 and B4).

[26]Comparisons of public school kindergarten and first-grade activities and skills show that a higher percent of first-grade children compared to kindergartners engage in these at least once a week (reading aloud fluently, 98 vs. 44 percent; reading multi-syllable words, 84 vs. 36 percent; and alphabetizing, 66 vs. 18 percent) (unpublished tables, ECLS-K kindergarten and first-grade longitudinal file).

Figure 27. Percent of U.S. public kindergarten classes that work daily on various reading/ language arts activities and skills, by program type: Spring 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

Mathematics activities and skills

Items in the teacher questionnaire about specific mathematics skills were developed to correspond to items in the mathematics domain of the ECLS-K battery. The assessment items as well as these teacher questions covers a wide range of mathematics content areas and ability levels. The kindergarten teachers indicated how often their class spent time doing a variety of mathematics activities and covering a variety of mathematics skills.

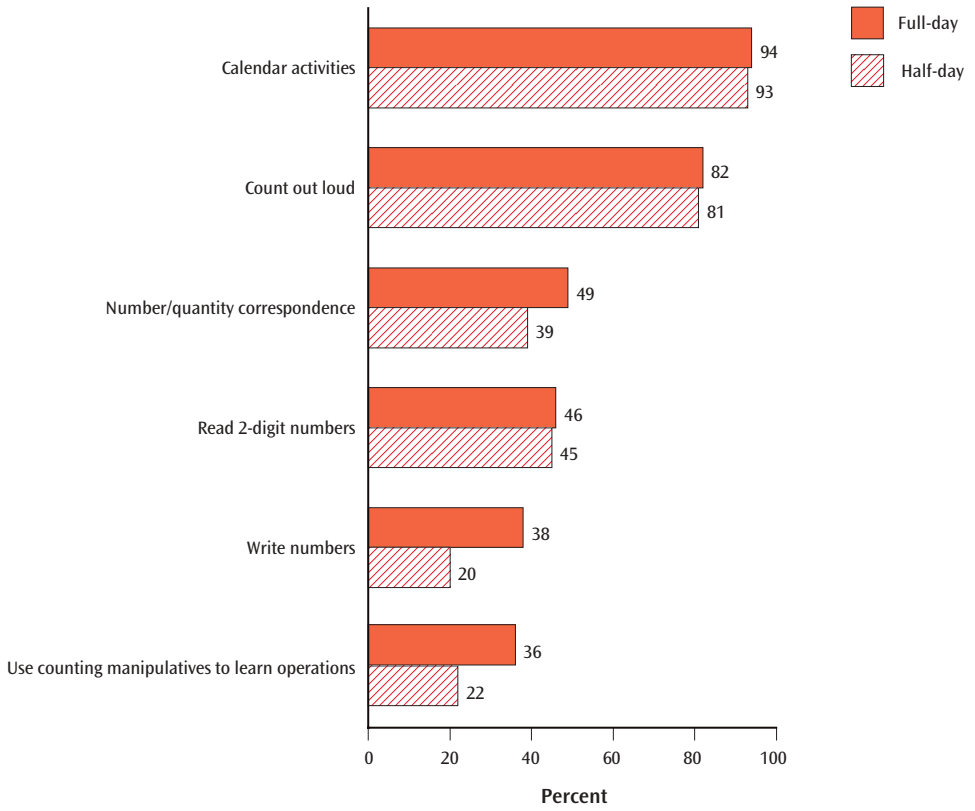
Mathematics activities that are not related to specific skills (e.g., play math games and do math worksheets) are presented together simply as mathematics activities (figure B7). Some of the mathematics activities can be directly related to specific skills (e.g., count out loud) so for the purpose of presenting these results, the skill-specific activities are grouped with the related skills. The mathematics skills are grouped into six categories: counting and quantity (figure B8), number systems (figure B9), operations (figure B10), measurement (figure B11), data analysis (figure B12), geometry (figure B13), and patterns and sorting (figure B14). To illustrate some differences in the daily mathematics curriculum covered in public kindergarten full-day and half-day classes, figure 28 presents a selection of the most commonly reported mathematic activities and skills and compares the percent of full-day and half-day classes that do these every day.

How often do U.S. public school full-day and half-day kindergarten classes spend time on specific mathematics activities and skills?

- Teachers use calendar activities to teach mathematics skills every day in nearly all full-day (94 percent) and half-day kindergarten classes (93 percent) (figure 28).
- Counting out loud is a commonly taught skill for both full-day and half-day classes. In 82 percent of full-day classes and 81 percent of half-day classes children spend time each day counting out loud (figure 28).
- Children work daily on number/quantity correspondence in a larger percent of full-day classes (49 percent) compared with half-day classes (39 percent) (figure 28). This skill is covered at least weekly in most full-day (95 percent) and half-day classes (94 percent) (figure B8).
- Writing numbers from 1 to 10 is taught on a daily basis in a larger percent of full-day classes (38 percent) compared to half-day classes (20 percent) (figure 28). This skill is also taught more often on at least a weekly basis in a larger percent of full-day classes (89 percent) than half-day classes (78 percent) (figure B9).
- Kindergarten is a time where many children are introduced to addition and subtraction by learning how to model these mathematical operations with manipulatives (e.g., blocks). Full-day kindergarten classes are more likely to use manipulatives for this purpose on a daily basis (36 percent) compared with half-day classes (22 percent) (figure 28).
- Among the 37 skills and activities examined in the mathematics domain, there are 29 in which the percent of full-day classes engaged in the skill or activity at least weekly exceeds the percent of half-day classes (figures B7 to B14). Many of these are activities or skills that involve solving mathematics problems (e.g., explain how a math problem is solved, solve a real-life math problem, and solve math problems on the chalkboard). Additionally, some of these mathematics skills and activities are ones more typically part of a first-grade curriculum (e.g., recognizing fractions, telling time, and writing numbers from 1–100). [27]

[27]Comparisons of public school kindergarten and first-grade activities and skills show that a higher percent of first-grade children compared to kindergartners engage in these at least once a week (recognizing fractions, 32 vs. 6 percent; telling time, 72 vs. 40 percent; and writing numbers from 1–100, 41 vs. 18 percent) (unpublished tables, ECLS-K kindergarten and first-grade longitudinal file.)

Figure 28. Percent of U.S. public kindergarten classes that work daily on various mathematics activities and skills, by program type: Spring 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Spring 1999 Kindergarten Teacher Questionnaire, Base-year Public-Use Data File.

Chapter 5:

Cognitive Gains of Public School Children in Full-day and Half-day Kindergarten Classes

This chapter focuses on the relationship between kindergarten program type and academic gains. Children in full-day classes spend more time in school than those in half-day classes and this difference, as described in the previous chapter, increases the frequency with which children are exposed to a wide variety of specific instructional activities. As described in the introduction to this report, prior research suggests that full-day kindergarten programs compare favorably to half-day programs in terms of children's academic growth (Fusaro 1997; Cryan et al. 1992; and Gullo 2000).

This chapter compares public school full-day and half-day children's gains made during the kindergarten year in reading/language arts and in mathematics and then these gains are compared while taking into account child, family and other classroom characteristics that may be related to student achievement differences.

While the following analyses look at overall score gains from fall to spring, a previous report, *The Kindergarten Year* (West, Denton and Reaney 2001), provides descriptive details about the kinds of skills and abilities that children are learning in reading/language arts and mathematics throughout the kindergarten year. As noted in *The Kindergarten Year*, first-time kindergartner's reading and mathematics knowledge and skills differ by certain child and family characteristics both at the beginning and at the end of the kindergarten year. All groups make gains during the year, and White and Asian children, on average, score higher than Black and Hispanic children both in the fall and spring of kindergarten. Additionally, children from economically disadvantaged households make gains during their kindergarten year but tend to both start and end the year behind children from more economically advantaged households.

The findings presented in this chapter do not focus on fall score differences or spring score differences among groups of children or by class characteristics, but instead they highlight differences in the average progress made during the year—the score gains from fall to spring. The findings are limited to children who attended public kindergarten programs for the first time in 1998–99, did not change teachers during the school year, and who were assessed in English in both the fall and spring.

The findings begin with a comparison of the average gains made in reading/language arts and mathematics for public kindergarten children in full-day and half-day classes. However, simple comparisons of children in the two program types may be confounded with other differences associated with full-day and half-day programs such as children's race/ethnicity and poverty status (as described in chapter 3). Additionally, there are differences in some characteristics of full-day and half-day classes such as the presence of an instructional aide and class size (as described in chapter 4), and these may be related to achievement gains. For these reasons, the additional analyses reported on in this chapter control for child characteristics (i.e., race/ethnicity, sex, poverty status, and initial achievement level) and other classroom features that may be considered beneficial for academic gains (e.g., Finn et al. 2001). These classroom features are class size, the presence of a classroom instructional aide, the total time devoted to subject area instruction, and the use of achievement groups. These classroom features are included in these analyses because they, like program type, are related to the time and individual attention available for instruction for each child in the kindergarten classroom. Additionally, these analyses investigate whether gains made in full-day programs are differentially associated with other child and class characteristics. For example, the analyses answer questions such as; "Are the differences in gains made by children in full-day and half-day classes the same for children in different race/ethnicity groups?" and, "Does having an instructional aide in the class mitigate differences that may be associated with full-day and half-day

classes?" When differences between group means are found to be statistically significant, the difference is described in standard deviation terms. A standard deviation is a measure of the variability of a distribution of scores (i.e., reading gain scores or mathematics gain scores). In general, approximately two-thirds of the scores in a distribution fall between one standard deviation above and one standard deviation below the mean.

It is important to note that these analyses do not offer a formal evaluation of the impact of full-day kindergarten. Causal relationships are best determined with a design that randomly assigns children to classes with the characteristics under study. The strengths of this study, however, are that it uses a nationally representative sample of English-speaking, first-time kindergartners, incorporates a pre- and post-test design (fall and spring scores), and controls for variables that may be related to achievement outcomes (i.e., sex, race/ethnicity, poverty status, and class size). It is possible that other potentially important variables (e.g., teacher qualifications, specific instructional practices, and school resources) may be related to the classroom characteristics and achievement but are not represented in the analyses. Given the non-experimental, pre-test-posttest design of the study, there is no way to determine if the samples were equivalent in all important ways at the beginning of the kindergarten year. This is a research design limitation which makes it impossible to draw causal conclusions from the data. The analyses in this report are intended to provide a description of the differences associated with program type and to stimulate others to further explore the differences found here.

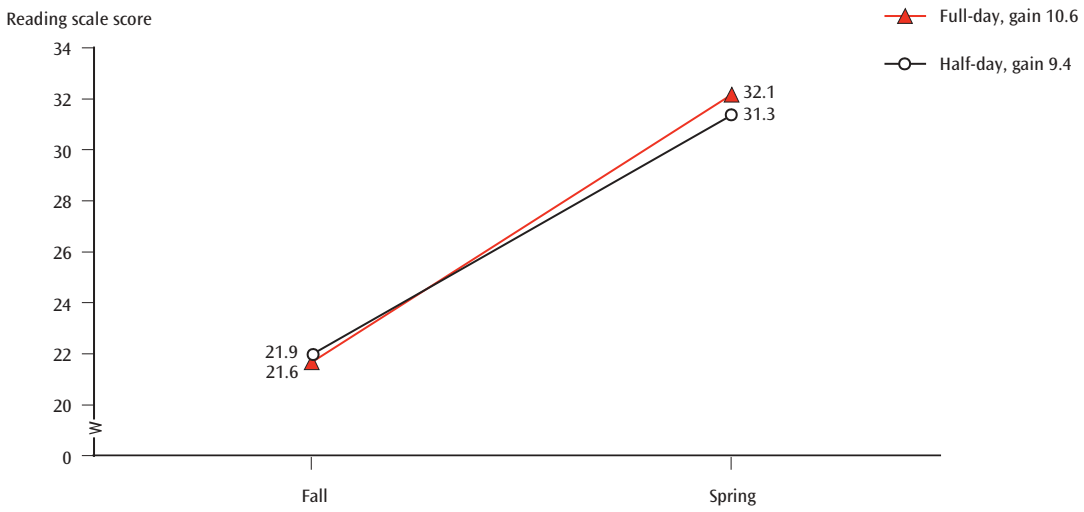
The analyses used to investigate the differences associated with these variables take into account the structure of the ECLS-K data—children are clustered within classes and these classes are clustered within schools. Detailed descriptions of the variables, the sample, the multi-level regression method, and the complete set of findings follow the key findings presented below.

Do public school children who attend full-day kindergarten make larger reading achievement gains than children who attend half-day?

Key findings: Reading gains

- Children in full-day programs, on average, make greater gains in their reading achievement scores from fall to spring (10.6) compared to those in half-day classes (9.4) (figure 29).
- When the gain scores are analyzed while taking into account differences due to child, family and other classroom characteristics, the positive effect associated with full-day programs persists (table 5). This represents a difference in gain scores of about 32 percent of a standard deviation.
- Some child characteristics are related to reading gain differences (table 5).
  - Girls make slightly greater gains than boys.
  - Children living in poverty make slightly smaller gains than those not in poverty.
  - Children beginning the year in the top third of the reading score distribution make slightly smaller gains compared to others.
  - Whites are compared to others by race/ethnicity and are found to make smaller overall gains than Asian children.
  - Reading score gains are positively related to the childrens' ages.
- Children in classes with 25 or more children make slightly smaller gains compared to those in classes with 18 to 24 children. There is not a differential effect associated with class size by program type—a smaller class size does not mitigate the difference in gains found between children in half-day and full-day classes. Program type differences are also examined in conjunction with other child and class characteristics and the positive effect associated with full-day kindergarten is found to be consistent with the following exception.
- For Black students, there is a significant relationship between presence of an aide in the class and program type on reading score gains from fall to spring. While the presence of an aide in the class is not associated with differences in gain scores among White, Asian, or Hispanic children in either half-day or full-day programs, Black children in full-day classes with an aide make greater gains compared to Black children in full-day classes without an aide (figure 30). The benefit associated with the presence of a classroom aide for Black children in full-day classes is not found for Black children in half-day classes.

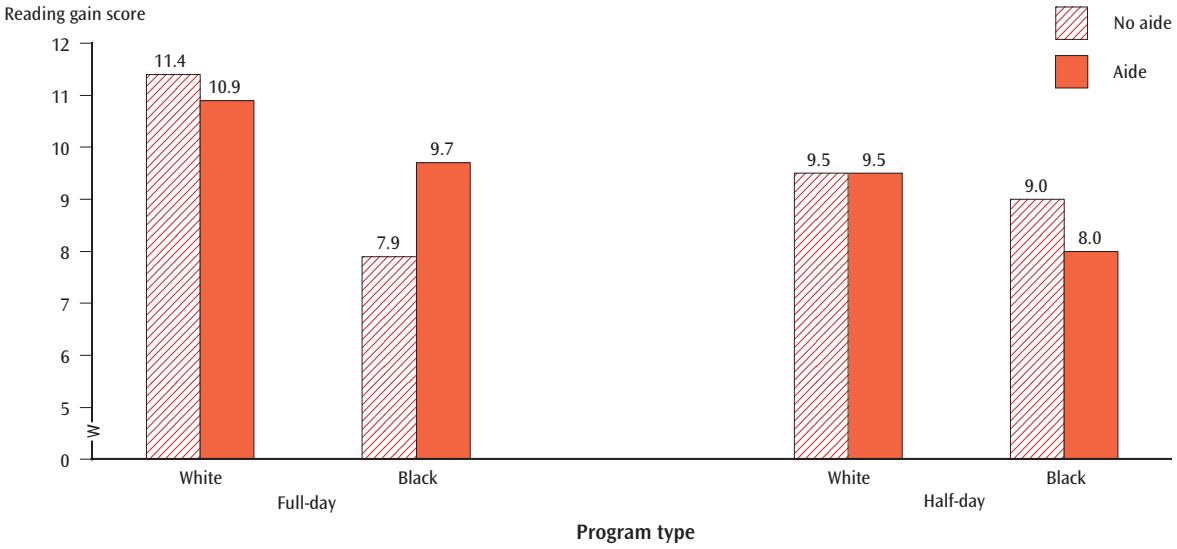
Figure 29. Public school first-time kindergartners' mean reading gain scores, by program type: Fall 1998 to spring 1999



NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (not a transitional or multi-grade class) who are assessed in English in both the fall and the spring. Only children with the same teacher in both the fall and spring are included in the analysis. Detail may not sum to totals because of rounding. The scores are simple means and are unadjusted for a number of other factors that are related to performance.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaire and Child Assessments, Base-Year Public-Use data.

Figure 30. Public school, first-time kindergartners' mean reading score gains, by race/ethnicity, program type and the presence of an aide in the class: Fall 1998 to spring 1999



NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (not a transitional or multi-grade class) who are assessed in English in both the fall and the spring. Only children with the same teacher in both the fall and spring are included in the analysis. The scores are simple means and are unadjusted for a number of other factors that are related to performance.

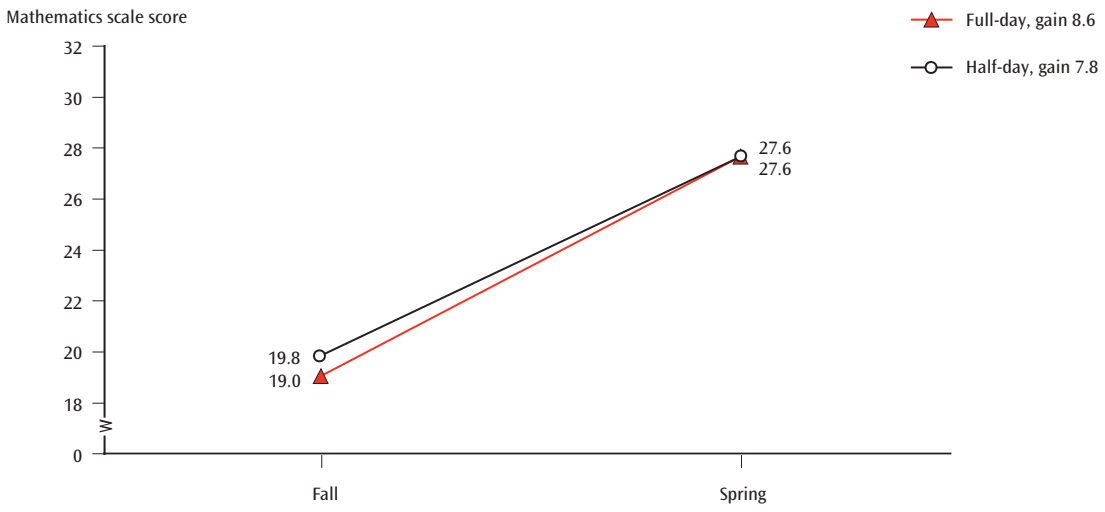
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaire and Child Assessments, Base-Year Public-Use data.

Do public school children who attend full-day kindergarten make larger mathematics achievement gains than children who attend half-day?

Key findings: Mathematics gains

- Children in full-day programs, on average, make greater gains in their mathematics achievement scores from fall to spring (8.6) compared to those in half-day classes (7.8) (figure 31).
- After accounting for differences due to child, family and classroom characteristics, children in full-day kindergarten classes make gains in their mathematics scores from fall to spring that are larger than those in half-day classes (table 7). This represents a difference in gains scores of about 22 percent of a standard deviation.
- Differences in mathematics gain scores are related to some child characteristics (table 7).
  - Children from homes living below the poverty threshold make smaller gains than those not in poverty.
  - Black children make smaller gains compared to White children.
  - Compared to children with fall mathematics scores in the bottom third of the distribution, children in the top third make smaller gains during the year.
- Full-day and half-day mathematics gain score differences are compared across other characteristics. The positive effect associated with full-day programs is not different across levels of other child or family characteristics included in the analysis (e.g., sex, race/ethnicity, poverty status, or fall mathematics ability level) or with classroom characteristics (e.g., class size or classroom aide).

Figure 31. Public school first-time kindergartners' mean mathematics gain scores, by program type: Fall 1998 to spring 1999



NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (not a transitional or multi-grade class) who are assessed in mathematics in both the fall and the spring. Only children with the same teacher in both the fall and spring are included in the analysis. The scores are simple means and are unadjusted for a number of other factors that are related to performance.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaire and Child Assessments, Base-Year Public-Use data.

HLM Analyses

Multi-level regression analyses are used to model the effects associated with kindergarten program type and other child and classroom variables. The ECLS-K design includes nested data with three levels: child, class and schools. The models used for these analyses are formulated as three-level regression models, with the first level being the child (within classes), the second class (within schools) and the third school. The three-level models are fitted using HLM software (Bryk and Raudenbush 2002). The use of this modeling approach assures that the significance tests for effects are conducted using appropriate degrees of freedom. Reading score gains and math score gains are analyzed separately. When a characteristic is a significant "main effect" it indicates that gain scores are related to this characteristic after accounting for differences due to other factors in the model. Main effects can be at the child level (e.g., children living in poverty make lower reading gains, on average, compared to other children) or at the class level (e.g., the average reading gain score for children in full-day classes is higher than it is for half-day classes). A regression coefficient (B) for a significant effect can be interpreted as the difference in the number of test items a student would answer correctly (if all items had been taken) in the spring compared to the fall for different groups after adjusting for other characteristics. For example, if B=1.00 for an effect associated with groups x and y (with group x as the reference group), this can be interpreted to mean that after accounting for other characteristics in the model, children in group y answered on average one additional reading test item correctly over the course of the kindergarten year compared to group x. This can be interpreted in light of the overall average gain score (e.g., 10 points for reading gains). Significant differences for average adjusted gain scores can also be expressed as a percentage of the standard deviation of the gain scores. For example, if the standard deviation of gain scores is 5.0 score points, a regression coefficient of 1.0 represents an effect size of .20 (or 20 percent of a standard deviation).

Whether or not an effect associated with program type is consistent across levels of the other child and class characteristics is examined with tests

for interaction effects. A significant interaction effect is found when differences attributed to one characteristic (e.g., program type) are not the same for levels of one or more other characteristics (e.g., race/ethnicity and classroom aide).

The data for the analyses presented in this chapter are weighted at the child level to account for unequal selection probabilities and nonresponse.[28] The multi-level nature of these analyses eliminates the need to take into account the complex design of the sample of schools and children when estimating variances since class- and school-level variation are accounted for in the models.[29] Robust standard errors and p-values for all coefficients are those produced using the HLM software.

Variables in the Analyses

Dependent Variables: Assessment Score Gains

The ECLS-K direct child cognitive assessment is administered one-on-one with each child using a computer-assisted personal interview (CAPI). The assessment included two cognitive domains (reading and mathematics).[30] The ECLS-K battery used a two-stage assessment approach in which the first stage in each domain contained a routing test that determined the child's approximate skills. According to the child's performance on the routing test, the child is administered one of the three skill level assessments in that domain (the second stage). This adaptive approach is used in both the fall and spring administrations of the assessments. The reading domain consisted of basic reading skills (e.g., letter recognition, understanding of the letter-sound relationship, word reading), vocabulary, and reading comprehension (e.g., initial understanding, developing interpretation, recognizing implausible events). The mathematics domain covered early skills including number sense, number properties, operations, measurement, data analysis, probability, shapes and patterns, and problem solving.

Item response theory (IRT) is used to calculate scores that could be compared regardless of which second stage form is completed. The routing test items plus a core set of common items across second stage forms are used to establish a common scale. The items' level of difficulty, discriminating ability and "guessability" are used in IRT to place each child on a continuous ability scale. The IRT scale scores themselves represent estimates of the number of items students would have answered correctly if they had taken all of the 72 questions in the reading test, and all of the 64 questions in the mathematics test.

The reliability (IRT-based theta) is .9 for the fall and spring reading and mathematics estimates of ability.[31] The dependent variables in these analyses are gain scores that represent the differences between the IRT fall and spring scale scores for the reading and mathematics assessments. The results of these analyses are presented in terms of the amount of learning children demonstrate during the kindergarten year, as opposed to children's status at the end of the year adjusted by their fall status, as would be the case with an alternative approach (i.e., a covariance model).[32]

Level 1: Child characteristics

Poverty status: Children from households below the federal poverty threshold are compared to the reference group of children living at or above the poverty threshold. In 1998, the poverty threshold for a family of four was $16,655.

Race/Ethnicity: Children's race/ethnicity is coded as four dummy variables: Black, Hispanic, Asian and Other, with White as the reference category.

Age: Children's age in months at the beginning of the kindergarten year is included.

Sex: Boys' score gains are compared to girls' score gains, with girls as the reference category.

[28]The longitudinal child weight, BYCOMW0 from the ECLS-K Public-Use Data File, is used for analyses in this chapter and this weight is normalized so that the sum of the weights equals the sample size.

[29]This approach does not take into account clustering associated with primary sampling units.

[30]A third cognitive domain, general knowledge, is a part of the ECLS-K assessment battery, but is not included here.

[31]For more information about the assessment scores, refer to the ECLS-K Psychometric Report (Rock and Pollack 2002).

[32]For further discussion about the appropriateness of gain scores as a dependent variable, see page 124 in the technical appendix.

Initial reading ability: The distribution of all children's fall reading scale scores are examined and three equal-sized groups are formed to represent low, middle and high initial reading ability groups. These groups are dummy coded in the analyses of reading score gains. Two comparisons are made, children in the lowest third and middle third are each compared to children in the top third of the fall reading score distribution. This variable is included in the model to investigate whether the effect associated with full-day kindergarten is equally apparent for children that begin the year at different ability levels.

Initial mathematics ability: Like reading, the distribution of all children's fall mathematics scale scores are examined and three equal-sized groups are formed to represent low, middle and high initial math ability groups. These groups are dummy coded and in the analyses of the math score gains two comparisons are made, the lowest third and middle third are each compared to those children in the top third of the fall math score distribution. Again, the inclusion of this variable allows for the examination of the consistency of a full-day program effect for children possessing varying mathematics skills at the start of the kindergarten year.

Time lapse between assessments: Over 90 percent of the fall assessments took place in October and November of 1998 and over 90 percent of the spring assessments took place in April and May of 1999. The average time that lapsed between assessments is a little more than six months but there is some variation in the time between assessments. The amount of time between assessments is correlated to the score gains, as would be expected with a sensitive assessment that is measuring the same skills and abilities that are being taught throughout the year. The positive correlation between score gains and the time between assessments is .20 for reading and .15 for math. There is no indication that this "lapse" variable is related to any independent variables of interest, therefore there is no concern that results are confounded by the correlations to gain scores (for example, children in full-day programs do *not* have a longer average time between assessments which would confound an effect associated with program type). This lapse variable is included in the model, however, as a safeguard against this concern. The number of days between the fall and spring assessment dates is calculated and transformed so that 1 equals 180 days (approximately the mean time lapse) and other values represent a proportion of 180 days (e.g., 150 days =.83). This variable has values ranging from .64 to 1.46. Since this variable is scaled so that a 1 roughly equals the mean time lapse, the unstandardized regression coefficient (B) associated with this variable (presented in table 5 for reading and table 7 for mathematics) is very close to the overall mean gain score. The coefficient itself has little value for interpretation, but it is recommended that analyses of ECLS-K gain scores incorporate this, or a similar variable, to eliminate possible confounding of time lapse with other variables.

Level 2: Class characteristics

Program type: As defined throughout this report, classes are categorized as either full-day or half-day based on information provided by teachers in the fall and spring teacher questionnaires. In the analyses in this chapter, children in full-day kindergarten classes are compared to those in half-day classes.

Class size: While not all authors conclude that the recent class size studies necessarily find higher achievement children in smaller classes (Hanushek 1999; Finn and Achilles 1999), in general the literature provides evidence that children in smaller classes often make greater academic gains compared to those in larger classes (Grissmer 1999; Nyhan and Alkadry 1999; Achilles, Harmon, and Egelson 1995). There is additional evidence that smaller class sizes in early grades lead to achievement gains that can last for years (Finn et al. 2001; Molnar et al. 1999; Nye, Hedges, and Konstantopoulos 1999).

Tennessee's Project STAR (Student-Teacher-Achievement-Ratio) study, an important large-scale class size experiment, compared two class size groups: "small" (13–17 children), and "large" (22–26 children) (Grissmer 1999). Class size groups are constructed for this chapter to have a comparable "small" class group of 17 or fewer children. About 19 percent of the children in this study are in a "small" class and an approximately equal number are in a class with 25 or more children—this is

used to define the "large" class size group.[33] The "medium" group consists of those in classes with between 18–24 children. Preliminary analysis with the ECLS-K data indicated that differences in reading and mathematics gains are not apparent among children in the small and medium-sized classes but suggested that those in the largest classes made smaller gains. For this reason class size is dummy coded so that children in small classes (up to 17 children) and children in medium sized classes (18–24) are compared to those in large classes (25+).

Instructional aides: Instructional aides are used in some classrooms to assist teachers with a variety of instructional activities and lower the student-adult ratio in the classroom. Teacher aides can offer support to teachers in the classroom by working directly with children in small groups or individually. However, Gerber et al. (2001) showed the presence of classroom aides has only a very small positive association with reading achievement in the primary grades. These authors argue that having an aide in the classroom is not nearly as effective at improving achievement as reducing class size.

ECLS-K teachers provided information about paid aides in the classroom in the spring teacher questionnaire. For the purpose of these analyses, classes are defined as having an instructional aide only if the aide worked directly with children on instructional tasks and if the aide is in the class for at least one hour per day. Special education aides and English as a second language or bilingual education aides are not included as instructional aides for these analyses. Classes with an aide are compared to the classes without an aide.

Relative time for reading instruction: This is a dichotomous classroom variable indicating whether or not the class spends a relatively large amount of time on reading/language arts instruction. This variable is based on teachers' responses to questions about the number of minutes per day and number of times per week they have reading instruction in their class. Since full-day and half-day classes do not have the same amount of total time during the day for instruction, the relative time for reading instruction variable is created separately for full-day and half-day programs. For full-day classes, the modal response for reading instruction is the category 61–90 minutes per day and for half-day classes the modal response category is 31–60 minutes per day. For the purpose of these analyses a full-day class is categorized as having "more time for reading instruction" if reading is taught at least 3–4 times a week and more than 90 minutes per day. Half-day classes are categorized as having "more" time for reading instruction if reading is taught at least 3–4 times a week and more than 60 minutes per day. For models examining reading score gains, classes with "more" time for reading instruction (33 percent of all classes) are compared with the reference group, which spends less time on reading. Thirty-one percent of full-day classes and 37 percent of half-day classes are classified as spending "more" time for reading instruction.

Relative time for mathematics instruction: The distribution of responses for amount of time spent on mathematics instruction is examined to create a "time for math instruction" variable. The modal response for full-day classes is 31–60 minutes per day, so classes are coded as having "more" time for math instruction when math is taught more than 60 minutes per day (and at least 3–4 times per week). In half-day classes, the mode response is 1–30 minutes per day so these classes are classified as having "more" time for mathematics instruction if they have math for more than 30 minutes per day (and at least 3–4 times per week). For models examining mathematics score gains, classes with "more" time for math instruction (31 percent of the classes) are compared with the reference group, which spends less time on math. Forty-seven percent of half-day classes and 20 percent of full-day classes are classified as spending more time on mathematics instruction.

Achievement grouping for reading instruction: In some classes, teachers form achievement groups so children of similar ability can work on the skills that are best suited to their skill level. The purpose of achievement grouping is to target instruction time in a way that reduces the amount of time children spend on skills that they either have already mastered or are not yet ready to master. The ECLS-K teacher questionnaires asked the teachers to indicate whether they use achievement groups for reading instruction and for how many minutes per day.

[33]In order to keep the sample sizes of the "small" and "large" categories approximately equal, the large class size category is not defined in the same way as the STAR studies.

For the analyses of reading score gains, classes that use achievement groups as a substantial feature of their reading instruction program are compared against classes that do not. Classes that use reading achievement groups at least weekly and for more than 15 minutes on the days they use the groups are, for these analyses, coded as using achievement groups (43 percent of classes).

Achievement grouping for mathematics instruction: For the analyses of mathematics score gains, classes that use achievement groups (at least weekly and for more than 15 minutes per day) for mathematics instruction (34 percent of classes) are compared to those that do not.

Level 3: School characteristics

Region of the country, location (large and mid-sized cities, suburban and large towns, and rural and small town areas) and concentration of low-income students are dummy coded and entered in the models but none of these factors are significantly associated with either reading or mathematics gains. The school level, however, is maintained as a separate level in the models in order to measure accurate dependent score variance components associated with variation among schools.

Sample

This chapter looks at changes in reading and mathematics achievement over the kindergarten year for public school children enrolled for the first time in a regular kindergarten program in the 1998–99 school year. Children repeating kindergarten and those who attend a transitional or 2-year kindergarten and those in a multi-graded or ungraded class are excluded from the analyses. Children who changed teachers between spring and fall year are excluded to ensure that the class characteristics associated with each child (e.g., program type, class size and time for instruction) are those to which the child had been exposed throughout the full year. An English language proficiency screener, called the Oral Language Development Scale (OLDS), is administered if school records indicated that the child's home language is not English. The child had to demonstrate a certain level of English proficiency to be administered the cognitive assessment in English. Children who are not assessed in English in both the fall and spring are also excluded for these analyses. Children are also excluded due to the requirement of the HLM software that no cases with missing data at level-two (the class level) be included in the analyses. There are 8,062 children, 1,907 classes and 611 schools represented in the analysis of reading gain scores. More teachers left questions blank when referring to their mathematics instruction (i.e., time for instruction and use of achievement groups) than when they answered reading instruction questions. For this reason, the analysis of mathematics gain scores is based on a smaller sample compared to the reading gain score analyses—6,768 children, 1,630 classes and 583 schools.

Table 4 describes selected characteristics of the population of all public kindergarten children and of the children represented by the sample used for these analyses. As would be expected given the requirement that the children are able to be assessed in English, this analyses represents a population of kindergartners that has smaller percent of Hispanic children, children from homes where the primary language is not English and children whose family income is below the poverty threshold compared to all public kindergartners.

Findings: Reading score gains

The average reading score gain from fall to spring for public school, first-time kindergartners in this analysis is 10.04 score points and the standard deviation of these gain scores is 6.01. Sixty-eight percent of these scores fall within one standard deviation of the average (between 4.03 and 16.05). Ninety percent of the reading gain scores fall between 1.27 and 20.50. To determine which child, class and school factors relate to reading gain scores, all of the school, class and child variables mentioned above are examined in the analysis. In order to determine if program type is differentially related to reading score gains for different groups of children (i.e., race/ethnicity, sex, initial reading ability, poverty status) or for classrooms with other characteristics (e.g., class size, presence of a classroom aide, use of achievement groups), many interac-

Table 4. Sample sizes and percentage distributions for selected characteristics of all public kindergarten children and of all children used in the analyses: 1998–99

Child characteristics	All public kindergarten children	Public kindergarten children with selected characteristics[1]	Public kindergarten children represented in reading gain score analysis[2]	Public kindergarten children represented in mathematics gain score analysis[3]
Sample size	16,665	9,553	8,062	6,768
Program type				
Full-day	54	54	56	55
Half-day	46	46	44	45
Child's race/ethnicity				
White, non-Hispanic	55	62	59	59
Black, non-Hispanic	18	18	17	18
Hispanic	20	14	13	12
Asian	3	2	6	5
Other	4	4	6	6
Sex				
Male	52	51	50	49
Female	48	49	50	51
Primary home language				
English	87	93	93	93
Non-English	13	7	7	7
Household income				
Below poverty threshold	26	20	21	20
At or above poverty threshold	74	80	79	80

[1]This includes public school, first-time kindergarten children attending a regular kindergarten program (not a transitional or multi-grade class) who are assessed in English in both the fall and the spring. Only children with the same teacher in both the fall and spring are included.

[2]This includes selected children whom also have teacher provided information about reading/language arts instruction.

[3]This includes selected children whom also have teacher provided information about mathematics instruction.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaire, School Administrator Questionnaire and Parent Interviews, Base-Year Public-Use Data File.

tions are tested.[34] Because relative time for reading instruction is defined differently for full-day and half-day classes the interaction between relative time for reading instruction and program type is not tested. Some interactions include two level-2 (class) variables (e.g. 'program type x aide') and x class' variable interactions are in the level-1 (child) portion of the model. Only significant terms ($p<.050$) are included in the model presented in table 5. The only exception to this is that non-significant effects that are a part of a significant higher order effect are kept in the model (e.g., "aide" is kept in the model only because it is a part of the

[34]The main effects and interaction terms tested in these analyses are selected based on the research literature mentioned in this report and on prior analyses done with the ECLS-K data.

significant "aide x program type x race/ethnicity" interaction).[35]

The results of the regression analysis suggest that there are differences in reading score gains that are associated with class and child characteristics. Table 5 shows the unstandardized regression coefficient (B), standard error, and p-value for each main and interaction term in this model.

Class characteristics and reading score gains

The level-2 (between class) portion of the multilevel model investigates the differences in each class' mean reading score gain as a function of class characteristics while adjusting for other variables in the model. The use of achievement groups for reading instruction is not found to have a significant effect on reading score gains.[36] Other class characteristics that are related to children's gains in reading are described below.

Program type: The overall average gain between fall and spring is about 10 score points. After controlling for the other child- and class-level variables in the model, children in full-day classes make gains in their reading scale score from fall to spring that are, on average, 1.91 score points larger than those in half-day classes (B =1.91). The standard deviation of reading score gains from fall to spring is 6.01 score points for the children in this sample, so this difference of 1.91 score points represents an increase that is 32 percent of a standard deviation for kindergarten program type (i.e., effect size =0.32).

Classroom instructional aide: The presence of an aide in the class did not have a significant main effect on reading score gains. However, the main effect associated with kindergarten program type should be considered in light of a significant three-way interaction between program type, race/ethnicity (Black vs. White) and whether there is an instructional aide in the classroom who worked directly with the children (B =1.76). Figure 30 illustrates the direction of this relationship using unadjusted mean gain scores. The presence of an aide in the class is not associated with a reading gain difference for White children in either half-day or full-day kindergarten programs. However, an aide in the class is associated with greater reading gains for Black children in full-day kindergartens. The gain for these children is 29 percent of a standard deviation.

Class size: Class size is a very small but significant main effect indicating that children in the largest classes make slightly smaller gains in reading compared to those that are in medium sized classes. After accounting for other child and class characteristics in the model, children in classes with between 18 and 24 students make gains that are, on average, .54 score points larger than those in classes with 25 or more children (B =.54, effect size =.09). In addition, although not significant, the gain score difference between small and large classes is similar in magnitude and direction. No difference is found between small and medium classes.[37]

Relative time for reading instruction: Children in classes that devote more than the typical amount of time for reading instruction (compared to other full-day or other half-day classes)[38] make gains in reading scores that are slightly larger (.35 score points) than those that spend less time with reading instruction (B =.35, effect size =.06.)

Child characteristics and reading score gains

The level-1 (within-class) portion of the model investigates the differences in reading score gains for children in each class as a function of a select set of child characteristics (poverty status, race/ethnicity, sex, age, and initial reading ability). The regression coefficients represent the differences in

[35]See the technical appendix for further details about the analyses.

[36]If 'achievement grouping for reading, yes' were added to the model shown in table 5, it would have an unstandardized regression coefficient of 0.36 and a standard error of 0.36 with a p-value of 318.

[37]If the analysis is set up so that small class size is the reference group, the difference in gains for small vs. medium sized classes is not statistically significant, (B =.04).

[38]See page 53 for a definition of this variable.

Table 5. Multilevel regression model relating reading score gains of public school first-time kindergartners to child and class characteristics: Fall 1998 to spring 1999

Fixed effect (reference group)	Unstandardized coefficient (B)	Standard error
Intercept	–4.12*	1.51
Level-2 Class characteristics		
Length of kindergarten day (Half-day)		
Full-day	1.91*	0.34
Class size (Large 25+)		
Small <18	0.58	0.30
Medium 18–24	0.54*	0.25
Instructional aide (No)		
Yes	0.29	0.33
Relative time for reading instruction (Less)		
More	0.35*	0.18
Level-2 Interactions		
Program type*Aide	–0.57	0.47
Level-1 Child Characteristics		
Poverty status (At or above)		
Below poverty threshold	–1.04*	0.18
Race/ethnicity (White, non-Hispanic)		
Black, non-Hispanic	–0.42	0.48
Hispanic	0.16	0.40
Asian	1.55*	0.78
Other	–0.67	0.64
Sex (Female)		
Male	–0.73*	0.13
Age	3.10*	0.99
Fall reading score (High 1/3)		
Low 1/3	1.00*	0.20
Middle 1/3	0.79*	0.18
Lapse[1]	9.02*	0.78
Level-1 Interactions, 2-way		
Aide*Race/ethnicity:		
Black, non-Hispanic	–0.58	0.74
Aide*Race/ethnicity: Hispanic	–0.31	0.64
Aide*Race/ethnicity: Asian	0.34	1.02
Aide*Race/ethnicity: Other	0.79	0.98
Program type*Race/ethnicity: Black, non-Hisp.	–1.92*	0.62
Program type*Race/ethnicity: Hispanic	–0.52	0.73
Program type*Race/ethnicity: Asian	0.15	1.11
Program type*Race/ethnicity: Other	–1.27	0.86
Level-1 Interactions, 3-way		
Race/ethnicity: Black, nH*Program type*Aide	1.76*	0.89
Race/ethnicity: Hisp.*Program type*Aide	1.47	0.95
Race/ethnicity: Asian*Program type*Aide	–0.94	1.43
Race/ethnicity: Other*Program type*Aide	1.06	1.25

* p<.05

[1]Lapse refers to the length of time between assessments. See page 52 for details.

NOTE: "More" time for reading instruction is defined for full-day classes as spending at least 90 minutes a day, at least 3 times a week on reading instruction. For half-day, this is defined as spending at least 60 minutes a day, at least 3 times a week on reading instruction. Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (no transitional or multi-grade classes). Only children who stayed with the same teacher in both the fall and spring and who are assessed in English in both fall and spring are included in the analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires, Parent Interview, and Child Assessment, Base-Year Public-Use data.

reading score gains occurring within each class across the measured child characteristics. Children from households with incomes below the poverty threshold make slightly smaller gains compared to those with incomes at or above this threshold (B=–1.04, effect size =.17). Boys make slightly smaller gains compared with girls (B=–.73, effect size =.12). Older first time kindergartners make greater gains compared to those that are younger. Children in the bottom 1/3 and middle 1/3 of the fall score distribution make slightly greater gains compared to those in the top 1/3 of the distribution (B=1.00, effect size =.17, and B=.79, effect size =.13, respectively). This finding might be interpreted to suggest a ceiling effect in the assessment, but given that the assessment is adaptive and is designed to cover kindergarten and first-grade skills and the scores are IRT-scaled, this interpretation is unlikely. There is no evidence of a ceiling effect for the ECLS-K assessments from a psychometric perspective (Rock and Pollack 2002). It may be that this finding reflects a real difference in the gains made by children at various ability levels. Perhaps the children who begin the kindergarten year already possessing many kindergarten-level skills and abilities make relatively smaller gains during the year because instructional time is devoted to teaching these kindergarten skills to the general class and to bringing up the achievement level of those that are lagging behind.

No tested interaction effects were significant with the exception of the one discussed with classroom aides above (program type x aide x race/ethnicity, Black) and a two-way interaction embedded within it (program type x race/ethnicity, Black).[39] The positive effect associated with full-day kindergarten is consistent when examined by poverty status, age, initial fall reading score, sex, class size and use of reading groups.[40]

Variance components of reading score gains

Children in the same class tend to be more alike than those not in the same class, and classes in the same school are more alike than classes from different schools. Another way to examine the relationship of the child and class characteristics to the reading gain scores is to first look at how much variance in the gain scores occurs at each level (children within classes, classes within schools, and between schools) and then look at how much of the variance at each level can be attributed to these sets of child and class characteristics. The variance of the reading gain scores is initially partitioned into components associated with each level of the nested data incorporating information identifying children that are in the same class and classes that are in the same school but not incorporating child and class characteristic information. This is the unconditional (null) three-level model. The variance components associated with the null model show the amount of variance attributed to the nested structure of the data and these components can be expressed as a

[39]The interpretation of this significant two-way interaction suggests that the positive difference in gain scores associated with full-day programs is not found for Black children to the same degree as is found for White children. The interpretation of the three-way interaction (illustrated in figure 30), however, incorporates and supersedes the interpretation of the lower-order interaction.

[40]If 'program type x poverty status, below' were added to the model shown in table 5, it would have an unstandardized coefficient of 0.33 and a standard error of 0.41 with a p-value of .430. If 'program type x age' were added to the model shown in table 5, it would have an unstandardized coefficient of –2.30 and a standard error of 2.57 with a p-value of .372. If program type x fall reading score variables were added to the model shown in table 5, 'program type x fall reading score, low 1/3' would have an unstandardized coefficient of 0.01 and a standard error of 0.50 with a p-value of .989 and 'program type x fall reading score, mid 1/3' would have an unstandardized coefficient of –0.14 and a standard error of 0.48 with a p-value of .766. If program type x class size variables were added to the model shown in table 5, 'program type x class size, small' would have an unstandardized coefficient of 0.05 and a standard error of 0.75 with a p-value of .942 and 'program type x class size, medium' would have an unstandardized coefficient of 0.33 and a standard error of 0.41 with a p-value of .430. If 'program type x instructional groups for reading, yes' were added to the model shown in table 5, it would have an unstandardized coefficient of –0.10 and a standard error of 0.50 with a p-value of .839.

percent of the total. After the null model is examined, the variance components for a model with just the child characteristics is examined and then one for the final model with both the child and class characteristics is examined. Comparing these components allows the effects of the characteristics to be evaluated in terms of the portion of variance that is explained at each level. Table 6 presents the variance components for each level in the simplest "null" model analysis with no characteristics, the model including only child characteristics, and the final model with both child and class characteristics.

Examining the variance components for the null model in comparison to the total amount of variance in the null model (35.65), we see that 78 percent ((27.95/35.65)*100) of the total variance in reading gain scores is due to variation between children within classes, 8 percent ((3.02/35.65)*100) is due to class variation within schools and 13 percent ((4.68/35.65)*100) is due to variation between schools. Comparing the variance components between the null model and the model with only child variables provides an indication of the amount of variance at each level that is accounted for by these child variables. Only a small portion of the between child (1 percent) or between class variance (3 percent) is explained by the child variables in the model, but 28 percent of the school level variance (((4.68 –3.39)/4.68)*100) is accounted for by introducing the child-level characteristics. The reduction of school-level variance due to child-level variables is likely a result of the homogeneity within schools (and within the classes in each school) of these influential child variables. Children within a school often share many of the same characteristics, so a relationship between these child variables and reading score gains is likely to explain some of the variation between schools.

Comparing the variance components between the model that includes the child variables and the final model examines the proportion of variation in reading score gains that is explained by class characteristics after accounting for the variance at all levels due to the child level characteristics. Class characteristics explain no variation in reading gains scores between classes within a school but account for about 18 percent (((3.39–2.77)/3.39)*100) of the variation of reading score gains between schools (after having already accounted for the effect of the child characteristics). This reduction in the school-level variance due to these class-level characteristics

Table 6. Variance components of the null model, the intermediate model with only child characteristics, and the final model with child and class characteristics; kindergarten reading score gains: Fall 1998 to spring 1999

Level	Null model	Model with child characteristics only	Final model with child and class characteristics
1) Between children within classes	27.95	27.54	27.29
2) Between classes within schools	3.02	2.93	2.98
3) Between schools	4.68	3.39	2.77
Total	35.65		

NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (no transitional or multi-grade classes). Only children who stayed with the same teacher in both the fall and spring and who are assessed in English in both the fall and the spring are included in the analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires, Parent Interview, and Child Assessment, Base-Year Public-Use data.

is due to the fact that these class characteristics are generally the same for classes within the same school. Only 7 percent of the schools have both a full-day and half-day class. Thus, program type, while measured at the class level, is acting much like a school-level variable so its effect on reading gains shows up as explaining between school variance. Similarly, schools that provide paid aides or that have large class sizes tend to have these characteristics in most or all classes and the effects associated with these classroom features will have an impact on school-level variance. This analysis shows that the average reading gain score differences among public schools can partly be explained by whether that school offers full-day or half-day classes, as well as the kindergartens' class sizes, and time allotted for reading instruction.

Findings: Mathematics score gains

The average mathematics score gain from fall to spring for public school, first-time kindergartners in this analysis is 8.19 score points and the standard deviation of these scores is 5.00. Fifty-nine percent of the children in this analysis have mathematics gain scores within one standard deviation away from the average (between 3.19 and 13.19). Ninety percent of the mathematics gains scores fall between 0.91 and 17.05. In order to determine if program type is differentially related to mathematics score gains for different groups of children (i.e., race/ethnicity, sex, initial reading ability, poverty status) or for classrooms with other characteristics (e.g., class size, presence of a classroom aide, use of achievement groups), many interactions are tested.[41] The model for mathematics has fewer significant effects and is a simpler model than the one for reading. Table 7 shows the regression coefficients, standard errors and p-values for the class and child characteristics that are associated with differences in mathematics score gains.[42]

Class characteristics and mathematics score gains

The level-2 (between class) portion of the multilevel model investigated the differences in each class' mean mathematics score gain as a function of class characteristics while adjusting for other variables in the model. Neither time for math instruction, achievement groups, class size nor instructional aides are significantly related to mathematics gain scores.[43] Program type is the only class characteristic included in the model.

Program type: After accounting for other child and class variables in the model, mathematics score gains are related to program type. Public school first-time kindergartners in full-day classes make gains in their mathematics scores from fall to spring that are, on average, about one point larger than the gains made by children in half-day classes (B=1.11, s.e.=.17). Given that the standard deviation of these scores is 5.00, this difference represents 22 percent of a standard deviation (effect size=0.22). Program type does not interact with child characteristics indicating that the effect on gains in mathematics achievement is uniform for children from different race/ethnicity groups, children above and below the poverty threshold, and for children that begin the year with different

[41]The main effects and interaction terms tested in these analyses are selected based on the research literature mentioned in this report and on prior analyses done with the ECLS-K data.

[42]See the technical appendix for further details about the HLM analyses.

[43]If 'relative time for mathematics' were added to the model shown in table 7, it would have an unstandardized regression coefficient of –0.18 and a standard error of 0.21 with a p-value of .397. If 'achievement grouping for mathematics, yes' were added to the model shown in table 7, it would have an unstandardized regression coefficient of –0.04 and a standard error of 0.20 with a p-value of .823. If class size variables were added to the model shown in table 7, 'class size, small' would have an unstandardized regression coefficient of 0.47 and a standard error of 0.29 with a p-value of .107 and 'class size, medium' would have an unstandardized regression coefficient of 0.47 and a standard error of 0.25 with a p-value of .056. If 'instructional aide, yes' were added to the model shown in table 7, it would have an unstandardized regression coefficient of –0.05 and a standard error of 0.19 with a p-value of .793.

Table 7. Multilevel regression model relating mathematics score gains of public school first-time kindergartners to child and class characteristics: Fall 1998 to spring 1999

Fixed effect (Reference group)	Unstandardized regression coefficient (B)	Standard errors
Intercept	1.07	0.66
Level-2 Class characteristics		
Length of kindergarten day (Half-day)		
Full-day	1.11*	0.17
Level-1 Child characteristics		
Poverty Status (At or above)		
Below poverty threshold	–0.58*	0.16
Race/ethnicity (White, non-Hispanic)		
Black, non-Hispanic	–1.53*	0.19
Hispanic	–0.37	0.22
Asian	0.44	0.35
Other	–0.74*	0.30
Fall mathematics score (High 1/3)		
Low 1/3	–0.21	0.17
Middle 1/3	0.43*	0.18
Lapse[1]	6.69*	0.64

* p<.05.

[1]Lapse refers to the length of time between assessments. See page 52 for details.

NOTE: "More" time for mathematics instruction is defined for full-day classes as spending at least 60 minutes a day, at least 3 times a week on mathematics instruction**.** For half-day, this is defined as spending at least 30 minutes a day, at least 3 times a week on mathematics instruction. Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (not a transitional or multi-grade class). Only children who stayed with the same teacher in both the fall and spring and who are assessed in English in both fall and spring are included in the analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires, Parent Interview, and Child Assessment, Base-Year Public-Use data.

ability levels in math.[44] Additionally, program type does not interact with other class-level variables which indicates that the smaller average gains made by those in half-day classes is not mitigated by being in a smaller class or in a class with an instructional aide or in a class that uses mathematics instructional grouping.[45]

Child characteristics and mathematics score gains

The level-1 (within-class) portion of the model investigates the differences in mathematics score gains for children in each class as a function of a set of child characteristics. The regression coefficients represent the differences in mathematics score gains occurring within each class across the measured child characteristics. As found with the model of reading score gains, children from households with incomes below the Federal poverty threshold make slightly smaller gains in mathematics scores compared to those living at or above this threshold (B=–0.58, effect size =.12). Black children make smaller gains in mathematics during the year compared to White children (B=–1.53, effect size =.31) and children from "other" race/ethnicity groups (this group includes Native Hawaiians and other Pacific Islanders, American Indians, Alaska Natives and multi-racial children) make slightly smaller gains compared to White children (B=–0.74, effect size =.15). Children in the middle 1/3 of the fall score distribution make greater gains compared to those in the top 1/3 of the distribution (B=.43, effect size =.09). There are no significant differences in score gains between boys and girls.[46]

Variance components of mathematics score gains

Table 8 presents the variance components for each level in the simplest "null" model analysis with no characteristics, in the model with just the child characteristics, and in the final model with the child and class variables.

Examining each of the variance components for the null model in comparison to the total variance in the null model (25.02) we see that 83 percent ((20.80/25.02)*100) of the variance in mathematics score gains is due to variation between children within classes, 7 percent ((1.79/25.02)*100) is due to class variation within schools and 10 percent ((2.43/25.02)*100) is due to variation between schools. When comparing variance components between the null model and the model with only child variables, about 8 percent of class level variance is explained by the child variables in the model (((1.79–1.64)/1.79)*100), and 26 percent (((2.43–1.80)/2.43)*100) of the school level variance is accounted for by introducing these child-level characteristics.

Comparing the variance components between the model with only child variables and the final model shows the proportion of variation in mathematics score gains that is explained by class characteristics after accounting for the variance at all

[44]If program type x race/ethnicity variables were added to the model shown in table 7 'program type x race/ethnicity, Black' would have an unstandardized regression coefficient of –0.56 and a standard error of 0.52 with a p-value of .286; 'program type x race/ethnicity, Hispanic' would have an unstandardized regression coefficient of –0.03 and a standard error of 0.54 with a p-value of .955; 'program type x race/ethnicity, Asian' would have an unstandardized regression coefficient of 0.77 and a standard error of 0.78 with a p-value of .321; 'program type x race/ethnicity, other' would have an unstandardized regression coefficient of 0.31 and a standard error of 0.73 with a p-value of .667. If 'program type x poverty status' were added to the model shown in table 7, it would have an unstandardized regression coefficient of –0.61 and a standard error of 0.37 with a p-value of .102. If program type x fall mathematics score variables were added to the model shown in table 7 'program type x fall mathematics score, low 1/3' would have an unstandardized regression coefficient of 0.43 and a standard error of 0.42 with a p-value of .313; 'program type x fall mathematics score, mid 1/3' would have an unstandardized regression coefficient of 0.70 and a standard error of 0.43 with a p-value of .102.

[45]If program type x class size variables were added to the model shown in table 7 'program type x class size, small' would have an unstandardized regression coefficient of –0.29 and a standard error of 0.64 with a p-value of .651 and 'program type x class size, medium' would have an unstandardized regression coefficient of 0.22 and a standard error of 0.54 with a p-value of .672. If 'program type x instructional aide, yes' were added to the model shown in table 7, it would have an unstandardized regression coefficient of 0.64 and a standard error of 0.42 with a p-value of .128. If 'program type x instructional groups for mathematics, yes' were added to the model shown in table 7, it would have an unstandardized regression coefficient of –0.43 and a standard error of 0.43 with a p-value of .318.

[46]If 'sex, male' were added to the model shown in table 7, it would have an unstandardized regression coefficient of 0.19 and a standard error of 0.15 with a p-value of .193.

Table 8. Variance components of null model, the model with only child characteristics and the final model, kindergarten mathematics scores gains: Fall 1998 to spring 1999

Level	Null model	Model with only child characteristics	Final model with child and class characteristics
1) Between children within classes	20.80	20.50	20.53
2) Between classes within schools	1.79	1.64	1.61
3) Between schools	2.43	1.80	1.49
Total	25.02		

NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (no transitional or multi-grade classes). Only children who stayed with the same teacher in both the fall and spring and who are assessed in mathematics in both the fall and the spring are included in the analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaire, Parent Interview, and Child Assessment, Base-Year Public-Use data.

levels accounted for by the child level characteristics. The class characteristic in the model (program type) explains virtually no variation in mathematics score gains between classes within a school but accounts for about 17 percent (((1.80–1.49)/1.80)*100) of the variation of mathematics score gains between schools (after having already accounted for the effect of the child characteristics). This analysis shows that the average kindergarten mathematics gain differences among public schools is partly explained by whether that school offers full-day or half-day classes.

Chapter 6:
Summary and Discussion

Schools that offer full-day and half-day kindergarten

In the 1998–99 school year, 61 percent of all U.S. schools that have a kindergarten program offer at least one full–day kindergarten class. This percent, however, is not uniform across different school types, and across different regions of the United States. Full-day programs are most prevalent in Catholic schools (78 percent). There is also a large regional difference—84 percent of public schools in the southern region of the country provide a full-day program. The percent of schools that offer full-day programs is also related to schools' enrollment of "at-risk" children. Both private and public schools that serve high concentrations of minority children are more likely to provide full-day programs compared with those with a smaller minority enrollment. Among public schools, schools where more than half of the student enrollment qualifies for free or reduced-priced lunch are more likely to offer a full-day program compared to those with a smaller percent of low-income children.

Children enrolled in full-day and half-day kindergarten

Overall, 56 percent of kindergarten children attend a full-day program. Fifty-four percent of public school kindergarten children attend a full-day program. In public schools, Black children are attending full-day programs at a higher rate than White, Asian or Hispanic kindergartners. Additionally, public school kindergartners whose family income is below the federal poverty threshold are attending full-day programs at a higher rate (62 percent) than those from more affluent families (51 percent). The findings for Black children and economically disadvantaged children are consistent with what is expected given the fact that some state and local districts offer full-day programs as a way to ease the child care needs of families who are least able to afford quality after-school programs and as a way to provide "at-risk" children with more time during the kindergarten year to acquire the beginning reading and mathematics skills necessary to succeed in school. However, not all "at-risk" groups of children are attending full-day programs at relatively high rates. Compared to 79 percent of Black public school kindergarten children and 62 percent of public school kindergartners living in poverty attending full-day kindergarten, 46 percent of public school Hispanic kindergartners and 45 percent of public school kindergartners from homes where English is not the primary language attend full-day programs.

Among private schools, 77 percent of kindergartners in Catholic schools and 65 percent in other private schools attend a full-day program. Black children in these schools are more likely to attend a full-day program compared to White children but poverty status and home language are not related to full-day enrollment rates.

Class composition and structure in full-day and half-day public kindergartens

The difference in the composition of public full-day kindergarten classes compared to half-day classes mirrors the pattern seen in the child-level enrollment findings. Full-day classes' average percent minority (46 percent) is higher than it is in half-day classes (35 percent). Thirty percent of full-day classes have more than 75 percent minority enrollment compared to 19 percent of half-day classes. The same pattern in not evident for limited-English proficient students. The majority of both full-day and half-day classes are being taught by White teachers (80 and 87 percent, respectively), but a higher percent of full-day classes are taught by Black teachers (10 percent) compared to half-day classes (2 percent). The teachers in full-day and half-day classes have similar education levels and are equally likely to be fully certified. Full-day teachers, however, are more likely to have their certification in the area of early childhood education.

The average number of children in full-day classes (20.3) is higher than in half-day classes (19.1) but large classes (more than 25 children) are uncommon in both full-day (10 percent) and half-day classes (7 percent). Classroom instructional aides are more

prevalent in full-day classes. Sixty-one percent of full-day classes and 44 percent of half-day classes have an aide who works directly with the children on instructional tasks.

Instructional activities in full-day and half-day public kindergarten

Teachers in full-day kindergarten classes organize instruction in much the same way as teachers in half-day classes. Full-day kindergarten classes spend, on average, more time each day on teacher-directed whole class, small group, and individual activities and they spend more time on child-selected activities. However, the *percent* of their total time spent in each type of activity is similar between full-day and half-day classes. Strategies for grouping children are also similar in full-day and half-day classes with teachers using mixed-level groups as the most common strategy in both types of classes. Full-day classes, however, are more likely to have achievement groups for reading and mathematics instruction compared with half-day classes.

A large majority of both full-day and half-day classes have reading and language arts activities every day (97 and 96 percent, respectively). However, full-day classes are more likely to spend time each day on other subjects—math, social studies, and science, compared with half-day classes. Among the four art and music subjects that teachers were questioned about—art, music, dance/creative movement, and theater/creative dramatics—only art is done everyday in a larger percent of full-day classes (30 percent) compared to half-day classes (21 percent). Music is taught daily in a smaller percent of full-day classes (30 percent) compared to half-day classes (36 percent).

The relative order of the skills and activities children spend time on within the domains of reading/language arts and mathematics is very similar for full-day and part day classes; the most common skills and activities in full-day classes are generally the most common in half-day classes. Almost all specific skills and activities are more often covered daily in full-day classes compared with half-day classes with some of the exceptions being those done daily by a large majority of both types of classes (e.g., calendar activities and counting out loud).

It is interesting to note that while teachers of 73 percent of half-day classes reported having mathematics every day, 93 percent report having calendar activities every day and 81 percent have the children count aloud (which may often be a part of the calendar activity) every day. It seems that while half-day classes are less likely to have formal daily math instruction compared with full-day classes (73 vs. 90 percent), math concepts are being presented each day in many of these half-day classes in the form of common kindergarten opening or daily "circle time" routines.

While there are many skills and activities that a larger percent of full-day classes spend time on each day compared with half-day classes, these differences may simply be attributed to the fact that full-day classes have the time to devote to a greater number of separate skills and activities. The differences in the percent of classes that spend time on specific skills and activities *at least weekly* (either daily or weekly) may be a more useful comparison for describing differences in the curricular focus between full-day and half-day kindergarten classes. Within the reading/language arts domain (reading, writing, and expressive and receptive language), the percent of full-day classes that engage in a skill or activity at least weekly exceeds the percent of half-day classes for 19 out of the 36 skills and activities examined. Some of the reading activities and skills that are more likely to be part of at least a weekly routine in full-day classes are typically considered more advanced than the traditional kindergarten reading curriculum (e.g., reading aloud fluently, reading multi-syllable words, and alphabetizing).[47] Nine out of the 11 writing skills and activities are done weekly in more full-day classes compared to half-day classes (e.g., writing in journal, writing stories and reports, and conventional spelling). Among the 37 skills and activities examined in the mathematics domain, there are 29 in which the percent of full-day classes engaged in the skill or activity at least weekly exceeds the percent of half-day classes. Many of these are activities or skills that involve solving mathematics problems (e.g., explain how a math problem is

[47]Comparisons of public school kindergarten and first-grade activities and skills show that a higher percent of first-grade children compared to kindergartners engage in these at least once a week (reading aloud fluently, 98 vs. 44 percent; reading multi-syllable words, 84 vs. 36 percent; and alphabetizing, 66 vs. 18 percent) (unpublished tables, ECLS-K kindergarten and first-grade longitudinal file).

solved, solve a real-life math problem, and solve math problems on the chalkboard). Additionally, some of these mathematics skills and activities are ones more typically part of a first-grade curriculum (e.g., recognizing fractions, telling time, and writing numbers from 1–100).[48]

Children in full-day kindergarten classes are spending some of the time focused on learning many of the same things and doing many of the same types of learning activities as those in half-day classes, but some full-day kindergarten classes are spending the "extra time" during the day exposed to more advanced reading, writing, and mathematics skills.

Full-day and half-day children's gains in cognitive skills and knowledge

The ECLS-K children were assessed in the fall and in the spring of the kindergarten year in both reading/language arts and in mathematics. The achievement gains made during the year are compared for English-speaking, first-time kindergartners in full-day and half-day public kindergarten classes. Given the non-experimental, pretest-posttest design of the study, there is no way to determine if the samples were equivalent in all important ways at the beginning of the kindergarten year. This is a research design limitation which makes it impossible to draw causal conclusions from this data. The children enrolled in a full-day program make greater gains in reading language arts over the course of the kindergarten year compared to those in half-day classes. The differences in achievement gains associated with program type are not only apparent when simple comparisons of gains are made, they persist when the comparisons of gains take into account other influential child and class characteristics. The findings from multi-level regression analyses indicate that children in full-day kindergarten classes make greater gains in both reading and mathematics compared to those in half-day classes, while accounting for gain score differences associated with race/ethnicity, poverty status, initial ability, sex, class size, amount of time for subject area instruction, and the presence of an instructional aide. These findings support prior research that attributes full-day kindergarten to greater academic progress.

The results presented in chapter five indicate that public school, first-time kindergarten children in full-day classes are making greater gains in reading/language arts and in mathematics achievement. As found in other studies, children in a full-day kindergarten program generally make greater gains in both reading and math compared to children in half-day kindergarten.

Controlling for the characteristics included in this study, Black children make substantially larger reading gains in full-day classes with an aide compared to those in full-day classes without an aide. While the study is not designed to support causal statements, this finding certainly suggests the need for further study about the use of instructional aides to support achievement in different types of kindergarten programs. Further inquiry into how aides are incorporated into daily instruction and which children are being served by the classroom aides may help to understand the potential benefit this classroom resource might have.

Other class characteristics that were found to be related to achievement gains in reading/language arts in this study are class size and relative time for reading instruction. Children in kindergarten classes with 25 or more children make smaller gains in reading compared to children in classes with 18 to 24 children. Children in classes that spend a relatively large part of the day on reading instruction (more than 90 minutes in full-day classes or more than 60 minutes per day in half-day classes) make greater gains in reading compared to children in those classes that spend less time on reading instruction. Time for math instruction, as defined for these analyses, is not similarly related to math gains. The use of achievement groups for reading or mathematics instruction is not related to the gains made in these two subject areas.

By examining the variance component structure in these hierarchical models, the influence of the child and class characteristics in these models is better understood. After accounting for school-level

[48] Comparisons of public school kindergarten and first-grade activities and skills show that a higher percent of first-grade children compared to kindergartners engage in these at least once a week (recognizing fractions, 32 vs. 6 percent; telling time, 72 vs. 40 percent; and writing numbers from 1–100, 41 vs. 18 percent) (unpublished tables, ECLS-K kindergarten and first-grade longitudinal file).

variance that is explained by characteristics of the children in each school, a substantial percent of the variation between average gains made from school to school is explained by the characteristics of the kindergarten classes in these school. Eighteen percent of variation in the average reading gains between schools is explained by program type, class size and frequency of reading instruction. Seventeen percent of the variation in the average mathematics gains between schools is explained by program type.

This report describes achievement gains made during the year by classroom differences and supports past findings that children in full-day kindergarten make greater achievement gains than those in half-day kindergarten. There are, however, important features of kindergarten programs beyond those examined in this study. Future research on the relationship between gains and kindergarten classroom characteristics could look at many of the specific instructional practices described in chapter four. It may be that some of the curriculum differences found between half-day and full-day classes can be explained by demographic differences associated with program type rather than program type alone. Moreover, the finding reported in chapter five that children in the top third of the fall kindergarten reading scores make smaller overall reading gains during the year compared to other children could be further investigated by examining the frequency that these children are being taught the more advanced reading and language arts skills.

All children, regardless of child, family and classroom characteristics, are learning new skills and abilities in reading and math during the kindergarten year. This study suggests that public school full-day kindergarten is associated with larger reading and math gains but does not specify which knowledge and skills are being learned in kindergarten. In addition to the scale scores provided in the ECLS-K data, there are also 5 proficiency scores in reading (e.g., letter recognition, beginning and ending sounds) and 5 proficiency scores in math (e.g., number and shape, relative size, and ordinality/sequence) that are used to provide a more descriptive picture of the gains being made. These ECLS-K scores have been used to describe detailed differences in skill attainment by child, family and class characteristics (West, Denton, and Reaney 2001). Future research about full-day kindergarten should explore the relationships between the specific skills different groups of children learn during the kindergarten year and program type.

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Appendix A: Tables of Estimates

Table A1. Percent of U.S. schools that offer full-day and half-day kindergarten programs, by school type: 1998–99

School characteristics	All schools		Public		Private			
					Catholic		Other private	
	Full-day	Half-day	Full-day	Half-day	Full-day	Half-day	Full-day	Half-day
All schools	61	47	57	52	78	29	63	40

NOTE: Percent offering full-day and half-day programs totals more than 100 because some schools have both full-day and half-day programs.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Table A2. Percent of U.S. schools that offer full-day and half-day kindergarten programs, by school type and school characteristics: 1998–99

School characteristics	All schools		Public		Private	
	Full-day	Half-day	Full-day	Half-day	Full-day	Half-day
All schools	61	47	57	52	67	37
Region						
Northeast	50	57	37	73	70	30
Midwest	57	55	57	56	58	54
South	80	25	84	22	71	31
West	49	56	38	69	69	32
Location						
Large/mid-sized cities	68	41	64	49	73	31
Suburbs/large town	53	54	46	62	64	40
Small town/rural	61	44	63	43	56	48
School minority enrollment[1]						
Less than 10%	51	55	48	58	54	49
10–24%	55	54	44	67	74	30
25–49%	65	44	63	48	‡	‡
50–75%	71	38	69	42	‡	‡
75% +	81	26	76	32	93	13
Concentration of low-income children in public schools[2]						
0–49%	—	—	48	61	—	—
50% +	—	—	69	41	—	—

‡ Reporting standards not met.

— Not available.

[1]All children who are not identified as White, non-Hispanic are classified as minority children.

[2]A school's concentration of poverty is based on a composite of free and reduced-priced lunch and participation in a "school-wide" Title I program. This is calculated only for public schools with a kindergarten program.

NOTE: Percent offering full-day and half-day programs totals more than 100 because some schools have both full-day and half-day programs.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Table A3. Percent of U.S. kindergarten children enrolled in a full-day kindergarten program, by school type and school characteristics: 1998–99

School characteristics	All kindergartners	Public	Catholic	Other private
All kindergartners	56	54	77	65
Region				
Northeast	48	41	81	71
Midwest	47	45	71	38
South	82	83	93	70
West	31	23	52	79
Location				
Large and mid-sized cities	61	59	79	67
Suburbs/large town	48	45	70	65
Small town/rural	65	65	84	59
School minority enrollment[1]				
Less than 10%	50	47	71	47
10–24%	46	41	78	69
25–49%	58	56	76	75
50–74%	63	62	64	84
75% or more	68	66	93	87
Concentration of low-income children in public schools[2]				
0–49%	—	43	—	—
50% or more	—	65	—	—

— Not available.

[1]All children who are not identified as White, non-Hispanic are classified as minority children.

[2]A school's concentration of poverty is based on a composite of free and reduced-priced lunch and participation in a "school-wide" Title I program. This is calculated only for public schools with a kindergarten program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Table A4. Percent of U.S. kindergarten children enrolled in a full-day program, by school type and child and family characteristics: 1998–99

Child and family characteristics	All kindergartners	Public	Catholic	Other private
All kindergartners	56	54	77	65
Child's sex				
Male	56	54	77	64
Female	57	54	76	66
Mother's education				
Less than high school	58	58	79	77
High school diploma or equivalent	59	58	81	60
Some college, including vocational/technical	55	51	78	63
Bachelor's degree or higher	54	48	71	67
Primary language spoken in home				
Non-English	48	45	82	78
English	57	55	76	64
Child's race/ethnicity				
White, non-Hispanic	52	49	74	59
Black, non-Hispanic	80	79	96	91
Hispanic	49	46	79	76
Asian	46	40	71	75
Hawaiian Native/Pacific Islander	73	72	55	91
American Indian/Alaska Native	77	75	88	94
More than one race, non-Hispanic	46	42	66	71
Diagnosed disability				
Yes	57	56	78	59
No	56	54	72	63
First time-kindergartner				
Yes	55	53	73	61
No	69	68	72	75
Poverty status[1]				
Below poverty threshold	63	62	80	78
At or above poverty threshold	55	51	76	65
Child's age at entry				
4 yrs, 8 mos — 4 yrs, 11 mos	48	42	79	70
5 yrs, 0 mos — 5 yrs, 3 mos	55	52	75	64
5 yrs, 4 mos — 5 yrs, 7 mos	56	54	77	68
5 yrs, 8 mos — 5 yrs, 11 mos	60	59	77	63
6 yrs, 0 mos — 6 yrs, 7 mos	61	59	76	61

[1]Poverty status is determined by comparing the child's household income to the national poverty threshold.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire, Teacher Questionnaires and Parent Interviews, Base-Year Public-Use Data Files.

Table A5. Percent of U.S. public kindergarten children enrolled in a full-day program, by poverty status and primary home language: 1998–99

Child characteristics	Below poverty threshold	At or above poverty threshold
Primary home language		
English	68	52
Non-English	43	46

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires and Parent Interviews, Base-Year files.

Table A6. Percentage distribution of U.S. public kindergarten classes with various enrollment characteristics, by program type: 1998–99

Class composition	Full-day	Half-day
All public school kindergarten classes	51	49
Percent minority[1]		
0–10%	24	34
11–25%	17	20
26–75%	30	28
More than 75%	30	19
Percent limited English proficient (LEP)		
0%	65	59
1–10%	14	15
11–50%	15	16
More than 50%	6	10

[1]All children who are not identified as White, non-Hispanic are classified as minority children.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires and Parent Interviews, Base-Year Public-Use Data Files.

Table A7. Percentage distribution of various teacher characteristics in U.S. public kindergarten classes, by program type: 1998–99

Teacher characteristic	Full-day	Half-day
Teacher's race		
White, non-Hispanic	80	87
Black, non-Hispanic	10	2
Hispanic	7	7
Other, non-Hispanic or multiracial	3	3
Teacher's highest degree		
Bachelor's	62	60
Master's	31	33
Doctorate/Specialist	7	7
Teacher's certification		
Early Childhood	61	47
Elementary	85	90
Teacher's certification type		
Other than fully certified	10	12
Fully certified	90	88
Years teaching kindergarten		
Less than 3	26	26
3–9	39	34
10–19	23	29
20+	12	12

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics. Early Childhood Longitudinal Study, Kindergarten Class of 1998–99, Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

Table A8. Percentage distribution of class sizes and percent of classes with classroom aides in U.S. public kindergarten classes, by program type: 1998–99

Class characteristic	Full-day	Half-day
All public school kindergarten classes	51	49
Class size levels		
Up to 17	21	31
18–24	62	59
25+	16	10
Classroom aides		
Regular instructional aide	61	44
Special ed. instructional aide	13	13
English as a second language (ESL) instructional aide	9	7

NOTE: Detail may not sum to totals because of rounding. A class is classified as having an aide if the aide spends at least one hour per day in the class working directly with the children in the class.

SOURCE: U.S. Department of Education, National Center for Education Statistics. Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

Table A9. Average minutes per day and percent of total time that U.S. public kindergarten classes spend in various classroom organizations, by program type: Spring 1999

	Full-day	Half-day
Minutes per day		
Teacher directed whole class activities	111	73
Teacher directed small-group activities	80	50
Teacher directed individual activities	43	25
Child selected activities	57	32
Percent of total		
Teacher directed whole class activities	38	40
Teacher directed small-group activities	27	28
Teacher directed individual activities	15	14
Child selected activities	20	18

NOTE: Detail may not sum to totals because of rounding.

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

Table A10. Percentage distribution of the frequency that U.S. public kindergarten classes use various grouping strategies for reading and mathematics instruction, by program type: Spring 1999

Grouping strategies	Full-day	Half-day
Reading		
Work in mixed level groups		
Less than weekly	22	25
Weekly	30	33
Daily	48	42
Achievement groups		
Less than weekly	38	50
Weekly	35	36
Daily	26	14
Peer tutoring in reading		
Less than weekly	39	58
Weekly	38	27
Daily	23	15
Mathematics		
Work in mixed level groups		
Less than weekly	26	30
Weekly	39	41
Daily	35	29
Achievement groups		
Less than weekly	58	68
Weekly	28	25
Daily	14	7
Peer tutoring in reading		
Less than weekly	46	65
Weekly	36	25
Daily	18	9

NOTE: Detail may not sum to totals because of rounding.

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

Table A11. Percent of U.S. public kindergarten classes that spend time daily, weekly or less than weekly in various subject areas, by program type: Spring 1999

	Full-day	Half-day
Reading and language arts		
Never/less than weekly	1	1
Weekly	2	4
Daily	97	96
Mathematics		
Never/less than weekly	0	0
Weekly	10	26
Daily	90	73
Social studies		
Never/less than weekly	3	9
Weekly	66	73
Daily	30	18
Science		
Never/less than weekly	4	11
Weekly	72	79
Daily	24	10
Music		
Never/less than weekly	6	7
Weekly	65	57
Daily	30	36
Art		
Never/less than weekly	4	6
Weekly	66	73
Daily	30	21
Dance/creative movement		
Never/less than weekly	41	47
Weekly	46	44
Daily	13	9
Theater/creative dramatics		
Never/less than weekly	59	69
Weekly	36	28
Daily	6	3

NOTE: Detail may not sum to totals because of rounding.

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

Table A12. Percent distribution of the amount of time per day U.S. public kindergarten classes spend on reading/language arts and mathematics activities, by program type: Spring 1999

	Full-day	Half-day
Reading and language arts		
1–30	6	15
31–60	26	49
61–90	37	27
91+	31	10
Mathematics		
1–30	19	49
31–60	60	43
61–90	17	7
91+	4	2

NOTE: 'Minutes per day' refers to the time spent per day on those days when the subject is taught. Detail may not sum to totals because of rounding.

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

Table A13. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various reading activities, by program type: Spring 1999

Reading activity	Full-day	Half-day
Learning letter names		
Less than weekly	1	1
Weekly	8	12
Daily	91	88
Work on phonics		
Less than weekly	0	2
Weekly	13	19
Daily	86	79
Discuss new vocabulary		
Less than weekly	1	3
Weekly	35	42
Daily	64	55
Choose to read books		
Less than weekly	6	10
Weekly	32	43
Daily	62	48
Read aloud		
Less than weekly	10	19
Weekly	41	48
Daily	49	33
Read silently		
Less than weekly	28	36
Weekly	29	35
Daily	43	29
Work in reading workbook/worksheet		
Less than weekly	26	34
Weekly	40	46
Daily	33	21
Use basal reading texts		
Less than weekly	68	80
Weekly	20	15
Daily	13	5

NOTE: Detail may not sum to totals because of rounding.

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

Table A14. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various reading skills, by program type: Spring 1999

Reading skill	Full-day	Half-day
Letter recognition		
Less than weekly	1	1
Weekly	8	13
Daily	91	87
Letter/sound match		
Less than weekly	#	1
Weekly	12	20
Daily	88	79
Conventions of print		
Less than weekly	4	6
Weekly	19	24
Daily	78	70
Vocabulary		
Less than weekly	22	33
Weekly	27	29
Daily	52	38
Make predictions based on text		
Less than weekly	8	10
Weekly	49	54
Daily	43	36
Using context cues for comprehension		
Less than weekly	18	23
Weekly	43	49
Daily	39	28
Rhyming words and word families		
Less than weekly	11	15
Weekly	61	66
Daily	28	18
Reading aloud fluently		
Less than weekly	47	66
Weekly	29	22
Daily	24	13
Reading multi-syllable words		
Less than weekly	58	69
Weekly	29	23
Daily	13	7
Alphabetizing		
Less than weekly	75	87
Weekly	17	9
Daily	8	4

Rounds to zero

NOTE: Detail may not sum to totals because of rounding.

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

Table A15. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various writing activities, by program type: Spring 1999

Writing activities	Full-day	Half-day
Writing alphabet		
Less than weekly	1	4
Weekly	22	41
Daily	76	56
Invented spelling		
Less than weekly	13	19
Weekly	34	49
Daily	53	32
Write in journal		
Less than weekly	28	39
Weekly	38	44
Daily	34	17
Write stories/reports		
Less than weekly	41	60
Weekly	40	32
Daily	19	8
Write from dictation		
Less than weekly	51	67
Weekly	36	29
Daily	13	5
Publish own writing		
Less than weekly	72	84
Weekly	22	14
Daily	6	2

NOTE: Detail may not sum to totals because of rounding.

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

Table A16. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various writing skills, by program type: Spring 1999

Writing skills	Full-day	Half-day
Writing name		
Less than weekly	3	8
Weekly	12	17
Daily	85	74
Use capitalization and punctuation		
Less than weekly	26	36
Weekly	32	38
Daily	42	27
Compose sentences		
Less than weekly	34	48
Weekly	34	36
Daily	32	16
Conventional spelling		
Less than weekly	51	66
Weekly	28	22
Daily	21	12
Compose and write stories with a beginning, middle and end		
Less than weekly	69	86
Weekly	22	11
Daily	9	3

NOTE: Detail may not sum to totals because of rounding.

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

Table A17. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various receptive and expressive language activities, by program type: Spring 1999

Receptive and expressive language activities	Full-day	Half-day
Hear story/See print		
Less than weekly	3	4
Weekly	18	34
Daily	79	62
Hear story/Don't see print		
Less than weekly	35	36
Weekly	24	22
Daily	41	42
Retell stories		
Less than weekly	16	32
Weekly	63	57
Daily	21	11
Dictate stories		
Less than weekly	25	40
Weekly	54	51
Daily	21	9

NOTE: Detail may not sum to totals because of rounding.

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

Table A18. Percent of U.S. kindergarten classes that work daily, weekly or less than weekly on various receptive and expressive language skills, by program type: Spring 1999

Receptive and expressive language skills	Full-day	Half-day
Identify main idea and parts of story		
Less than weekly	22	35
Weekly	47	44
Daily	31	21
Remember and follow directions that include a series of actions		
Less than weekly	6	7
Weekly	32	32
Daily	63	61
Communicate complete ideas orally		
Less than weekly	5	5
Weekly	28	33
Daily	68	62

NOTE: Detail may not sum to totals because of rounding.

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

Table A19. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics activities, by program type: Spring 1999

Mathematics activities	Full-day	Half-day
Play math games		
Less than weekly	11	20
Weekly	61	65
Daily	28	16
Do math worksheets		
Less than weekly	23	35
Weekly	52	53
Daily	26	12
Explain how math problem is solved		
Less than weekly	30	46
Weekly	46	40
Daily	24	13
Solve real-life math problems		
Less than weekly	28	44
Weekly	53	42
Daily	19	13
Solve math problem in small group or partner		
Less than weekly	37	58
Weekly	50	36
Daily	13	6
Do math problems in textbook		
Less than weekly	72	87
Weekly	17	10
Daily	11	4
Complete math problems on chalkboard		
Less than weekly	55	72
Weekly	35	22
Daily	10	6
Use music to learn math		
Less than weekly	64	69
Weekly	29	25
Daily	7	6
Use creative movement or drama to understand math concepts		
Less than weekly	70	74
Weekly	26	22
Daily	4	3

NOTE: Detail may not sum to totals because of rounding.

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

Table A20. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving counting and quantities, by program type: Spring 1999

Counting and quantity skills	Full-day	Half-day
Count out loud		
Less than weekly	#	1
Weekly	18	18
Daily	82	81
Number/quantity correspondence		
Less than weekly	5	6
Weekly	46	54
Daily	49	39
Count by 2's/5's/10's		
Less than weekly	27	35
Weekly	40	42
Daily	33	23
Ordinal numbers (first, second, third)		
Less than weekly	35	51
Weekly	40	28
Daily	25	21
Count beyond 100		
Less than weekly	58	65
Weekly	19	18
Daily	23	17
Estimate quantities		
Less than weekly	59	69
Weekly	34	27
Daily	8	4
Recognize fractions		
Less than weekly	84	96
Weekly	13	4
Daily	3	#

Rounds to zero.

NOTE: Detail may not sum to totals because of rounding.

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

Table A21. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving number systems, by program type: Spring 1999

Number systems skills	Full-day	Half-day
Read 2-digit numbers		
Less than weekly	20	21
Weekly	33	35
Daily	46	45
Write numbers 1-10		
Less than weekly	11	22
Weekly	50	58
Daily	38	20
Place value		
Less than weekly	58	64
Weekly	13	11
Daily	29	26
Read 3-digit numbers		
Less than weekly	64	70
Weekly	15	13
Daily	21	17
Value of coins and cash		
Less than weekly	45	67
Weekly	37	23
Daily	18	10
Write numbers 1-100		
Less than weekly	76	88
Weekly	17	10
Daily	7	2

NOTE: Detail may not sum to totals because of rounding.

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

Table A22. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving operations, by program type: Spring 1999

Mathematics operations skills	Full-day	Half-day
Work with counting manipulatives to learn operations		
Less than weekly	4	10
Weekly	60	68
Daily	36	22
Relative quantity (equal, more, less)		
Less than weekly	19	26
Weekly	55	55
Daily	26	19
Add single-digit numbers		
Less than weekly	27	42
Weekly	50	47
Daily	23	11
Subtract single-digit numbers		
Less than weekly	41	60
Weekly	43	33
Daily	17	7

NOTE: Detail may not sum to totals because of rounding.

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

Table A23. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving measurement, by program type: Spring 1999

Measurement skills	Full-day	Half-day
Calendar activities		
Less than weekly	2	2
Weekly	5	5
Daily	94	93
Tell time		
Less than weekly	49	69
Weekly	34	22
Daily	18	8
Use measuring instruments		
Less than weekly	75	87
Weekly	21	11
Daily	4	1

NOTE: Detail may not sum to totals because of rounding.

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

Table A24. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving data analysis, by program type: Spring 1999

Data analysis skills	Full-day	Half-day
Read simple graphs		
Less than weekly	39	48
Weekly	40	34
Daily	20	19
Simple data collection/graphing		
Less than weekly	57	67
Weekly	32	21
Daily	10	11
Estimate probability		
Less than weekly	89	94
Weekly	8	5
Daily	3	1

NOTE: Detail may not sum to totals because of rounding.

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

Table A25. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving geometry, by program type: Spring 1999

Geometry skills	Full-day	Half-day
Name geometric shapes		
Less than weekly	28	37
Weekly	48	47
Daily	24	16
Work with geometric manipulatives		
Less than weekly	17	27
Weekly	60	61
Daily	22	12

NOTE: Detail may not sum to totals because of rounding.

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

Table A26. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving patterns and sorting, by program type: Spring 1999

Patterns and sorting skills	Full-day	Half-day
Copy/extend patterns		
Less than weekly	23	29
Weekly	50	48
Daily	28	24
Sort into subgroups using rule		
Less than weekly	32	43
Weekly	55	51
Daily	13	6
Order objects by property		
Less than weekly	37	51
Weekly	53	44
Daily	10	5

NOTE: Detail may not sum to totals because of rounding.

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

Table A27. Public school first-time kindergartners' mean reading fall, spring and gain scores (unadjusted), by program type: Fall 1998 to spring 1999

Program type	Reading gain	Fall score	Spring score
All public kindergartners	10.04	21.72	31.76
Half-day	9.45	21.88	31.33
Full-day	10.55	21.59	32.14

NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (no transitional or multi-grade classes). Only children who stayed with the same teacher in both the fall and spring and who are assessed in English in both the fall and the spring are included in the analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires and Child Assessment, Base-Year Public-Use data.

Table A28. Public school first-time kindergartners' mean mathematics fall, spring and gain scores (unadjusted), by program type: Fall 1998 to spring 1999

Program type	Math gain	Fall score	Spring score
All public kindergartners	8.20	19.36	27.56
Half-day	7.77	19.79	27.56
Full-day	8.57	18.99	27.55

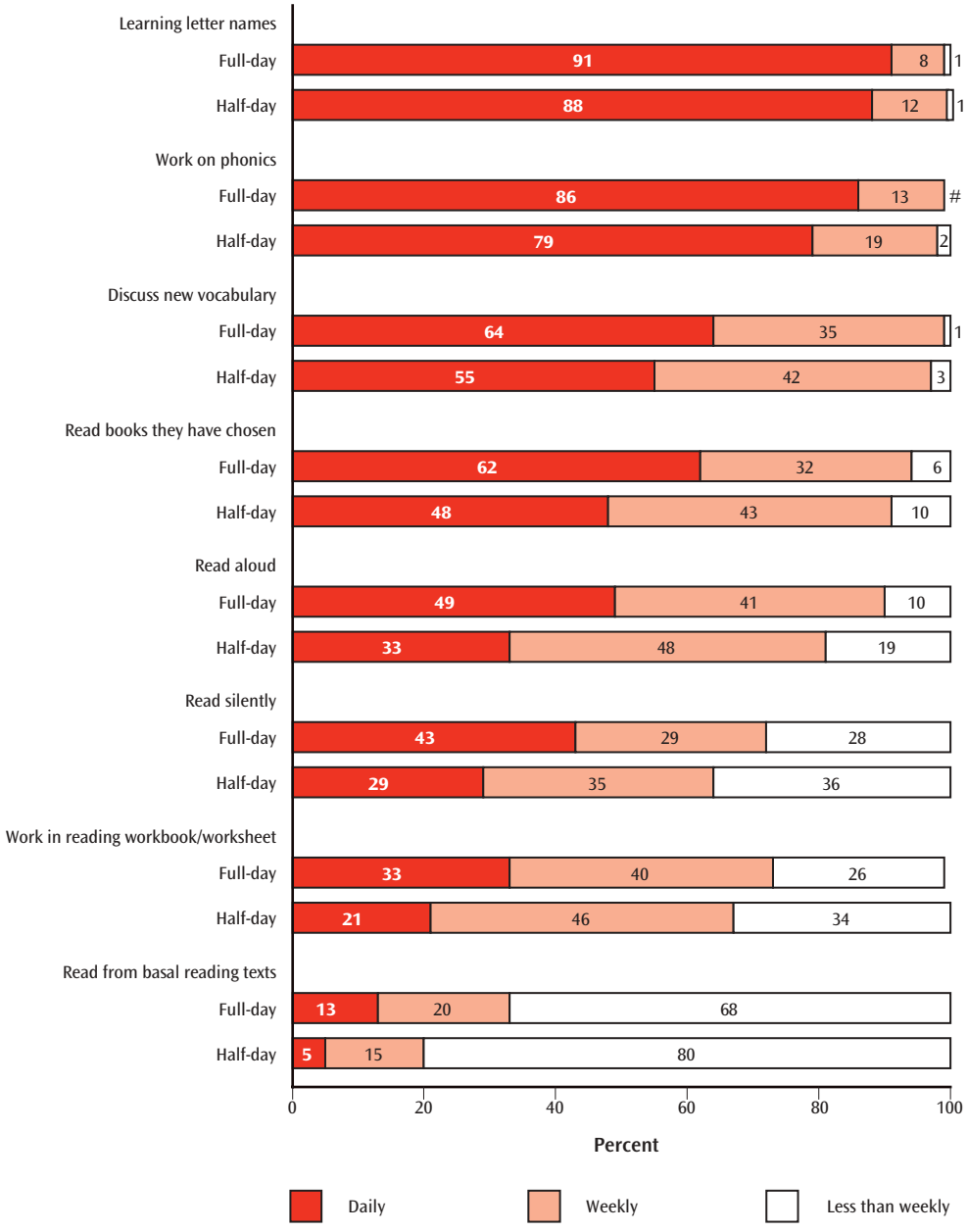
NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (no transitional or multi-grade classes). Only children who stayed with the same teacher in both the fall and spring and who are assessed in mathematics in both the fall and the spring are included in the analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires and Child Assessment, Base-Year Public-Use data.

Appendix B:

Supplemental figures: Reading and mathematics activities and skills

Figure B1. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various reading activities, by program type: Spring 1999

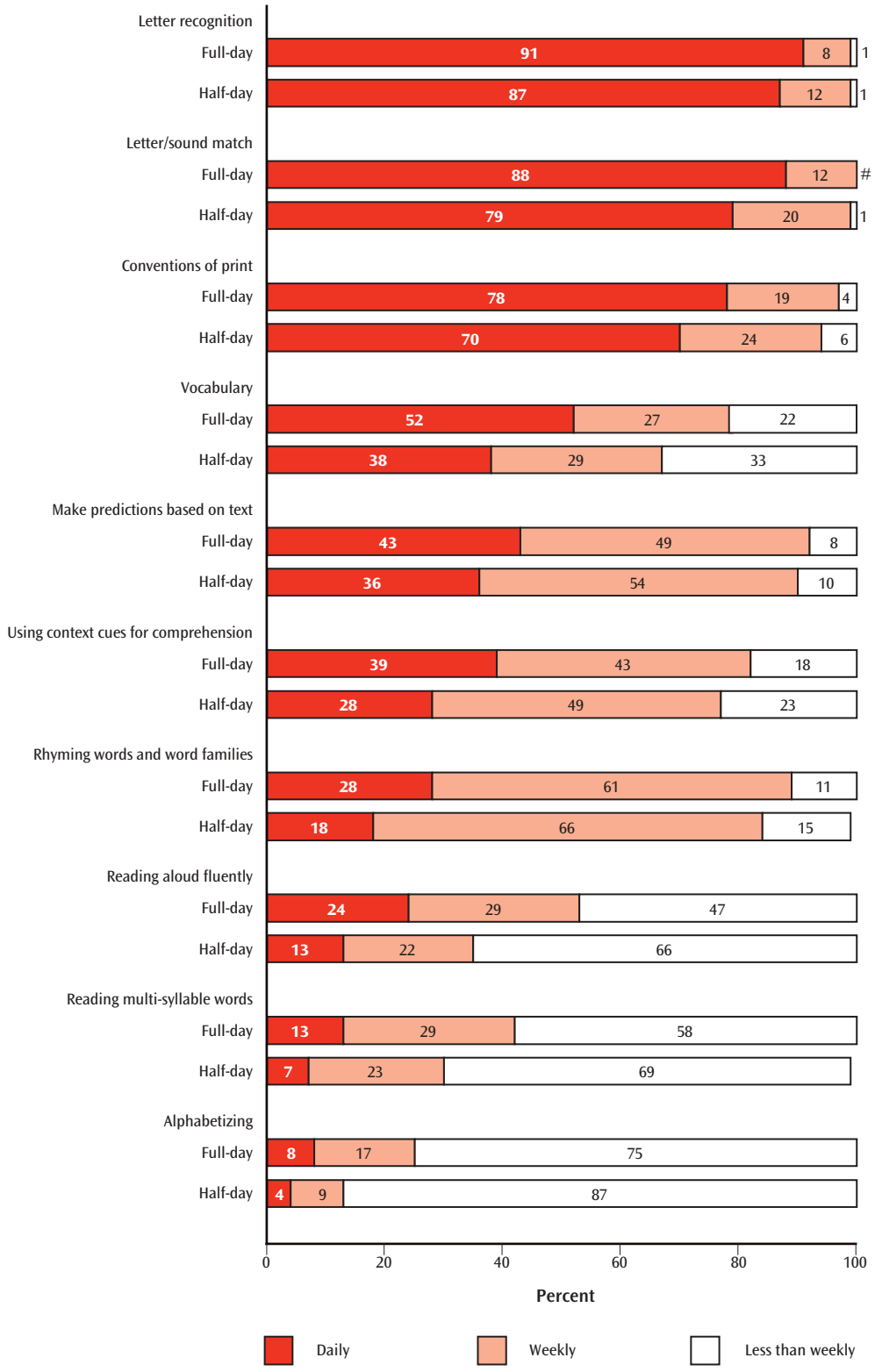


Rounds to zero.

NOTE: Detail may not sum to totals because of rounding.

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

Figure B2. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various reading skills, by program type: Spring 1999

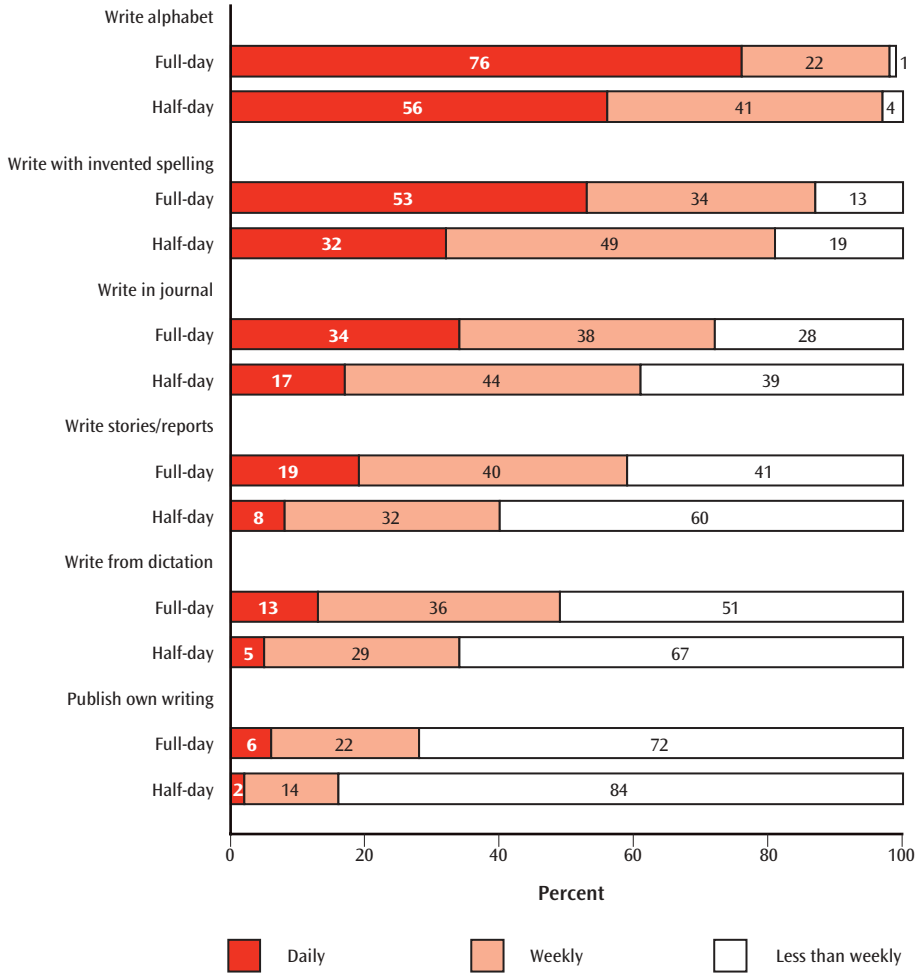


Rounds to zero.

NOTE: Detail may not sum to totals because of rounding.

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

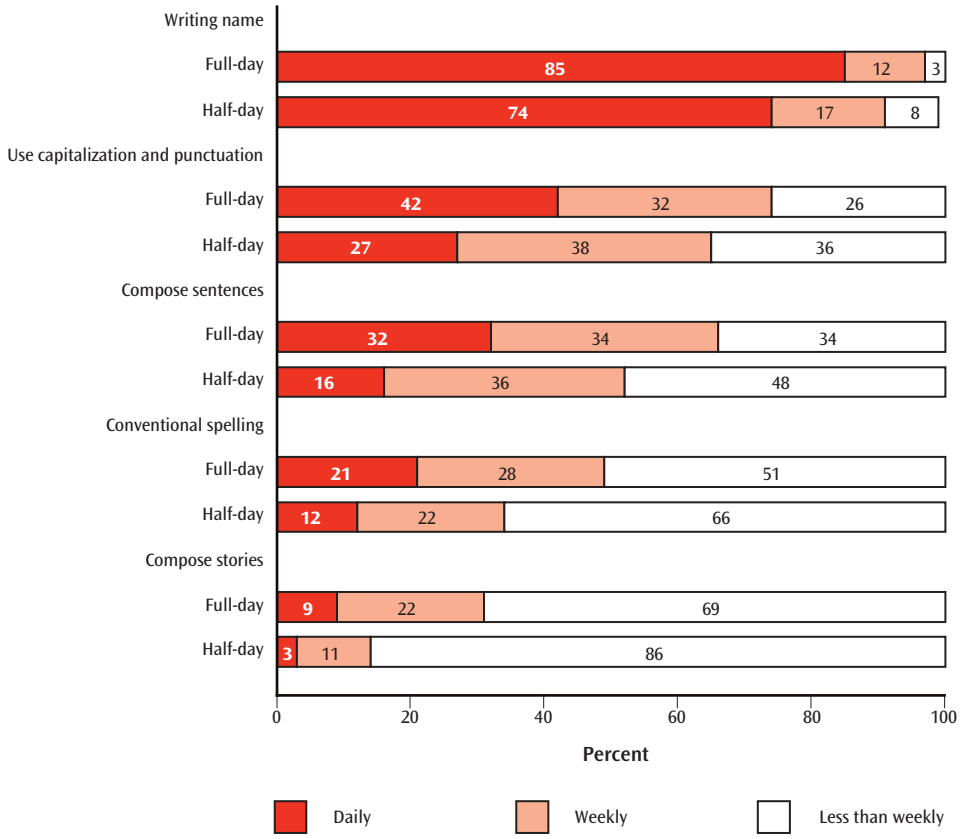
Figure B3. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various writing activities, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

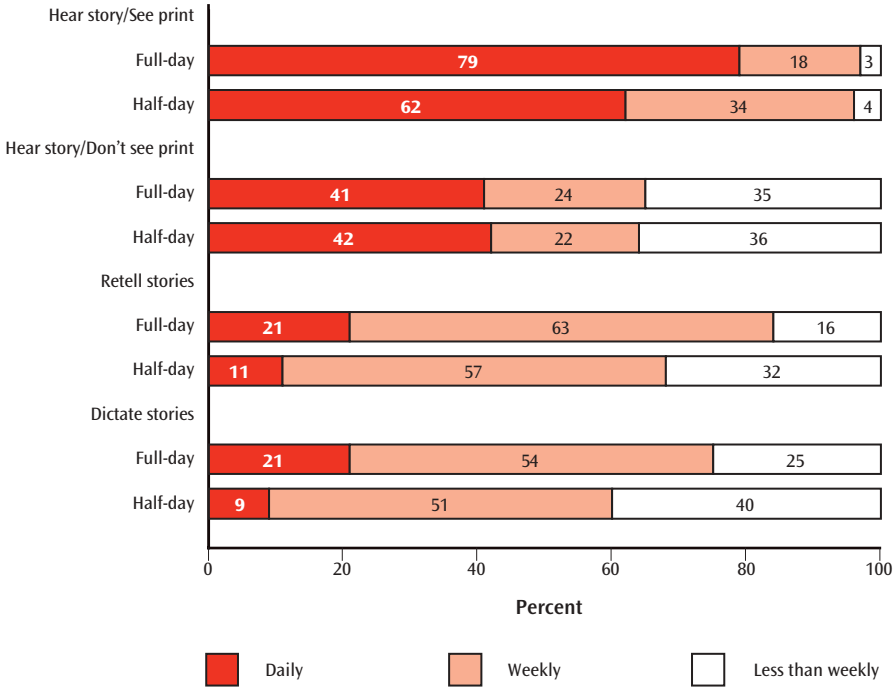
Figure B4. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various writing skills, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

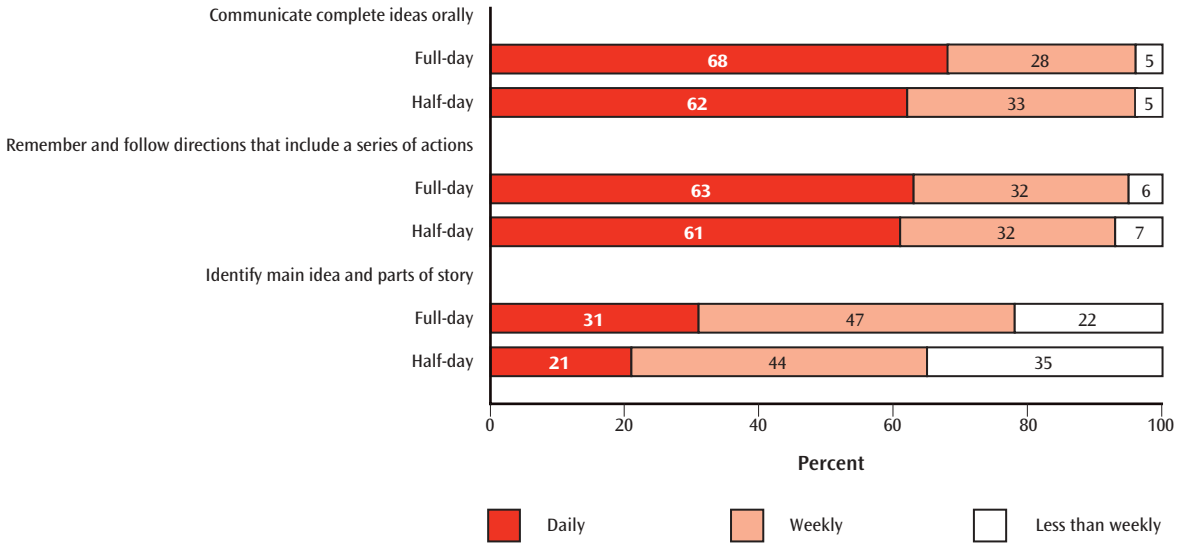
Figure B5. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various receptive and expressive language activities, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

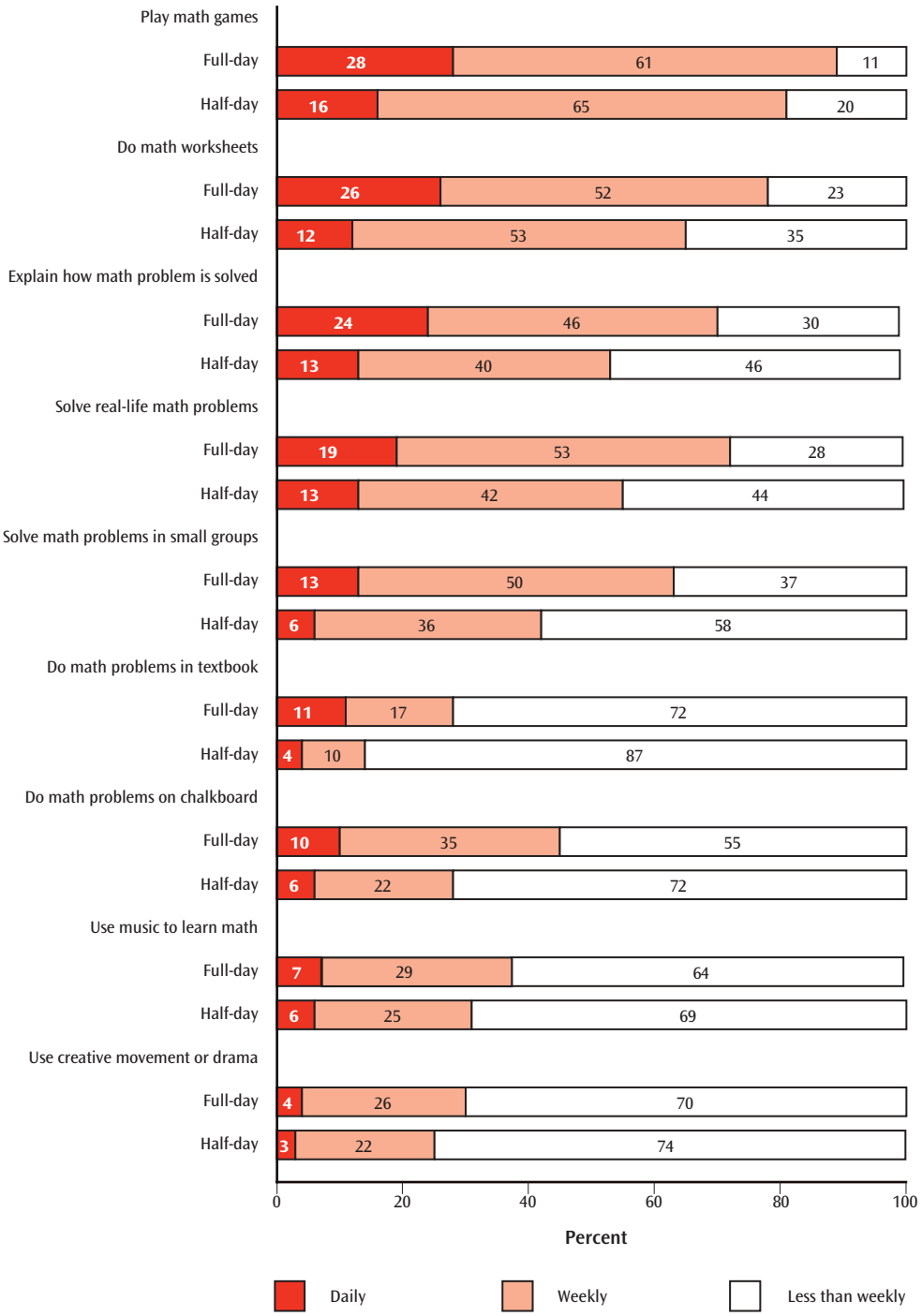
Figure B6. Percent of U.S. kindergarten classes that work daily, weekly or less than weekly on various receptive and expressive language skills, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

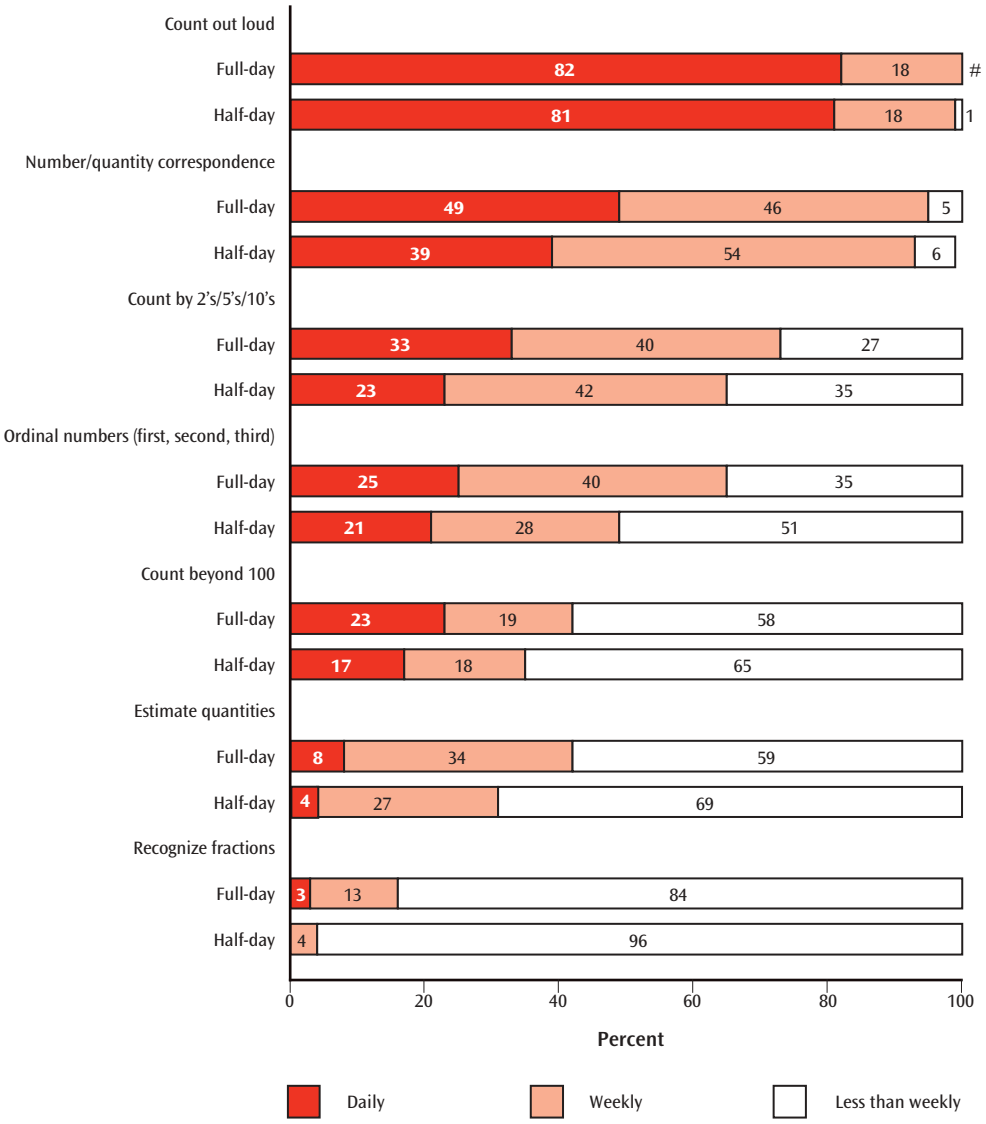
Figure B7. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics activities, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

Figure B8. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving counting and quantities, by program type: Spring 1999

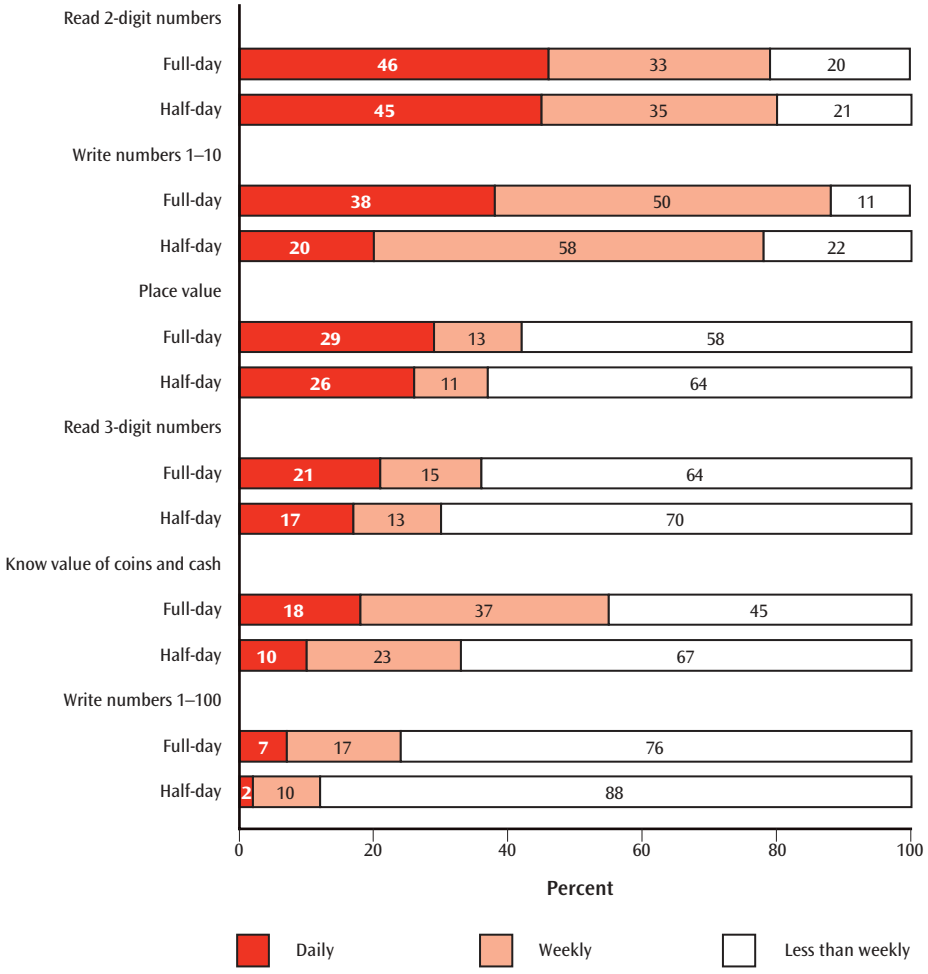


Rounds to zero.

NOTE: Detail may not sum to totals because of rounding.

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

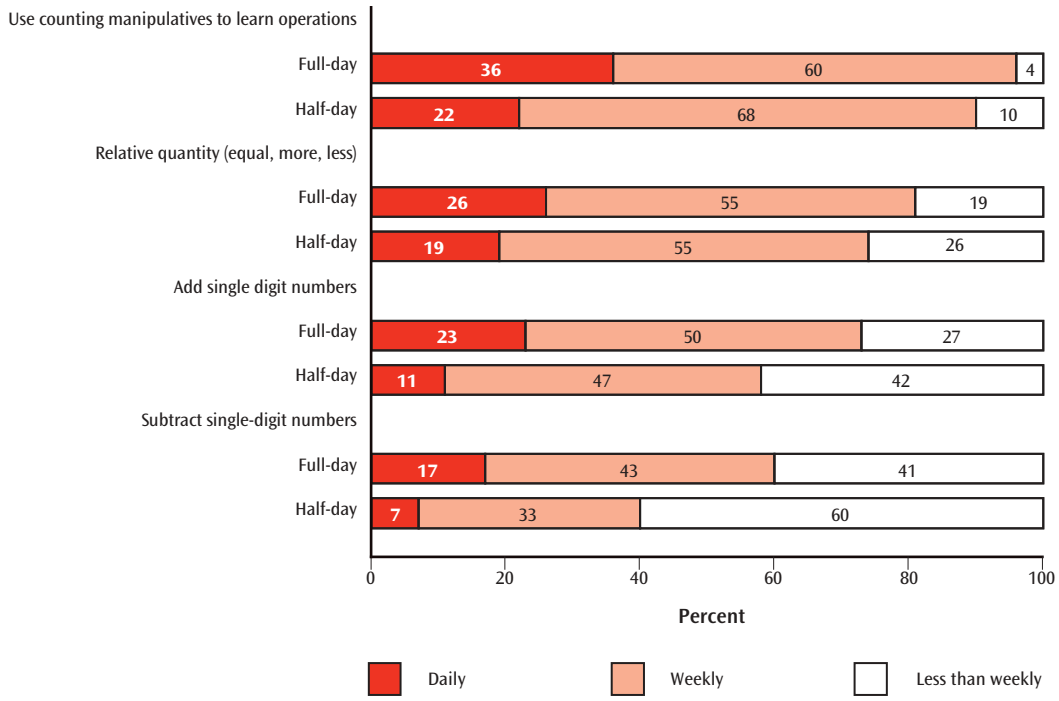
Figure B9. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving number systems, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

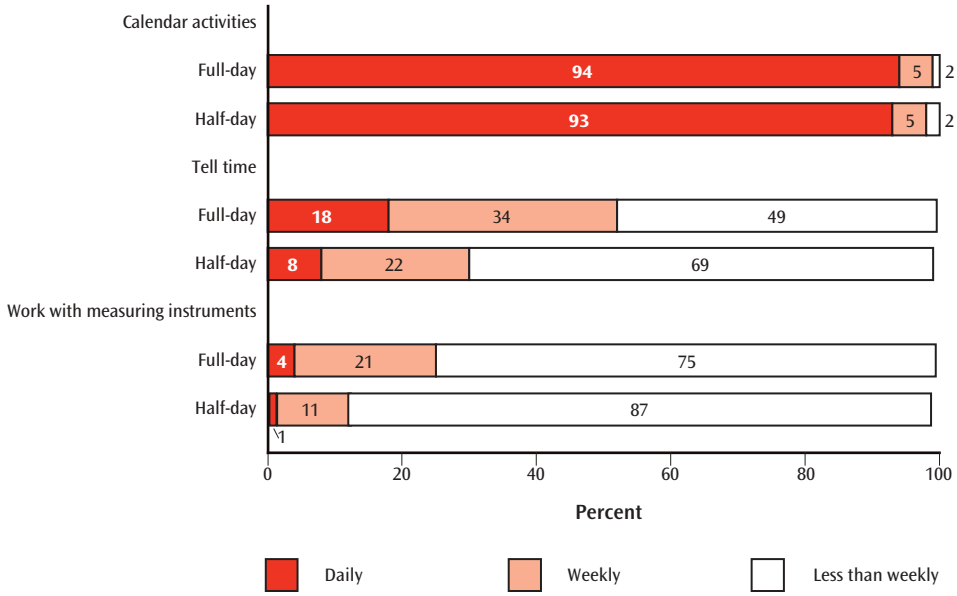
Figure B10. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving operations, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

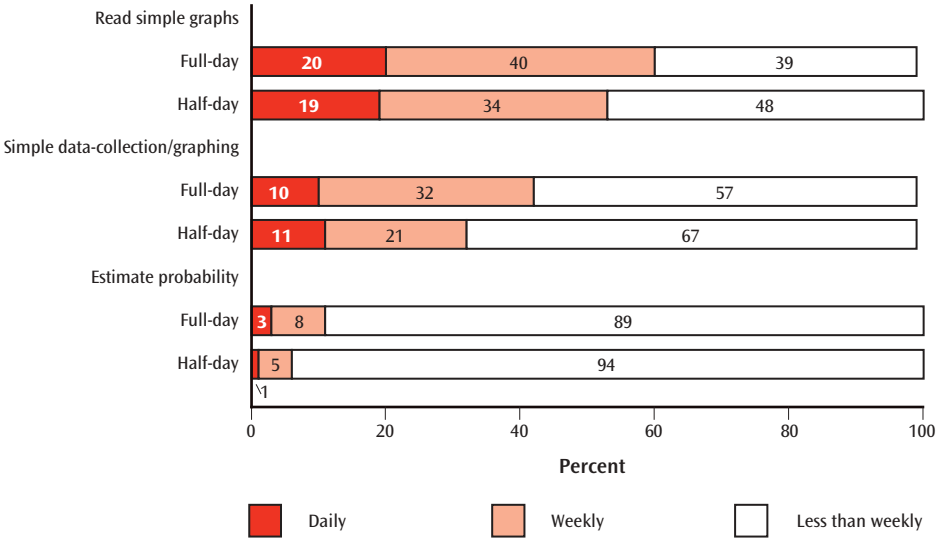
Figure B11. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving measurement, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

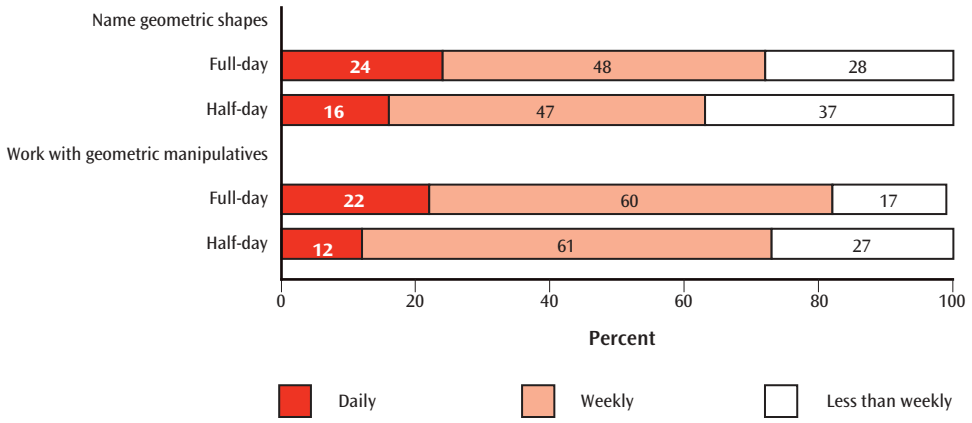
Figure B12. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving data analysis, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

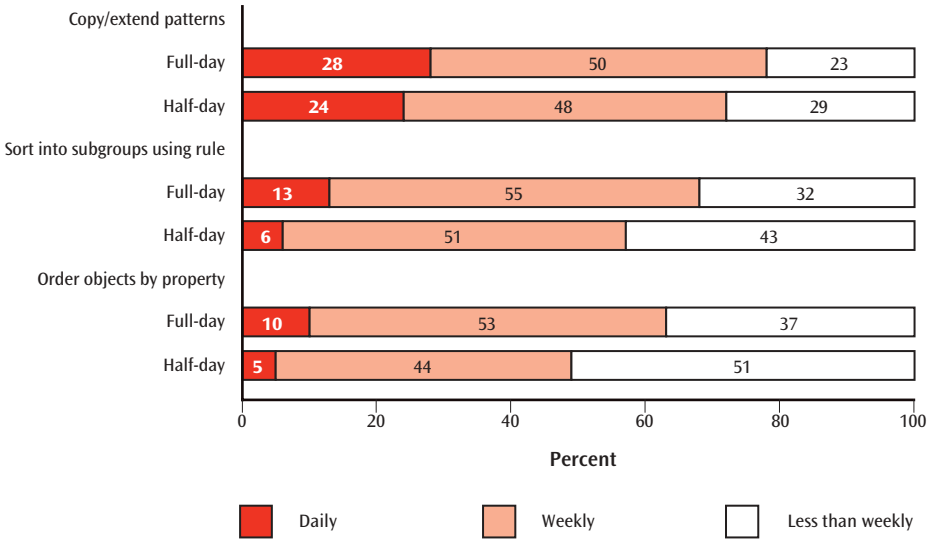
Figure B13. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving geometry, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

Figure B14. Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving patterns and sorting, by program type: Spring 1999



NOTE: Detail may not sum to totals because of rounding.

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

Appendix C: Standard Error Tables

Table C1. Standard errors for table A1, figures A and 2—Percent of U.S. schools that offer full-day and half-day kindergarten programs, by school type: 1998–99

School characteristics	All schools		Public		Private			
					Catholic		Other private	
	Full-day	Half-day	Full-day	Half-day	Full-day	Half-day	Full-day	Half-day
All schools	2.30	2.38	2.91	3.04	3.56	4.33	4.61	4.77

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Table C2. Standard errors for table A2, figures 3, 4, 5, and 6—Percent of U.S. schools that offer full-day and half-day kindergarten programs, by school characteristics: 1998–99

School characteristics	All schools		Public		Private	
	Full-day	Half-day	Full-day	Half-day	Full-day	Half-day
All schools	2.30	2.38	2.91	3.04	3.71	3.64
Region						
Northeast	4.30	4.62	5.03	5.39	8.47	8.47
Midwest	4.73	4.16	5.25	5.29	8.65	7.41
South	4.16	5.18	4.74	6.26	6.77	7.03
West	6.02	5.90	9.51	9.50	6.09	5.97
Location						
Large and mid-sized cities	4.22	4.07	5.86	5.32	4.74	4.70
Suburbs/large town	3.54	3.70	3.94	4.17	6.08	6.49
Small town/rural	5.24	5.05	4.86	5.49	13.21	11.00
School minority enrollment[1]						
Less than 10%	3.56	3.53	4.59	4.66	7.00	7.07
10–24%	5.44	5.56	5.64	5.91	8.20	8.05
25–49%	5.67	6.22	6.81	7.69	‡	‡
50–75%	5.81	6.17	6.30	6.65	‡	‡
75% or more	4.74	4.80	5.39	5.45	4.56	6.01
Concentration of low-income children in public schools[2]						
0–49%	—	—	3.78	3.36	—	—
50% or more	—	—	4.40	4.87	—	—

‡ Reporting standards not met.

— Not available.

[1]All children who are not identified as White, non-Hispanic are classified as minority children.

[2]A school's concentration of poverty is based on a composite of free and reduced-priced lunch and participation in a "school-wide" Title I program. This is calculated only for public schools with a kindergarten program.

NOTE: Percent offering full-day and half-day programs totals more than 100 because some schools have both full-day and half-day programs.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Table C3. Standard errors for table A3, figures B, 7, and 8—Percent of U.S. kindergarten children enrolled in a full-day kindergarten program, by school characteristics: 1998–99

School characteristics	All kindergartners	Public	Catholic	Other private
All kindergartners	2.17	2.41	3.78	4.30
Region				
Northeast	4.18	4.84	4.61	10.58
Midwest	3.78	4.16	6.79	9.37
South	3.83	4.12	6.11	6.77
West	5.32	5.75	11.87	7.54
Location				
Large and mid-sized cities	3.17	3.76	4.59	6.30
Suburbs/large town	3.36	3.76	7.35	7.10
Small town/rural	6.51	6.76	8.64	14.60
School minority enrollment[1]				
Less than 10%	3.28	3.87	6.57	8.68
10–24%	4.76	5.32	9.79	8.10
25–49%	5.72	6.25	13.14	15.86
50–75%	5.46	5.75	26.67	14.83
75% or more	3.14	3.49	5.02	7.68
School enrollment in poverty[2]				
0–49%	—	3.09	—	—
50% or more	—	3.93	—	—

— Not available.

[1]All children who are not identified as White, non-Hispanic are classified as minority children.

[2]A school's concentration of poverty is based on a composite of free and reduced-priced lunch and participation in a "school-wide" Title I program. This is calculated only for public schools with a kindergarten program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire and Kindergarten Teacher Questionnaires, Base-Year Public-Use Data Files.

Table C4. Standard errors for table A4, figures 9, 10, 11, and 12—Percent of U.S. kindergarten children enrolled in a full-day program, by school type and child and family characteristics: 1998–99

Child and family characteristics	All kindergartners	Public	Catholic	Other private
All kindergartners	2.17	2.41	3.78	4.30
Child's sex				
Male	2.26	2.47	3.93	4.46
Female	2.14	2.42	3.87	4.51
Mother's education				
Less than high school	3.15	3.20	7.58	9.58
High school diploma or equivalent	2.66	2.80	4.04	6.44
Some college, including vocational/technical	2.41	2.70	3.84	5.02
Bachelor's degree or higher	2.37	2.85	4.72	4.78
Primary Language spoken in home				
Non-English	3.21	3.32	6.46	7.48
English	2.31	2.61	3.96	4.45
Child's race/ethnicity				
White, non-Hispanic	2.52	2.84	4.35	5.08
Black, non-Hispanic	3.19	3.49	1.75	3.37
Hispanic	3.23	3.44	6.63	7.06
Asian	3.37	3.88	11.42	9.53
Hawaiian Native/Pacific Islander	11.41	11.50	28.50	8.10
American Indian/Alaska Native	8.58	9.17	9.98	2.79
More than one race, non-Hispanic	4.57	4.94	10.33	8.38
Diagnosed disability				
Yes	3.03	3.37	4.60	6.04
No	2.25	2.57	3.91	4.63
First time-kindergartner				
Yes	2.30	2.62	3.89	4.67
No	3.59	4.08	9.34	6.53
Poverty status[1]				
Below poverty threshold	3.19	3.23	4.74	7.48
At or above poverty threshold	2.12	2.40	3.89	4.38
Child's age at entry				
4 yrs, 8 mos — 4 yrs, 11 mos	2.89	3.54	6.04	5.75
5 yrs, 0 mos — 5 yrs, 3 mos	2.42	2.68	4.08	4.64
5 yrs, 4 mos — 5 yrs, 7 mos	2.15	2.41	3.92	4.92
5 yrs, 8 mos — 5 yrs, 11 mos	2.69	2.91	4.78	5.63
6 yrs, 0 mos — 6 yrs, 7 mos	2.83	3.14	7.75	8.46

[1]Poverty status is determined by comparing the child's household income to the national poverty threshold.

SOURCE: U.S. Department of Education, National Center for Education Statistics. Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; School Administrator Questionnaire, Kindergarten Teacher Questionnaires and Parent Interview, Base-Year Public-Use Data Files.

Table C5. Standard errors for table A5 and figure 13—Percent of U.S. public kindergarten children enrolled in a full-day program, by poverty status and primary home language: 1998–99

Child characteristics	Below poverty threshold	At or above poverty threshold
Primary home language		
English	3.49	2.58
Non-English	4.46	3.24

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires and Parent Interviews, Base-Year files.

Table C6. Standard errors for table A6 and figure 14—Percentage distribution of U.S. public kindergarten classes with various enrollment characteristics, by program type: 1998–99

Class composition	Full-day	Half-day
All public school kindergarten classes	2.68	2.68
Percent minority		
0–10%	3.10	2.63
11–25%	2.09	1.85
26–75%	2.64	3.29
More than 75%	3.29	1.98
Percent limited English proficient (LEP)		
0%	2.89	2.66
1–10%	1.33	1.26
11–50%	2.02	1.53
More than 50%	1.08	1.30

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

Table C7. Standard errors for table A7, figures 15, 16, and 17—Percentage distribution of various teacher characteristics in U.S. public kindergarten classes, by program type: 1998–99

Teacher characteristic	Full-day	Half-day
Teacher's race		
White, non-Hispanic	1.92	1.34
Black, non-Hispanic	1.36	0.52
Hispanic	1.16	1.04
Other, non-Hispanic or multiracial	1.10	0.82
Teacher's highest degree		
Bachelor's	2.17	2.33
Master's	1.96	2.18
Doctorate/Specialist	0.88	0.90
Teacher's certification		
Early Childhood	2.18	3.33
Elementary	1.68	2.14
Teacher's certification type		
Other than fully certified	0.89	1.57
Fully certified	0.89	1.57
Years teaching kindergarten		
Less than 3	1.45	1.47
3 to 9	1.40	1.96
10–19	1.21	1.92
20 or more	1.20	1.08

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

Table C8. Standard errors for table A8, figures 18 and 19—Percentage distribution of class sizes and percent of classes with classroom aides in U.S. public kindergarten classes, by program type: 1998–99

Class characteristic	Full-day	Half-day
Class size levels		
Up to 17	2.40	3.18
18–24	2.63	2.79
25 or more	2.06	1.57
Classroom aides		
Regular instructional aide	3.83	2.97
Special ed. instructional aide	1.87	2.32
English as a second language (ESL) instructional aide	1.56	0.90

NOTE: A class is classified as having an aide if the aide spends at least one hour per day in the class working directly with the children in the class.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Kindergarten Teacher Questionnaires, Base-Year Public-Use Data File.

Table C9. Standard errors for table A9, figures 20 and 21—Average minutes per day and percent of total time that U.S. public kindergarten classes spend in various classroom organizations, by program type: Spring 1999

Time	Full-day	Half-day
Minutes per day		
Teacher directed whole class activities	2.07	2.49
Teacher directed small-group activities	1.72	1.92
Teacher directed individual activities	1.07	1.39
Child selected activities	1.37	1.32
Percent of total		
Teacher directed whole class activities	0.71	1.38
Teacher directed small-group activities	0.59	1.06
Teacher directed individual activities	0.37	0.77
Child selected activities	0.47	0.73

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

Table C10. Standard errors for table A10 and figure 22—Percentage distribution of the frequency that U.S. public kindergarten classes use various grouping strategies for reading and mathematics instruction, by program type: Spring 1999

Grouping strategies	Full-day	Half-day
Reading		
Work in mixed level groups		
Less than weekly	1.27	1.62
Weekly	1.41	2.31
Daily	1.60	2.49
Achievement groups		
Less than weekly	2.29	2.76
Weekly	1.77	2.46
Daily	1.91	1.52
Peer tutoring in reading		
Less than weekly	1.82	2.34
Weekly	1.89	1.64
Daily	1.47	1.63
Mathematics		
Work in mixed level groups		
Less than weekly	1.36	1.81
Weekly	1.59	2.13
Daily	1.47	1.83
Achievement groups		
Less than weekly	2.01	1.96
Weekly	1.74	1.75
Daily	1.35	0.99
Peer tutoring in reading		
Less than weekly	2.04	2.06
Weekly	2.00	1.96
Daily	1.13	1.31

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

Table C11. Standard errors for table A11, figures C, 23, and 24—Percent of U.S. public kindergarten classes that spend time daily, weekly or less than weekly in various subject areas, by program type: Spring 1999

Subject area	Full-day	Half-day
Reading and language arts		
Never/less than weekly	0.22	0.23
Weekly	0.40	0.70
Daily	0.45	0.73
Mathematics		
Never/less than weekly	0.13	0.05
Weekly	0.98	1.69
Daily	1.01	1.69
Social studies		
Never/less than weekly	0.63	1.20
Weekly	1.71	1.99
Daily	1.70	1.71
Science		
Never/less than weekly	0.69	1.25
Weekly	1.54	1.99
Daily	1.51	1.70
Music		
Never/less than weekly	0.92	1.49
Weekly	2.02	2.81
Daily	1.64	2.56
Art		
Never/less than weekly	0.54	0.88
Weekly	1.82	2.30
Daily	1.73	2.09
Dance/creative movement		
Never/less than weekly	1.50	2.56
Weekly	1.45	2.32
Daily	1.25	0.94
Theater/creative dramatics		
Never/less than weekly	1.59	2.36
Weekly	1.40	2.22
Daily	0.88	0.63

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

Table C12. Standard errors for Table A12 and figures 25 and 26—Percent distribution of the amount of time per day U.S. public kindergarten classes spend time on reading/language arts activities and mathematics activities, by program type: Spring 1999

	Full-day	Half-day
Reading and language arts		
1–30	0.71	1.58
31–60	1.34	2.17
61–90	1.32	2.11
91+	1.32	1.28
Mathematics		
1–30	1.42	2.18
31–60	1.58	2.02
61–90	1.36	1.16
91+	0.51	0.51

NOTE: 'Minutes per day' refers to the time spent per day on those days when the subject is taught.

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

Table C13. Standard errors for table A13, figures D, 27, and B1—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various reading activities, by program type: Spring 1999

Reading activities	Full-day	Half-day
Learning letter names		
Less than weekly	0.23	0.23
Weekly	0.83	1.03
Daily	0.84	1.03
Work on phonics		
Less than weekly	0.16	0.68
Weekly	1.28	1.18
Daily	1.29	1.33
Discuss new vocabulary		
Less than weekly	0.29	0.75
Weekly	1.58	1.95
Daily	1.58	1.88
Choose to read books		
Less than weekly	0.80	1.18
Weekly	1.81	2.33
Daily	2.01	2.47
Read aloud		
Less than weekly	1.16	1.79
Weekly	1.46	2.43
Daily	1.60	2.24
Read silently		
Less than weekly	1.66	2.54
Weekly	1.55	1.94
Daily	1.87	2.19
Work in reading workbook/worksheet		
Less than weekly	1.97	2.67
Weekly	1.75	2.20
Daily	2.15	2.56
Use basal reading texts		
Less than weekly	1.86	1.79
Weekly	1.76	1.56
Daily	1.16	0.90

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

Table C14. Standard errors for table A14, figures D, 27 and B2—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various reading skills, by program type: Spring 1999

Reading skills	Full-day	Half-day
Letter recognition		
Less than weekly	0.28	0.39
Weekly	0.87	0.96
Daily	0.90	1.09
Letter/sound match		
Less than weekly	0.21	0.59
Weekly	1.24	1.49
Daily	1.24	1.38
Conventions of print		
Less than weekly	0.60	1.18
Weekly	1.16	1.67
Daily	1.32	2.05
Vocabulary		
Less than weekly	1.68	2.18
Weekly	1.46	2.03
Daily	1.89	2.09
Make predictions based on text		
Less than weekly	0.72	1.43
Weekly	1.46	2.08
Daily	1.52	2.00
Using context cues for comprehension		
Less than weekly	1.18	1.72
Weekly	1.69	2.46
Daily	1.76	1.96
Rhyming words and word families		
Less than weekly	1.08	1.64
Weekly	1.58	2.13
Daily	1.60	1.30
Reading aloud fluently		
Less than weekly	2.31	2.30
Weekly	1.94	1.78
Daily	1.38	1.49
Reading multi-syllable words		
Less than weekly	2.00	2.05
Weekly	1.45	1.80
Daily	1.19	1.07
Alphabetizing		
Less than weekly	1.69	1.38
Weekly	1.38	1.29
Daily	0.83	0.69

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

Table C15. Standard errors for table A15, figures D, 27 and B3—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various writing activities, by program type: Spring 1999

Writing activity	Full-day	Half-day
Writing alphabet		
Less than weekly	0.32	0.86
Weekly	1.47	2.00
Daily	1.49	2.38
Invented spelling		
Less than weekly	1.64	2.72
Weekly	1.65	1.96
Daily	1.98	2.45
Write in journal		
Less than weekly	2.12	3.20
Weekly	2.23	2.23
Daily	2.35	2.10
Write stories/reports		
Less than weekly	1.63	2.73
Weekly	1.61	2.39
Daily	1.32	1.21
Write from dictation		
Less than weekly	1.65	2.28
Weekly	1.40	2.11
Daily	1.52	0.82
Publish own writing		
Less than weekly	1.79	1.62
Weekly	1.56	1.50
Daily	0.80	0.49

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

Table C16. Standard errors for table A16, figures D, 27 and B4—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various writing skills, by program type: Spring 1999

Writing skills	Full-day	Half-day
Writing name		
Less than weekly	0.51	1.07
Weekly	1.02	1.64
Daily	1.09	1.97
Use capitalization and punctuation		
Less than weekly	2.45	2.30
Weekly	1.58	1.73
Daily	1.97	1.96
Compose sentences		
Less than weekly	2.58	2.49
Weekly	1.89	2.03
Daily	1.82	1.33
Conventional spelling		
Less than weekly	1.99	2.16
Weekly	1.44	1.92
Daily	1.53	1.41
Compose and write stories with a beginning, middle and end		
Less than weekly	1.46	1.50
Weekly	1.43	1.39
Daily	0.85	0.76

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

Table C17. Standard errors for table A17, figures D, 27 and B5—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various receptive and expressive language activities, by program type: Spring 1999

Receptive and expressive language activities	Full-day	Half-day
Hear story/See print		
Less than weekly	0.70	0.73
Weekly	1.34	1.81
Daily	1.16	1.92
Hear story/Don't see print		
Less than weekly	1.36	2.46
Weekly	1.38	1.58
Daily	1.71	2.53
Retell stories		
Less than weekly	1.16	2.60
Weekly	1.81	2.33
Daily	1.52	1.17
Dictate stories		
Less than weekly	1.38	2.31
Weekly	1.57	2.14
Daily	1.39	1.27

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

Table C18. Standard errors for table A18 and figure B6—Percent of U.S. kindergarten classes that work daily, weekly or less than weekly on various receptive and expressive language skills, by program type: Spring 1999

Receptive and expressive language skills	Full-day	Half-day
Identify main idea and parts of story		
Less than weekly	1.40	2.00
Weekly	1.96	2.10
Daily	1.48	1.59
Remember and follow directions that include a series of actions		
Less than weekly	0.73	0.94
Weekly	1.64	1.80
Daily	1.74	1.93
Communicate complete ideas orally		
Less than weekly	0.74	0.77
Weekly	1.26	2.28
Daily	1.38	2.45

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

Table C19. Standard errors for table A19 and figures 28 and B7—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics activities, by program type: Spring 1999

Mathematics activities	Full-day	Half-day
Play math games		
Less than weekly	0.96	1.64
Weekly	1.57	1.95
Daily	1.66	1.66
Do math worksheets		
Less than weekly	2.08	2.72
Weekly	1.64	2.52
Daily	2.01	1.49
Explain how math problem is solved		
Less than weekly	1.85	2.20
Weekly	2.01	2.09
Daily	1.43	1.35
Solve real-life math problems		
Less than weekly	1.39	2.01
Weekly	1.71	1.79
Daily	1.28	1.30
Solve math problem in small group or partner		
Less than weekly	1.57	2.13
Weekly	1.42	2.07
Daily	0.96	0.87
Do math problems in textbook		
Less than weekly	2.55	1.76
Weekly	1.72	1.43
Daily	1.33	0.97
Complete math problems on chalkboard		
Less than weekly	1.54	2.16
Weekly	1.50	2.04
Daily	1.12	1.04
Use music to learn math		
Less than weekly	1.85	2.36
Weekly	1.68	2.13
Daily	0.81	1.16
Use creative movement or drama to understand math concepts		
Less than weekly	1.68	1.52
Weekly	1.61	1.68
Daily	0.61	0.72

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

Table C20. Standard errors for table A20, figures E, 28 and B8—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving counting and quantities, by program type: Spring 1999

Counting and quantity skills	Full-day	Half-day
Count out loud		
Less than weekly	0.17	0.33
Weekly	1.23	1.41
Daily	1.26	1.43
Number/quantity correspondence		
Less than weekly	0.67	0.96
Weekly	2.15	1.82
Daily	2.25	2.11
Count by 2's/5's/10's		
Less than weekly	1.91	1.97
Weekly	1.73	1.99
Daily	1.85	1.82
Ordinal numbers (first, second, third)		
Less than weekly	1.49	2.51
Weekly	1.55	1.77
Daily	1.16	1.76
Count beyond 100		
Less than weekly	1.91	2.20
Weekly	1.05	1.48
Daily	1.72	1.54
Estimate quantities		
Less than weekly	2.38	1.68
Weekly	2.17	1.54
Daily	0.95	0.78
Recognize fractions		
Less than weekly	1.33	0.84
Weekly	1.18	0.88
Daily	0.65	0.29

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

Table C21. Standard errors for table A21, figures E, 28 and B9—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving number systems, by program type: Spring 1999

Number systems skills	Full-day	Half-day
Read 2-digit numbers		
Less than weekly	1.59	1.99
Weekly	2.03	1.45
Daily	1.99	2.18
Write numbers 1–10		
Less than weekly	1.16	1.60
Weekly	1.52	2.04
Daily	1.46	1.46
Place value		
Less than weekly	2.36	2.57
Weekly	1.02	1.42
Daily	1.83	2.05
Read 3-digit numbers		
Less than weekly	1.71	2.56
Weekly	1.53	1.87
Daily	1.54	2.08
Value of coins and cash		
Less than weekly	2.00	2.73
Weekly	1.69	1.84
Daily	1.51	1.56
Write numbers 1–100		
Less than weekly	1.43	1.68
Weekly	1.04	1.64
Daily	1.05	0.41

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

Table C22. Standard errors for table A22, figures E, 28 and B10—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving operations, by program type: Spring 1999

Mathematics operations skills	Full-day	Half-day
Work with counting manipulatives to learn operations		
Less than weekly	0.62	1.14
Weekly	1.35	1.92
Daily	1.39	1.85
Relative quantity (equal, more, less)		
Less than weekly	1.37	1.83
Weekly	1.79	2.04
Daily	1.52	1.33
Add single-digit numbers		
Less than weekly	1.59	2.17
Weekly	1.87	2.20
Daily	1.53	1.28
Subtract single-digit numbers		
Less than weekly	1.98	1.82
Weekly	1.97	1.65
Daily	1.17	0.99

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

Table C23. Standard errors for table A23, figures E, 28 and B11—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving measurement, by program type: Spring 1999

Measurement skills	Full-day	Half-day
Calendar activities		
Less than weekly	0.38	0.43
Weekly	0.82	0.86
Daily	0.97	0.94
Tell time		
Less than weekly	2.06	2.54
Weekly	1.96	1.84
Daily	1.60	1.35
Use measuring instruments		
Less than weekly	1.46	1.41
Weekly	1.25	1.52
Daily	0.78	0.51

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

Table C24. Standard errors for table A24 and figure B12—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving data analysis, by program type: Spring 1999

Data analysis skills	Full-day	Half-day
Read simple graphs		
Less than weekly	1.83	2.63
Weekly	1.78	2.26
Daily	1.59	1.83
Simple data collection/graphing		
Less than weekly	1.73	2.17
Weekly	1.68	1.79
Daily	0.78	1.48
Estimate probability		
Less than weekly	1.20	1.02
Weekly	1.03	0.97
Daily	0.56	0.33

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

Table C25. Standard error for table A24 and figure B13—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving geometry, by program type: Spring 1999

Geometry skills	Full-day	Half-day
Name geometric shapes		
Less than weekly	1.42	2.02
Weekly	1.86	2.14
Daily	1.56	1.23
Work with geometric manipulatives		
Less than weekly	1.67	1.87
Weekly	1.56	1.81
Daily	1.42	1.20

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of

Table C26. Standard errors for table A26 and figure B14—Percent of U.S. public kindergarten classes that work daily, weekly or less than weekly on various mathematics skills involving patterns and sorting, by program type: Spring 1999

Patterns and sorting skills	Full-day	Half-day
Copy/extend patterns		
Less than weekly	1.55	1.84
Weekly	1.71	1.69
Daily	1.89	1.78
Sort into subgroups using rule		
Less than weekly	1.41	2.40
Weekly	1.80	2.34
Daily	1.37	0.92
Order objects by property		
Less than weekly	1.22	2.29
Weekly	1.71	2.12
Daily	1.28	0.91

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

Table C27. Standard errors for table A27, figures F and 29—Public school first-time kindergartners' mean reading fall, spring and gain scores (unadjusted), by program type: Fall 1998 to spring 1999

Program type	Reading gain	Fall score	Spring score
All public kindergartners	0.16	0.18	0.26
Half-day	0.17	0.26	0.32
Full-day	0.23	0.25	0.40

NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (no transitional or multi-grade classes). Only children who stayed with the same teacher in both the fall and spring and who are assessed in English in both the fall and the spring are included in the analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires and Child Assessment, Base-Year Public-Use data.

Table C28. Standard errors for table A28, figures G and 31—Public school first-time kindergartners' mean mathematics fall, spring and gain scores (unadjusted), by program type: Fall 1998 to spring 1999

Program type	Math gain	Fall score	Spring score
All public kindergartners	0.10	0.16	0.23
Half-day	0.12	0.25	0.31
Full-day	0.15	0.23	0.33

NOTE: Estimates are based on public school, first-time kindergarten children attending a regular kindergarten program (no transitional or multi-grade classes). Only children who stayed with the same teacher in both the fall and spring and who are assessed in mathematics in both the fall and the spring are included in the analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99; Teacher Questionnaires and Child Assessment, Base-Year Public-Use data.

Appendix D:

Methodology and Technical Notes

Survey Methodology

The Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), is being conducted by Westat for the U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (NCES). It is designed to provide detailed information on children's early school experiences. The study began in the fall of the 1998–99 school year. The children participating in the ECLS-K are being followed longitudinally through the fifth grade.

A nationally representative sample of 22,782 children enrolled in kindergarten during the 1998–99 school year was selected to participate in the ECLS-K. The children attend both public and private schools that offer a kindergarten program. The sample includes children from different racial/ethnic and socioeconomic backgrounds, and includes oversamples of Asian children, private school kindergartens and private school kindergarten children.

The ECLS-K kindergarten reading assessment included questions designed to measure basic skills (letter recognition, beginning and ending sounds), vocabulary (reading sight words), and comprehension (listening comprehension and reading words in context). The ECLS-K kindergarten mathematics assessment was designed to measure skills in conceptual knowledge, procedural knowledge, and problem solving. Approximately one-half of the mathematics assessment consisted of questions on number sense, number properties and operations. The remainder of the assessment included questions in measurement; geometry and spatial sense; data analysis, statistics, and probability; and patterns, algebra, and functions. The ECLS-K assessments were administered individually and took place in the child's school. The assessors were ECLS-K staff with extensive training in how to administer the assessments using standardized procedures.

The family demographic information presented in this report was obtained through computer assisted telephone interviews (CATI) with the children's parents. Teachers completed questionnaires about themselves, their classrooms, and each child in the study. The instructional practices and curricular focus items are based on teachers' report. As a result, there may be possible response bias due to social desirability. For example, some teachers may indicate they use certain instructional activities more often than they actually do if the teachers believe that those instructional activities are more highly valued. Since independent observation of instructional activities was not part of the ECLS-K study design, it is not possible to examine whether response bias might have an effect on reported estimates.

For complete details about the sample design, response rates and nonresponse bias analysis for the ECLS-K, refer to the *ECLS-K Base-Year Public-Use Data Files User's Manual* and/or the *ECLS-K Methodology Report.* Findings in these reports suggest that there is not a bias due to nonresponse.

Statistical Procedures

Chapters 2, 3 and 4

Comparisons made in the text must be larger than 5 percentage points and are tested for statistical significance (alpha = .05) to ensure that the differences are larger than might be expected due to sampling variation. When comparing estimates between categorical groups (e.g., region, race/ethnicity), *t* statistics are calculated. The formula used to compute the *t* statistic is:

$$t = \text{Est}_1 - \text{Est}_2 \;/\; \text{SQRT}\ [(\text{se}_1)^2 + (\text{se}_2)^2]$$

Where Est_1 and Est_2 are the estimates being compared and se_1 and se_2 are their corresponding standard errors. For example, information from Tables A1 and C1 are used to compare the percent of public and Catholic schools that offer full-day kindergarten. The formula used to compute the *t* statistic for the comparison of public and Catholic schools is:

$$t = \frac{\text{Public school estimate} - \text{Catholic school estimate}}{\text{SQRT}\ [(\text{Public se})^2 + (\text{Catholic se})^2]}$$

$$t = \frac{57 - 78}{\text{SQRT}\ [(2.91)^2 + (3.56)^2]}$$

$$t = -4.57$$

In some instances, it is reported that two estimates are "similar" (e.g., "Full-day and half-day classes have similar numbers of ESL aides"). These statements are made when, in addition to no statistical difference found, a test for equivalence rejects a null hypothesis that the difference between the two estimates is not near zero and therefore the two estimates are considered to be equivalent. The equivalence tests are used to identify similar estimates with an alpha level of .05 and tolerance bound of 5 percentage points (Rogers, Howard and Vessey 1993).

Chapter 5

The dependent variables in chapter 5 analyses are gain scores that represent the differences between the IRT fall and spring scale scores for the reading and mathematics assessments. Using gain scores as the dependent variable rather than spring scores as the dependent variable with fall scores as a covariate allows results to be presented in terms of progress made during the year regardless of where along the continuum that progress is made. There are longstanding concerns about the unreliability of gain scores in the measurement literature although these concerns have more recently been shown to be largely unfounded and based on faulty assumptions (e.g., Gottman and Rushe 1993; Williams and Zimmerman 1996). Rogosa and Willet (1983) show that gain score reliabilities tend to be strong when individual differences between pre-test and post-test are substantial, as is the case in most longitudinal assessment applications (including the fall and spring kindergarten ECLS-K assessments). Maris (1998) argues that regression toward the mean is not a legitimate argument against using gains scores nor is pretest measurement error a concern unless assignment into independent variable groups is determined from pre-test performance (which is not the case in the ECLS-K). Additionally, the use of IRT scale scores and the adaptive testing approach used in the ECLS-K limit the concern that gain scores may be unreliable due to floor and ceiling effects (Rock and Pollack 2002).

Comparisons of simple mean gain scores presented in chapter 5 are done using the t-test procedures described for chapters 2, 3 and 4. The regression analyses described in chapter 5 compare mean gain scores for children in full-day and half-day programs while accounting for other child and classroom characteristics and incorporating the nested structure of the data. A three-level hierarchical linear modeling (HLM) method is used to calculate unstandardized regression coefficients for terms in the analyses and to partition the variance associated with each level. This method assures that the proper degrees of freedom are used for estimating the regression coefficients at each level of the data. For example, the degrees of freedom for a class-level variable will be based on the number of classes rather than the number of children. The three-level model consists of three submodels, one for each level. For example, the model for the mathematics gain scores (table 7) can be expressed as the following equations.

Level-1 model

The level-1 model specifies the relationship between child characteristics and children's mathematics gains. The intercept (P0), child-level coefficients (P1-P8) and error (E) appear at this level. Y is the child's mathematics gain score.

Y = P0 + P1*(Poverty) + P2*(Race/ethnicity: Black) + P3*(Race/ethnicity: Hispanic) + P4*(Race/ethnicity: Asian) + P5*(Race/ethnicity: Other) + P6*(Time lapse) + P7*(Fall math score: Low 1/3) + P8*(Fall math score: Middle 1/3) + E

Level-2 model

The level-2 model specifies the relationship between program type and classes' mathematics gains. The equation includes the level-2 intercept (B00) the class-level coefficients for program type (B01) and error (R0). The level-1 intercept (PO) and each of the level-1 coefficients (P1–P8) are treated as outcomes in the level 2 equation. In this analysis, effects associated with each of the level-1 variables are assumed to be invariant (fixed) across classes so no error terms are attached to these.

P0 = B00 + B01*(Program type) + R0
P1 = B10
P2 = B20
P3 = B30
P4 = B40
P5 = B50
P6 = B60
P7 = B70
P8 = B80

Level-3 model

No school-level characteristics appear in the model. The level-2 intercept (B00) and the level-2 coefficient for program type (B01) as well as the level-1 coefficients are considered as outcomes in the level-3 equation. In this analysis, all child and class effects are assumed to be fixed across schools. In this application of a 3-level HLM model, level-3 is included so that school-level variance components are calculated.

B00 = G000 + U00
B01 = G010
B10 = G100
B20 = G200
B30 = G300
B40 = G400
B50 = G500
B60 = G600
B70 = G700
B80 = G800

The regression models presented in chapter 5 (tables 5 and 7) were obtained after testing all child and class characteristics discussed in that chapter and many interaction effects between program type and other class and child characteristics. The main effects and interaction terms tested in these analyses are selected based on the research literature mentioned in this report and on prior analyses done with the ECLS-K data. The focus of the analyses is to describe the relationship between program type and cognitive gains while controlling for other related variables and to investigate whether this relationship is consistent across levels of child and other class characteristics. The child characteristics considered in these analyses are those that are often associated with academic performance (e.g., West, Denton, and Reaney 2001). The class level characteristics tested in these models are those that, like program type, are related to the time and individual attention available for instruction for each child in the kindergarten classroom. The interactions tested in the analyses investigate whether gains made in full-day programs are differentially associated with other child and class characteristics. As described in chapter 5, the tested main effects are: poverty status, race/ethnicity, age, sex, fall reading ability (or fall mathematics ability for the mathematics gains model), time lapse between assessments, program type, class size, presence of an instructional aide, relative time for reading instruction (or relative time for mathematics instruction for the math gains model), use of reading achievement groups (or mathematics groups for the mathematics gains model), region of the country, location, and school's concentration of low-income students. The interactions effects tested are: 'program type x race/ethnicity,' 'program type x age,' 'program type x sex,' 'program type x fall reading (or mathematics) ability,' 'program type x class size,' 'program type x aide,' 'program type x aide x race/ethnicity,' 'program type x use of reading (or mathematics) groups.' The initial models were reduced to the final models presented in tables 5 and 7 using a backward elimination procedure. That is, non-significant effects were dropped from the model one at a time using the Wald statistic. Non-significant terms ($p>.05$) were not included in the final models presented. The regression coefficients, standard errors, and p-values presented in the footnotes accompanying statements about non-significant terms are those obtained when adding the terms to the final models presented in tables 5 and 7. There is no indication of multicollinearity between the independent variables tested in the models which would suggest that a variable was not included in the model due to it's close association with another variable in the model. The Variance Inflation Factors (VIF), which provide a measure of the degree of collinearity among independent variables all fall below the common cutoff threshold of 10.0 (Hair, Anderson, Tatham, and Black 1998). For all variables tested in the reading analysis, the VIF values ranged from 1.02 to 1.71, and for variables in the mathematic analyses the VIF values ranged from 1.01 to 1.74.

The HLM method allows the variance components at each level of a model to be analyzed. Chapter 5 presents the variance of gain scores that is associated with each level of the data (i.e., children within classrooms, classes within schools, and between schools) and the amount of variance at each level that can be attributed to the child and classroom characteristics specified in the models. Variance components are compared from one model to the next by calculating the change as a percent. For example, the school-level variance of mathematics gain scores after accounting for child-level characteristics is 1.80 and when program type is added to

the model this goes down to 1.49. This represents a change of 17 percent (((1.80–1.48)/1.80)*100). This is interpreted to mean that after accounting for the relationship between child characteristics and mathematic score gains, program type accounts for 17 percent of the variation of mathematics score gains between schools.

Weights and Standard Errors

Chapters 2, 3 and 4

To produce the national school, child and class level estimates from the ECLS-K data that appear respectively in chapters 2, 3, and 4 of this report, the sample data were weighted. Weighting the data adjusts for unequal selection probabilities at the school and child level and adjusts for school, child, teacher and parent nonresponse. In addition to properly weighting the responses, special procedures for estimating the statistical significance of the estimates are employed because of the ECLS-K's complex sample design. Replication methods of variance estimation are used to reflect the sample design used in the ECLS-K. A form of the jackknife replication method (JK2) using 90 replicates is used to compute approximately unbiased estimates for the standard errors of the estimates using WesVarPC.

Chapter 5

The hierarchical linear model analyses presented in chapter 5 are weighted at the child level to account for unequal selection probabilities and nonresponse.[49] The multi-level nature of these analyses eliminates the need to take into account the complex design of the sample of schools and children when estimating variances since class- and school-level variation are accounted for in the models.[50] Reported standard errors and p-values for all coefficients are those produced using the HLM software (Bryk and Raudenbush 2002).

[49] The child level weight C2BYCOM is normalized so that the sum of the weights equals the sample size.

[50] This approach does not take into account clustering associated with primary sampling units.

Variable Definitions

Each of the variables used in the report are defined below. Variables not discussed in the findings chapters but that appear in the accompanying tables of estimates (appendix A) are also defined here.

Chapter 2—School variables

Program type: Full-day or half-day kindergarten program type is determined for teachers from information provided by teachers in the fall and spring teacher questionnaires. Inconsistencies between rounds are resolved with information from the field management system used by ECLS-K field staff to schedule assessments. Schools that have at least one teacher that is identified as teaching a full-day class is classified as a full-day school and those that have at least one half-day teacher are classified as a half-day school. The estimates for the school level comparisons sum to more than 100 percent because these two categories are not mutually exclusive.

School type: Information from the school administrator questionnaire is used to categorize each school as either public, Catholic, other religious private or non-religious private. For cases where school administrator information is missing, school sample frame data are used to create this variable.

Region: States including in each region are as follows: the Northeast includes CT, ME, MA, NH, RI, VT, NJ, NY, PA; the Midwest includes IL, IN, MI, OH, WI, IA, KS, MN, MO, NE, ND, SD; the South includes DE, DC, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, TX; the West includes: AZ, CO, ID, MT, NV, NM, UT, WY, AK, CA, HA, OR, WA.

Location: This variable is assigned on the basis of the school's physical address, or mailing address, if the former is not reported. Location types are grouped into three categories in this report, Large and mid-sized cities, Suburbs/large towns, and Small town/rural.

Large and mid-sized cities

- Large city—central city of a metropolitan statistical area (MSA) or consolidated MSA (CMSA), with a population of at least 250,000.

- Midsize city—central city of an MSA or CMSA, with a population less than 250,000.

Suburbs/large town

- Urban fringe of a large or mid-sized city—any incorporated place, Census-designated place (CDP), or non-place territory within a CMSA or MSA of a large or mid-sized city and defined as urban by the U.S. Bureau of the Census.
- Large town—an incorporated place or CDP with a population of at least 25,000 and located outside a CMSA or MSA.

Small town/rural

- Small town—an incorporated place or CDP with a population between 2,500 and 24,999 and located outside a CMSA or MSA.
- Rural—any incorporated place, CDP, or non-place territory designated as rural by the U.S. Bureau of the Census.

School minority enrollment: Information from the school administrator questionnaire is used to create this variable. This variable represents the percent of children enrolled at all grade levels in the school who are identified as something other than "White, non-Hispanic."

School's concentration of low-income students: A standard indicator used for describing the income level of a school's student population is the percent of the students who are eligible for free or reduced-priced lunch. Eligibility for free or reduced-priced meals is based on household income which must be below 185 percent of the federal poverty level to qualify for reduced-priced meals and below 130 percent of the federal poverty level for free meals. For the purpose of this report, schools with 50 percent or more of the its total enrollment eligible for free or reduced priced meals are classified as high poverty schools and schools with between 0–49 percent of enrolled children eligible for free or reduced-priced meals are designated as non-high poverty schools. Administrators reported the number of children at their school who are eligible for free lunch and for reduced-priced lunch. The two values are added together and converted to a percent of the school's total enrollment. However, these items on the school administrator questionnaire have a high level of item non-response (these data are missing for approximately 38 percent of public schools). Schools qualify for school-wide Title I funding when 50 percent or more of the students are eligible for free or reduced-priced lunch. Thus, for schools where the free and reduced-priced lunch information is missing, participation in a "school-wide" Title I program is used as an indicator of whether the free or reduced-priced lunch eligibility is below or above 50 percent.

Chapter 3—Child variables

Full-day enrollment estimates were presented at the child-level by the school-level variables described above and by the following child-level variables.

Program type: Full-day or half-day kindergarten program type is determined for teachers from information provided by teachers in the fall and spring teacher questionnaires. Inconsistencies between rounds are resolved with information from the field management system used by ECLS-K field staff to schedule assessments. A child's program type is determined by the program type of the teacher to whom the child is linked.

Sex: This variable was obtained during the school visit and verified when necessary during the parent interview.

Mother's education: This variable is constructed using a question about the highest grade the mother had completed and for cases where she did not complete high school, whether the mother had obtained a high school equivalency degree. This information is collapsed into four categories: less than high school, high school diploma or equivalent, some college including vocational/technical training, and bachelor's degree or higher.

Primary language spoken in the home: A dichotomous variable is used to indicate whether or not English was the primary language spoken at

home. This composite is constructed by using responses to three questions in the parent interview: whether another language other than English was regularly spoken at home; if yes, whether English was also spoken at home; and if English and one or more other languages were spoken at home, which of those languages is considered the home's primary language.

Child's race/ethnicity: The race/ethnicity composite is computed using two parent-reported variables, ethnicity and race. Parents indicated whether the child is Hispanic and then selected one or more races. All Hispanic children are classified as Hispanic regardless of the race indicated and all non-Hispanic children who belong to more than one racial group are grouped in the "other" category for analyses in this report.

Diagnosed disability: This composite variable is derived from parent information on whether the child has been diagnosed by a professional as having problems with attention, activity level, coordination, speech, hearing, or vision, or has participated in therapy or programs form children with disabilities.

First time kindergartner: Approximately 5 percent of the kindergarten children in the study had also been in kindergarten the previous school year. Children that were not repeating kindergarten were designated as first time kindergartners. Both types of kindergartners are represented in chapter 3 where child-level estimates are presented. In chapter 5, however, only first time kindergartners are represented in the analyses of fall to spring gain scores.

Poverty status: The child poverty variable is based on the federal government's poverty threshold, which is calculated using household income and the number of people living in the household. Income is imputed for children for whom this information is missing using related data from the parent interview. In 1998, the poverty threshold for a family of four was $16,655. This variable has two categories, children whose household is at or above the poverty threshold and children whose household is below the poverty threshold.

Child's age at entry: This variable is the child's age at the beginning of the 1998–99 school year. This variable was constructed using two variables: month and year of birth.

Chapter 4—Class variables

Program type: Full-day or half-day kindergarten program type is determined for teachers from information provided by teachers in the fall and spring teacher questionnaires. Inconsistencies between rounds are resolved with information from the field management system used by ECLS-K field staff to schedule assessments. Morning and afternoon classes for teachers that teach two half-day classes are treated as two separate classes in this report. Teachers with two half-day classes provided the class composition information (percent minority and percent limited English proficiency), separately for each class.

Percent minority: Information from the teacher questionnaire is used to create this variable. This variable is the percent of children in the class who are identified as something other than "White, non-Hispanic."

Percent limited English proficient: Teachers provide information about the number of children in the class that have limited English proficiency. This number is converted into a percent of the class using the total class size composite variable described below.

Teacher's race/ethnicity: The teacher's race/ethnicity composite is computed using two items from the teacher questionnaire, ethnicity and race. Teacher's indicated whether they are Hispanic and then selected one or more races. All Hispanic teachers are classified as Hispanic regardless of the race indicated and all non-Hispanic teachers who belong to more than one racial group are grouped in the "other" category.

Teachers provided information about this and other background characteristics (highest degree, certification, and years teaching kindergarten) on questionnaires distributed in the fall. Teachers new to the study in the spring received questionnaires with these items during the spring data collection.

Teacher's highest degree: Teachers provided their highest level of education on the teacher questionnaire. The categories were collapsed to: bachelor's degree, master's degree, and doctorate or educational specialist degree. No public school teachers had less than a bachelor's degree as their highest education level.

Teacher certification: There are two separate variables for teachers certification: one indicating whether the teacher is certified in early childhood education and one indicating whether the teacher is certified in elementary education. This information comes from the teacher questionnaires.

Teachers' certification type: Teachers who report having a "regular" teaching certificate or "the highest certification available" were grouped into the category "fully certified." Teachers who report having a temporary, probational, provisional, or emergency certificate, or those who report having an alternative certification program are grouped into the category "other".[51]

Years teaching kindergarten: This variable is from a single question on the teacher questionnaire. The teachers provided the number of years, including the current school year, that they have taught kindergarten (including "transistional/ readiness kindergarten" and "transistional/pre-1st grade").

Class size: Teachers with two half-day classes provided class size information separately for each class. This variable is derived from multiple teacher questionnaire items. Class size is based on the total enrollment item that follows the enrollment counts for students of different racial/ethnic backgrounds. For classes where this information was missing, the total enrollment item following the enrollment counts for students of different ages was used. A third measure, the sum of the number of boys and the number of girls in the class was used when the other enrollment items are missing. This class size composite variable was then converted into a three-category variable: up to 17, 18–24, and 25+. The rationale for choosing these cut-off points is explained on page 52.

Classroom aides: Teachers provide information about three types of paid classroom aides—regular, special education and English as a second language (ESL) aides. Information about the aides in the class was collected in the spring of 1999. For this report, a class is identified as having one of these three types of aides if the aide is paid (as opposed to a volunteer), works directly with children on instructional tasks (as opposed to helping with non-instructional tasks) and spends at least an hour per day in the classroom. Teachers with two half-day classes did not provide this information separately for each class. It is assumed that teachers report this information for the entire day rather than for each class separately. Therefore, when constructing this variable teachers with two half-day classes had to report having the aide for at least *two* hours during the day in order to have the aide count for the two classes. An assumption is made for these teachers that an aide they have for two hours during the day spends about an hour in each of their two classes.

Classroom organization: In the spring of the kindergarten year, teachers report the amount of time per day their students spend in different types of teacher-directed activities—whole class, small group and individual—and the amount of time per day students spend in child-selected activities. The response categories for each of these four items are "no time," "half an hour or less," "about one hour," "about two hours," and "three or more hours." In order to create a time estimate that could be averaged, the five response categories are converted to minutes; 0, 15, 60, 120, and 180, respectively. The time spent in each of these different arrangements is reported both in terms of actual number of minutes and in terms of the percent of the total class time that is devoted to each activity. The total available time was calculated by adding the number of minutes across the

[51]The ECLS-K does not include teachers with probationary certificates in its estimate of teachers with full certification because probationary certificates were grouped along with temporary and emergency certification on the ECLS-K questionnaire. Published reports based on the 1999–2000 Schools and Staffing Survey (e.g., Seastrom et al. 2002) have treated teachers with probationary certificates as certified. Data from the 1999–2000 SASS indicate that 3 percent of public school kindergarten teachers in 1999–2000 who were certified had a probationary certificate.

four variables. The percent of total time for each variable (whole class, small group, individual, or child-selected) was calculated by dividing the number of minutes for that variable by the number of sum of the minutes reported across the four variables. Teachers with two half-day classes did not report this information separately for each of their classes; it was assumed that their responses would be similar for each class and were linked to both of their classes as reported.

Grouping strategies: Teachers report the grouping strategies they use on the spring teacher questionnaire. Six variables are reported, three for reading instruction and three for mathematics instruction—mixed level groups, achievement groups, and peer tutoring. Teachers report the frequency that they use each of these grouping strategies and the responses for each are collapsed into three categories: 1) *daily*, 2) *weekly* ("two or three times a week" and "once a week"), and 3) *less than weekly* ("once a month," "two or three times a month" and "never"). Responses provided by teachers with two half-day classes were linked to both of their classes.

Subject areas—frequency: Teachers report the frequency their children have various subject areas on the spring teacher questionnaire. The subject areas are, reading language arts, mathematics, social studies, science, music, art, dance/creative movement, and theater/creative dramatics. For the purpose of this report the responses to these items are collapsed into three categories: 1) *daily*, 2) *weekly* ("two or three times a week" and "once a week"), and 3) *less than weekly* ("once a month," "two or three times a month" and "never"). Responses provided by teachers with two half-day classes were linked to both of their classes.

Subject areas—minutes per day: Teachers report the number of minutes their children spend on subject areas on the days that the subject area is taught. The number of minutes per day for reading and the number of minutes per day for mathematics are reported using the same response categories that appear on the questionnaire, "1–30 minutes a day," "31–60 minutes a day," "61–90 minutes a day," and "more than 90 minutes a day." In chapter four, these variables are presented for all classes, without regard to the number of days the subject area is taught. Responses provided by teachers with two half-day classes were linked to both of their classes.

Reading and mathematics skills and activities: The variables for specific skills and activities discussed in chapter four and shown in figures B1 to B14 come from the spring teacher questionnaires. For the purpose of this report the responses to these items are collapsed into three categories: 1) daily, 2) weekly ("*two or three times a week*" and *"once a week*"), and 3) less than weekly ("*once a month," "two or three times a month*" and *"never*"). The response categories for the list of skills differ slightly from the ones used for activities; "not taught" appears on the list of skills and is treated the same as "never" responses on the list of activities.

Additional variables for Chapter 5

Many of the variables used in the analyses described in chapter five are defined above (e.g., program type, class size, and child's race/ethnicity). The variables unique to chapter five are described below. Complete descriptions of every chapter 5 variable including how they are used in the context of the regression analyses appear in that chapter on pages 51 through 54.

Reading gain score: This is the difference between the child's spring and fall reading IRT scale scores. The fall and spring IRT scale scores represent estimates of the number of items students would have answered correctly if they had taken all of the 72 questions in the reading test.

Mathematics gain score: This is the difference between the child's spring and fall reading IRT scale scores. The fall and spring IRT scale scores represent estimates of the number of items students would have answered correctly if they had taken all of the 64 questions in the mathematics test.

Initial reading ability: The distribution of all children's fall reading scale scores are examined and three equal-sized groups are formed to represent low, middle and high initial reading ability groups.

Initial mathematics ability: Like reading, the distribution of all children's fall mathematics scale scores are examined and three equal-sized groups are formed to represent low, middle and high initial math ability groups.

Time lapse between assessments: The number of days between the fall and spring assessment dates is calculated and transformed so that 1 equals 180 days (approximately the mean time lapse) and other values represent a proportion of 180 days (e.g., 150 days = .83). This variable has values ranging from .64 to 1.46. See page 52 for a discussion about why this variable is included.

Relative time for reading instruction: This is a dichotomous classroom variable indicating whether or not the class spends a relatively large amount of time on reading/language arts instruction. This variable is based on teachers' responses to questions about the number of minutes per day and number of times per week they have reading instruction in their class. Since full-day and half-day classes do not have the same amount of total time during the day for instruction, the relative time for reading instruction variable is created separately for full-day and half-day programs. For full-day classes, the modal response for reading instruction is the category 61–90 minutes per day and for half-day classes the modal response category is 31–60 minutes per day. For the purpose of these analyses a full-day class is categorized as having "more" time for reading instruction, if reading is taught at least 3–4 times a week and more than 90 minutes per day. Half-day classes are categorized as having "more" time for reading instruction if reading is taught at least 3–4 times a week and more than 60 minutes per day.

Relative time for mathematics instruction: The distribution of responses for amount of time spent on mathematics instruction is examined to create a "time for math instruction" variable. The modal response for full-day classes is 31–60 minutes per day, so classes are coded as having "more" time for math instruction when math is taught more than 60 minutes per day (and at least 3–4 times per week). In half-day classes, the mode response is 1–30 minutes per day so these classes are classified as having "more" time for mathematics instruction if they have math for more than 30 minutes per day (and at least 3–4 times per week).