



# Primary Early Care and Education Arrangements and Achievement at Kindergarten Entry



# Primary Early Care and Education Arrangements and Achievement at Kindergarten Entry

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# EXECUTIVE SUMMARY

Young children experience various types of early care and education environments the year before they enter kindergarten. Some children attend center-based arrangements such as preschools, childcare centers, or Head Start programs, while others are cared for in relatives' or nonrelatives' homes or are normally cared for only by their parents (Denton and Germino Hausken 2000; Snyder and Dillow 2016). Prior research indicates that children's participation rates in specific types of primary care arrangements and their knowledge and skills at kindergarten entry differ in relation to certain characteristics of children and their families, including age at kindergarten entry, race/ethnicity, primary home language, and mother's educational attainment (Denton and Germino Hausken 2000; Mulligan, Hastedt, and McCarroll 2012). Earlier research also finds evidence of positive associations between participation in early care and education (ECE) arrangements and academic skills around the time that children begin kindergarten (Bradley and Vandell 2007; Denton Flanagan and McPhee 2009; Magnuson et al. 2004; NICHD Early Child Care Research Network 2002).

This Statistical Analysis Report builds upon prior work by using the most recently available data to explore relationships between children's primary care and education arrangements the year before kindergarten and their academic skills and learning behaviors at kindergarten entry, after accounting for child and family background characteristics. In the report, ECE arrangements are classified into five groups: (1) center-based care (including day care centers, Head Start programs, preschools, prekindergartens, and other early childhood programs), (2) home-based relative care, (3) home-based nonrelative care, (4) multiple arrangements (i.e., children who spent an equal amount of time in each of two or more types of arrangements), and (5) no ECE arrangement on a regular basis (i.e., children who had no regularly scheduled care arrangement and mainly received care only from their parents). Information for this report comes from the nationally representative National Household Education Surveys Program (NHES) and the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011) data collections.

Data from the NHES cross-sectional sample survey are used to describe trends in participation in ECE arrangements that children experience prior to kindergarten entry. The NHES Early Childhood Program Participation (ECPP) surveys gather information on children's participation in ECE programs and the characteristics of these arrangements. Parents reported information on their child's participation in different types of ECE arrangements in 1995, 2001, 2005, and 2012. This report compares estimates of 4- and 5-year-old children's primary ECE arrangements prior to kindergarten entry in 1995 and 2012. Estimates are presented overall and by children's race/ethnicity, their family's poverty status, and their mother's educational attainment.

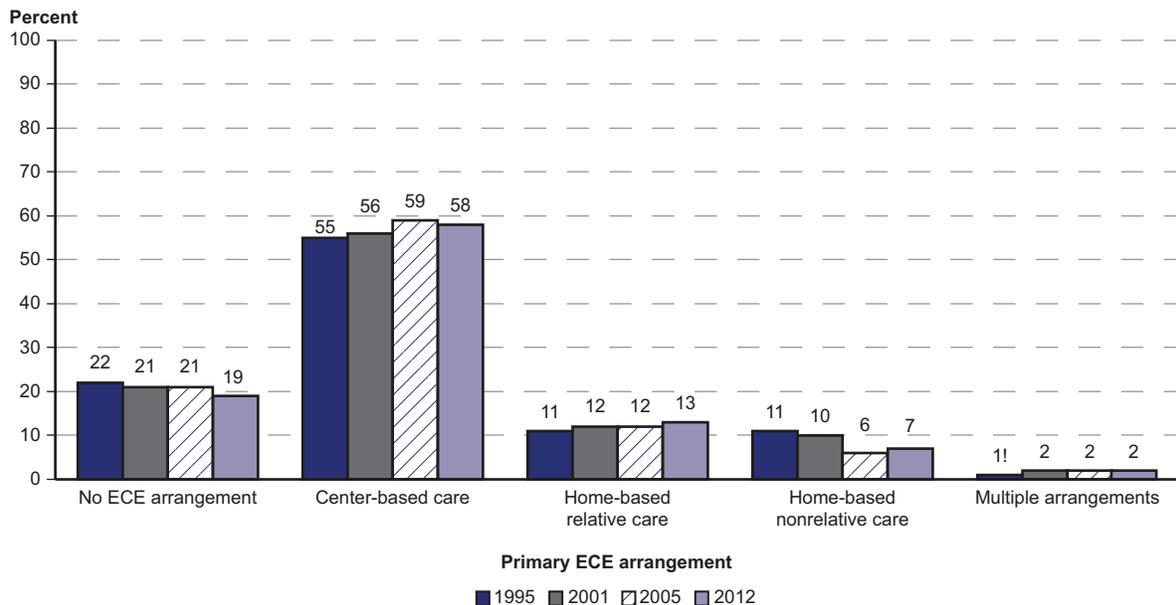
Data from the ECLS-K:2011 longitudinal sample survey are used to explore relationships between primary ECE arrangements the year before kindergarten and academic skills and learning behaviors at kindergarten entry. The ECLS-K:2011 collects detailed information on the school achievement and experiences of students from the 2010–11 kindergarten school year through the spring of 2016, when most of them are expected to be in fifth grade. In the fall of 2010 and spring of 2011, parents reported information on child and family characteristics and their child's participation in ECE settings the year before kindergarten; children were assessed in reading, mathematics, and cognitive flexibility; and kindergarten teachers reported on children's approaches to learning. The report describes the distribution of primary ECE arrangements that first-time kindergartners attended in the year before entering kindergarten in the fall of 2010,

including differences in primary ECE arrangements by characteristics of children and their families. The report also describes differences in first-time kindergartners' academic knowledge, skills, and learning behaviors at kindergarten entry relative to their primary ECE arrangement, after accounting for children's sex, age at kindergarten entry, race/ethnicity, family type, primary home language, and socioeconomic status (SES).

All comparisons of estimates were tested for statistical significance using Student's *t* test and ordinary least squares (OLS) regression, and all differences cited are statistically significant at the  $p < .05$  level. No adjustments were made for multiple comparisons.

## ***Did participation in different types of primary ECE arrangements for children ages 4 and 5 years old who were not yet enrolled in kindergarten in 2012 change compared with 1995?***

**Figure A. Percentage distribution of children ages 4 and 5 years old who were not yet enrolled in kindergarten, by primary early care and education (ECE) arrangement: Selected years, 1995 through 2012**



! Interpret data with caution. The coefficient of variation (CV) for this estimate is between 30 and 50 percent.

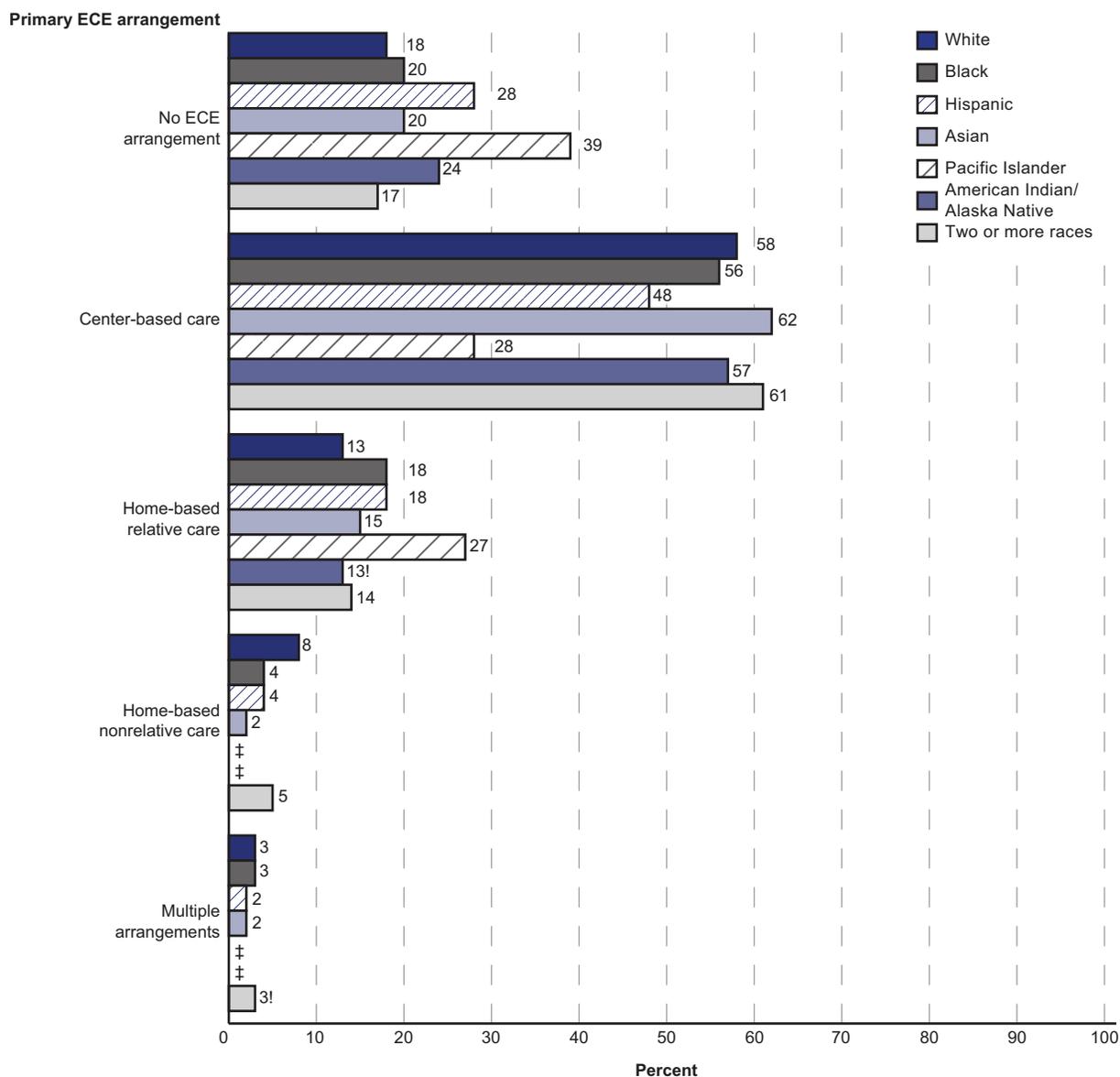
NOTE: A child's "primary arrangement" was defined as the regular nonparental care arrangement or early childhood education program in which the child spent the most time per week. "No ECE arrangement" refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more types of arrangements. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Program Participation Survey of the National Household Education Surveys Program (ECP-P-NHES:1995, 2001, 2005, and 2012).

Based on information from the NHES, the overall percentage of children ages 4 and 5 years old who attended center-based care as their primary ECE arrangement before kindergarten entry was higher in 2012 than in 1995 (58 vs. 55 percent), while the percentage of children who primarily received home-based nonrelative care as their primary ECE arrangement was lower in 2012 than in 1995 (7 vs. 11 percent, figure A and table A-1). The overall percentages of children receiving home-based relative care as their primary ECE arrangement (13 percent) and those with no ECE arrangement on a regular basis (19 percent) in 2012 were not measurably different from the percentages in 1995.

## Did participation in different types of primary ECE arrangements for fall 2010 first-time kindergartners in the year before entering kindergarten vary by child and family characteristics?

Figure B. Percentage distribution of first-time kindergartners, by primary type of early care and education (ECE) arrangement prior to kindergarten entry and child's race/ethnicity: Fall 2010



! Interpret data with caution. The coefficient of variation (CV) for this estimate is between 30 and 50 percent.

‡ Reporting standards not met (too few cases for a reliable estimate).

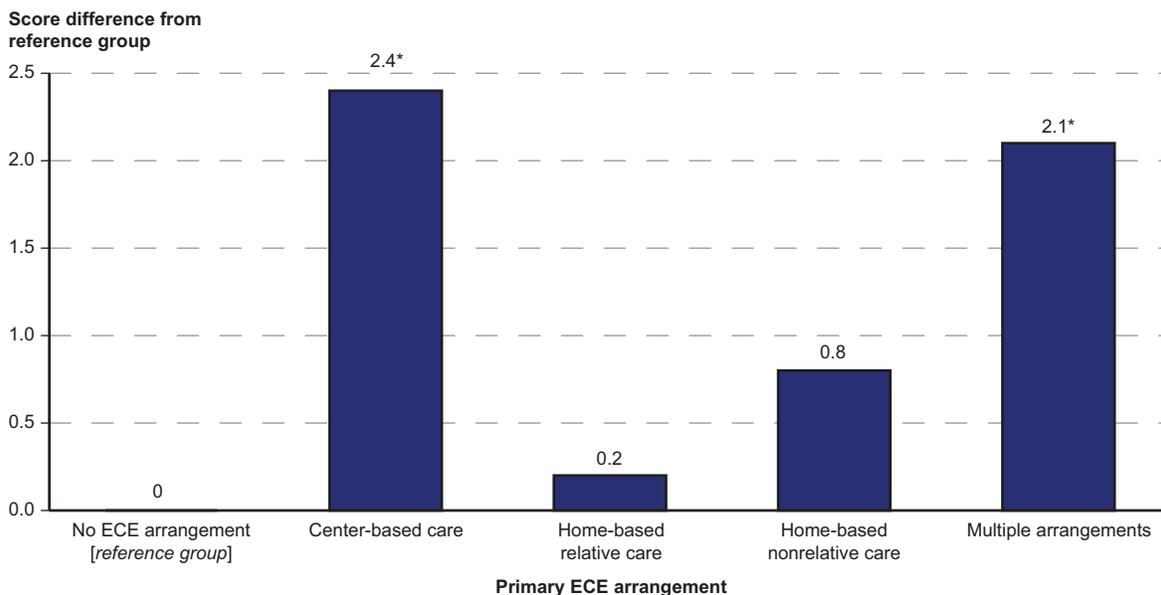
NOTE: Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Primary type of child care arrangement refers to the type of nonparental care in which the child spent the most hours. "No ECE arrangement" refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more types of arrangements. Race categories exclude persons of Hispanic ethnicity. Detail may not sum to totals because of rounding and survey item nonresponse. SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

Based on information from the ECLS-K:2011, the percentages of fall 2010 first-time kindergartners with various primary ECE arrangements the year before kindergarten differed by race/ethnicity, SES, family type, and primary home language (figures B and 4, and table A-2). For instance, the percentages of first-time kindergartners who received center-based care as their primary ECE arrangement the year before kindergarten were lower for Hispanics (48 percent) and Pacific Islanders (28 percent) than for Whites (58 percent), Blacks (56 percent), Asians (62 percent), American Indians/Alaska Natives (57 percent), and kindergartners of Two or more races (61 percent). In addition, about 36 percent of kindergartners from households that spoke a language other than English as their primary language had no ECE arrangement on a regular basis the year before kindergarten, compared with 18 percent of kindergartners whose primary home language was English.

### ***Were differences in first-time kindergartners' academic skills and learning behaviors in the fall of kindergarten related to their primary ECE arrangement the year before kindergarten, after accounting for characteristics of kindergartners and their families?***

Using information from the ECLS-K:2011, academic skills and learning behavior scores of fall 2010 first-time kindergartners at kindergarten entry were compared with respect to students' primary ECE arrangements the year before kindergarten. In general, after accounting for characteristics of kindergartners and their families, academic skill and learning behavior scores were lower for those who did not attend any ECE arrangement on a regular basis and for those who primarily attended home-based relative care than for those who primarily attended center-based care and those who attended multiple ECE arrangements for equal amounts of time.

**Figure C. Adjusted fall kindergarten reading score difference, by primary early care and education (ECE) arrangement prior to kindergarten entry: Fall 2010**



\*  $p < 0.05$ .

NOTE: The reading score reflects performance on questions measuring basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition), vocabulary knowledge, and reading comprehension (including locate/recall questions, integrate/interpret questions, and critique/evaluate questions about text the children were asked to read). Actual scores for all kindergartners range from 6 to 83. Primary ECE arrangement refers to the type of nonparental care in which the child spent the most hours. "No ECE arrangement" refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

After accounting for children's sex, age at kindergarten entry, race/ethnicity, family type, primary home language, and SES, the following findings were observed:

- Fall kindergarten reading scores were lower, on average, for children who had no regular ECE arrangements the year before kindergarten and for those whose primary ECE arrangements were home-based relative care or nonrelative care than for children whose primary ECE arrangements were center-based care or multiple care arrangements for equal amounts of time (figure C, tables 1, A-4, and A-5).
- Fall kindergarten mathematics scores were lower, on average, for children who had no regular ECE arrangements the year before kindergarten than for children who attended any type of ECE arrangement (figure 6, table 1). In addition, children who were primarily in home-based relative care also scored lower in mathematics than children who were primarily in home-based nonrelative care, center-based care, or multiple care arrangements for equal amounts of time (table A-4).
- Fall kindergarten cognitive flexibility scores were lower, on average, for children who had no regular ECE arrangements the year before kindergarten and for those whose primary arrangements were home-based relative care than for children who primarily attended center-based care (figure 7, tables 1 and A-4). In addition, children who had no regular ECE arrangements also scored lower in cognitive flexibility than children who were primarily in multiple care arrangements for equal amounts of time. To measure cognitive flexibility, a component of executive functioning, children were administered the Dimensional Change Card Sort (DCCS), in which they were asked to sort a series of cards into one of two trays according to different rules (e.g., by color, by shape).
- Fall kindergarten approaches to learning ratings were lower, on average, for children who had no regular ECE arrangements the year before kindergarten than for those who were primarily in home-based nonrelative care, center-based care, or multiple care arrangements for equal amounts of time (figure 8, table 1). For the approaches to learning measure, teachers reported on how students rated in seven areas: attentiveness, task persistence, eagerness to learn, learning independence, flexibility, organization, and ability to follow classroom rules, with higher scores indicating that a child exhibits positive learning behaviors more often.

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# INTRODUCTION

Young children experience various types of early care and education environments the year before they enter kindergarten. Some children attend center-based arrangements such as preschools, childcare centers, or Head Start programs, while others are cared for in relatives' or nonrelatives' homes or are normally cared for only by their parents (Denton and Germino Hausken 2000; Snyder and Dillow 2013). Prior research indicates that children's participation rates in specific types of primary care arrangements and their knowledge and skills at kindergarten entry differ in relation to certain characteristics of children and their families, including age at kindergarten entry, race/ethnicity, primary home language, and mother's educational attainment (Denton and Germino Hausken 2000; Mulligan, Hastedt, and McCarroll 2012).

Earlier research also finds evidence of positive associations between participation in early care and education (ECE) arrangements and academic skills around the time that children begin kindergarten. Results from the Early Childhood Longitudinal Study, Birth Cohort of 2001 showed that children who participated in regular early care and education arrangements the year prior to kindergarten scored higher on the reading and mathematics assessments in the fall of kindergarten than their peers who were regularly cared for only by their parents the year prior to entering kindergarten (Denton Flanagan and McPhee 2009). Similarly, research conducted on the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 also found that center-based care attendance the year before kindergarten was related to higher reading and mathematics skills at kindergarten entry, after controlling for family characteristics and other factors that were related to center-based care access and academic performance (Magnuson et al. 2004). A separate study conducted by the National Institute of Child Health and Human Development (NICHD), the Study of Early Child Care, found that children who received more center-based care scored higher on measures of cognitive and linguistic functioning prior to kindergarten entry, even after accounting for several child and family background characteristics (NICHD Early Child Care Research Network 2002). A review of research on child care and well-being, including the type of care received, noted that children who attended center-based care arrangements tended to score higher in cognitive functioning, after controlling for family demographics and parenting behaviors (Bradley and Vandell 2007).

This Statistical Analysis Report builds upon prior work by using the most recently available data to explore relationships between children's primary ECE arrangements the year before kindergarten and their academic skills and learning behaviors at kindergarten entry, after accounting for child and family background characteristics. Information for this report comes from the nationally representative National Household Education Surveys Program (NHES) and the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011) data collections. The ECLS-K:2011 provides a unique opportunity to explore relationships between primary care arrangements the year before kindergarten and children's early academic skills because the study collects data in the 2010–11 school year on a nationally representative sample of kindergartners through direct assessments of their skills at kindergarten entry, interviews with their parents, and questionnaires completed by their teachers. The NHES data serve a complementary role by providing nationally representative estimates over time on the percentages of children who attended different types of primary care arrangements before kindergarten.

This report provides data at the child level, and explores three questions:

1. Did participation in different types of primary ECE arrangements for children ages 4 and 5 years old who were not yet enrolled in kindergarten in 2012 change compared with 1995?
2. Did participation in different types of primary ECE arrangements for fall 2010 first-time kindergartners in the year before entering kindergarten vary by child and family characteristics?
3. Were differences in first-time kindergartners' academic skills and learning behaviors in the fall of kindergarten related to their primary ECE arrangement the year before kindergarten, after accounting for characteristics of kindergartners and their families?

In the report, primary ECE arrangements are classified into five groups based on care arrangements used on a regular basis: (1) center-based care (including day care centers, Head Start programs, preschools, prekindergartens, programs for children with disabilities, and other early childhood programs), (2) home-based relative care, (3) home-based nonrelative care, (4) multiple arrangements (i.e., children who spent an equal amount of time in each of two or more types of arrangements), and (5) no ECE arrangement on a regular basis (i.e., children who had no regularly scheduled care arrangement and mainly received care only from their parents). Children were classified into mutually exclusive groups based on the ECE arrangement in which they spent the most time each week on a regular basis to allow for comparisons of skills at kindergarten entry across all types of care arrangements.

A limitation of this report is that the primary ECE arrangement and family socioeconomic status (SES) variables used in the analyses are only a subset of potential configurations of variables that can be compared in relation to children's academic skills at kindergarten entry. Also, the primary ECE arrangement variable allows for comparisons of fall kindergarten skills across different types of primary arrangements; however, it does not account for varying levels of participation at one or more types of ECE arrangements. For example, two children could attend center-based care for the same number of hours each week and yet, because of differences in the care arrangements of the children for the rest of the hours in the week, end up being classified into two different primary ECE arrangement groups for the purposes of the report analyses. If the first child only attended center-based care and then spent the remainder of time in parental care, the child would be classified as having center-based care as the primary ECE arrangement. In contrast, if the second child attended center-based care for the same number of hours as the first child, but spent a greater number of hours in home-based relative care each week, this child would be classified as having home-based relative care, not center-based care, as the primary ECE arrangement. Future research can build upon these initial findings by exploring relationships between levels of participation in different combinations of ECE settings and skills at the start of kindergarten. In addition, future research could explore different aspects of family SES, such as focusing on parental education, household income, or poverty status to assess whether certain aspects were more strongly associated with skills at kindergarten entry.

# DATA SOURCES

Data used in this report come from the NHES and ECLS-K:2011. The following section provides a description of the NHES and ECLS-K:2011, including information on survey content, target population, data collection periods, sample sizes, and response rates. Additional details about the NHES and ECLS-K:2011 data and the measures used can be found in Appendix B: Technical Notes and Methodology and the NHES (<http://nces.ed.gov/nhes/>) and ECLS (<http://nces.ed.gov/ecls/>) websites.

## National Household Education Surveys Program (NHES)

Using data from the NHES cross-sectional sample, this report describes trends in participation in children's primary ECE arrangements prior to kindergarten entry. In the NHES:1995 Early Childhood Program Participation (ECPP) Survey, parents of about 14,000 children from birth through age 10 and in third grade or below were interviewed by telephone. In NHES:2001, parents of approximately 6,700 children from birth through age 6 who were not yet in kindergarten were interviewed by telephone. In NHES:2005, parents of about 7,200 children from birth through age 6 who were not yet in kindergarten were interviewed by telephone. Mailed questionnaires for the NHES:2012 ECPP were completed by parents for 7,893 children from birth through the age of 5 who were not yet enrolled in kindergarten. Parents reported information about their household and background characteristics and their child's participation in different types of ECE arrangements in 1995, 2001, 2005, and 2012.

Administrations of NHES prior to 2012 used a random-digit dial sample of landline phones and computer-assisted telephone interviewing to conduct interviews. However, due to declining response rates for all telephone surveys and the increase in households that only or mostly use a cell phone instead of a landline, NHES:2012 was changed to an address-based sample survey that was administered with printed questionnaires mailed to the sampled respondents. The NHES:2012 sample was selected using a two-stage address-based sampling frame. The first sampling stage selected residential addresses, and the second sampling stage selected an eligible child from information provided on the household mail screener. To increase the number of Black and Hispanic children in the sample, Black and Hispanic households were sampled at a higher rate than other households by identifying census tracts with higher percentages of these residents.

The overall weighted response rate for the ECPP survey (the product of the screener weighted unit response rate and the ECPP survey weighted unit response rate) was about 66.3 percent in 1995, about 59.9 percent in 2001, about 56.4 percent in 2005, and about 58.1 percent in 2012.

This report compares estimates of 4- and 5-year-old children's primary ECE arrangements prior to kindergarten entry in 1995 and 2012. Estimates are presented overall and by children's race/ethnicity, their family's poverty status, and their mother's educational attainment. Details about the key NHES variables included in the report are presented in Appendix B: Technical Notes and Methodology.

The NHES estimates in this report were weighted using the probabilities of selection of the respondents and other adjustments to account for nonresponse and coverage bias. The weight used for NHES:1995 data was EWEIGHT, and the weights used for NHES:2001, NHES:2005, and NHES:2012 data were FEWT. The standard errors presented in this report were produced using Jackknife 1 replication procedures in the SAS statistical software package.

More information about the NHES, including technical documentation and questionnaires, can be found on the NCES website at <http://nces.ed.gov/nhes/>.

## Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)

Using data from the ECLS-K:2011, this report explores relationships between primary ECE arrangements the year before kindergarten and academic skills and learning behaviors at kindergarten entry. The survey provides detailed information on the school achievement and experiences of students throughout their elementary school years. The students participating in the ECLS-K:2011 are being followed longitudinally from the kindergarten year (the 2010–11 school year) through the spring of 2016, when most of them are expected to be in fifth grade.

Approximately 18,200 students participated in the base year collection of the ECLS-K:2011. The study is designed to be nationally representative of all students who were enrolled in kindergarten or who were of kindergarten age and being educated in an ungraded classroom or school in the United States in the 2010–11 school year, including those in public and private schools, those who attended full-day and part-day programs, those who were in kindergarten for the first time, and those who were kindergarten repeaters. Students who attended early learning centers or institutions that offered education only through kindergarten are included in the study sample and represented in the cohort. The sample includes children from different racial/ethnic and socioeconomic backgrounds and children with limited English proficiency. Asian and Pacific Islander students were oversampled to assure that the sample included enough students of this race/ethnicity to be able to make accurate estimates for these students as a group. In addition, the study sample includes children with disabilities.

This report focuses on data collected in the kindergarten (base year). In the fall of 2010 and spring of 2011, parents reported information on child and family characteristics and their child's participation in ECE settings the year before kindergarten; children were assessed in reading, mathematics, and cognitive flexibility; and kindergarten teachers reported on children's approaches to learning.

The ECLS-K:2011 cohort was sampled using a multistage sampling design. In the first stage, 90 primary sampling units (PSUs) were selected from a national sample of PSUs. The PSUs were counties and county groups. In the second stage, public and private schools educating kindergartners (or ungraded schools educating children of kindergarten age) were selected within the PSUs. Finally, students were sampled from the selected schools. In the third stage of sampling, approximately 23 kindergartners were selected from a list of all enrolled

kindergartners (or students of kindergarten age being educated in an ungraded classroom) in each of the sampled schools. Asian and Pacific Islander students were oversampled to assure that the sample included enough students of this race/ethnicity to be able to make accurate estimates for these students as a group.

A total of approximately 780 of the 1,320 originally sampled schools participated during the base year of the study. This translates to a weighted unit response rate (weighted by the base weight) of 63 percent for the base year. The weighted student unit response rates were 87 percent for the fall data collection and 85 percent for the spring data collection. The weighted parent unit response rates were 74 percent for the fall data collection and 67 percent for the spring data collection.

The report describes the distribution of primary ECE arrangements that first-time kindergartners attended in the year before entering kindergarten in the fall of 2010, including differences in primary ECE arrangements by characteristics of children and their families. The report also describes differences in first-time kindergartners' academic knowledge, skills, and learning behaviors at kindergarten entry relative to their primary ECE arrangement, after accounting for student and family characteristics including children's sex, age at kindergarten entry, race/ethnicity, family type, primary home language, and SES. Details about the key ECLS-K:2011 variables included in the report are presented in Appendix B: Technical Notes and Methodology.

The ECLS-K:2011 data are weighted to compensate for unequal probabilities of selection at each sampling stage and to adjust for the effects of school, teacher, before- and afterschool care provider, child, and parent nonresponse. Estimates for this Statistical Analysis Report were weighted by W1\_2P0, which is the base-year child weight adjusted for nonresponse to the fall or spring parent interview. The standard errors presented in this report were produced using Jackknife 2 replication procedures in the SAS statistical software package.

More information about the ECLS-K:2011, including technical documentation and questionnaires, can be found on the NCES website at <http://nces.ed.gov/ecls/kindergarten2011.asp>.

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# METHODOLOGY

For the report questions regarding whether participation in primary ECE arrangements changed for 4- and 5-year-olds between 1995 and 2012 (question 1) and whether participation in different primary ECE arrangements for fall 2010 first-time kindergartners varied by child and family characteristics (question 2), comparisons of means and percentages were tested for statistical significance at the .05 level using Student's *t* test to ensure that the differences are larger than those that might be expected due to sampling variation. For the report question regarding whether differences in first-time kindergartners' academic skills and learning behaviors in the fall of kindergarten were related to their primary ECE arrangement the year before kindergarten, after controlling for selected child and family characteristics (question 3), ordinary least squares (OLS) regression analyses were conducted. Independent variables were entered simultaneously for each regression analysis. Children with no regular ECE arrangement the year before kindergarten served as the reference primary ECE arrangement group for the regression table (table 1). Comparisons for other groups (e.g., home-based relative care vs. other types of primary ECE arrangements) were conducted using the same regression model, with the exception that the reference group was changed so that it was the primary ECE arrangement being compared to other primary ECE arrangements (tables A-4 through A-7 in Appendix A: Reference Tables). Significant regression coefficients generated by the OLS procedure indicate the units of change in the dependent variable when comparing one primary ECE arrangement group against the reference group, after taking into account all of the other independent variables in the model.

Readers are cautioned not to make causal inferences from the data presented here and, when making comparisons across time or surveys, to be aware of differences in sample designs and data collection procedures. NHES and ECLS-K:2011 estimates are based on samples. The sample estimates may differ somewhat from the values that would be obtained from the universe of respondents. As sample surveys, NHES and ECLS-K:2011 data are weighted to produce population estimates, which are provided in Appendix A: Reference Tables. Since the two studies are collected over different time periods and include different age groups, they are not directly comparable across demographic and other related variables.

The standard errors for each estimate are based on the amount of variation in the responses and the size of the sample or subgroup for which the estimate is computed. No adjustments were made for multiple comparisons. For more information on the methodology used in this report, please see Appendix B: Technical Notes and Methodology.

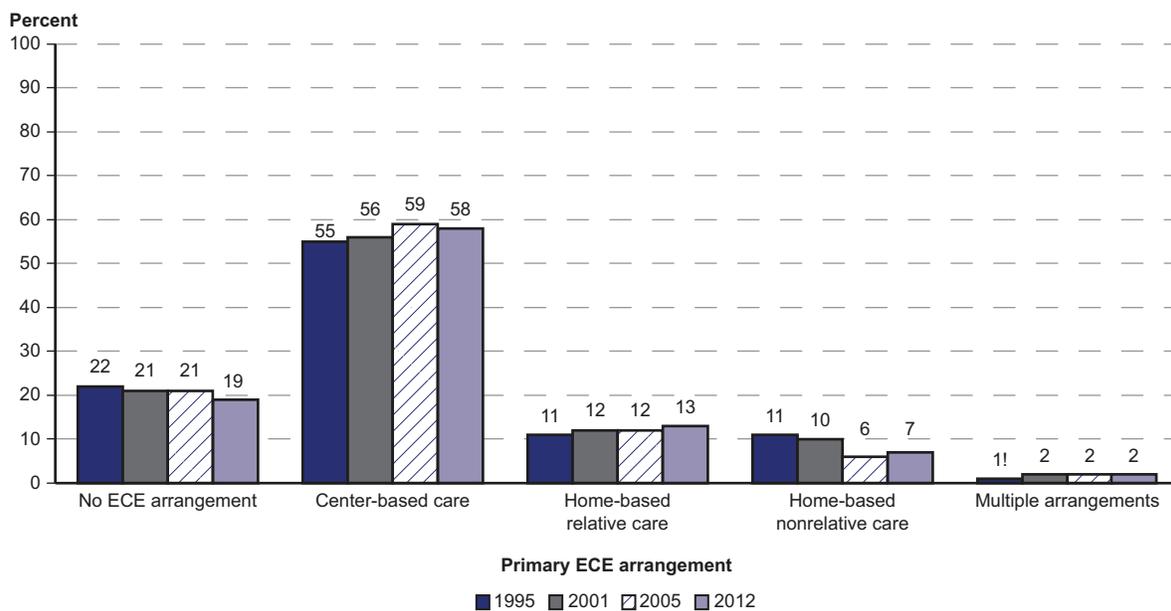
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## FINDINGS

Presented below are findings from the primary ECE arrangement analyses using the NHES and ECLS-K:2011 data files. For all questions, children are classified into one of these primary ECE arrangement types: (1) center-based care, (2) home-based relative care, (3) home-based nonrelative care, (4) multiple arrangements (i.e., children who spent an equal amount of time in each of two or more types of arrangements), and (5) no ECE arrangement on a regular basis (i.e., children who had no regularly scheduled care arrangement and mainly received care only from their parents). Findings for question 1 are based on data collected in the NHES ECCP surveys, while findings for questions 2 and 3 are based on data collected in the ECLS-K:2011 survey.

### *Did participation in different types of primary ECE arrangements for children ages 4 and 5 years old who were not yet enrolled in kindergarten in 2012 change compared with 1995?*

**Figure 1. Percentage distribution of children ages 4 and 5 years old who are not yet enrolled in kindergarten, by primary early care and education (ECE) arrangement: Selected years, 1995 through 2012**



! Interpret data with caution. The coefficient of variation (CV) for this estimate is between 30 and 50 percent.

NOTE: A child's "primary arrangement" was defined as the regular nonparental care arrangement or early childhood education program in which the child spent the most time per week. "No ECE arrangement" refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more types of arrangements. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Program Participation Survey of the National Household Education Surveys Program (ECCP-NHES:1995, 2001, 2005, and 2012).

Data collected in the NHES were used to provide information on the prevalence of different types of primary ECE arrangements over time for children ages 4 and 5 years old who were not yet enrolled in kindergarten. Overall, the percentage of 4- and 5-year-olds who attended center-based care as their primary ECE arrangement before kindergarten entry was higher in 2012 than in 1995 (58 vs. 55 percent; figure 1 and table A-1). However, there were no measurable changes in the percentages of children in center-based care between 2012 and 1995 by child's race/ethnicity, family poverty status, or mother's highest level of education. In contrast, the percentage of 4- and 5-year-olds who received home-based nonrelative care as their primary ECE arrangement was lower in 2012 than in 1995 overall (7 vs. 11 percent), as well as for children in the following subgroups: Black children (2 vs. 8 percent), children from nonpoor<sup>1</sup> families (9 vs. 14 percent), children whose mother's highest level of education was vocational or technical school or some college (6 vs. 11 percent), and children whose mother's highest level of education was a bachelor's or higher degree (10 vs. 15 percent; table A-1).

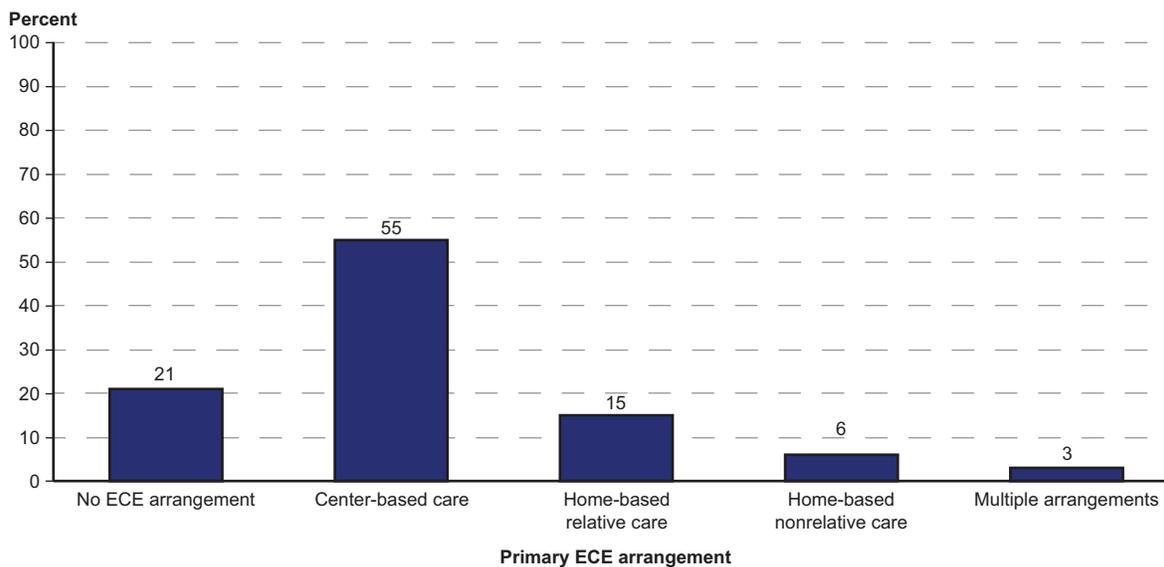
The overall percentage of children receiving home-based relative care as their primary ECE arrangement in 2012 (13 percent) was not measurably different from the percentage in 1995, nor were the 2012 percentages measurably different from the 1995 percentages by children's race/ethnicity, family poverty status, or mother's highest level of education. Despite an apparent difference, the overall percentage of 4- and 5-year-olds who did not attend any ECE arrangement on a regular basis in 2012 (19 percent) was not measurably different from the percentage in 1995. However, the percentages of children attending no ECE arrangement on a regular basis were lower in 2012 than in 1995 for Hispanic children (24 vs. 34 percent) and for children from near-poor families (24 vs. 32 percent).

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<sup>1</sup> Poverty status is defined in terms of the Census Bureau's poverty threshold, a dollar amount that varies depending on a family's size and composition and is updated annually to account for inflation. In 2012, for example, the poverty threshold for a family of four with two children was \$23,283. Poor students are those with family incomes below the poverty threshold; near-poor students are those with family incomes ranging from the poverty threshold to 199 percent of the poverty threshold; and nonpoor students are those with family incomes at or above 200 percent of the poverty threshold.

## Did participation in different types of primary ECE arrangements for fall 2010 first-time kindergartners in the year before entering kindergarten vary by child and family characteristics?

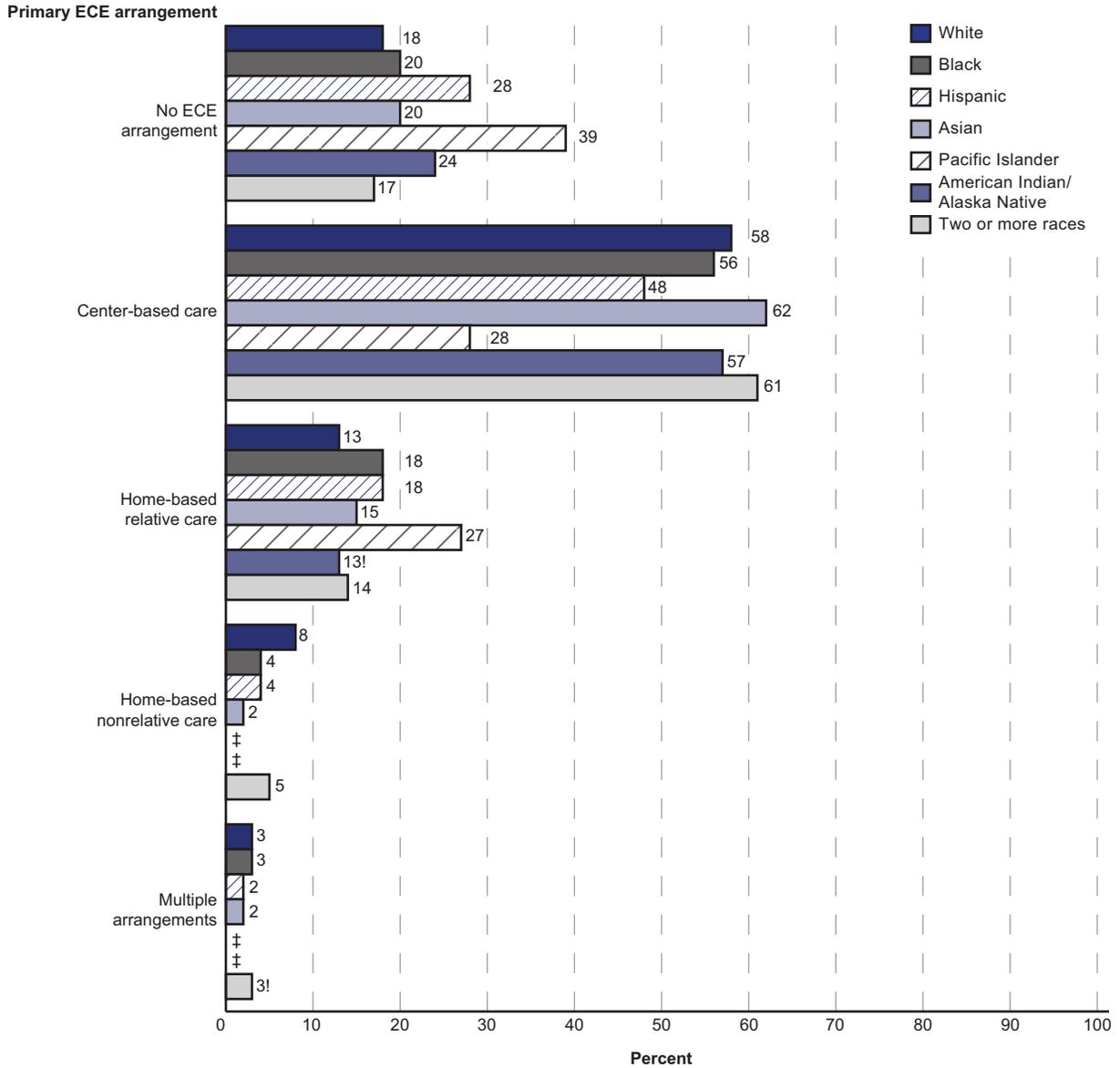
Figure 2. Percentage distribution of first-time kindergartners' primary type of early care and education (ECE) arrangement prior to kindergarten entry: Fall 2010



NOTE: Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Primary type of child care arrangement refers to the type of nonparental care in which the child spent the most hours. “No ECE arrangement” refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. “Multiple arrangements” refers to children who spent an equal amount of time in each of two or more types of arrangements. Detail may not sum to totals because of rounding and survey item nonresponse.  
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

Data collected in the ECLS-K:2011 were used to provide information on children’s participation in primary ECE arrangements the year before kindergarten for children who started kindergarten in the fall of 2010. Some 21 percent of fall 2010 first-time kindergartners received care only from their parents on a regular basis in the year prior to kindergarten and did not attend any ECE arrangement (figure 2 and table A-2). The remaining 79 percent of fall 2010 first-time kindergartners attended some type of regularly scheduled ECE arrangement in the year prior to kindergarten: 55 percent primarily attended center-based care arrangements, 15 percent primarily attended home-based relative care, 6 percent primarily attended home-based nonrelative care, and 3 percent primarily attended multiple care arrangements for equal amounts of time.

**Figure 3. Percentage distribution of first-time kindergartners, by primary type of early care and education (ECE) arrangement prior to kindergarten entry and child's race/ethnicity: Fall 2010**



! Interpret data with caution. The coefficient of variation (CV) for this estimate is between 30 and 50 percent.

‡ Reporting standards not met (too few cases for a reliable estimate).

NOTE: Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Primary type of child care arrangement refers to the type of nonparental care in which the child spent the most hours. "No ECE arrangement" refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more types of arrangements. Race categories exclude persons of Hispanic ethnicity. Detail may not sum to totals because of rounding and survey item nonresponse.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

It was less common for Hispanic and Native Hawaiian or Other Pacific Islander<sup>2</sup> children than for children from other racial/ethnic groups to attend a center-based setting as the primary ECE arrangement the year before kindergarten. The percentages of first-time kindergartners who received center-based care as their primary ECE arrangement before kindergarten were lower for Hispanics (48 percent) and Pacific Islanders (28 percent) than for Whites (58 percent), Blacks (56 percent), Asians (62 percent), American Indians/Alaska Natives (57 percent), and kindergartners of Two or more races (61 percent; figure 3 and table A-2). In contrast, the percentages of fall 2010 kindergartners who did not attend any ECE arrangement on a regular basis the year before kindergarten were higher for Hispanics (28 percent) and Pacific Islanders (39 percent) than for Whites (18 percent), Blacks (20 percent), and Asians (20 percent). Also, the percentage of Pacific Islander kindergartners with no regular ECE arrangement was higher than the percentages for American Indian/Alaska Native kindergartners (24 percent) and kindergartners of Two or more races (17 percent).

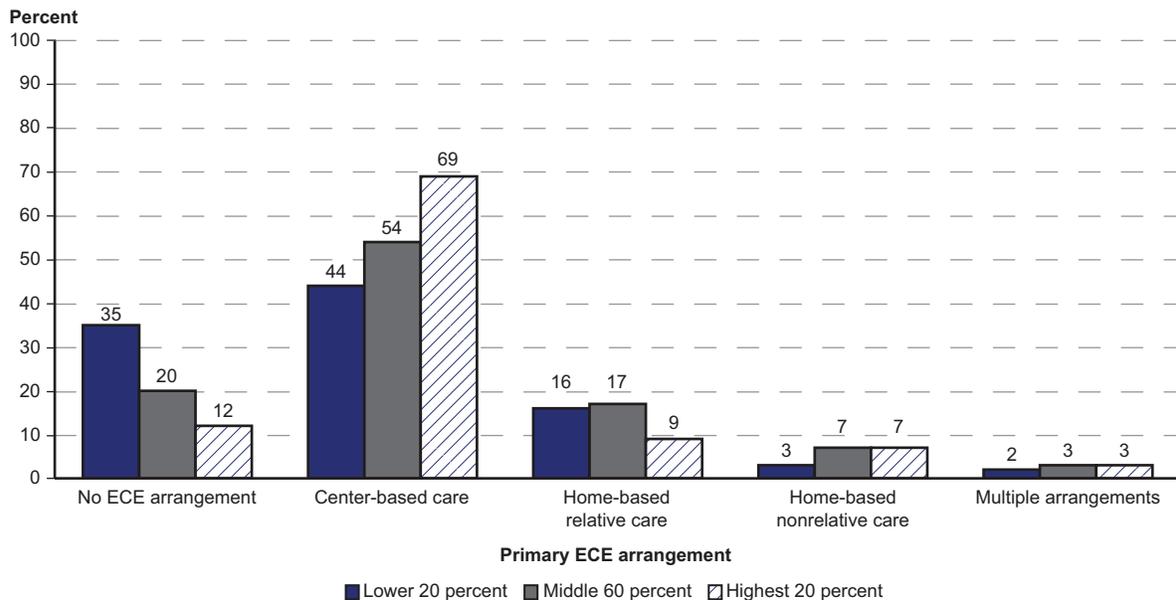
With respect to home-based care arrangements, higher percentages of Black and Hispanic kindergartners (18 percent each) than of White (13 percent) kindergartners and kindergartners of Two or more races (14 percent) received relative care as their primary ECE arrangement, and the percentage of Hispanic kindergartners receiving relative care was also higher than the percentage of Asian kindergartners (15 percent) doing so. The percentage of kindergartners who primarily received nonrelative care was higher for White kindergartners (8 percent) than for Black (4 percent), Hispanic (4 percent), and Asian kindergartners (2 percent), as well as kindergartners of Two or more races (5 percent).

The percentages of fall 2010 first-time kindergartners who attended various primary ECE arrangements did not differ by sex, and few differences were observed with respect to age at kindergarten entry. About 12 percent of kindergartners who were more than 6 years old at kindergarten entry received home-based relative care as their primary ECE arrangement, compared with 16 percent of kindergartners who entered kindergarten when they were 5 to 5½ years old and 15 percent who entered when they were more than 5½ years old to 6 years old (table A-2). On the other hand, 9 percent of kindergartners who were more than 6 years old at kindergarten entry received home-based nonrelative care as their primary ECE arrangement, compared with 4 percent of kindergartners who entered kindergarten when they were less than 5 years old and 6 percent who entered when they were 5 to 5½ years old.

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<sup>2</sup> A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands. Used interchangeably with the shorter term *Pacific Islander*.

**Figure 4. Percentage distribution of first-time kindergartners, by primary type of early care and education (ECE) arrangement prior to kindergarten entry and socioeconomic status (SES): Fall 2010**



NOTE: Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Primary type of child care arrangement refers to the type of nonparental care in which the child spent the most hours. “No ECE arrangement” refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. “Multiple arrangements” refers to children who spent an equal amount of time in each of two or more types of arrangements. Socioeconomic status (SES) was measured by a composite score based on parental education and occupations and household income at the time of data collection. Detail may not sum to totals because of rounding and survey item nonresponse.  
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

It was more common for children from households of high socioeconomic status (SES) than for those from households of lower SES to attend center-based settings as the primary ECE arrangement the year before kindergarten. Kindergartners’ SES was measured in the ECLS-K:2011 by a composite score based on parental education and occupations and household income at the time of data collection. Kindergartners living in households in the highest 20 percent of the SES scale were identified as kindergartners from high-SES households, those living in households in the middle 60 percent of the SES scale were identified as kindergartners from middle-SES households, and those living in households in the lowest 20 percent of the SES scale were identified as kindergartners from low-SES households. About 69 percent of kindergartners from high-SES households were in center-based arrangements as their primary ECE arrangement, compared with 54 percent of kindergartners from middle-SES households and 44 percent of kindergartners from low-SES households (figure 4 and table A-2). In contrast, about 35 percent of fall 2010 first-time kindergartners from low-SES households had no ECE arrangement on a regular basis the year before kindergarten, compared with 12 percent of kindergartners from high-SES households and 20 percent of kindergartners from middle-SES households. In terms of home-based ECE arrangements, the percentage of kindergartners who primarily received relative care was lower for kindergartners from high-SES households (9 percent) than for those from middle-SES (17 percent) and low-SES households (16 percent). In contrast, the percentage of kindergartners who primarily received nonrelative care was lower for kindergartners from low-SES households (3 percent) than for those from middle- and high-SES households (7 percent each).

Other household characteristics, such as family type and primary home language, were also related to participation in various primary ECE arrangements the year before kindergarten. For instance, a higher percentage of fall 2010 first-time kindergartners from two-parent households (57 percent) than from mother-only (50 percent) or father-only households (43 percent) attended center-based settings as their primary ECE arrangement (table A-2). In contrast, a lower percentage of kindergartners from two-parent households (12 percent) than from mother-only (24 percent) or father-only households (31 percent) received home-based relative care as their primary ECE arrangement. In addition, a higher percentage of kindergartners whose primary home language was English (57 percent) received center-based care as their primary ECE arrangement than did kindergartners from households that spoke a primary language other than English (45 percent). Conversely, 36 percent of kindergartners from households that spoke a language other than English as their primary language had no regular ECE arrangement the year before kindergarten, compared with 18 percent of kindergartners whose primary home language was English.

***Were differences in first-time kindergartners' academic skills and learning behaviors in the fall of kindergarten related to their primary ECE arrangement the year before kindergarten, after accounting for characteristics of kindergartners and their families?***

Among the many strengths of the ECLS-K:2011 are that it collects not only information provided by parents on background characteristics and primary ECE arrangements the year before kindergarten but also data directly from kindergartners and teachers on students' performance in different academic areas. In the fall of kindergarten, students were administered individual assessments in reading, mathematics, and cognitive flexibility, and kindergarten teachers reported on students' approaches to learning.

One method of comparing academic skills and learning behavior scores for different groups of students is the use of bivariate analyses, which do not account for student background characteristics. For example, a *t* test analysis can be used to determine whether fall kindergarten mathematics scores are significantly higher for students who primarily attended center-based care (32.0 points) than for those who primarily attended home-based relative care (28.3 points) the year before kindergarten (table A-3). However, one of the limitations of such bivariate analyses is that they compare information across groups without taking into account the influence of other factors that may also be related to differences.

When comparing ECE arrangements the year before kindergarten with achievement at school entry, multivariate analyses—such as ordinary least squares (OLS) multiple regression models—provide information on whether group differences persist after controlling for other student and family characteristics such as kindergartners' sex, age at kindergarten entry, race/ethnicity, household type, primary home language, and SES. Results in the previous section demonstrate that kindergartners' participation in ECE arrangements the year before kindergarten vary with respect to characteristics of children and their families. In addition, prior research based on the ECLS-K:2011 data indicates that fall 2010 first-time kindergartners' academic skills in the beginning of kindergarten are associated with individual and family characteristics (Mulligan,

Hastedt, and McCarroll 2012). For instance, bivariate analyses in that report indicated that Asian first-time kindergartners had higher reading and mathematics scores at kindergarten entry than first-time kindergartners of other races/ethnicities, and White first-time kindergartners had higher reading and math scores than Black, Hispanic, Pacific Islander, and American Indian/Alaska Native kindergartners. In addition, Black kindergartners scored higher in reading than Hispanic kindergartners, and Pacific Islander kindergartners had higher mathematics scores than Hispanic kindergartners. With respect to family characteristics, first-time kindergartners in two-parent households had higher reading and mathematics scores at kindergarten entry than those in households of different structures, and first-time kindergartners with a primary home language of English scored higher in both subjects than those from households with a primary home language other than English.

Since ECE arrangements and academic achievement both differ by child and family characteristics, multivariate analyses are used in this report to allow for estimation of differences in academic skills and learning behaviors at the start of kindergarten by children's primary ECE arrangement the year before kindergarten, after controlling for selected child and family characteristics. This section presents results from OLS regression analyses of ECLS-K:2011 data. These results may provide answers to questions about relationships between primary ECE arrangements the year before kindergarten and academic outcomes, in general, and may provide an answer to the specific question, "How are kindergartners' primary ECE arrangements the year before kindergarten associated with their reading, mathematics, cognitive flexibility, and approaches to learning skills in the beginning of kindergarten, holding other factors, such as socioeconomic status, constant?" For each regression model, all independent variables (e.g., sex, race/ethnicity) were entered simultaneously, so that relationships between individual independent variables and the dependent variable (e.g., fall kindergarten reading score) could be described after controlling for the effect of all of the other independent variables in the model.

The following findings present information on relationships between primary ECE arrangements the year before kindergarten and academic skills and learning behaviors at kindergarten entry, after accounting for children's sex, age at kindergarten entry, race/ethnicity, family type, primary home language, and SES.

**Table 1. Estimated coefficients from ordinary least squares (OLS) regressions of fall kindergarten reading, mathematics, science, cognitive flexibility, and approaches to learning scores for children with no regular early care and education arrangement prior to kindergarten entry, by selected child and family characteristics: 2010–11**

Variable	Mean reading score <sup>1</sup>		Mean mathematics score <sup>2</sup>		Mean cognitive flexibility score <sup>3</sup>		Mean approaches to learning score <sup>4</sup>	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Intercept	13.51*	(1.521)	-7.55*	(2.007)	10.15*	(0.586)	1.35*	(0.119)
Primary type of early care and education (ECE) arrangement prior to kindergarten entry <sup>5</sup>								
(No regular ECE arrangement)								
Center-based care	2.37*	(0.230)	2.86*	(0.272)	0.38*	(0.110)	0.06*	(0.017)
Home-based relative care	0.21	(0.255)	0.72*	(0.305)	0.16	(0.124)	0.04	(0.021)
Home-based nonrelative care	0.78	(0.437)	2.40*	(0.451)	0.33	(0.209)	0.07*	(0.025)
Multiple arrangements	2.08*	(0.535)	3.06*	(0.568)	0.59*	(0.212)	0.08*	(0.039)
Sex of child								
(Male)								
Female	1.04*	(0.197)	-0.04	(0.219)	0.39*	(0.070)	0.31*	(0.014)
Age of child at kindergarten entry, fall 2010	0.36*	(0.022)	0.59*	(0.029)	0.06*	(0.008)	0.02*	(0.002)
Race/ethnicity of child								
(White)								
Black	-0.96*	(0.415)	-3.51*	(0.349)	-1.10*	(0.153)	-0.07*	(0.022)
Hispanic	-1.54*	(0.365)	-2.99*	(0.307)	-0.66*	(0.102)	-0.01	(0.021)
Asian	6.32*	(0.598)	5.53*	(0.676)	-0.04	(0.175)	0.09	(0.048)
Native Hawaiian/ Pacific Islander	-2.11	(1.371)	-2.74	(1.708)	-1.45*	(0.601)	-0.06	(0.082)
American Indian/ Alaska Native	-3.03*	(0.553)	-3.77*	(0.980)	-0.61	(0.507)	0.05	(0.068)
Two or more races	0.30	(0.485)	-0.46	(0.541)	-0.27	(0.144)	-0.02	(0.034)
Household type, fall 2010								
(Two-parent household)								
Single-parent or other household type	-2.26*	(0.197)	-2.75*	(0.255)	-0.25*	(0.088)	-0.17*	(0.018)
Primary home language								
(English)								
Non-English	-2.07*	(0.366)	-2.59*	(0.340)	-0.75*	(0.144)	0.05	(0.028)
Socioeconomic status (SES) <sup>6</sup>								
(Higher SES percents)								
Lowest 20 percent	-3.98*	(0.275)	-5.25*	(0.319)	-0.50*	(0.117)	-0.16*	(0.023)

\*  $p < 0.05$ .

<sup>1</sup> Reflects performance on questions measuring basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition), vocabulary knowledge, and reading comprehension (including locate/recall questions, integrate/interpret questions, and critique/evaluate questions about text the children were asked to read). Actual scores for all kindergartners range from 6 to 83 points.

<sup>2</sup> Reflects performance on questions on number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability (measured with a set of simple questions assessing children's ability to read a graph); and prealgebra skills such as identification of patterns. Actual scores for all kindergartners range from 5 to 75 points.

<sup>3</sup> To measure cognitive flexibility, children were administered the Dimensional Change Card Sort (DCCS) (developed by Philip Zelazo in 2006). Children were asked to sort a series of cards into one of two trays according to different rules (e.g., by color, by shape). Actual scores for all kindergartners range from 0 to 12 points.

<sup>4</sup> The approaches to learning scale is based on teachers' reports on how students rate in seven areas: attentiveness, task persistence, eagerness to learn, learning independence, flexibility, organization, and ability to follow classroom rules. Actual scores for all kindergartners range from 1 to 4, with higher scores indicating that a child exhibits positive learning behaviors more often.

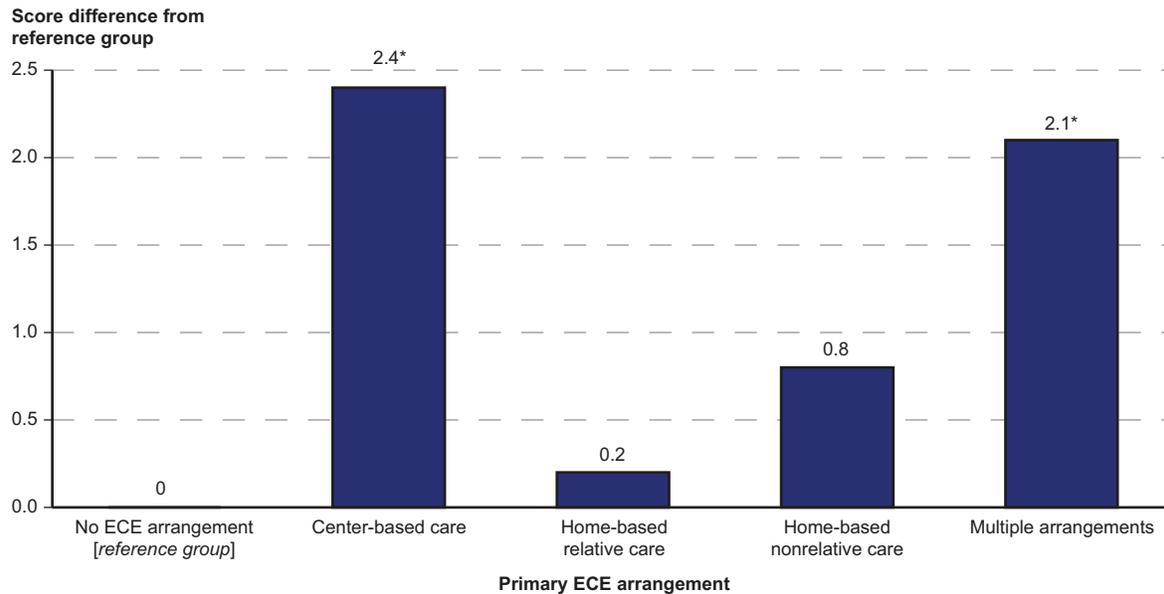
<sup>5</sup> The type of nonparental care in which the child spent the most hours. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements.

<sup>6</sup> Socioeconomic status (SES) was measured by a composite score based on parental education and occupations and household income at the time of data collection.

NOTE: The reference category is the first group listed and is shown in parentheses. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Two parents may refer to two biological parents, two adoptive parents, or one biological/adoptive parent and one other parent/partner. Single parent refers to one biological or adoptive parent only. In households without parents, the guardian or guardians may be related or unrelated to the child. Race categories exclude persons of Hispanic ethnicity.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

**Figure 5. Adjusted fall kindergarten reading score difference, by primary early care and education (ECE) arrangement prior to kindergarten entry: Fall 2010**



\*  $p < 0.05$ .

NOTE: The reading score reflects performance on questions measuring basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition), vocabulary knowledge, and reading comprehension (including locate/recall questions, integrate/interpret questions, and critique/evaluate questions about text the children were asked to read). Actual scores for all kindergartners range from 6 to 83. Primary ECE arrangement refers to the type of nonparental care in which the child spent the most hours. "No ECE arrangement" refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

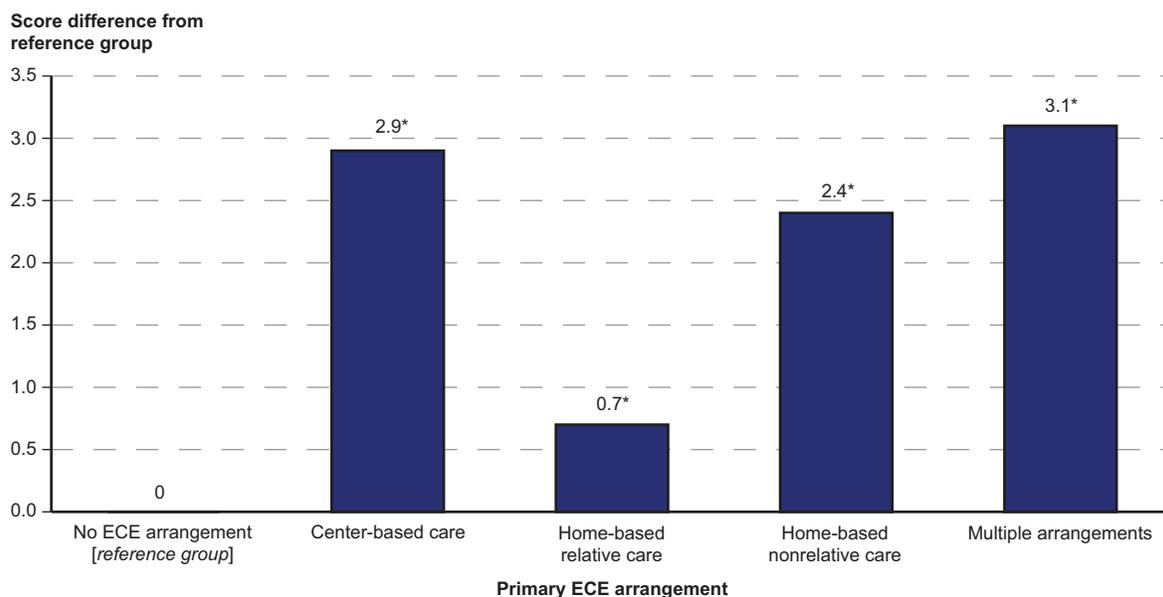
The ECLS-K:2011 reading assessment measures students' performance on questions measuring basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition); vocabulary knowledge; and reading comprehension. Possible scores on the reading assessment range from 0 to 100 points, with a standard deviation of 9.5 points (Tourangeau et al. 2012).

After accounting for child and family background characteristics, fall kindergarten reading scores were lower, on average, for children who had no regular ECE arrangements the year before kindergarten and for those whose primary ECE arrangements were home-based relative care or nonrelative care than for children whose primary ECE arrangements were center-based care or multiple care arrangements for equal amounts of time (tables 1, A-4, A-5, and figure 5). For example, first-time kindergartners who had no regular ECE arrangement the year before kindergarten scored 2.4 points,<sup>3</sup> or 0.25 standard deviations (SD),<sup>4</sup> lower in reading than their peers who attended center-based care as their primary arrangement and 2.1 points (0.22 SD) lower than their peers who had attended multiple ECE arrangements for equal amounts of time.

<sup>3</sup> Children with no regular ECE arrangement the year before kindergarten served as the reference group, with their regression coefficient set to zero. Score differences between this group and children with any type of primary ECE arrangement were calculated by subtracting the coefficient for the specific primary care type from 0. For example, the difference in fall kindergarten reading scores between children with no regular ECE arrangement and children whose primary ECE arrangement was center-based care was calculated as  $0 - 2.37$ , indicating that scores were 2.37 points lower for children with no regular ECE arrangement.

<sup>4</sup> Difference scores are presented in standard deviation (SD) units by dividing the unstandardized regression coefficient by the standard deviation of the assessment score. As an example, an unstandardized fall kindergarten reading coefficient of 2.37 for kindergartners who attended center-based care the year before kindergarten would be divided by the fall kindergarten reading score standard deviation of 9.457 to yield a difference of 0.25 SD.

**Figure 6. Adjusted fall kindergarten mathematics score difference, by primary early care and education (ECE) arrangement prior to kindergarten entry: Fall 2010**



\*  $p < 0.05$ .

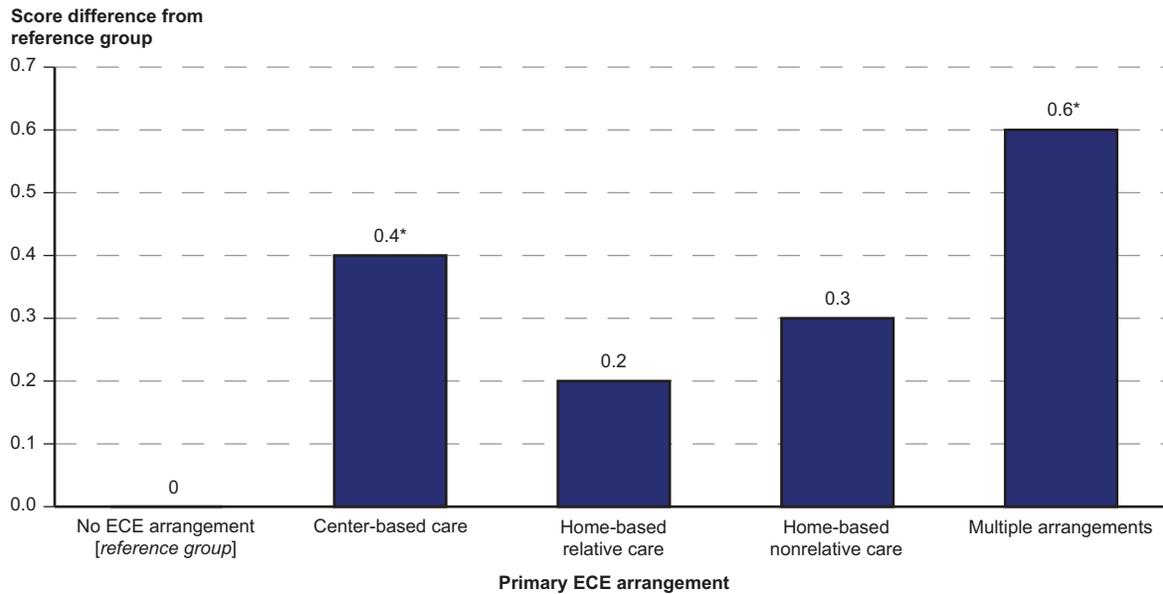
NOTE: The mathematics score reflects performance on questions on number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability (measured with a set of simple questions assessing children's ability to read a graph); and prealgebra skills such as identification of patterns. Actual scores for all kindergartners range from 5 to 75. Primary ECE arrangement refers to the type of nonparental care in which the child spent the most hours. "No ECE arrangement" refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

The ECLS-K:2011 mathematics assessment measures performance on questions pertaining to number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and prealgebra skills such as identification of patterns. Possible scores on the mathematics assessment range from 0 to 96 points, with a standard deviation of 10.9 points (Tourangeau et al. 2012).

Fall kindergarten mathematics scores were lower, on average, for children who had no regular ECE arrangements the year before kindergarten than for children who attended any type of ECE arrangement (table 1 and figure 6). For example, first-time kindergartners who had no regular ECE arrangement the year before kindergarten scored 2.9 points (0.26 SD) lower in mathematics than their peers who attended center-based care as their primary arrangement, 0.7 points (0.07 SD) lower than their peers who received home-based relative care, 2.4 points (0.22 SD) lower than their peers who received home-based nonrelative care, and 3.1 points (0.28 SD) lower than their peers who had attended multiple ECE arrangements for equal amounts of time. In addition, children who were primarily in home-based relative care also scored lower in mathematics than children who were primarily in home-based nonrelative care, center-based care, or multiple care arrangements for equal amounts of time (table A-4).

**Figure 7. Adjusted fall kindergarten cognitive flexibility score difference, by primary early care and education (ECE) arrangement prior to kindergarten entry: Fall 2010**



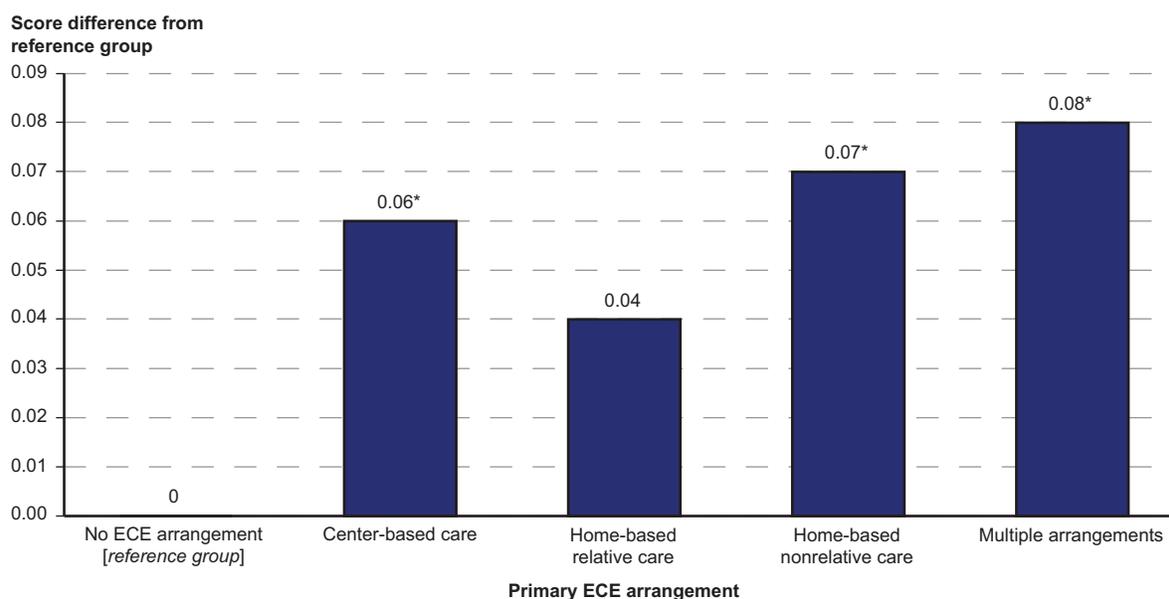
\*  $p < 0.05$ .

NOTE: To measure cognitive flexibility, children were administered the Dimensional Change Card Sort (DCCS) (developed by Philip Zelazo in 2006). Children were asked to sort a series of cards into one of two trays according to different rules (e.g., by color, by shape). Actual scores for all kindergartners range from 0 to 12. Primary ECE arrangement refers to the type of nonparental care in which the child spent the most hours. "No ECE arrangement" refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

Cognitive flexibility, a component of executive functioning, is a measure of children's ability to adjust their behaviors or attention in response to changes in their environment. The Dimensional Change Card Sort (DCCS) task measures cognitive flexibility by assessing the extent to which young children are able to hold two sets of rules in mind, apply them, and switch between them. In this task, children are asked to sort a series of picture cards into one of two trays according to different rules. In the first round, children are asked to sort the cards by the color of the object on the card; in the next round, they are asked to sort the cards by the shape of the object on the card. Then in the final round, the child is to sort by color if the card has a black border, and the child is to sort by shape if the card does not have a black border. Possible scores on the cognitive flexibility assessment range from 0 to 18 points, with a standard deviation of 3.3 points (Tourangeau et al. 2012).

Fall kindergarten cognitive flexibility scores were lower, on average, for children who had no regular ECE arrangements the year before kindergarten and for those whose primary arrangements were home-based relative care than for children who primarily attended center-based care (tables 1, A-4, and figure 7). In addition, children who had no regular ECE arrangements also scored lower in cognitive flexibility than children who were primarily in multiple care arrangements for equal amounts of time. For example, first-time kindergartners who had no regular ECE arrangement the year before kindergarten scored 0.4 points (0.11 SD) lower in cognitive flexibility than their peers who attended center-based care as their primary arrangement and 0.6 points (0.18 SD) lower than their peers who had attended multiple ECE arrangements for equal amounts of time.

**Figure 8. Adjusted fall kindergarten approaches to learning score difference, by primary early care and education (ECE) arrangement prior to kindergarten entry: Fall 2010**



\*  $p < 0.05$ .

NOTE: The approaches to learning scale is based on teachers' reports on how students rate in seven areas: attentiveness, task persistence, eagerness to learn, learning independence, flexibility, organization, and ability to follow classroom rules. Actual scores for all kindergartners range from 1 to 4, with higher scores indicating that a child exhibits positive learning behaviors more often. Primary ECE arrangement refers to the type of nonparental care in which the child spent the most hours. "No ECE arrangement" refers to children who did not attend any ECE arrangement on a regular basis. Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood arrangements. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

For the approaches to learning measure, teachers reported on how students rated in seven areas: attentiveness, task persistence, eagerness to learn, learning independence, flexibility, organization, and ability to follow classroom rules, with higher scores indicating that a child exhibits positive learning behaviors more often. Research suggests that children who demonstrate positive approaches to learning behaviors more frequently perform better academically, on average, in the early grades than students who demonstrate these behaviors less frequently (Kena et al. 2015).

The range of possible values for the fall kindergarten approaches to learning score was 1 to 4 points, with a standard deviation of 0.7 points (Tourangeau et al. 2012).

Fall kindergarten approaches to learning ratings were lower, on average, for children who had no regular ECE arrangements the year before kindergarten than for those who were primarily in home-based nonrelative care, center-based care, or multiple care arrangements for equal amounts of time (table 1 and figure 8). For example, first-time kindergartners who had no regular ECE arrangement the year before kindergarten scored 0.06 points (0.09 SD) lower in approaches to learning than their peers who attended center-based care as their primary arrangement, 0.07 points (0.11 SD) lower than their peers who received nonrelative care, and 0.08 points (0.12 SD) lower than their peers who had attended multiple ECE arrangements for equal amounts of time.

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## SUMMARY

Between 1995 and 2012, there were changes in the percentages of children ages 4 and 5 years old who received different types of ECE arrangements as their primary arrangement before kindergarten entry. The percentage of young children who attended center-based care as their primary ECE arrangement was higher in 2012 than in 1995, while the percentage who received home-based nonrelative care as their primary ECE arrangement was lower in 2012 than in 1995. The percentages of young children who received home-based relative care as their primary ECE arrangement and those who had no regular ECE arrangements and mainly received care from their parents the year before kindergarten in 2012 were not measurably different from the percentages in 1995.

In fall 2010, the percentages of first-time kindergartners with various primary ECE arrangements the year before kindergarten differed by race/ethnicity, SES, family type, and primary home language. For instance, the percentages of first-time kindergartners who received center-based care as their primary ECE arrangement the year before kindergarten were lower for Hispanic and Pacific Islander kindergartners than for White, Black, Asian, American Indian/Alaska Native kindergartners, and kindergartners of Two or more races. In addition, a higher percentage of kindergartners from households that spoke a language other than English as their primary language had no ECE arrangement on a regular basis the year before kindergarten than did kindergartners whose primary home language was English.

First-time kindergartners' academic skills and learning behaviors at the beginning of kindergarten were related to their primary ECE arrangement the year before kindergarten, after taking into account children's sex, age at kindergarten entry, race/ethnicity, family type, primary home language, and SES. For example, kindergartners who had no regular ECE arrangements and mainly received care from their parents the year before kindergarten and those whose primary ECE arrangement was home-based relative care tended to score lower in reading, mathematics, and cognitive flexibility in the fall of kindergarten than their peers whose primary ECE arrangement was center-based care. In addition, fall kindergarten approaches to learning ratings were lower, on average, for children who had no regular ECE arrangements the year before kindergarten than for those who were primarily in home-based nonrelative care, center-based care, or multiple care arrangements for equal amounts of time.

Readers are cautioned not to make causal inferences from the data presented here and, when making comparisons across time or surveys, to be aware of differences in sample designs and data collection procedures. NHES and ECLS-K:2011 estimates are based on sample surveys. The sample estimates may differ somewhat from the values that would be obtained from the universe of respondents.

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# APPENDIX A: REFERENCE TABLES

**Table A-1. Primary child care arrangements of 4- and 5-year-old children who are not yet enrolled in kindergarten, by selected child and family characteristics: Selected years, 1995 through 2012**

[Standard errors appear in parentheses]

Year and primary child care arrangement	Total	Race/ethnicity					Poverty status <sup>1</sup>			Mother's highest education <sup>2</sup>				
		White	Black	Hispanic	Asian/Pacific Islander	Other <sup>3</sup>	Poor	Near-poor	Nonpoor	Less than high school	High school/ GED	Vocational/ technical or some college	Associate's degree	Bachelor's or higher degree
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>1995</b>														
Percent of all children	100.0 (†)	69.2 (1.09)	14.8 (0.79)	10.8 (0.53)	2.4 (0.36)	2.9 (0.46)	25.9 (1.11)	22.5 (1.11)	51.7 (1.28)	12.3 (0.97)	35.3 (1.31)	21.7 (1.10)	7.8 (0.68)	22.9 (0.95)
<b>Percent in all types of care</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>				
Parental care only	21.7 (1.09)	20.9 (1.27)	15.8 (3.24)	33.7 (2.55)	15.5! (5.61)	30.0 (7.78)	28.4 (3.03)	32.1 (2.52)	13.8 (1.16)	40.2 (3.32)	26.2 (2.11)	18.9 (2.16)	17.4 (2.87)	9.0 (1.51)
Nonparental care	78.3 (1.09)	79.1 (1.27)	84.2 (3.24)	66.3 (2.55)	84.5 (5.61)	70.0 (7.78)	71.6 (3.03)	67.9 (2.52)	86.2 (1.16)	59.8 (3.32)	73.8 (2.11)	81.1 (2.16)	82.6 (2.87)	91.0 (1.51)
Primary arrangement <sup>4</sup>														
Center-based care <sup>5</sup>	55.1 (1.08)	55.0 (1.38)	59.7 (4.21)	44.3 (2.69)	73.7 (7.32)	58.3 (9.02)	51.4 (3.10)	45.4 (2.73)	61.0 (1.72)	41.2 (3.88)	50.0 (2.07)	57.5 (1.85)	57.7 (4.30)	67.4 (2.58)
Nonrelative care	11.0 (0.86)	12.7 (1.02)	7.8 (1.71)	6.6 (1.72)	‡ (†)	‡ (†)	‡ (†)	5.8 (1.18)	9.4 (1.27)	14.3 (1.25)	5.7 (1.69)	9.5 (1.15)	11.1 (1.64)	14.8 (1.94)
Relative care	10.8 (0.70)	10.0 (0.75)	14.2 (2.82)	14.7 (1.86)	7.1! (3.49)	‡ (†)	‡ (†)	11.8 (1.94)	12.3 (1.59)	9.7 (0.93)	11.6 (2.61)	12.1 (0.94)	10.6 (2.74)	7.1 (1.20)
Multiple arrangements <sup>6</sup>	1.4! (0.48)	1.4! (0.48)	‡ (†)	‡ (†)	‡ (†)	‡ (†)	‡ (†)	0.8! (0.38)	1.2 (0.33)	‡ (†)	2.2! (0.93)	‡ (†)	‡ (†)	1.7! (0.60)
<b>2001</b>														
Percent of all children	100.0 (†)	62.6 (0.89)	14.5 (0.82)	17.1 (0.73)	2.2 (0.41)	3.7 (0.47)	23.6 (1.26)	20.6 (1.15)	55.8 (1.21)	10.2 (0.67)	32.7 (1.44)	23.8 (1.23)	7.0 (0.66)	26.3 (1.20)
<b>Percent in all types of care</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>				
Parental care only	20.5 (1.00)	20.3 (1.32)	10.6 (2.45)	31.6 (2.35)	22.6! (7.97)	10.7! (4.34)	25.1 (2.69)	30.0 (2.60)	15.1 (1.35)	35.0 (3.90)	25.0 (2.28)	17.3 (1.98)	14.0 (3.86)	13.3 (1.94)
Nonparental care	79.5 (1.00)	79.7 (1.32)	89.4 (2.45)	68.4 (2.35)	77.4 (7.97)	89.3 (4.34)	74.9 (2.69)	70.0 (2.60)	84.9 (1.35)	65.0 (3.90)	75.0 (2.28)	82.7 (1.98)	86.0 (3.86)	86.7 (1.94)
Primary arrangement <sup>4</sup>														
Center-based care <sup>5</sup>	56.2 (1.17)	57.3 (1.48)	63.4 (3.66)	44.1 (2.42)	59.6 (9.47)	62.4 (6.73)	47.4 (3.00)	50.8 (2.33)	61.9 (1.74)	42.6 (3.71)	49.5 (2.64)	59.3 (2.74)	68.0 (4.08)	66.0 (2.68)
Nonrelative care	9.6 (0.72)	11.5 (1.03)	4.3! (1.70)	8.4 (1.59)	‡ (†)	‡ (†)	8.5! (3.71)	5.2 (1.17)	8.3 (1.48)	12.0 (1.07)	7.0 (1.92)	8.6 (1.39)	9.7! (3.03)	13.1 (1.67)
Relative care	12.1 (0.95)	10.1 (0.99)	17.4 (3.64)	13.8 (1.98)	12.6! (5.95)	17.0! (5.95)	19.5 (3.28)	8.7 (2.02)	10.2 (0.95)	12.5 (3.10)	15.5 (2.02)	12.5 (1.79)	7.8 (2.32)	6.7 (1.26)
Multiple arrangements <sup>6</sup>	1.6 (0.40)	0.7! (0.32)	‡ (†)	2.1! (0.76)	‡ (†)	‡ (†)	2.9! (1.31)	‡ (†)	0.8! (0.24)	‡ (†)	1.3! (0.61)	2.6! (1.27)	‡ (†)	0.9! (0.40)
<b>2005</b>														
Percent of all children	100.0 (†)	57.9 (1.14)	14.1 (1.02)	19.1 (0.94)	3.2 (0.58)	5.7 (0.65)	22.2 (1.15)	25.9 (1.48)	51.9 (1.42)	9.3 (0.89)	31.6 (1.61)	20.7 (1.44)	7.4 (0.68)	31.1 (1.25)
<b>Percent in all types of care</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>				
Parental care only	21.1 (1.37)	19.3 (1.69)	13.8 (3.72)	32.6 (2.91)	14.7! (5.84)	21.2 (6.06)	25.8 (3.40)	29.7 (2.77)	14.7 (1.60)	36.2 (4.03)	27.4 (3.35)	22.5 (2.94)	14.7 (3.87)	11.2 (1.57)
Nonparental care	78.9 (1.37)	80.7 (1.69)	86.2 (3.72)	67.4 (2.91)	85.3 (5.84)	78.8 (6.06)	74.2 (3.40)	70.3 (2.77)	85.3 (1.60)	63.8 (4.03)	72.6 (3.35)	77.5 (2.94)	85.3 (3.87)	88.8 (1.57)
Primary arrangement <sup>4</sup>														
Center-based care <sup>5</sup>	59.2 (1.34)	60.2 (1.86)	66.1 (4.75)	49.7 (3.00)	70.2 (8.60)	57.5 (6.98)	51.8 (3.98)	48.4 (3.21)	67.7 (1.96)	50.6 (3.84)	48.4 (3.15)	57.1 (3.02)	65.7 (5.07)	72.4 (2.17)
Nonrelative care	5.5 (0.89)	7.3 (1.29)	2.6! (1.14)	3.2 (0.80)	3.6! (1.70)	2.8! (1.32)	4.7! (2.14)	3.0 (0.75)	7.1 (1.26)	‡ (†)	5.2! (1.64)	5.1 (1.48)	9.5 (2.63)	6.1 (1.52)
Relative care	12.0 (1.16)	10.7 (1.20)	15.7! (4.72)	13.6 (2.22)	‡ (†)	12.0! (4.59)	16.0 (3.18)	15.1 (2.98)	8.8 (1.12)	9.6! (3.27)	15.9 (2.42)	13.9 (2.62)	6.5! (2.68)	8.8 (1.52)
Multiple arrangements <sup>6</sup>	2.2 (0.44)	2.4 (0.51)	1.8! (0.86)	0.9! (0.40)	‡ (†)	‡ (†)	‡ (†)	3.8 (1.07)	1.7 (0.38)	‡ (†)	3.0! (0.94)	1.5! (0.66)	3.5! (1.73)	1.5 (0.44)
<b>2012</b>														
Percent of all children	100.0 (†)	50.6 (1.50)	14.6 (1.05)	23.9 (1.26)	5.2 (0.55)	5.7 (0.68)	22.9 (1.22)	23.6 (1.28)	53.5 (1.30)	16.9 (1.44)	21.3 (1.17)	21.8 (1.28)	8.1 (0.84)	31.9 (1.16)
<b>Percent in all types of care</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>	<b>100.0 (†)</b>				
Parental care only	19.5 (1.43)	18.5 (1.83)	15.3 (3.50)	24.3 (3.38)	19.4 (5.00)	18.9 (5.51)	29.0 (2.87)	23.9 (2.66)	13.5 (1.96)	35.1 (5.53)	23.5 (3.23)	22.0 (2.23)	15.0 (3.11)	7.7 (1.12)
Nonparental care	80.5 (1.43)	81.5 (1.83)	84.7 (3.50)	75.7 (3.38)	80.6 (5.00)	81.1 (5.51)	71.0 (2.87)	76.1 (2.66)	86.5 (1.96)	64.9 (5.53)	76.5 (3.23)	78.0 (2.23)	85.0 (3.11)	92.3 (1.12)
Primary arrangement <sup>4</sup>														
Center-based care <sup>5</sup>	58.4 (1.32)	58.5 (1.82)	65.3 (4.10)	52.9 (3.60)	67.0 (5.41)	55.6 (6.52)	49.4 (3.05)	51.4 (3.04)	65.4 (1.88)	45.9 (5.65)	51.9 (3.68)	54.2 (2.93)	63.4 (4.02)	71.1 (1.88)
Nonrelative care	7.2 (0.72)	9.7 (1.19)	2.4! (0.93)	5.5 (1.47)	‡ (†)	‡ (†)	5.2! (1.67)	5.1 (1.46)	8.6 (1.04)	‡ (†)	7.9 (1.98)	6.4 (1.33)	7.3! (2.24)	9.8 (1.36)
Relative care	13.0 (0.96)	11.3 (1.14)	16.3 (3.17)	14.4 (2.36)	10.2! (3.64)	15.4! (4.69)	14.9 (2.19)	15.6 (2.78)	11.0 (1.37)	12.3 (3.01)	16.4 (2.63)	15.2 (2.26)	9.7 (2.45)	9.3 (1.35)
Multiple arrangements <sup>6</sup>	1.9 (0.33)	1.9 (0.44)	‡ (†)	2.9! (1.04)	‡ (†)	‡ (†)	1.5! (0.54)	3.2! (1.09)	1.5 (0.37)	‡ (†)	‡ (†)	2.2 (0.61)	4.6! (1.72)	2.2 (0.63)

†Not applicable.

!Interpret data with caution. The coefficient of variation (CV) for this estimate is between 30 and 50 percent.

‡Reporting standards not met. Either there are too few cases for a reliable estimate or the coefficient of variation (CV) is 50 percent or greater.

<sup>1</sup>Poor children are those whose family incomes were below the Census Bureau's poverty threshold in the year prior to data collection; near-poor children are those whose family incomes ranged from the poverty threshold to 199 percent of the poverty threshold; and nonpoor children are those whose family incomes were at or above 200 percent of the poverty threshold. The poverty threshold is a dollar amount that varies depending on a family's size and composition and is updated annually to account for inflation. In 2011, for example, the poverty threshold for a family of four with two children was \$22,811. Survey respondents are asked to select the range within which their income falls, rather than giving the exact amount of their income; therefore, the measure of poverty status is an approximation.

<sup>2</sup>Excludes children living in households with no mother or female guardian present.

<sup>3</sup>Includes persons of all other races and Two or more races.

<sup>4</sup>A child's primary arrangement is the regular nonparental care arrangement or early childhood education program in which the child spent the most time per week.

<sup>5</sup>Center-based arrangements include day care centers, Head Start programs, preschools, prekindergartens, and other early childhood programs.

<sup>6</sup>Refers to children who spent an equal number of hours per week in multiple nonparental care arrangements.

NOTE: While National Household Education Surveys Program (NHES) administrations prior to 2012 were administered via telephone with an interviewer, NHES:2012 used self-administered paper-and-pencil questionnaires that were mailed to respondents. Measurable differences in estimates between 2012 and prior years could reflect actual changes in the population, or the changes could be due to the mode change from telephone to mail. Race categories exclude persons of Hispanic ethnicity. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Program Participation Survey of the National Household Education Surveys Program (ECPP-NHES:1995, 2001, 2005, and 2012). (This table was prepared November 2014.)

**Table A-2. Percentage distribution of first-time kindergartners, by primary type of child care arrangement during the year prior to kindergarten entry and selected child, family, and school characteristics: 2010–11**

[Standard errors appear in parentheses]

Selected child, family, or school characteristic	Percent of first-time kindergartners during the year before starting kindergarten													
	Total, all children		No regular nonparental care		Total, any regular nonparental care		Primary type of nonparental care arrangement <sup>1</sup>							
							Home-based care		Center-based care	Multiple arrangements				
				Relative care	Nonrelative care									
1	2	3	4	5	6	7	8							
<b>Total</b> .....	<b>100.0</b>	<b>(†)</b>	<b>20.9</b>	<b>(0.82)</b>	<b>79.1</b>	<b>(0.82)</b>	<b>14.9</b>	<b>(0.46)</b>	<b>6.3</b>	<b>(0.36)</b>	<b>55.3</b>	<b>(0.97)</b>	<b>2.5</b>	<b>(0.18)</b>
<b>Sex of child</b>														
Male.....	100.0	(†)	21.0	(0.91)	79.0	(0.91)	14.3	(0.51)	6.6	(0.38)	55.6	(1.01)	2.6	(0.23)
Female.....	100.0	(†)	20.8	(0.88)	79.2	(0.88)	15.6	(0.67)	6.0	(0.46)	55.1	(1.13)	2.4	(0.25)
<b>Age of child at kindergarten entry, fall 2010</b>														
Less than 5 years old.....	100.0	(†)	19.5	(1.88)	80.5	(1.88)	14.4	(1.39)	4.3	(1.19)	59.3	(2.53)	2.5	(0.53)
5 years old to 5 1/2 years old.....	100.0	(†)	21.5	(0.92)	78.5	(0.92)	15.8	(0.64)	5.9	(0.39)	54.5	(1.09)	2.3	(0.21)
More than 5 1/2 years old to 6 years old.....	100.0	(†)	20.5	(0.89)	79.5	(0.89)	14.8	(0.62)	6.4	(0.45)	55.6	(1.05)	2.7	(0.26)
More than 6 years old.....	100.0	(†)	21.1	(1.56)	78.9	(1.56)	11.8	(1.15)	8.6	(1.15)	55.8	(2.26)	2.6	(0.63)
<b>Race/ethnicity of child</b>														
White.....	100.0	(†)	18.1	(0.86)	81.9	(0.86)	12.9	(0.57)	8.5	(0.65)	57.8	(1.15)	2.7	(0.25)
Black.....	100.0	(†)	19.9	(1.93)	80.1	(1.93)	17.8	(1.29)	3.9	(0.59)	55.5	(2.06)	2.8	(0.47)
Hispanic.....	100.0	(†)	28.3	(1.28)	71.7	(1.28)	18.1	(0.70)	4.0	(0.43)	47.8	(1.41)	1.8	(0.21)
Asian.....	100.0	(†)	19.6	(2.37)	80.4	(2.37)	14.6	(1.43)	2.3	(0.57)	61.6	(3.25)	1.8	(0.52)
Pacific Islander.....	100.0	(†)	38.8	(6.02)	61.2	(6.02)	27.2	(7.27)	‡	(†)	27.6	(6.59)	‡	(†)
American Indian/Alaska Native.....	100.0	(†)	23.5	(3.93)	76.5	(3.93)	13.2	(4.58)	‡	(†)	56.7	(2.41)	‡	(†)
Two or more races.....	100.0	(†)	17.2	(2.03)	82.8	(2.03)	13.8	(1.53)	5.2	(0.97)	60.9	(2.51)	2.9	(0.93)
<b>Parents' employment status, fall 2010<sup>2</sup></b>														
<b>Two parents</b>														
Both employed full time.....	100.0	(†)	8.4	(0.67)	91.6	(0.67)	17.6	(0.89)	12.9	(1.12)	57.1	(1.35)	4.0	(0.47)
One employed full time, one part time.....	100.0	(†)	16.5	(1.19)	83.5	(1.19)	14.7	(0.85)	7.1	(0.75)	58.8	(1.40)	2.8	(0.38)
One employed full time, one looking for work.....	100.0	(†)	23.6	(2.19)	76.4	(2.19)	16.2	(1.87)	4.6	(0.86)	52.9	(2.82)	2.8	(0.80)
One employed full time, one not in labor force.....	100.0	(†)	33.7	(1.63)	66.3	(1.63)	4.7	(0.49)	1.6	(0.25)	58.9	(1.59)	1.0	(0.22)
Other combination.....	100.0	(†)	36.8	(1.48)	63.2	(1.48)	11.7	(1.29)	4.3	(0.90)	45.8	(1.92)	1.5	(0.43)
<b>Single parent</b>														
Employed full time.....	100.0	(†)	9.5	(0.97)	90.5	(0.97)	29.0	(1.23)	7.9	(0.95)	49.4	(1.39)	4.2	(0.41)
Employed part time.....	100.0	(†)	16.3	(1.75)	83.7	(1.75)	26.6	(1.99)	5.0	(1.14)	49.4	(2.56)	2.7	(0.97)
Looking for work.....	100.0	(†)	23.0	(2.23)	77.0	(2.23)	17.9	(2.32)	2.8	(1.19)	54.7	(2.38)	1.5	(0.72)
Not in labor force.....	100.0	(†)	35.2	(2.53)	64.8	(2.53)	14.2	(1.70)	‡	(†)	48.1	(2.69)	‡	(†)
No parent in household.....	100.0	(†)	23.4	(2.65)	76.6	(2.65)	16.9	(3.28)	3.7	(1.29)	52.8	(4.15)	3.3	(1.45)
<b>Parents' highest level of education<sup>3</sup></b>														
Less than high school.....	100.0	(†)	37.7	(2.11)	62.3	(2.11)	15.8	(1.21)	3.1	(0.68)	42.5	(2.04)	0.9	(0.27)
High school completion.....	100.0	(†)	28.3	(1.22)	71.7	(1.22)	19.1	(0.96)	5.1	(0.40)	45.5	(1.25)	1.9	(0.33)
Some college/vocational.....	100.0	(†)	20.2	(0.90)	79.8	(0.90)	18.1	(0.81)	7.0	(0.54)	51.6	(1.30)	3.0	(0.35)
Bachelor's degree.....	100.0	(†)	14.7	(0.96)	85.3	(0.96)	10.9	(0.69)	6.5	(0.71)	64.8	(1.23)	3.1	(0.31)
Any graduate education.....	100.0	(†)	12.9	(1.14)	87.1	(1.14)	8.7	(0.70)	7.6	(0.67)	68.3	(1.38)	2.4	(0.33)
<b>Household type, fall 2010</b>														
Two-parent household.....	100.0	(†)	21.5	(0.94)	78.5	(0.94)	12.4	(0.45)	6.9	(0.49)	56.7	(1.14)	2.5	(0.21)
Mother-only household.....	100.0	(†)	17.5	(0.87)	82.5	(0.87)	23.9	(0.90)	5.2	(0.58)	50.4	(1.08)	3.1	(0.32)
Father-only household.....	100.0	(†)	17.5	(2.96)	82.5	(2.96)	30.8	(3.51)	5.8	(1.69)	43.4	(3.66)	2.4	(1.16)
Other household type.....	100.0	(†)	23.4	(2.65)	76.6	(2.65)	16.9	(3.28)	3.7	(1.29)	52.8	(4.15)	3.3	(1.45)
<b>Primary home language</b>														
English.....	100.0	(†)	18.4	(0.72)	81.6	(0.72)	14.9	(0.56)	7.0	(0.41)	57.1	(0.98)	1.7	(0.21)
Non-English.....	100.0	(†)	35.6	(2.10)	64.4	(2.10)	14.7	(0.95)	2.9	(0.48)	45.3	(1.84)	1.5	(0.25)
Primary language not identified.....	100.0	(†)	22.1	(4.09)	77.9	(4.09)	18.2	(3.74)	‡	(†)	54.2	(4.62)	‡	(†)
<b>Poverty status<sup>4</sup></b>														
Below poverty threshold.....	100.0	(†)	30.4	(1.46)	69.6	(1.46)	16.4	(0.90)	2.6	(0.36)	48.9	(1.46)	1.7	(0.30)
100 to 199 percent of poverty threshold.....	100.0	(†)	24.9	(1.20)	75.1	(1.20)	16.5	(0.90)	5.0	(0.49)	51.8	(1.40)	1.7	(0.25)
200 percent or more of poverty threshold.....	100.0	(†)	13.5	(0.69)	86.5	(0.69)	12.3	(0.64)	8.7	(0.58)	62.3	(1.12)	3.2	(0.29)
<b>Socioeconomic status<sup>5</sup></b>														
Lowest 20 percent.....	100.0	(†)	35.2	(1.52)	64.8	(1.52)	15.6	(0.75)	3.4	(0.44)	44.3	(1.28)	1.6	(0.27)
Middle 60 percent.....	100.0	(†)	19.6	(0.71)	80.4	(0.71)	16.9	(0.54)	6.9	(0.45)	53.9	(1.09)	2.7	(0.23)
Highest 20 percent.....	100.0	(†)	12.3	(1.13)	87.7	(1.13)	8.7	(0.67)	7.1	(0.56)	69.1	(1.29)	2.7	(0.29)
<b>School type</b>														
Public.....	100.0	(†)	21.8	(0.80)	78.2	(0.80)	15.8	(0.51)	6.2	(0.35)	53.7	(0.98)	2.5	(0.20)
Private.....	100.0	(†)	14.5	(1.98)	85.5	(1.98)	8.3	(0.78)	7.0	(0.88)	67.9	(1.69)	2.3	(0.32)

†Not applicable.

!Interpret data with caution. The coefficient of variation (CV) for this estimate is between 30 and 50 percent.

‡Reporting standards not met. Either there are too few cases for a reliable estimate or the coefficient of variation (CV) is 50 percent or greater.

<sup>1</sup>The type of nonparental care in which the child spent the most hours. Multiple arrangements refers to children who spent an equal amount of time in each of two or more types of arrangements.<sup>2</sup>Parents who reported working at least 35 hours per week are defined as employed full time, while those who reported working less than 35 hours per week are defined as employed part time. Those neither employed nor looking for work are not in the labor force.<sup>3</sup>Parents highest level of education is the highest level of education achieved by either of the parents or guardians in a two-parent household, by the only parent in a single-parent household, or by any guardian in a household with no parents.<sup>4</sup>Poverty status is based on preliminary U.S. Census income thresholds for 2010, which identify incomes determined to meet household needs, given family size and composition.

For example, a family of three with one child was below the poverty threshold if its annual income was less than \$17,552 in 2010.

<sup>5</sup>Socioeconomic status (SES) was measured by a composite score based on parental education and occupations and household income at the time of data collection.

NOTE: Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Two parents may refer to two biological parents, two adoptive parents, or one biological/adoptive parent and one other parent/partner. Single parent refers to one biological or adoptive parent only. In households without parents, the guardian or guardians may be related or unrelated to the child. Race categories exclude persons of Hispanic ethnicity. Detail may not sum to totals because of rounding and survey item nonresponse. Some data have been revised from previously published figures.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File. (This table was prepared November 2014.)

**Table A-3. Fall 2010 first-time kindergartners' reading, mathematics, and science scale scores, by selected child, family, and school characteristics: Fall 2010, spring 2011, and spring 2012**

[Standard errors appear in parentheses]

Selected child, family, or school characteristic	Number of children (in thousands)		Percentage distribution of children		Mean reading score <sup>1</sup>			Mean mathematics score <sup>2</sup>			Mean science score <sup>3</sup>									
					Kindergarten		First grade, spring 2012	Kindergarten		First grade, spring 2012	Kindergarten, spring 2011	First grade, spring 2012								
					Fall 2010	Spring 2011		Fall 2010	Spring 2011											
1	2	3	4	5	6	7	8	9	10	11										
<b>Total</b> .....	<b>3,765</b>	<b>(31.3)</b>	<b>100.0</b>	<b>(†)</b>	<b>37.4</b>	<b>(0.23)</b>	<b>49.9</b>	<b>(0.31)</b>	<b>69.9</b>	<b>(0.31)</b>	<b>30.6</b>	<b>(0.27)</b>	<b>43.5</b>	<b>(0.31)</b>	<b>63.1</b>	<b>(0.31)</b>	<b>21.2</b>	<b>(0.14)</b>	<b>26.8</b>	<b>(0.17)</b>
<b>Sex of child</b>																				
Male .....	1,921	(22.2)	51.0	(0.45)	37.0	(0.26)	49.1	(0.34)	68.7	(0.37)	30.8	(0.33)	43.6	(0.36)	63.6	(0.39)	21.2	(0.15)	27.0	(0.19)
Female .....	1,843	(23.9)	49.0	(0.45)	38.0	(0.25)	50.8	(0.33)	71.2	(0.33)	30.4	(0.29)	43.5	(0.31)	62.7	(0.32)	21.1	(0.16)	26.6	(0.19)
<b>Age of child at kindergarten entry, fall 2010</b>																				
Less than 5 years old .....	142	(18.3)	3.8	(0.49)	35.0	(0.56)	45.8	(0.75)	65.9	(0.91)	26.0	(0.61)	38.4	(0.73)	57.8	(0.84)	19.2	(0.38)	24.7	(0.41)
5 years old to 5 1/2 years old .....	1,594	(28.2)	42.3	(0.57)	36.1	(0.27)	48.4	(0.35)	68.6	(0.37)	28.2	(0.32)	41.4	(0.36)	61.1	(0.39)	20.2	(0.17)	25.7	(0.21)
More than 5 1/2 years old to 6 years old .....	1,681	(26.6)	44.7	(0.66)	38.4	(0.27)	51.1	(0.33)	71.0	(0.37)	32.3	(0.31)	45.1	(0.33)	64.7	(0.34)	21.9	(0.14)	27.6	(0.19)
More than 6 years old .....	347	(16.5)	9.2	(0.44)	40.2	(0.43)	53.2	(0.56)	72.9	(0.52)	35.4	(0.57)	47.8	(0.63)	67.4	(0.56)	22.7	(0.29)	28.9	(0.31)
<b>Race/ethnicity of child</b>																				
White .....	1,957	(66.6)	52.0	(1.67)	38.8	(0.30)	51.7	(0.38)	72.4	(0.36)	33.1	(0.34)	46.2	(0.38)	66.7	(0.34)	23.2	(0.14)	29.0	(0.16)
Black .....	491	(43.5)	13.1	(1.16)	36.0	(0.32)	47.6	(0.55)	67.0	(0.68)	27.0	(0.34)	38.5	(0.37)	56.7	(0.46)	18.6	(0.30)	23.6	(0.36)
Hispanic .....	934	(46.2)	24.8	(1.24)	34.5	(0.26)	46.5	(0.30)	65.5	(0.44)	26.3	(0.30)	39.7	(0.35)	58.3	(0.49)	18.3	(0.19)	23.8	(0.23)
Asian .....	157	(23.8)	4.2	(0.63)	42.2	(0.62)	54.5	(0.73)	74.2	(0.79)	35.8	(0.62)	47.4	(0.45)	67.8	(0.48)	19.8	(0.22)	26.6	(0.28)
Pacific Islander .....	29	(4.9)	0.8	(0.13)	36.1	(1.59)	49.0	(1.93)	70.0	(1.86)	30.1	(1.78)	44.9	(2.28)	62.1	(2.06)	18.9	(0.87)	24.8	(1.10)
American Indian/Alaska Native .....	42	(19.6)	1.1	(0.52)	34.4	(0.54)	45.7	(0.79)	67.2	(1.02)	27.4	(1.06)	41.3	(1.06)	61.4	(1.28)	21.7	(0.91)	27.1	(1.07)
Two or more races .....	154	(9.3)	4.1	(0.24)	39.2	(0.62)	51.7	(0.75)	71.4	(0.88)	32.5	(0.60)	45.2	(0.70)	64.2	(0.86)	22.5	(0.31)	28.4	(0.38)
<b>How often child exhibited positive learning behaviors, fall 2010<sup>4</sup></b>																				
Never .....	50	(5.3)	1.4	(0.15)	29.3	(0.48)	37.1	(0.78)	51.8	(1.22)	18.5	(0.67)	28.8	(0.90)	45.1	(1.23)	16.5	(0.51)	20.5	(0.62)
Sometimes .....	915	(23.7)	25.3	(0.52)	33.4	(0.29)	44.7	(0.35)	63.3	(0.44)	25.3	(0.34)	37.9	(0.38)	56.8	(0.45)	19.3	(0.18)	24.3	(0.22)
Often .....	1,716	(27.0)	47.5	(0.70)	37.4	(0.23)	50.3	(0.35)	70.9	(0.34)	31.0	(0.32)	44.3	(0.36)	64.2	(0.35)	21.4	(0.16)	27.3	(0.17)
Very often .....	933	(28.7)	25.8	(0.69)	41.8	(0.38)	55.3	(0.46)	75.9	(0.39)	35.7	(0.38)	48.7	(0.39)	68.8	(0.38)	23.0	(0.15)	29.0	(0.23)
<b>Primary type of nonparental care arrangement prior to kindergarten entry<sup>5</sup></b>																				
No regular nonparental arrangement .....	747	(31.8)	20.6	(0.84)	35.7	(0.32)	48.1	(0.42)	67.7	(0.46)	28.1	(0.38)	41.6	(0.40)	60.8	(0.40)	20.0	(0.18)	25.7	(0.22)
Home-based care																				
Relative care .....	555	(18.6)	15.3	(0.50)	35.6	(0.30)	48.5	(0.37)	68.4	(0.46)	28.3	(0.38)	41.6	(0.39)	61.4	(0.46)	20.5	(0.21)	26.2	(0.27)
Nonrelative care .....	228	(15.1)	6.3	(0.41)	37.8	(0.46)	51.0	(0.63)	72.5	(0.53)	32.6	(0.59)	45.8	(0.70)	66.4	(0.59)	22.5	(0.29)	28.3	(0.33)
Center-based care .....	2,007	(41.2)	55.4	(1.04)	38.6	(0.25)	50.9	(0.35)	71.0	(0.35)	32.0	(0.30)	44.6	(0.35)	64.1	(0.35)	21.6	(0.17)	27.3	(0.20)
Multiple arrangements .....	88	(6.7)	2.4	(0.18)	38.8	(0.53)	51.8	(0.79)	72.0	(0.88)	32.2	(0.56)	44.9	(0.72)	65.9	(0.68)	22.6	(0.39)	28.6	(0.38)
<b>Parents' employment status, fall 2010<sup>6</sup></b>																				
<b>Two parents</b>																				
Both employed full time .....	878	(26.2)	26.1	(0.73)	39.4	(0.26)	52.4	(0.33)	72.8	(0.35)	33.3	(0.32)	46.3	(0.37)	66.2	(0.37)	22.3	(0.15)	28.2	(0.17)
One employed full time, one part time .....	563	(19.7)	16.7	(0.53)	39.2	(0.44)	52.4	(0.50)	73.2	(0.53)	33.3	(0.49)	46.4	(0.47)	66.5	(0.47)	22.6	(0.18)	28.7	(0.23)
One employed full time, one looking for work .....	143	(10.3)	4.2	(0.30)	36.4	(0.55)	49.2	(0.78)	68.4	(0.86)	29.4	(0.62)	42.3	(0.67)	62.3	(0.70)	20.6	(0.38)	26.3	(0.40)
One employed full time, one not in labor force .....	799	(28.5)	23.7	(0.82)	38.0	(0.39)	50.4	(0.50)	70.6	(0.55)	31.2	(0.44)	44.2	(0.46)	64.2	(0.47)	21.6	(0.20)	27.3	(0.24)
Other combination .....	205	(13.1)	6.1	(0.36)	35.9	(0.54)	48.0	(0.64)	66.6	(0.74)	27.5	(0.46)	41.1	(0.49)	59.9	(0.73)	19.7	(0.25)	25.2	(0.33)
<b>Single parent</b>																				
Employed full time .....	361	(17.6)	10.7	(0.52)	35.8	(0.34)	47.7	(0.48)	67.7	(0.58)	28.1	(0.39)	40.6	(0.50)	60.2	(0.55)	19.9	(0.27)	25.3	(0.31)
Employed part time .....	130	(8.1)	3.9	(0.24)	34.9	(0.39)	47.0	(0.57)	67.6	(0.70)	27.7	(0.57)	40.0	(0.65)	59.9	(0.81)	20.2	(0.33)	25.6	(0.34)
Looking for work .....	102	(9.0)	3.0	(0.27)	33.2	(0.52)	44.7	(0.78)	62.9	(1.21)	24.8	(0.63)	37.0	(0.56)	55.3	(1.10)	18.9	(0.46)	24.1	(0.56)
Not in labor force .....	120	(10.9)	3.5	(0.33)	34.4	(0.50)	45.5	(0.61)	64.1	(0.88)	25.8	(0.62)	39.0	(0.79)	56.7	(0.91)	19.4	(0.40)	24.4	(0.56)
No parent in household .....	67	(5.9)	2.0	(0.18)	33.7	(0.54)	45.1	(0.71)	64.7	(1.15)	24.9	(0.71)	37.6	(0.81)	55.3	(1.24)	19.7	(0.45)	24.2	(0.57)
<b>Parents' highest level of education<sup>7</sup></b>																				
Less than high school .....	298	(17.4)	7.9	(0.47)	31.2	(0.33)	42.5	(0.38)	60.1	(0.50)	22.0	(0.44)	35.6	(0.51)	53.5	(0.51)	16.2	(0.21)	21.0	(0.25)
High school completion .....	725	(20.3)	19.3	(0.51)	34.0	(0.26)	45.9	(0.33)	65.2	(0.43)	26.2	(0.34)	39.0	(0.32)	58.3	(0.35)	19.0	(0.18)	24.4	(0.19)
Some college/vocational .....	1,342	(30.8)	35.8	(0.77)	36.4	(0.21)	49.0	(0.34)	69.4	(0.31)	29.7	(0.29)	42.6	(0.34)	62.3	(0.38)	21.1	(0.14)	26.7	(0.17)
Bachelor's degree .....	756	(27.8)	20.1	(0.71)	40.3	(0.31)	53.1	(0.36)	73.8	(0.39)	34.3	(0.29)	47.3	(0.34)	67.3	(0.34)	22.9	(0.16)	28.8	(0.21)
Any graduate education .....	633	(27.0)	16.9	(0.71)	43.1	(0.40)	56.1	(0.43)	76.5	(0.38)	37.1	(0.36)	49.9	(0.39)	69.9	(0.36)	24.0	(0.14)	30.3	(0.22)
<b>Household type, fall 2010</b>																				
Two-parent household .....	2,662	(45.8)	76.6	(0.92)	38.4	(0.26)	51.2	(0.32)	71.4	(0.34)	31.9	(0.31)	45.0	(0.32)	64.8	(0.31)	21.8	(0.13)	27.6	(0.16)
Mother-only household .....	696	(29.8)	20.0	(0.85)	35.0	(0.25)	46.7	(0.38)	66.5	(0.49)	27.3	(0.33)	39.7	(0.37)	59.0	(0.45)	19.6	(0.25)	25.0	(0.29)
Father-only household .....	48	(4.5)	1.4	(0.13)	34.9	(0.69)	46.9	(1.07)	66.3	(1.25)	27.6	(0.74)	40.2	(0.89)	59.3	(1.20)	21.8	(0.45)	25.9	(0.53)
Other household type .....	67	(5.9)	1.9	(0.17)	33.7	(0.54)	45.1	(0.71)	64.7	(1.15)	24.9	(0.71)	37.6	(0.81)	55.3	(1.24)	19.7	(0.45)	24.2	(0.57)

See notes at end of table.

**Table A-3. Fall 2010 first-time kindergartners' reading, mathematics, and science scale scores, by selected child, family, and school characteristics: Fall 2010, spring 2011, and spring 2012—Continued**

[Standard errors appear in parentheses]

Selected child, family, or school characteristic	Number of children (in thousands)	Percentage distribution of children	Mean reading score <sup>1</sup>			Mean mathematics score <sup>2</sup>			Mean science score <sup>3</sup>	
			Kindergarten		First grade, spring 2012	Kindergarten		First grade, spring 2012	Kindergarten, spring 2011	First grade, spring 2012
			Fall 2010	Spring 2011		Fall 2010	Spring 2011			
1	2	3	4	5	6	7	8	9	10	11
Primary home language										
English .....	3,140 (40.0)	83.6 (0.70)	38.1 (0.23)	50.8 (0.33)	71.0 (0.32)	31.6 (0.27)	44.4 (0.32)	64.2 (0.32)	22.0 (0.14)	27.8 (0.18)
Non-English .....	567 (24.0)	15.1 (0.64)	34.0 (0.43)	45.5 (0.51)	64.5 (0.69)	25.4 (0.52)	38.9 (0.53)	57.8 (0.62)	16.4 (0.21)	22.0 (0.28)
Primary language not identified .....	48 (6.1)	1.3 (0.16)	34.9 (0.91)	46.8 (1.25)	65.7 (1.74)	27.9 (1.27)	40.3 (1.07)	58.2 (1.59)	18.1 (0.57)	23.8 (0.46)
Poverty status <sup>8</sup>										
Below poverty threshold.....	723 (31.8)	22.7 (0.95)	33.6 (0.27)	45.2 (0.34)	63.6 (0.43)	25.4 (0.37)	38.4 (0.41)	56.9 (0.45)	18.3 (0.23)	23.4 (0.28)
100 to 199 percent of poverty threshold .....	766 (20.7)	24.0 (0.61)	36.2 (0.23)	48.7 (0.43)	69.0 (0.48)	29.2 (0.35)	42.2 (0.42)	61.9 (0.46)	20.6 (0.19)	26.3 (0.23)
200 percent or more of poverty threshold.....	1,702 (41.8)	53.3 (1.16)	40.3 (0.28)	53.1 (0.34)	73.9 (0.33)	34.3 (0.30)	47.1 (0.35)	67.3 (0.33)	23.1 (0.13)	29.1 (0.15)
Socioeconomic status <sup>9</sup>										
Lowest 20 percent.....	694 (26.9)	18.5 (0.71)	32.4 (0.27)	43.6 (0.30)	62.0 (0.42)	23.7 (0.38)	36.8 (0.40)	55.3 (0.42)	17.4 (0.20)	22.5 (0.22)
Middle 60 percent .....	2,279 (34.5)	60.7 (0.73)	37.0 (0.19)	49.7 (0.31)	70.1 (0.30)	30.4 (0.26)	43.4 (0.31)	63.1 (0.31)	21.3 (0.13)	27.0 (0.16)
Highest 20 percent.....	782 (33.0)	20.8 (0.86)	43.1 (0.39)	56.1 (0.42)	76.5 (0.35)	37.1 (0.31)	49.9 (0.36)	70.1 (0.33)	24.1 (0.14)	30.4 (0.22)
School type										
Public .....	3,361 (23.4)	89.3 (0.25)	37.2 (0.25)	49.6 (0.34)	69.6 (0.34)	30.2 (0.30)	43.1 (0.33)	62.8 (0.34)	21.0 (0.16)	26.6 (0.19)
Private.....	404 (11.7)	10.7 (0.25)	39.9 (0.55)	52.3 (0.71)	72.8 (0.81)	34.1 (0.53)	47.3 (0.71)	66.3 (0.74)	22.9 (0.25)	28.5 (0.38)

†Not applicable.

Interpret data with caution. The coefficient of variation (CV) for this estimate is between 30 and 50 percent.

<sup>1</sup>Reflects performance on questions measuring basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition); vocabulary knowledge; and reading comprehension, including identifying information specifically stated in text (e.g., definitions, facts, and supporting details), making complex inferences from texts, and considering the text objectively and judging its appropriateness and quality. Possible scores for the reading assessment range from 0 to 100.

<sup>2</sup>Reflects performance on questions on number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability (measured with a set of simple questions assessing children's ability to read a graph); and pre-algebra skills such as identification of patterns. Possible scores for the mathematics assessment range from 0 to 96.

<sup>3</sup>Science was not assessed in the fall of kindergarten. Reflects performance on questions on physical sciences, life sciences, environmental sciences, and scientific inquiry. Possible scores for the science assessment range from 0 to 47.

<sup>4</sup>Derived from child's approaches to learning scale scores in fall of the kindergarten year. This score is based on teachers' reports on how often students exhibit positive learning behaviors in seven areas: attentiveness, task persistence, eagerness to learn, learning independence, ability to adapt easily to changes in routine, organization, and ability to follow classroom rules. Possible scores range from 1 to 4, with higher scores indicating that a child exhibits positive learning behaviors more often. Fall 2010 scores were categorized into the four anchor points on the original scale—1 (never), 2 (sometimes), 3 (often), and 4 (very often)—by rounding the mean score to the nearest whole number.

<sup>5</sup>The type of nonparental care in which the child spent the most hours. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements.

<sup>6</sup>Parents who reported working at least 35 hours per week are defined as employed full time, while those who reported working less than 35 hours per week are defined as employed part time. Those neither employed nor looking for work are not in the labor force.

<sup>7</sup>Parents' highest level of education is the highest level of education achieved by either of the parents or guardians in a two-parent household, by the only parent in a single-parent household, or by any guardian in a household with no parents.

<sup>8</sup>Poverty status is based on preliminary U.S. Census income thresholds for 2010, which identify incomes determined to meet household needs, given family size and composition. For example, a family of three with one child was below the poverty threshold if its income was less than \$17,552 in 2010.

<sup>9</sup>Socioeconomic status (SES) was measured by a composite score based on parental education and occupations and household income at the time of data collection.

NOTE: Estimates weighted by W4C4P\_2T0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Most of the children were in first grade in 2011–12, but 4 percent were in kindergarten or other grades (e.g., second grade, ungraded classrooms). Two parents may refer to two biological parents, two adoptive parents, or one biological/adoptive parent and one other parent/partner. Single parent refers to one biological or adoptive parent only. In households without parents, the guardian or guardians may be related or unrelated to the child. Estimates differ from previously published figures because scores were recalibrated to represent the kindergarten through first-grade assessment item pools and weights were adjusted to account for survey nonresponse at each data collection wave. Race categories exclude persons of Hispanic ethnicity. Detail may not sum to totals because of rounding and survey item nonresponse.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File. (This table was prepared September 2014.)

**Table A-4. Estimated coefficients from ordinary least squares (OLS) regressions of fall kindergarten reading, mathematics, science, cognitive flexibility, and approaches to learning scores for children whose primary early care and education arrangement prior to kindergarten entry was home-based relative care, by selected child and family characteristics: 2010–11**

Variable	Mean reading score <sup>1</sup>		Mean mathematics score <sup>2</sup>		Mean cognitive flexibility score <sup>3</sup>		Mean approaches to learning score <sup>4</sup>	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Intercept	13.71*	(1.507)	-6.83*	(2.013)	10.31*	(0.581)	1.38*	(0.120)
Primary type of early care and education (ECE) arrangement prior to kindergarten entry <sup>5</sup>								
(Home-based relative care)								
No regular ECE arrangement	-0.21	(0.255)	-0.72*	(0.305)	-0.16	(0.124)	-0.04	(0.021)
Home-based nonrelative care	0.57	(0.443)	1.69*	(0.420)	0.16	(0.185)	0.04	(0.027)
Center-based care	2.16*	(0.248)	2.14*	(0.307)	0.22*	(0.076)	0.03	(0.019)
Multiple arrangements	1.87*	(0.581)	2.35*	(0.619)	0.43	(0.227)	0.04	(0.040)
Sex of child								
(Male)								
Female	1.04*	(0.197)	-0.04	(0.219)	0.39*	(0.070)	0.31*	(0.014)
Age of child at kindergarten entry, fall 2010	0.36*	(0.022)	0.59*	(0.029)	0.06*	(0.008)	0.02*	(0.002)
Race/ethnicity of child								
(White)								
Black	-0.96*	(0.415)	-3.51*	(0.349)	-1.10*	(0.153)	-0.07*	(0.022)
Hispanic	-1.54*	(0.365)	-2.99*	(0.307)	-0.66*	(0.102)	-0.01	(0.021)
Asian	6.32*	(0.598)	5.53*	(0.676)	-0.04	(0.175)	0.09	(0.048)
Native Hawaiian/ Pacific Islander	-2.11	(1.371)	-2.74	(1.708)	-1.45*	(0.601)	-0.06	(0.082)
American Indian/ Alaska Native	-3.03*	(0.553)	-3.77*	(0.980)	-0.61	(0.507)	0.05	(0.068)
Two or more races	0.30	(0.485)	-0.46	(0.541)	-0.27	(0.144)	-0.02	(0.034)
Household type, fall 2010								
(Two-parent household)								
Single-parent or other household type	-2.26*	(0.197)	-2.75*	(0.255)	-0.25*	(0.088)	-0.17*	(0.018)
Primary home language								
(English)								
Non-English	-2.07*	(0.366)	-2.59*	(0.340)	-0.75*	(0.144)	0.05	(0.028)
Socioeconomic status (SES) <sup>6</sup>								
(Higher SES percents)								
Lowest 20 percent	-3.98*	(0.275)	-5.25*	(0.319)	-0.50*	(0.117)	-0.16*	(0.023)

\*  $p < 0.05$ .

<sup>1</sup> Reflects performance on questions measuring basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition), vocabulary knowledge, and reading comprehension (including locate/recall questions, integrate/interpret questions, and critique/evaluate questions about text the children were asked to read). Actual scores for all kindergartners range from 6 to 83 points.

<sup>2</sup> Reflects performance on questions on number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability (measured with a set of simple questions assessing children's ability to read a graph); and prealgebra skills such as identification of patterns. Actual scores for all kindergartners range from 5 to 75 points.

<sup>3</sup> To measure cognitive flexibility, children were administered the Dimensional Change Card Sort (DCCS) (developed by Philip Zelazo in 2006). Children were asked to sort a series of cards into one of two trays according to different rules (e.g., by color, by shape). Actual scores for all kindergartners range from 0 to 12 points.

<sup>4</sup> The approaches to learning scale is based on teachers' reports on how students rate in seven areas: attentiveness, task persistence, eagerness to learn, learning independence, flexibility, organization, and ability to follow classroom rules. Actual scores for all kindergartners range from 1 to 4, with higher scores indicating that a child exhibits positive learning behaviors more often.

<sup>5</sup> The type of nonparental care in which the child spent the most hours. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements.

<sup>6</sup> Socioeconomic status (SES) was measured by a composite score based on parental education and occupations and household income at the time of data collection.

NOTE: The reference category is the first group listed and is shown in parentheses. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Two parents may refer to two biological parents, two adoptive parents, or one biological/adoptive parent and one other parent/partner. Single parent refers to one biological or adoptive parent only. In households without parents, the guardian or guardians may be related or unrelated to the child. Race categories exclude persons of Hispanic ethnicity.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

**Table A-5. Estimated coefficients from ordinary least squares (OLS) regressions of fall kindergarten reading, mathematics, science, cognitive flexibility, and approaches to learning scores for children whose primary early care and education arrangement prior to kindergarten entry was home-based nonrelative care, by selected child and family characteristics: 2010–11**

Variable	Mean reading score <sup>1</sup>		Mean mathematics score <sup>2</sup>		Mean cognitive flexibility score <sup>3</sup>		Mean approaches to learning score <sup>4</sup>	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Intercept	14.28*	(1.487)	-5.15*	(1.961)	10.47*	(0.553)	1.42*	(0.122)
Primary type of early care and education (ECE) arrangement prior to kindergarten entry <sup>5</sup>								
(Home-based nonrelative care)								
No regular ECE arrangement	-0.78	(0.437)	-2.40*	(0.451)	-0.33	(0.209)	-0.07*	(0.025)
Home-based relative care	-0.57	(0.443)	-1.69*	(0.420)	-0.16	(0.185)	-0.04	(0.027)
Center-based care	1.59*	(0.468)	0.46	(0.472)	0.05	(0.182)	-0.01	(0.025)
Multiple arrangements	1.30*	(0.620)	0.66	(0.562)	0.27	(0.282)	0.01	(0.035)
Sex of child								
(Male)								
Female	1.04*	(0.197)	-0.04	(0.219)	0.39*	(0.070)	0.31*	(0.014)
Age of child at kindergarten entry, fall 2010	0.36*	(0.022)	0.59*	(0.029)	0.06*	(0.008)	0.02*	(0.002)
Race/ethnicity of child								
(White)								
Black	-0.96*	(0.415)	-3.51*	(0.349)	-1.10*	(0.153)	-0.07*	(0.022)
Hispanic	-1.54*	(0.365)	-2.99*	(0.307)	-0.66*	(0.102)	-0.01	(0.021)
Asian	6.32*	(0.598)	5.53*	(0.676)	-0.04	(0.175)	0.09	(0.048)
Native Hawaiian/ Pacific Islander	-2.11	(1.371)	-2.74	(1.708)	-1.45*	(0.601)	-0.06	(0.082)
American Indian/ Alaska Native	-3.03*	(0.553)	-3.77*	(0.980)	-0.61	(0.507)	0.05	(0.068)
Two or more races	0.30	(0.485)	-0.46	(0.541)	-0.27	(0.144)	-0.02	(0.034)
Household type, fall 2010								
(Two-parent household)								
Single-parent or other household type	-2.26*	(0.197)	-2.75*	(0.255)	-0.25*	(0.088)	-0.17*	(0.018)
Primary home language								
(English)								
Non-English	-2.07*	(0.366)	-2.59*	(0.340)	-0.75*	(0.144)	0.05	(0.028)
Socioeconomic status (SES) <sup>6</sup>								
(Higher SES percents)								
Lowest 20 percent	-3.98*	(0.275)	-5.25*	(0.319)	-0.50*	(0.117)	-0.16*	(0.023)

\*  $p < 0.05$ .

<sup>1</sup> Reflects performance on questions measuring basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition), vocabulary knowledge, and reading comprehension (including locate/recall questions, integrate/interpret questions, and critique/evaluate questions about text the children were asked to read). Actual scores for all kindergartners range from 6 to 83 points.

<sup>2</sup> Reflects performance on questions on number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability (measured with a set of simple questions assessing children's ability to read a graph); and prealgebra skills such as identification of patterns. Actual scores for all kindergartners range from 5 to 75 points.

<sup>3</sup> To measure cognitive flexibility, children were administered the Dimensional Change Card Sort (DCCS) (developed by Philip Zelazo in 2006). Children were asked to sort a series of cards into one of two trays according to different rules (e.g., by color, by shape). Actual scores for all kindergartners range from 0 to 12 points.

<sup>4</sup> The approaches to learning scale is based on teachers' reports on how students rate in seven areas: attentiveness, task persistence, eagerness to learn, learning independence, flexibility, organization, and ability to follow classroom rules. Actual scores for all kindergartners range from 1 to 4, with higher scores indicating that a child exhibits positive learning behaviors more often.

<sup>5</sup> The type of nonparental care in which the child spent the most hours. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements.

<sup>6</sup> Socioeconomic status (SES) was measured by a composite score based on parental education and occupations and household income at the time of data collection.

NOTE: The reference category is the first group listed and is shown in parentheses. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Two parents may refer to two biological parents, two adoptive parents, or one biological/adoptive parent and one other parent/partner. Single parent refers to one biological or adoptive parent only. In households without parents, the guardian or guardians may be related or unrelated to the child. Race categories exclude persons of Hispanic ethnicity.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

**Table A-6. Estimated coefficients from ordinary least squares (OLS) regressions of fall kindergarten reading, mathematics, science, cognitive flexibility, and approaches to learning scores for children whose primary early care and education arrangement prior to kindergarten entry was center-based care, by selected child and family characteristics: 2010–11**

Variable	Mean reading score <sup>1</sup>		Mean mathematics score <sup>2</sup>		Mean cognitive flexibility score <sup>3</sup>		Mean approaches to learning score <sup>4</sup>	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Intercept	15.88*	(1.479)	-4.69*	(1.991)	10.53*	(0.571)	1.41*	(0.121)
Primary type of early care and education (ECE) arrangement prior to kindergarten entry <sup>5</sup>								
(Center-based care)								
No regular ECE arrangement	-2.37*	(0.230)	-2.86*	(0.272)	-0.38*	(0.110)	-0.06*	(0.017)
Home-based relative care	-2.16*	(0.248)	-2.14*	(0.307)	-0.22*	(0.076)	-0.03	(0.019)
Home-based nonrelative care	-1.59*	(0.468)	-0.46	(0.472)	-0.05	(0.182)	0.01	(0.025)
Multiple arrangements	-0.29	(0.520)	0.21	(0.598)	0.22	(0.208)	0.02	(0.035)
Sex of child								
(Male)								
Female	1.04*	(0.197)	-0.04	(0.219)	0.39*	(0.070)	0.31*	(0.014)
Age of child at kindergarten entry, fall 2010	0.36*	(0.022)	0.59*	(0.029)	0.06*	(0.008)	0.02*	(0.002)
Race/ethnicity of child								
(White)								
Black	-0.96*	(0.415)	-3.51*	(0.349)	-1.10*	(0.153)	-0.07*	(0.022)
Hispanic	-1.54*	(0.365)	-2.99*	(0.307)	-0.66*	(0.102)	-0.01	(0.021)
Asian	6.32*	(0.598)	5.53*	(0.676)	-0.04	(0.175)	0.09	(0.048)
Native Hawaiian/ Pacific Islander	-2.11	(1.371)	-2.74	(1.708)	-1.45*	(0.601)	-0.06	(0.082)
American Indian/ Alaska Native	-3.03*	(0.553)	-3.77*	(0.980)	-0.61	(0.507)	0.05	(0.068)
Two or more races	0.30	(0.485)	-0.46	(0.541)	-0.27	(0.144)	-0.02	(0.034)
Household type, fall 2010								
(Two-parent household)								
Single-parent or other household type	-2.26*	(0.197)	-2.75*	(0.255)	-0.25*	(0.088)	-0.17*	(0.018)
Primary home language								
(English)								
Non-English	-2.07*	(0.366)	-2.59*	(0.340)	-0.75*	(0.144)	0.05	(0.028)
Socioeconomic status (SES) <sup>6</sup>								
(Higher SES percents)								
Lowest 20 percent	-3.98*	(0.275)	-5.25*	(0.319)	-0.50*	(0.117)	-0.16*	(0.023)

\*  $p < 0.05$ .

<sup>1</sup> Reflects performance on questions measuring basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition), vocabulary knowledge, and reading comprehension (including locate/recall questions, integrate/interpret questions, and critique/evaluate questions about text the children were asked to read). Actual scores for all kindergartners range from 6 to 83 points.

<sup>2</sup> Reflects performance on questions on number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability (measured with a set of simple questions assessing children's ability to read a graph); and prealgebra skills such as identification of patterns. Actual scores for all kindergartners range from 5 to 75 points.

<sup>3</sup> To measure cognitive flexibility, children were administered the Dimensional Change Card Sort (DCCS) (developed by Philip Zelazo in 2006). Children were asked to sort a series of cards into one of two trays according to different rules (e.g., by color, by shape). Actual scores for all kindergartners range from 0 to 12 points.

<sup>4</sup> The approaches to learning scale is based on teachers' reports on how students rate in seven areas: attentiveness, task persistence, eagerness to learn, learning independence, flexibility, organization, and ability to follow classroom rules. Actual scores for all kindergartners range from 1 to 4, with higher scores indicating that a child exhibits positive learning behaviors more often.

<sup>5</sup> The type of nonparental care in which the child spent the most hours. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements.

<sup>6</sup> Socioeconomic status (SES) was measured by a composite score based on parental education and occupations and household income at the time of data collection.

NOTE: The reference category is the first group listed and is shown in parentheses. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Two parents may refer to two biological parents, two adoptive parents, or one biological/adoptive parent and one other parent/partner. Single parent refers to one biological or adoptive parent only. In households without parents, the guardian or guardians may be related or unrelated to the child. Race categories exclude persons of Hispanic ethnicity.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

**Table A-7. Estimated coefficients from ordinary least squares (OLS) regressions of fall kindergarten reading, mathematics, science, cognitive flexibility, and approaches to learning scores for children whose primary early care and education arrangement prior to kindergarten entry was multiple arrangements for equal amounts of time, by selected child and family characteristics: 2010–11**

Variable	Mean reading score <sup>1</sup>		Mean mathematics score <sup>2</sup>		Mean cognitive flexibility score <sup>3</sup>		Mean approaches to learning score <sup>4</sup>	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Intercept	15.59*	(1.641)	-4.49*	(2.073)	10.74*	(0.580)	1.43*	(0.117)
Primary type of early care and education (ECE) arrangement prior to kindergarten entry <sup>5</sup>								
(Multiple arrangements)								
No regular ECE arrangement	-2.08*	(0.535)	-3.06*	(0.568)	-0.59*	(0.212)	-0.08*	(0.039)
Home-based relative care	-1.87*	(0.581)	-2.35*	(0.619)	-0.43	(0.227)	-0.04	(0.040)
Home-based nonrelative care	-1.30*	(0.620)	-0.66	(0.562)	-0.27	(0.282)	-0.01	(0.035)
Center-based care	0.29	(0.520)	-0.21	(0.598)	-0.22	(0.208)	-0.02	(0.035)
Sex of child								
(Male)								
Female	1.04*	(0.197)	-0.04	(0.219)	0.39*	(0.070)	0.31*	(0.014)
Age of child at kindergarten entry, fall 2010	0.36*	(0.022)	0.59*	(0.029)	0.06*	(0.008)	0.02*	(0.002)
Race/ethnicity of child								
(White)								
Black	-0.96*	(0.415)	-3.51*	(0.349)	-1.10*	(0.153)	-0.07*	(0.022)
Hispanic	-1.54*	(0.365)	-2.99*	(0.307)	-0.66*	(0.102)	-0.01	(0.021)
Asian	6.32*	(0.598)	5.53*	(0.676)	-0.04	(0.175)	0.09	(0.048)
Native Hawaiian/ Pacific Islander	-2.11	(1.371)	-2.74	(1.708)	-1.45*	(0.601)	-0.06	(0.082)
American Indian/ Alaska Native	-3.03*	(0.553)	-3.77*	(0.980)	-0.61	(0.507)	0.05	(0.068)
Two or more races	0.30	(0.485)	-0.46	(0.541)	-0.27	(0.144)	-0.02	(0.034)
Household type, fall 2010								
(Two-parent household)								
Single-parent or other household type	-2.26*	(0.197)	-2.75*	(0.255)	-0.25*	(0.088)	-0.17*	(0.018)
Primary home language								
(English)								
Non-English	-2.07*	(0.366)	-2.59*	(0.340)	-0.75*	(0.144)	0.05	(0.028)
Socioeconomic status (SES) <sup>6</sup>								
(Higher SES percents)								
Lowest 20 percent	-3.98*	(0.275)	-5.25*	(0.319)	-0.50*	(0.117)	-0.16*	(0.023)

\*  $p < 0.05$ .

<sup>1</sup> Reflects performance on questions measuring basic skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition), vocabulary knowledge, and reading comprehension (including locate/recall questions, integrate/interpret questions, and critique/evaluate questions about text the children were asked to read). Actual scores for all kindergartners range from 6 to 83 points.

<sup>2</sup> Reflects performance on questions on number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability (measured with a set of simple questions assessing children's ability to read a graph); and prealgebra skills such as identification of patterns. Actual scores for all kindergartners range from 5 to 75 points.

<sup>3</sup> To measure cognitive flexibility, children were administered the Dimensional Change Card Sort (DCCS) (developed by Philip Zelazo in 2006). Children were asked to sort a series of cards into one of two trays according to different rules (e.g., by color, by shape). Actual scores for all kindergartners range from 0 to 12 points.

<sup>4</sup> The approaches to learning scale is based on teachers' reports on how students rate in seven areas: attentiveness, task persistence, eagerness to learn, learning independence, flexibility, organization, and ability to follow classroom rules. Actual scores for all kindergartners range from 1 to 4, with higher scores indicating that a child exhibits positive learning behaviors more often.

<sup>5</sup> The type of nonparental care in which the child spent the most hours. "Multiple arrangements" refers to children who spent an equal amount of time in each of two or more arrangements.

<sup>6</sup> Socioeconomic status (SES) was measured by a composite score based on parental education and occupations and household income at the time of data collection.

NOTE: The reference category is the first group listed and is shown in parentheses. Estimates weighted by W1\_2P0. Estimates pertain to a sample of children who were enrolled in kindergarten for the first time in the 2010–11 school year. Two parents may refer to two biological parents, two adoptive parents, or one biological/adoptive parent and one other parent/partner. Single parent refers to one biological or adoptive parent only. In households without parents, the guardian or guardians may be related or unrelated to the child. Race categories exclude persons of Hispanic ethnicity.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), Kindergarten–First Grade Restricted-Use Data File.

# APPENDIX B: TECHNICAL NOTES AND METHODOLOGY

The analyses presented in this Statistical Analysis Report are based on data from the National Household Education Surveys Program (NHES) and Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011) data collections. This section provides technical documentation on the data sources. It presents information on sampling, weighting, response rates, and nonresponse bias, as well as the statistical procedures used to conduct the analyses.

## National Household Education Surveys Program (NHES)

The NHES is a data collection system that is designed to address a wide range of education-related issues. Surveys have been conducted in 1991, 1993, 1995, 1996, 1999, 2001, 2003, 2005, 2007, and 2012. NHES targets specific populations for detailed data collection. It is intended to provide more detailed data on the topics and populations of interest than are collected through supplements to other household surveys. NHES data used for this report come from the 1995, 2001, 2005, and 2012 Early Childhood Program Participation Surveys.

In the NHES:1995 Early Childhood Program Participation (ECPP) Survey, parents of about 14,000 children from birth through age 10 and in third grade or below were interviewed by telephone. In NHES:2001, parents of approximately 6,700 children from birth through age 6 who were not yet in kindergarten were interviewed by telephone. In NHES:2005, parents of about 7,200 children from birth through age 6 who were not yet in kindergarten were interviewed by telephone. Mailed questionnaires for the NHES:2012 ECPP were completed by parents for 7,893 children from birth through the age of 5 who were not yet enrolled in kindergarten.

Administrations of NHES prior to 2012 used a random-digit-dial sample of landline phones and computer-assisted telephone interviewing to conduct interviews. However, due to declining response rates for all telephone surveys and the increase in households that only or mostly use a cell phone instead of a landline, the data collection method was changed to an address-based sample survey for NHES:2012.

The NHES:2012 sample was selected using a two-stage address-based sampling frame. The first sampling stage selected residential addresses, and the second sampling stage selected an eligible child from information provided on the household mail screener. To increase the number of Blacks and Hispanics in the sample, Black and Hispanic households were sampled at a higher rate than other households by identifying census tracts with higher percentages of these residents. After the sample was selected, the data were collected using printed questionnaires that were mailed to the sampled respondents.

Questionnaires for the NHES:2012 ECPP were completed for 7,893 children, for a weighted unit response rate of 78.7 percent. The overall estimated weighted unit response rate (the product of the screener weighted unit response rate of 73.8 percent and the Early Childhood Program Participation Survey unit weighted response rate) was 58.1 percent. The overall weighted response rate was 66.3 percent for the NHES:1995 ECPP, 59.9 percent for the NHES:2001 ECPP, and 56.4 percent for the NHES:2005 ECPP.

In order to produce unbiased and consistent estimates of national totals, all of the NHES estimates in this report were weighted using the probabilities of selection of the respondents and other adjustment to account for nonresponse and coverage bias. The weight used for NHES:1995 data was EWEIGHT and the weights used for NHES:2001, NHES:2005, and NHES:2012 data were FEWT. In addition to properly weighting the estimates, special procedures for estimating the standard errors of the estimates were employed because the NHES data were collected using a complex sample design. The standard errors presented in this report were produced using Jackknife 1 replication procedures in the SAS statistical software package. The replicate weights used for NHES:1995 data were ERPL1 through ERPL50, and the replicate weights used for NHES:2001, NHES:2005, and NHES:2012 data were FEWT1 through FEWT80.

Nonresponse bias analyses were conducted for NHES:2001 and NHES:2012 to evaluate whether nonresponse at the unit and item levels impacted the estimates. No nonresponse bias analysis was conducted for NHES:2005 because the survey and data collection procedures were very similar to those in NHES:2001. The methods used in the nonresponse bias analyses included but were not limited to evaluating the effect of weighting on estimates, comparing estimates generated with adjusted and unadjusted weights, and comparing NHES estimates to other sources. The results from both analyses suggest that there is no substantial nonresponse bias after adjusting for nonresponse.

### ***Key NHES variables used in the report***

- **Primary ECE arrangement** (MOSTHRS in NHES:1995, 2001, and 2005 and MOSTHRXS in NHES:2012) is a composite variable that indicates the primary nonparental care or program arrangement in which the child spends the most hours per week. For the purposes of this report, MOSTHRS/MOSTHRXS responses were collapsed into five categories of early care and education (ECE) arrangements: (1) center-based care (including day care centers, Head Start programs, preschools, prekindergartens, and other early childhood programs), (2) home-based relative care, (3) home-based nonrelative care, (4) multiple arrangements (i.e., children who spent equal amounts of time in each of two or more types of arrangements), and (5) no ECE arrangement on a regular basis (i.e., children who had no regularly scheduled care arrangement and mainly received care only from their parents). In addition, children whose only arrangements took place less often than once a week were coded as having no ECE arrangement on a regular basis.
- **Race/ethnicity** (RACEETHN in NHES:1995 and RACEETH2 in NHES:2001, 2005, and 2012) is a composite variable that indicates the race/ethnicity of the child using mutually exclusive categories to code a child as just one race/ethnicity. For this report, categories

were collapsed into the following groups: (1) White, (2) Black, (3) Hispanic, (4) Asian, and (5) Other (including all other races and Two or more races). For the 1995 data, an additional variable (CRACE) was used for determining whether the child was Asian. Race categories do not include children of Hispanic ethnicity.

- **Family poverty status** is a composite variable derived from the total household income (HINCOME in NHES:1995, 2001, and 2005 and TTLHHINC in NHES:2012) and total household size (HHTOTAL in NHES:1995, 2001, and 2005 and HHTOTALX in NHES:2012) of the child. The variable is defined in terms of the Census Bureau's poverty threshold, a dollar amount that varies depending on a family's size and composition and is updated annually to account for inflation. Poor children are those whose family incomes were below the Census Bureau's poverty threshold in the year prior to data collection; near-poor children are those whose family incomes ranged from the poverty threshold to 199 percent of the poverty threshold; and nonpoor children are those whose family incomes were at or above 200 percent of the poverty threshold. Survey respondents are asked to select the range within which their income falls, rather than giving the exact amount of their income; therefore, the measure of poverty status is an approximation.
- **Mother's highest level of education** is a composite variable derived from the educational attainment of or highest grade completed by the child's mother or female guardian (children living in households with no mother or female guardian present were excluded from this analysis). For the purpose of this report, mother's highest level of education was collapsed into the following categories: (1) less than high school, (2) high school/GED, (3) technical or some college, (4) associate's degree, and (5) bachelor's or higher degree. Even though NHES variables on mother or female guardian's education changed over time, consistency in coding procedures needed to be maintained for this report. Therefore, to determine the child's mother's highest level of education, variables MOMGRADE and MOMDIPL were used for the 1995 data, variable MOMEDUC was used for the 2001 and 2005 data, and variables PAR1EDUC, P1EDUC, PAR2EDUC, and P2EDUC were used for the 2012 data. If the child was reported to be living in households with two mothers or female guardians in 2012, information on the birth or adoptive mother was used for analysis before information on the step or foster mother was used, and information on the step or foster mother was used before information on the grandmother or other female guardian was used. In cases where both mothers or female guardians were of the same type, information on the first mother or female guardian as reported on the questionnaire was used for analysis.

More information about the NHES, including technical documentation and questionnaires, can be found on the NCES website at <http://nces.ed.gov/nhes/>.

## Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)

The ECLS-K:2011 provides detailed information on the school achievement and experiences of students throughout their elementary school years. The students participating in the ECLS-K:2011 are being followed longitudinally from the kindergarten year (the 2010–11 school year) through the spring of 2016, when most of them are expected to be in fifth grade. This sample of students is designed to be nationally representative of all students who were enrolled in kindergarten or who were of kindergarten age and being educated in an ungraded classroom or school in the United States in the 2010–11 school year, including those in public and private schools, those who attended full-day and part-day programs, those who were in kindergarten for the first time, and those who were kindergarten repeaters. Students who attended early learning centers or institutions that offered education only through kindergarten are included in the study sample and represented in the cohort. This report focuses on data collected in the kindergarten (base year).

The ECLS-K:2011 places emphasis on measuring students' experiences within multiple contexts and development in multiple domains. The design of the study includes the collection of information from the students, their parents/guardians, their teachers, and their schools. Information was collected from their before- and after-school care providers in the kindergarten year.

The ECLS-K:2011 cohort was sampled using a multistage sampling design. In the first stage, 90 primary sampling units (PSUs) were selected from a national sample of PSUs. The PSUs were counties and county groups. In the second stage, public and private schools educating kindergartners (or ungraded schools educating children of kindergarten age) were selected within the PSUs. Finally, students were sampled from the selected schools. In the third stage of sampling, approximately 23 kindergartners were selected from a list of all enrolled kindergartners (or students of kindergarten age being educated in an ungraded classroom) in each of the sampled schools.

A nationally representative sample of approximately 18,200 children enrolled in kindergarten in the 2010–11 school year participated in the base-year of the ECLS-K:2011. The children attended both public and private schools. The sample includes children from different racial/ethnic and socioeconomic backgrounds and children with limited English proficiency. Asian and Pacific Islander students were oversampled to assure that the sample included enough students of this race/ethnicity to be able to make accurate estimates for these students as a group. In addition, the study sample includes children with disabilities.

A total of approximately 780 of the 1,320 originally sampled schools participated during the base year of the study. This translates into a weighted unit response rate (weighted by the base weight) of 63 percent for the base year. The weighted student unit response rates were 87 percent for the fall data collection and 85 percent for the spring data collection. The weighted parent unit response rates were 74 percent for the fall data collection and 67 percent for the spring data collection.

Eight data collections have been conducted to date: fall and spring of the children’s kindergarten year (the base year), fall 2011 and spring 2012 (the first-grade year), fall 2012 and spring 2013 (the second-grade year), spring 2014 (the third-grade year), and spring 2015 (the fourth-grade year). Additional data collection is planned for the spring of 2016. Although the study refers to later rounds of data collection by the grade the majority of children are expected to be in (that is, the modal grade for children who were in kindergarten in the 2010–11 school year), children are included in subsequent data collections regardless of their grade level.

The ECLS-K:2011 data are weighted to compensate for unequal probabilities of selection at each sampling stage and to adjust for the effects of school, teacher, before- and after-school care provider, child, and parent nonresponse. Estimates for this report were weighted by W1\_2P0, which is the base-year child weight adjusted for nonresponse to the fall or spring parent interview. In addition to properly weighting the estimates, special procedures for estimating the standard errors of the estimates were employed because the ECLS-K:2011 data were collected using a complex sample design. The standard errors presented in this report were produced using Jackknife 2 replication procedures in the SAS statistical software package. The replicate weights used for ECLS-K:2011 data were W1\_2P1 through W12P80.

Nonresponse bias analyses were conducted to determine if substantial bias was introduced as a result of nonresponse in the kindergarten rounds of data collection. Three methods were used to examine the potential for nonresponse bias in the kindergarten data: (1) a comparison of estimates from the ECLS-K:2011 schools to those produced using frame data (i.e., data from the Common Core of Data and the Private School Universe Survey); (2) a comparison of estimates from the ECLS-K:2011 to those from other data sources (for example, the National Household Education Surveys Program); and (3) a comparison of estimates produced using weights that include adjustments for nonresponse to estimates produced using weights without nonresponse adjustments. Findings from these analyses suggest that there is not a substantial bias due to nonresponse after adjusting for that nonresponse.

### ***Key ECLS-K:2011 child and family/household variables used in the report***

- **Primary ECE arrangement** (X12PRIMPK) is a composite categorical variable that indicates the type and location of the child’s primary, regular, nonparental care arrangement, that is, the arrangement in which the child spent the most hours per week during the year before kindergarten. For children with more than one type of child care arrangement, the value for X12PRIMPK is identified based on which type of care had the most number of hours and where the care (for relative and nonrelative care) was located. If two or more child care arrangements were used for the same number of hours, X12PRIMPK is set to “two or more types of care with equal hours.” For the purposes of this report, X12PRIMPK responses were collapsed into five categories of early care and education (ECE) arrangements: (1) center-based care (including day care centers, Head Start programs, preschools, prekindergartens, and other early childhood programs), (2) home-based relative care, (3) home-based nonrelative care, (4) multiple arrangements (i.e., children who spent an equal amount of time in each of two or more types of arrangements), and (5) no ECE arrangement on a regular basis (i.e., children who had no regularly scheduled care arrangement and mainly received care only from their parents).

- **Age at kindergarten entry** (X1AGEENT) is a continuous composite variable, which was created using the date of birth information and parent reports in fall 2010 whether it was the child's first, second, or third (or more) year of kindergarten. For first-time kindergartners, the child's age in months is calculated as of September 1, 2010.
- **Race/ethnicity** (X\_RACETH\_R) is a composite variable that refers to the child's race/ethnicity using mutually exclusive categories to code a child as just one race/ethnicity. For this report, categories were collapsed into the following groups: (1) White, (2) Black, (3) Hispanic, (4) Asian, (5) Native Hawaiian or other Pacific Islander, (6) American Indian/Alaska Native, and (7) Two or more races. Race categories do not include children of Hispanic ethnicity.
- **Family type** (X1HPARNT) is a composite variable based on data collected in the parent interview about the number and type(s) of parents living in the household with the study child. When study children are living with parent figures (e.g., grandmother and grandfather), rather than biological, adoptive, step-, or foster parents, X1HPARNT is coded as "one or more related or unrelated guardian(s)."
- **Primary home language** (X12LANGST) is a composite variable that indicates whether English was the primary language spoken in a student's home or whether a non-English language was the primary language spoken, according to information collected in the parent interview. If English was the only language spoken in the home, or if a language other than English was spoken in the home but the primary language of the household was English, a student is classified as coming from a home in which the primary language was English. If a language other than English was the primary language spoken in the home, a student is classified as coming from a home in which the primary language was not English, even if English was also spoken. In some instances, children lived in a home where more than one language, including English, was spoken and the parent respondent could not choose a primary language. These children are coded in a third category indicating that a primary language was not identified. Children whose parents indicated they spoke more than one language equally are categorized in the third category. Interviews were conducted in English and Spanish in accordance with the parents' language preference; 89 percent of the parent interviews were conducted in English in the fall of kindergarten. The Spanish interviews were administered by bilingual interviewers. A small number of interviews were completed with parents who spoke other languages by using an interpreter who translated the English questions read by the assessor during the interview.
- **Socioeconomic status** (X12SESL), or SES, is a composite variable computed at the household level using data from parents who completed the parent interview in fall 2010 or spring 2011. The SES variable reflects the socioeconomic status of the household at the time of data collection. The five components used to create the SES were as follows: (1) Parent 1/guardian's education; (2) Parent 2/guardian's education; (3) Parent 1/guardian's occupational prestige score; (4) Parent 2/guardian's occupational prestige score; and

(5) Household income. When parent respondents reported a household income indicating the household was close to or lower than 200 percent of the U.S. Census Bureau poverty threshold for a household of its size, the respondents were asked to report household income to the nearest \$1,000 (referred to as exact income). Because not all households were asked to report their exact income, the midpoint of the detailed income range was used to compute the SES composite.

Not all parent respondents provided complete education, occupation, and household income information; therefore, it was necessary to impute missing values for the SES components before computing the SES composite. Imputation was done separately for each component using the hot deck method. For missing values that were imputed, a value reported by a respondent for a particular component (education, occupation, household income category) was assigned or “donated” to a “similar” person who failed to respond to that question. A “similar” person is one who has the same characteristic as the donor; these characteristics are demographic characteristics chosen to form imputation cells. Cells were defined for each imputation by characteristics related to the variable being imputed such as geographic region, urbanicity, household type, age, and race. The imputed value for a case with a missing value was taken from a randomly selected donor among the respondents within the cell.

After imputation, the occupation variables were also recoded to reflect the average of the 1989 General Social Survey (GSS) prestige scores. Occupational prestige level was based on information collected about the type of business or industry in which the parent worked, the parent’s job title, and the most important activities or duties the parent did for the job. Although the GSS prestige scores are from 1989, they are still being used by the current GSS. New technology jobs that came into existence since 1989 were appropriately coded. Details on the occupation categories and assigned prestige scores can be found in the ECLS-K Kindergarten Data User’s Manual (Tourangeau et al. 2012). Occupation was imputed only for those in the labor force. Labor force status was determined by a value of 1 (35 hours or more per week) or 2 (less than 35 hours per week). If a parent was not employed, but reported actively looking for work, the parent’s previous occupation was collected and used in the creation of the SES composite. If the parent was not employed and not actively looking for work, an occupation was not collected and was not imputed. Following imputation, all cases had data for each component variable used to calculate SES.

Note that for households with only one parent present and for parents who are unemployed and not looking for work, retired, or not currently in the labor force, not all the components are defined. In these cases, the SES is the average of the z-scores of the available components.

- **Direct assessment scores** The ECLS-K:2011 direct cognitive assessment focused on three domains in the fall kindergarten round: reading (language use and literacy), mathematics, and executive function (working memory and cognitive flexibility). For the reading and mathematics assessments, assessors asked the children questions related to images (such

as pictures, letters of the alphabet, words, or short sentences for reading or numbers and number problems for mathematics) that were presented on a small easel. Children could respond by pointing or telling the assessor their answers. They were not required to write their answers or explain their reasoning. The executive function component included a card sort task that required children to sort cards into trays.

The components of the ECLS-K:2011 assessment administered to children who spoke a language other than English at home depended on the children's performance on a language screener used in the fall and spring data collections. All children, regardless of home language, were administered the language screener as the first component of the direct cognitive assessment. For children whose home language was English, the screener primarily served as a warm-up or practice for the rest of the assessment since the items were of low difficulty. While the screener also served as a warm-up for children whose home language was one other than English, in addition it determined whether the children understood English well enough to receive the full direct child assessment in English. Students whose home language was one other than English and who did not achieve at least the minimum score on the screener were not administered any of the assessments used in the analyses in this report.

The assessments in ECLS-K:2011 were more inclusive than most other NCES assessment designs because they are individually administered to children and provide an environment that meets the accommodations of most children with special needs. Students whose Individualized Education Programs (IEPs) indicated that they should not participate in standardized assessments were excluded from the assessments. Also, students who required an assessment in Braille, students who required a sign language interpreter, and students whose IEPs required them to be assessed using large print materials were excluded from the assessments because the study did not provide these accommodations. Though these exclusions do result in the assessment data not being generalizable to students with these particular needs, less than 1 percent of all students were excluded due to needs that were not accommodated. To the greatest extent possible, other necessary accommodations (for example allowing a health care aid to be present during the assessment) were allowed so that students with disabilities could be included.

Because the ECLS-K:2011 is a longitudinal study, the assessments also were designed to allow for the measurement of growth in these domains across time. The longitudinal design of the ECLS-K:2011 required that the cognitive assessments be developed to support the measurement of change in knowledge and skills demonstrated by children from kindergarten entry through the spring of fifth grade. Below are brief descriptions of the content of each direct assessment measure; more details can be found in the ECLS-K:2011 technical reports on the NCES website.

- ◇ **Fall kindergarten reading scores** (X1RSCALK1) were based on an assessment that measured students' performance on questions measuring basic skills (print

familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition); vocabulary knowledge; and reading comprehension. Reading comprehension questions asked the child to identify information specifically stated in text (e.g., definitions, facts, supporting details), make complex inferences within and across texts, and consider the text objectively and judge its appropriateness and quality.

- ◇ **Fall kindergarten mathematics scores** (X1MSCALK1) were based on an assessment that measured performance on questions pertaining to number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and prealgebra skills such as identification of patterns. The mathematics assessment was designed to measure skills in conceptual knowledge, procedural knowledge, and problem solving.
- ◇ **Fall kindergarten cognitive flexibility scores** (X1DCCSTOT) were based on an assessment that obtained information on important cognitive processes associated with learning: cognitive flexibility. To measure cognitive flexibility, children were administered the Dimensional Change Card Sort (DCCS) (developed by Philip Zelazo in 2006). In this task, children were asked to sort a series of 22 picture cards into one of two trays according to different rules. Each card had a picture of either a red rabbit or a blue boat; one tray had a picture of a red boat and the other had a picture of a blue rabbit. Children were asked to sort the cards first by color and then by shape. If the child correctly sorted four of the six cards by shape, then he or she moved on to a third sorting rule: if the card had a black border, the child was to sort by color; if the card did not have a black border, the child was to sort by shape. The score used in this report reflects performance across all three sorting tasks: color, shape, and border. The developer of the DCCS recommends using this score, the overall score, to assess general performance.
- **Indirect assessment scores** The child-level teacher questionnaire included seven items, referred to as “Approaches to Learning” items, that asked the teachers to report how often their ECLS-K:2011 students exhibited a selected set of learning behaviors (keeps belongings organized; shows eagerness to learn new things; works independently; easily adapts to changes in routine; persists in completing tasks; pays attention well; and follows classroom rules). The Approaches to Learning scale score (X1TCHAPP) is the mean rating on the seven items included in the scale. Scores range from 1 to 4, with higher scores indicating that a child exhibits positive learning behaviors more often.

More information about the ECLS-K:2011, including technical documentation and questionnaires, can be found on the NCES website at <http://nces.ed.gov/ecls/kindergarten2011.asp>.

## Statistical Procedures

Comparisons of means and percentages were tested for statistical significance at the .05 level using Student's *t* test to ensure that the differences are larger than those that might be expected due to sampling variation. Adjustments for multiple comparisons were not included. Student's *t* values were computed to test differences between independent estimates using the following formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}}$$

where  $E_1$  and  $E_2$  are the estimates to be compared, and  $se_1$  and  $se_2$  are their corresponding standard errors.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large *t* statistics may appear to merit special attention. This can be misleading because the magnitude of the *t* statistic is related not only to the observed differences in means or percentages but also to the number of respondents in the specific categories used for comparison. Hence, a small difference compared across a large number of respondents would produce a large (and thus possibly statistically significant) *t* statistic.

A second hazard in reporting statistical tests is the possibility that one can report a “false positive,” or Type I error. This error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present. Statistical tests are designed to limit the risk of this type of error using a value denoted by alpha. The alpha level of .05 was selected for findings in this report and ensures that a difference of a certain magnitude or larger would be produced when there was no actual difference between the quantities in the underlying population no more than 1 time out of 20. When analysts test hypotheses that show alpha values at the .05 level or smaller, they reject the null hypothesis that there is no difference between the two quantities. Failing to reject a null hypothesis (i.e., detect a difference), however, does not imply the values are the same or equivalent.

In addition to *t* test comparisons, ordinary least squares (OLS) regression analyses were conducted to describe the relationship between primary early care and education (ECE) arrangements the year before kindergarten and children's fall kindergarten scores, after controlling for selected child and family characteristics. Independent variables were entered simultaneously for each regression analysis. Children with no nonparental care the year before kindergarten served as the reference primary ECE arrangement group for the regression table (table 1). Comparisons for other groups (e.g., home-based relative care vs. center-based care) were conducted using the same regression model, with the exception that the reference group was changed so that it was the primary ECE arrangement being compared to other primary ECE arrangements (tables A-4 through A-7). Significant regression coefficients generated by the OLS procedure indicate the units of change in the dependent variable when comparing one primary ECE arrangement group against the reference group, after taking into account all of the other independent variables in the model.



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