

# Findings From the Fifth-Grade Round of the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)

First Look



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# Contents

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	Page
Acknowledgments .....	iii
List of Tables .....	vii
Introduction.....	1
Selected Findings.....	3
References .....	9
Appendix A. Survey Methodology and Glossary .....	A-1
Appendix B. Standard Error Tables .....	B-1

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# List of Tables

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Table	Page
1. Percentage distribution of children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Spring 2016 .....	4
2. Mean reading scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016.....	5
3. Mean math scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016.....	6
4. Mean science scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016.....	7
A-1. Weighted child assessment unit response rates and overall response rates, by round of data collection: Fall 2010 and spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016.....	A-3
A-2. Characteristics of reading, math, and science IRT scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016.....	A-9
B-1. Standard errors for table 1: Percentage distribution of children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Spring 2016 .....	B-2
B-2. Standard errors for table 2: Mean reading scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016 .....	B-3
B-3. Standard errors for table 3: Mean math scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016 .....	B-4
B-4. Standard errors for table 4: Mean science scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016.....	B-5

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# Introduction

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The Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011) is the third in a series of longitudinal studies of young children conducted by the National Center for Education Statistics (NCES), within the U.S. Department of Education’s Institute of Education Sciences. The ECLS-K:2011 collected information about the early educational experiences of a nationally representative sample of children who were in kindergarten or who were of kindergarten age in ungraded classrooms or schools in the 2010–11 school year.

The ECLS-K:2011 provides information on students’ status at school entry, on their transition into school, and on their progression through the elementary grades. The data collection began in the 2010–11 school year, when the children in the sample were in kindergarten, and continued through the spring of 2016, when most of the children in the sample were in fifth grade. The longitudinal nature of the ECLS-K:2011 data enables researchers to study how a wide range of family, school, community, and individual factors are associated with educational, socioemotional, and physical development over time. Information was collected from the students, their parents and guardians, their teachers, and their school administrators. Information was also collected from their before- and after-school care providers in the kindergarten year.

This brief report focuses on information from the data collection conducted in the spring of 2016, when the majority of the ECLS-K:2011 students were in fifth grade. It is intended to provide a snapshot of the children in the ECLS-K:2011 cohort who were in kindergarten for the first time in the 2010–11 school year and in fifth grade 5 years later during the spring of 2016.<sup>1</sup> Information is presented on selected child and family characteristics, such as poverty status, parental education, family type, and primary home language (table 1), obtained when the children were in kindergarten. Estimates for these characteristics can be compared to those provided in previously released ECLS-K:2011 reports<sup>2</sup> to examine differences in the characteristics of the children in the cohort who have been on grade in each year of elementary school.<sup>3</sup> Information is also provided on the children’s knowledge and skills in reading (table 2), math (table 3), and science (table 4) in fifth grade, both overall and by the selected kindergarten-year child and family characteristics. Assessment scores from data collections prior to fifth grade have been recomputed and, therefore, cannot be compared to scores published in previously released reports (see Appendix A). For this reason, scores from the fall and spring of kindergarten and the spring of first, second, third, and fourth grade have been included in the tables.

Readers are cautioned not to draw causal inferences based on the results presented in this report. Although many of the characteristics examined may be related to one another, the complex interactions and relationships among them were not explored. It should also be noted that the variables examined here are just a few of the several thousand that can be examined in the ECLS-K:2011 data. The selected findings present examples of the estimates that can be obtained from the data and are not designed to emphasize any particular issue. All comparisons made in the text were tested for statistical significance to ensure that differences are larger than might be expected due to sampling variation. All differences reported are statistically significant at the  $p < .05$  level and are at least one-fifth of a standard deviation in size. Adjustments were not made for multiple comparisons. Appendix A provides technical documentation for the estimates presented in this report, a glossary describing the variables, and general information about the study. Appendix B reports the standard errors for the estimates. Additional information about the study can be found online at <https://nces.ed.gov/ecls/kindergarten2011.asp>.

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<sup>1</sup> About 88 percent of children enrolled in kindergarten in 2010–11 were in kindergarten for the first time that school year and were in fifth grade in the spring of 2016; these are the students included in this report. The remaining 12 percent includes children who were repeating kindergarten in 2010–11 or who were not in fifth grade in the spring of 2016, including children who had been retained or advanced resulting in enrollment in a grade other than fifth or who were in an ungraded classroom or setting in the spring of 2016. Students in these groups are excluded from the analyses in this report.

<sup>2</sup> See Mulligan et al. (2012), Mulligan et al. (2014), Mulligan et al. (2015), Mulligan et al. (2016), and Mulligan et al. (2018).

<sup>3</sup> On-grade students are those in the grade expected for a given academic year, given their status as first-time kindergartners in the 2010–11 school year.

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## Selected Findings

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Below are selected findings for students who were first-time kindergartners in the 2010–11 school year and in fifth grade in the spring of 2016.

### **Child and Family Characteristics (table 1)**

- Approximately 22 percent of the students lived in households in their kindergarten year (2010–11) that had incomes below the federal poverty level.
- About 8 percent of the students had parents whose highest level of education at the time of the kindergarten data collections (2010–11) was less than a high school credential; about 20 percent had parents with a high school diploma or an alternative credential; about 34 percent had parents whose highest level of education was some college, an associate’s degree, or career/technical education; and about 38 percent had parents whose highest level of education was a bachelor’s degree or higher.

### **Reading, Math, and Science Knowledge and Skills in the Spring of Fifth Grade (tables 2, 3, and 4)**

- In reading, math, and science, White students, Asian students, and students of Two or more races had higher average scores in the spring of fifth grade than did Black students and Hispanic students (tables 2, 3, and 4).<sup>4</sup> In math and science, Hispanic students had higher average scores on the fifth-grade assessment than did Black students.
- No significant differences by sex were detected in children’s fifth-grade reading, math, and science knowledge and skills (tables 2, 3, and 4).
- Across the three income groups examined, fifth-grade assessment scores for reading, math, and science were lowest for students who were living in households with incomes below the federal poverty level in kindergarten and highest for students who were living in households with incomes at or above 200 percent of the federal poverty level in kindergarten (tables 2, 3, and 4).
- In reading, math, and science, fifth-grade assessment scores increased with parents’ highest level of education at the time of the kindergarten collections (2010–11) (tables 2, 3, and 4).
- Assessment scores varied by family type, with students who were living in two-parent households in kindergarten scoring higher in reading, math, and science in fifth grade than students who were living in single-parent and other parent-type households in kindergarten (tables 2, 3, and 4).
- Students with a primary home language of English in kindergarten scored higher on the fifth-grade reading, math, and science assessments than did students with a non-English primary home language and students living in a household with multiple home languages where no primary language was identified (tables 2, 3, and 4).

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<sup>4</sup> Note that persons of Hispanic or Latino background are included in the Hispanic category, regardless of their race; the other race/ethnicity categories exclude persons of Hispanic or Latino background.

Table 1. Percentage distribution of children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Spring 2016

Characteristics	Percent
Total	100.0
Sex	
Male	50.1
Female	49.9
Child's race/ethnicity <sup>1</sup>	
White, non-Hispanic	53.1
Black, non-Hispanic	12.5
Hispanic	24.5
Asian, non-Hispanic	4.4
Native Hawaiian or Other Pacific Islander, non-Hispanic	0.4
American Indian or Alaska Native, non-Hispanic	1.1 !
Two or more races, non-Hispanic	4.2
Poverty status, spring 2011 <sup>2</sup>	
Income below 100 percent of the federal poverty level	22.1
Income between 100 and 199 percent of the federal poverty level	23.5
Income at or above 200 percent of the federal poverty level	54.4
Parents' highest level of education, 2010–11 kindergarten year	
Less than high school credential	7.6
High school diploma or alternative credential	20.2
Some college, associate's degree, or career/technical education	34.5
Bachelor's degree	20.1
Graduate/professional school	17.6
Family type, fall 2010 <sup>3</sup>	
Two parents	78.0
One parent	20.6
Other	1.4
Primary home language, 2010–11 kindergarten year	
Not English	14.9
English	83.8
Multiple home languages, no primary language specified	1.2

! Interpret data with caution. Estimate is unstable because the standard error represents more than 30 percent of the estimate.

<sup>1</sup> Black, non-Hispanic includes African American. Hispanic includes Latino.

<sup>2</sup> Poverty status is based on preliminary U.S. Census thresholds for 2010, which identify incomes determined to meet household needs, given the household size. For example, in 2010 a family of two was below the poverty threshold if its income was lower than \$14,220.

<sup>3</sup> "Two parents" includes two biological parents, two adoptive parents, and one biological/adoptive parent and one other parent/partner. "One parent" refers to one biological or adoptive parent only. "Other" refers to related and/or unrelated guardians.

NOTE: Estimates pertain to those children who were in kindergarten for the first time in 2010–11 and in fifth grade in the spring of 2016. Estimates weighted by W9C19P\_20, which is adjusted for nonresponse to the parent interview in the fall or spring of kindergarten and for nonresponse to the fall and spring kindergarten and spring fifth-grade child assessments. Detail may not sum to total due to rounding and/or missing data.

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

Table 2. Mean reading scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016

Characteristics	Kindergarten		Spring first	Spring second	Spring third	Spring fourth	Spring fifth
	Fall	Spring					
Total	55.1	70.4	97.2	114.6	122.7	131.0	138.0
Sex							
Male	54.7	69.7	95.7	113.1	121.3	130.2	137.4
Female	55.5	71.0	98.7	116.1	124.1	131.8	138.5
Child's race/ethnicity <sup>1</sup>							
White, non-Hispanic	56.7	72.3	100.4	117.8	126.1	133.9	141.0
Black, non-Hispanic	53.6	67.8	93.1	109.6	116.6	125.0	131.5
Hispanic	51.4	66.5	91.1	109.0	117.5	126.6	133.5
Asian, non-Hispanic	59.5	75.0	101.7	117.9	125.6	135.0	142.0
Native Hawaiian or Other Pacific Islander, non-Hispanic	52.5	69.8	97.6	114.8	122.6	130.8	137.8
American Indian or Alaska Native, non-Hispanic	51.6	66.1	96.3	113.2	122.3	130.7	137.3
Two or more races, non-Hispanic	57.2	72.3	99.6	117.1	125.2	133.8	140.9
Poverty status, spring 2011 <sup>2</sup>							
Income below 100 percent of the federal poverty level	50.7	65.2	89.4	107.0	115.6	124.4	131.2
Income between 100 and 199 percent of the federal poverty level	53.5	68.7	95.7	112.8	121.1	129.3	136.5
Income at or above 200 percent of the federal poverty level	58.1	73.7	102.0	119.4	127.2	135.2	142.3
Parents' highest level of education, 2010–11 kindergarten year							
Less than high school credential	48.3	63.2	86.6	103.9	112.9	121.9	128.7
High school diploma or alternative credential	50.9	65.7	90.9	108.3	117.2	125.7	132.7
Some college, associate's degree, or career/technical education	53.8	68.9	96.0	113.2	121.2	129.7	136.7
Bachelor's degree	58.0	73.8	101.7	119.3	127.1	135.2	142.3
Graduate/professional school	61.8	77.6	106.2	123.4	131.0	138.6	145.4
Family type, fall 2010 <sup>3</sup>							
Two parents	56.1	71.7	98.9	116.4	124.4	132.7	139.7
One parent	52.3	66.7	92.6	109.8	118.2	126.5	133.3
Other	51.1	66.1	91.7	108.6	116.6	125.2	131.2
Primary home language, 2010–11							
Not English	50.6	65.2	89.3	107.3	116.4	125.7	132.8
English	55.9	71.3	98.7	115.9	123.9	132.0	139.0
Multiple home languages, no primary language specified	52.6	69.1	93.5	110.7	118.1	128.3	133.2

<sup>1</sup> Black, non-Hispanic includes African American. Hispanic includes Latino.

<sup>2</sup> Poverty status is based on preliminary U.S. Census thresholds for 2010, which identify incomes determined to meet household needs, given the household size. For example, in 2010 a family of two was below the poverty threshold if its income was lower than \$14,220.

<sup>3</sup> "Two parents" includes two biological parents, two adoptive parents, and one biological/adoptive parent and one other parent/partner. "One parent" refers to one biological or adoptive parent only. "Other" refers to related and/or unrelated guardians.

NOTE: Estimates pertain to those children who were in kindergarten for the first time in 2010–11 and in fifth grade in the spring of 2016. Estimates weighted by W9C19P\_20, which is adjusted for nonresponse to the parent interview in the fall or spring of kindergarten and for nonresponse to the fall and spring kindergarten and spring fifth-grade child assessments. The possible range of scores was 0 to 167.

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

Table 3. Mean math scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016

Characteristics	Kindergarten		Spring first	Spring second	Spring third	Spring fourth	Spring fifth
	Fall	Spring					
Total	36.8	51.3	74.5	92.0	105.9	114.3	121.4
Sex							
Male	37.1	51.4	75.5	93.7	107.9	116.2	122.4
Female	36.5	51.1	73.5	90.3	103.9	112.5	120.3
Child's race/ethnicity <sup>1</sup>							
White, non-Hispanic	39.5	54.5	78.5	96.6	110.5	118.9	125.9
Black, non-Hispanic	32.7	45.4	67.1	81.3	94.6	102.9	110.3
Hispanic	32.0	46.4	68.4	85.8	100.0	108.7	115.7
Asian, non-Hispanic	41.0	54.2	77.9	98.9	112.6	121.0	128.7
Native Hawaiian or Other Pacific Islander, non-Hispanic	36.0	52.8	74.2	93.2	107.4	115.6	123.4
American Indian or Alaska Native, non-Hispanic	34.4	49.4	74.3	92.9	107.6	114.5	121.2
Two or more races, non-Hispanic	38.6	52.9	76.4	95.0	107.5	115.9	122.5
Poverty status, spring 2011 <sup>2</sup>							
Income below 100 percent of the federal poverty level	31.5	45.6	67.8	84.6	98.4	106.7	113.5
Income between 100 and 199 percent of the federal poverty level	35.1	49.4	72.6	89.9	103.9	112.6	119.5
Income at or above 200 percent of the federal poverty level	40.4	55.2	78.9	97.2	110.9	119.2	126.4
Parents' highest level of education, 2010–11 kindergarten year							
Less than high school credential	28.8	43.6	65.9	82.3	95.7	104.5	111.6
High school diploma or alternative credential	32.0	45.8	68.5	85.4	99.6	107.7	114.9
Some college, associate's degree, or career/technical education	35.6	50.1	73.1	90.2	104.5	112.9	119.6
Bachelor's degree	40.5	55.1	79.0	97.2	110.9	119.5	126.6
Graduate/professional school	43.8	58.7	82.5	101.6	114.5	123.1	130.3
Family type, fall 2010 <sup>3</sup>							
Two parents	38.1	52.8	76.2	94.2	108.1	116.6	123.7
One parent	33.1	47.0	70.0	85.8	99.7	107.8	114.5
Other	31.5	45.7	68.2	84.5	98.3	106.1	113.7
Primary home language, 2010–11							
Not English	31.2	45.6	68.0	85.8	100.0	109.3	116.6
English	37.8	52.3	75.7	93.2	107.0	115.3	122.2
Multiple home languages, no primary language specified	33.5	46.6	68.8	87.5	102.7	110.3	118.7

<sup>1</sup> Black, non-Hispanic includes African American. Hispanic includes Latino.

<sup>2</sup> Poverty status is based on preliminary U.S. Census thresholds for 2010, which identify incomes determined to meet household needs, given the household size. For example, in 2010 a family of two was below the poverty threshold if its income was lower than \$14,220.

<sup>3</sup> "Two parents" includes two biological parents, two adoptive parents, and one biological/adoptive parent and one other parent/partner. "One parent" refers to one biological or adoptive parent only. "Other" refers to related and/or unrelated guardians.

NOTE: Estimates pertain to those children who were in kindergarten for the first time in 2010–11 and in fifth grade in the spring of 2016. Estimates weighted by W9C19P\_20, which is adjusted for nonresponse to the parent interview in the fall or spring of kindergarten and for nonresponse to the fall and spring kindergarten and spring fifth-grade child assessments. The possible range of scores was 0 to 159.

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

Table 4. Mean science scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016

Characteristics	Kindergarten		Spring first	Spring second	Spring third	Spring fourth	Spring fifth
	Fall	Spring					
Total	–	34.4	43.7	53.6	61.0	67.9	74.7
Sex							
Male	–	34.5	44.1	54.1	61.6	68.4	75.2
Female	–	34.3	43.4	53.0	60.5	67.4	74.2
Child’s race/ethnicity <sup>1</sup>							
White, non-Hispanic	–	37.1	47.2	56.9	64.5	71.2	77.9
Black, non-Hispanic	–	31.1	38.9	47.6	54.6	61.2	66.9
Hispanic	–	30.1	38.4	48.6	56.0	63.3	70.6
Asian, non-Hispanic	–	32.1	42.7	55.0	63.2	69.9	77.8
Native Hawaiian or Other Pacific Islander, non-Hispanic	–	31.7	40.5	50.3	58.7	64.7	72.5
American Indian or Alaska Native, non-Hispanic	–	35.7	44.0	53.3	59.7	68.8	74.2
Two or more races, non-Hispanic	–	36.8	46.8	56.4	63.9	70.9	77.3
Poverty status, spring 2011 <sup>2</sup>							
Income below 100 percent of the federal poverty level	–	30.2	38.2	47.8	55.4	62.3	68.9
Income between 100 and 199 percent of the federal poverty level	–	33.6	42.6	52.5	59.6	66.7	73.4
Income at or above 200 percent of the federal poverty level	–	37.0	47.2	57.2	64.8	71.5	78.4
Parents’ highest level of education, 2010–11 kindergarten year							
Less than high school credential	–	28.0	35.1	45.1	52.5	60.0	66.4
High school diploma or alternative credential	–	31.4	39.7	49.3	56.4	63.3	70.3
Some college, associate’s degree, or career/technical education	–	34.2	43.2	52.6	60.0	67.1	73.8
Bachelor’s degree	–	36.8	46.8	57.1	64.8	71.3	78.4
Graduate/professional school	–	38.3	49.6	59.8	67.6	74.0	80.6
Family type, fall 2010 <sup>3</sup>							
Two parents	–	35.2	44.9	54.9	62.5	69.3	76.3
One parent	–	32.7	40.9	50.0	57.3	64.1	70.5
Other	–	32.4	40.4	49.7	56.4	62.5	68.7
Primary home language, 2010–11							
Not English	–	27.7	35.8	46.8	54.9	62.6	70.0
English	–	35.6	45.2	54.8	62.2	68.9	75.5
Multiple home languages, no primary language specified	–	29.8	38.1	48.1	56.4	63.7	72.4

– Not available. The direct science assessment was not fielded in the fall of kindergarten (fall 2010).

<sup>1</sup> Black, non-Hispanic includes African American. Hispanic includes Latino.

<sup>2</sup> Poverty status is based on preliminary U.S. Census thresholds for 2010, which identify incomes determined to meet household needs, given the household size. For example, in 2010 a family of two was below the poverty threshold if its income was lower than \$14,220.

<sup>3</sup> “Two parents” includes two biological parents, two adoptive parents, and one biological/adoptive parent and one other parent/partner. “One parent” refers to one biological or adoptive parent only. “Other” refers to related and/or unrelated guardians.

NOTE: Estimates pertain to those children who were in kindergarten for the first time in 2010–11 and in fifth grade in the spring of 2016. Estimates weighted by W9C19P\_20, which is adjusted for nonresponse to the parent interview in the fall or spring of kindergarten and for nonresponse to the fall and spring kindergarten and spring fifth-grade child assessments. The possible range of scores was 0 to 100.

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

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# Appendix A. Survey Methodology and Glossary

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## Survey Overview and Methodology

The Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011) is sponsored by the National Center for Education Statistics (NCES) within the U.S. Department of Education’s Institute of Education Sciences to provide detailed information on the school achievement and experiences of students throughout their elementary school years. Westat, Inc., assisted with the design of the study and collected the data upon which this report is based. The students participating in the ECLS-K:2011 were followed longitudinally from kindergarten (the 2010–11 school year) through the spring of 2016, when most were in fifth grade. This sample of students was 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,<sup>1</sup> those who attended full-day and part-day programs, those who were in kindergarten for the first time, and those who were kindergarten repeaters.

The ECLS-K:2011 placed an emphasis on measuring students’ experiences within multiple contexts and their development in multiple domains, including cognitive, socioemotional, and physical development. The study collected information from students as well as from their parents and guardians, teachers, schools, and before- and after-school care providers.

The estimates in this report are based on the data collected from students, in the form of direct assessments in reading, math, and science, and on information collected from the students’ parents or guardians during the kindergarten parent interview. The estimates pertain only to those children who attended kindergarten for the first time in the 2010–11 school year and who were in fifth grade in the spring of 2016. About 88 percent of children enrolled in kindergarten in 2010–11 were in kindergarten for the first time that school year and were in fifth grade in the spring of 2016. The remaining 12 percent includes children who were repeating kindergarten in 2010–11 or who were not in fifth grade in the spring of 2016, including children who had been retained or advanced resulting in enrollment in a grade other than fifth or who were in an ungraded classroom or setting in the spring of 2016.

## Sample Design

A nationally representative sample of approximately 18,170 children from about 1,310 schools<sup>2</sup> participated in the base-year administration of the ECLS-K:2011 in the 2010–11 school year. The sample included children from different racial/ethnic and socioeconomic backgrounds.

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. The schools were selected from a preliminary version of the frame developed for the 2010 National Assessment of Educational Progress (NAEP), which contained information about public schools that were included in the 2006–07 Common Core of Data Public Elementary/Secondary School Universe Survey and private schools that were included in the 2007–08 Private School Universe Survey. The NAEP frame had not yet been updated and, therefore, was not final at the time it was obtained for use in the

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<sup>1</sup> Students who attended early learning centers or institutions that offered education only through kindergarten are also included in the study sample and represented in the cohort if those institutions were included in NCES’s Common Core of Data or Private School Survey universe collections, which were used to develop the sampling frame.

<sup>2</sup> This number includes both schools that were part of the original sample of schools selected for the study (approximately 970) and schools to which children transferred between the fall and spring kindergarten collections (approximately 340).

ECLS-K:2011. For this reason, a supplemental frame of newly opened schools and kindergarten programs was developed in the spring of 2010, and a supplemental sample of schools selected from that frame was added to the main sample of study 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.

## **Data Collection**

Fall and spring data collections were conducted in the 2010–11 school year, when all study children were in kindergarten; in the 2011–12 school year, when most study children were in first grade; in the 2012–13 school year, when most study children were in second grade; in the spring of 2014, when most children were in third grade; in the spring of 2015, when most children were in fourth grade; and in the spring of 2016 when most children were in fifth grade.

The spring fifth-grade data collection included base-year respondents who attended schools within all 90 sampled PSUs. Due to the increased data collection costs associated with following students who transferred from their original sample school, in each round of data collection only a subsample of these students was followed into their new schools. About 11,450 children attending about 2,970 schools participated in the spring fifth-grade data collection. The spring fifth-grade direct child assessments were conducted from March through June of 2016, with approximately 76 percent conducted in April and May of 2016.

For more information on the sample design and sampling procedures for the fifth grade and for prior rounds, refer to the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–First Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–Second Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2017); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–Third Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–Fourth Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); and the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS K:2011 Kindergarten–Fifth Grade Data File and Electronic Codebook, Restricted Version* (Tourangeau et al. 2019).

Information on the child and family characteristics used in this report (children's race/ethnicity, household poverty status, parents' highest level of education, family type, and primary home language) was collected through interviews with parents in the children's kindergarten year. Most parent interviews were conducted by telephone; however, they were conducted in person for parents who were unreachable by telephone or who preferred an in-person interview. The respondent to the parent interview was usually a parent or guardian in the household who identified himself or herself as the person who knew the most about the child's care, education, and health.

The parent interview was fully translated into Spanish before data collection began and could be administered by bilingual interviewers if parent respondents preferred to speak in Spanish. Because it was cost prohibitive to do so, the parent interview was not translated into other languages. However, interviews could be completed with parents who spoke other languages by using an interpreter who translated from the English during the interview.

## **Response Rates**

The child assessment data presented in this report come from fall and spring kindergarten, spring first grade, spring second grade, spring third grade, spring fourth grade, and spring fifth grade. The weighted child

assessment unit response rates<sup>3</sup> and overall response rates are presented in table A-1. The overall response rate is the unit response rate multiplied by the base-year school-level response rate, which was 62.7 percent.

Table A-1. Weighted child assessment unit response rates and overall response rates, by round of data collection: Fall 2010 and spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016

Round of collection	Weighted unit response rate	Weighted overall response rate
Fall kindergarten	87.0	54.8
Spring kindergarten	85.2	53.4
Spring first grade	88.0	55.2
Spring second grade	83.4	52.3
Spring third grade	79.9	50.1
Spring fourth grade	77.3	48.5
Spring fifth grade	72.4	45.4

SOURCE: *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–First Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–Second Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2017); *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–Third Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–Fourth Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); and *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS K:2011 Kindergarten–Fifth Grade Data File and Electronic Codebook, Restricted Version* (Tourangeau et al. 2019).

The household characteristic data, such as poverty status, parents' highest level of education, family type, and primary home language, come from the parent interview kindergarten waves of collection. The weighted parent unit response rates were 74.2 percent for the fall kindergarten data collection and 67.1 percent for the spring kindergarten data collection. The weighted unit response rate for children whose parent completed the interview in either the fall or spring of kindergarten was 79.8 percent. The overall response rates for the kindergarten parent interviews, which also take into account school-level response, were 46.7 percent for the fall kindergarten data collection, 42.1 percent for the spring kindergarten data collection, and 50.0 percent for the fall or spring kindergarten data collection.

A nonresponse bias analysis was conducted to determine if substantial bias was introduced as a result of nonresponse. To examine the effect of school nonresponse, estimates from the ECLS-K:2011 schools were compared to those produced using frame data (i.e., data from the Common Core of Data and the Private School Universe Survey). The differences in the two sets of estimates are very small, suggesting there is not significant nonresponse bias present in the data at the school level. To examine the effect of nonresponse for data collected through instruments that have a response rate lower than 85 percent, in this case the kindergarten parent interviews and the second- through fifth-grade child assessments, estimates produced using weights that include adjustments for nonresponse were compared to estimates produced using weights without nonresponse adjustments. Additionally, for the parent interview data, estimates from the ECLS-K:2011 were compared to those from other data sources (for example, the National Household Education Surveys Program). The results of these nonresponse bias analyses also suggest that there is not a substantial bias due to nonresponse after adjusting for that nonresponse. For more information on the nonresponse bias analyses, refer to the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–First Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–Second Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2017); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-*

<sup>3</sup> The weighted unit response rates for the child assessment and parent interview were calculated using the student base weight, which is the product of the school base weight and the within-school student weight.

*K:2011*), *User's Manual for the ECLS-K:2011 Kindergarten–Third Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, *User's Manual for the ECLS-K:2011 Kindergarten–Fourth Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); and the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, *User's Manual for the ECLS K:2011 Kindergarten–Fifth Grade Data File and Electronic Codebook, Restricted Version* (Tourangeau et al. 2019).

The item missing rate for the variables in the analytic sample used in this report is generally low (less than 1 percent). The exceptions were poverty status in the spring of kindergarten, which has an item missing rate of 13 percent, and family type in the fall of kindergarten, which has an item missing rate of 8 percent. The item-level missing rates for parents' highest level of education were less than 5 percent. Even though the item-level nonresponse rate was relatively low, missing parent education data were imputed. This was done because parent education and other variables were used to create a measure of household socioeconomic status that is provided in the data file. More information on item-level missing data and hot-deck imputation can be found in the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, *User's Manual for the ECLS-K:2011 Kindergarten Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, *User's Manual for the ECLS-K:2011 Kindergarten–First Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, *User's Manual for the ECLS-K:2011 Kindergarten–Second Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2017); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, *User's Manual for the ECLS-K:2011 Kindergarten–Third Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, *User's Manual for the ECLS-K:2011 Kindergarten–Fourth Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); and the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, *User's Manual for the ECLS K:2011 Kindergarten–Fifth Grade Data File and Electronic Codebook, Restricted Version* (Tourangeau et al. 2019).

## **Data Reliability**

Estimates produced using data from the ECLS-K:2011 are subject to two types of error: nonsampling and sampling errors. Nonsampling errors are errors made in the collection and processing of data. Sampling errors occur because the data are collected from a sample rather than a census of the population.

### ***Nonsampling Errors***

Nonsampling error is the term used to describe variations in the estimates that may be caused by population coverage limitations as well as by data collection, processing, and reporting procedures. The sources of nonsampling errors are typically nonresponse, differences in respondents' interpretations of the meaning of survey questions, response differences related to the particular time when the survey was conducted, and mistakes in data preparation.

In general, it is difficult to identify and estimate either the amount of nonsampling error or the bias that it causes. In the ECLS-K:2011, efforts were made to prevent such errors from occurring and to compensate for them where possible (e.g., by field-testing items and assessments, using survey questions that had been tested and used in previous surveys, conducting multiday assessor/interviewer training, holding assessor certification sessions, and monitoring assessor/interviewer performance and field data quality throughout the collection period).

Another potential source of nonsampling error is respondent bias, which occurs when respondents systematically misreport (intentionally or unintentionally) information in a study. One potential source of respondent bias is social desirability bias, which can result when respondents provide information they believe is socially desirable or acceptable but that does not accurately reflect the respondents' characteristics or experiences. An associated error occurs when respondents give unduly positive reports about those close

to them. For example, parents may give a better assessment of their children's reading ability than might be obtained from a direct assessment. If there are no systematic differences among specific groups under study in their tendency to give socially desirable or unduly positive responses, then comparisons of the different groups will provide reasonable measures of relative differences among the groups.

The information in this report is based on items from the kindergarten parent interviews and child assessments from each grade. Analysis of potential bias due to item nonresponse is typically conducted for those items with a response rate less than 85 percent. As noted earlier, most of the parent interview items used in this report had an item-level missing rate below 1 percent and none had a response rate lower than 85 percent. Results of the reading, mathematics, and science child assessment are reported as overall scores. These assessment data are not reported out at the item level, so it is not appropriate to discuss item-level nonresponse rates in this regard.

### ***Sampling Errors and Weighting***

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. The sample weights used in the ECLS-K:2011 analyses were developed in several stages.<sup>4</sup> The first stage of the weighting process assigned weights to the sampled PSUs that are equal to the inverse of their probability of selection. The second stage of the weighting process assigned weights to the schools sampled within the selected PSUs. The base weight for each sampled school is the PSU weight multiplied by the inverse of the probability of the school being selected from the PSU. The base weights of responding schools were adjusted to compensate for nonresponse among the set of eligible schools. These adjustments were made separately for public and private schools.

To compute the kindergarten base weight for each student in the sample, the school nonresponse-adjusted weight for the school the student attended was multiplied by the within-school student weight. The within-school student weight was calculated separately for Asian/Pacific Islander (API) students and non-API students to account for the oversampling of API students.<sup>5</sup> For API students, the within-school student weight is the total number of API kindergarten students in the school divided by the number of API kindergarten students sampled in the school. For non-API students, the within-school student weight is the total number of non-API kindergarten students in the school divided by the number of non-API kindergarten students sampled in the school. The student-level base weight was then adjusted for nonresponse for different components of the study.

The weights developed for use in the analysis of the data collected in fifth grade are derived from the kindergarten student base weight. The spring fifth-grade student base weight is the base-year student base weight adjusted for base-year nonresponse.

The estimates in this report were weighted by W9C19P\_20. This weight is the spring fifth-grade student base weight adjusted to account for a purposeful subsampling of students who moved from their base-year schools<sup>6</sup> and for nonresponse to some of the data collection instruments that are the sources of information featured in this report to minimize bias in the estimates. That is, this weight is adjusted for nonresponse to the parent interview in the fall or spring of kindergarten and for nonresponse to the fall and spring kindergarten and spring fifth-grade child assessments.

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<sup>4</sup> The approach used to develop weights for the ECLS-K:2011 is described in the *User's Manual for the ECLS K:2011 Kindergarten–Fifth Grade Data File and Electronic Codebook, Restricted Version* (Tourangeau et al. 2019).

<sup>5</sup> Asians, Native Hawaiians, and Other Pacific Islanders were sampled at a higher rate in order to achieve the minimum sample size required to generate reliable estimates. Although they were oversampled as one group, the numbers of completed interviews for children in the Asian group and children in the Native Hawaiian and Other Pacific Islander group were large enough to produce estimates for each of these two groups separately.

<sup>6</sup> In order to control data collection costs, approximately 50 percent of study students who moved from their base-year schools between the spring kindergarten and spring fifth-grade data collections were followed into their new schools.

In addition to properly weighting the data in this report, special procedures for estimating the statistical significance of the estimates were employed, because the data were collected using a complex sample design. A complex sample design, like that used in the ECLS-K:2011, results in data that violate the assumptions that are normally required to assess the statistical significance of results. Statistical tests of significance from sample surveys require information about standard errors. The standard errors of the estimates from complex sample surveys may vary from those that would be expected if the sample were a simple random sample and the observations were independent and identically distributed random variables. Using the statistical software Stata, the jackknife replication variance estimation method was used to compute approximately unbiased estimates of the standard errors of the estimates in the report.<sup>7</sup>

## Statistical Procedures

Comparisons made in the text were tested for statistical significance at the  $p < .05$  level to ensure that the differences were larger than might be expected due to sampling variation. When comparing estimates within categorical groups (e.g., sex, race/ethnicity), Student's  $t$  statistics were calculated. The formula used to compute the  $t$  statistic is

$$t = \frac{x_2 - x_1}{\sqrt{(SE_2^2 + SE_1^2)}}$$

where  $x_1$  and  $x_2$  are the estimates being compared and  $SE_1$  and  $SE_2$  are their corresponding standard errors. With sample sizes as large as that of the ECLS-K:2011,  $t$ -scores greater than 1.96 or less than -1.96 are significant at the .05 level of significance. Due to the large sample size, many differences (no matter how substantively minor) are statistically significant. In this report, differences are considered substantively meaningful if they are at least one-fifth of a standard deviation in size. Therefore, only differences that are statistically significant at the  $p < .05$  level and are at least one-fifth of a standard deviation in size are reported. No adjustments were made for multiple comparisons.

## Direct Cognitive Assessments: Reading, Math, and Science

Children were assessed in reading, math, and science in all rounds of data collection. The assessments were administered directly to the sampled children on an individual basis by trained and certified child assessors.

The longitudinal design of the ECLS-K:2011 requires 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. To that end, the majority of the items included in the fifth-grade assessments had been included in the fourth-grade assessments. However, to ensure that the assessments adequately measured the knowledge and skills of the children as they progress through school, new, more difficult items were added to the assessments in fifth grade and the easiest items, reflecting lower-level third-grade skills, were omitted. The design of the assessments for other rounds was similar. The ECLS-K:2011 reading, math, and science specifications were based on the frameworks developed for the National Assessment of Educational Progress, which is administered starting in fourth grade. For the ECLS-K:2011 assessments below fourth grade, the NAEP specifications were extrapolated down to the lower grades based on current curriculum standards from several states and, for math, the National Council of Teachers of Mathematics Principles and Standards for School Mathematics. The frameworks necessarily cover content strands applicable to a range of content at different grade levels—for example, from number sense (i.e., basic knowledge of numbers) to algebra in mathematics.

In each round of data collection, content appropriate for most students in the focal grade was included in the assessments. While the assessments were designed to contain mostly items that assessed knowledge and

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<sup>7</sup> More detail about the jackknife replication variance estimation method is provided in the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS-K:2011 Kindergarten–Fifth Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018).

skills at the focal grade level, easier and more difficult items were included to measure the abilities of students performing below or above grade level. The reading assessment included questions measuring basic skills (e.g., 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); to make complex inferences within texts; and to consider the text objectively and judge its appropriateness and quality. The math assessment was designed to measure skills in conceptual knowledge, procedural knowledge, and problem solving. The assessment consisted of questions on number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and patterns, algebra, and functions. The science assessment domain included questions about physical sciences, life sciences, Earth and space sciences, and scientific inquiry.

Most sampled students participated in the cognitive assessments regardless of disability status or home language; however, there were some exceptions. Students whose Individualized Education Program (IEP) 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 IEP required them to be assessed using large-print materials were excluded from the assessments because the study did not provide these accommodations. Although these exclusions do result in the assessment data not being generalizable to students with these particular needs, this accounts for less than 1 percent of all students. To the greatest extent possible, other necessary accommodations were allowed (for example, allowing a health care aide to be present during the assessment).

Unlike the kindergarten and first-grade data collections, a language screener was not used in the second-through fifth-grade collections for children whose home language was not English. By the spring of first grade, nearly all children (99.9 percent) were routed through the assessment in English; therefore, the language screener was not administered beyond the spring of first grade. All children were assessed in English in the spring of fifth grade.

For the fifth-grade rounds of data collection, the overall testing time for each child was expected to be approximately 60 minutes, with more time allotted for the reading assessment (30 minutes) than for the math and science assessments (approximately 10–15 minutes each). In addition to the reading, math, and science assessments, children's executive function<sup>8</sup> was assessed, and measures of children's height and weight were collected. For a full description of the data collected from the child, please see Chapter 2 of the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS K:2011 Kindergarten–Fifth Grade Data File and Electronic Codebook, Restricted Version* (Tourangeau et al. 2019).

For the reading, math, and science assessments, the ECLS-K:2011 employed a two-stage assessment in which children were administered a set of items appropriate to their demonstrated ability level rather than all of the items in the assessment.<sup>9</sup> Although this procedure resulted in children being administered different sets of items, there was a subset of items that all children received (the items in the routing tests, plus a set of items common across the different second-stage forms). These common items were used to calculate scores for all children on the same scale.

Broad-based scores using the full set of items administered in the kindergarten through fifth-grade assessments in reading, math, and science were calculated using item response theory (IRT) procedures. IRT is a method for modeling assessment data that makes it possible to calculate an overall score for each domain measured. IRT has several advantages over raw number-right scoring. By using the overall pattern of right and wrong responses and the characteristics of each item to estimate ability, IRT can adjust for the possibility of a low-ability child guessing several difficult items correctly. If answers on several easy items are wrong, the probability of a correct answer on a difficult item would be quite low. Omitted items are also less likely to

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<sup>8</sup> Executive functions are interdependent processes that work together to regulate and orchestrate cognition, emotion, and behavior and that help a child to learn in the classroom. The executive function component of the cognitive assessment in fifth grade obtained information on cognitive flexibility, working memory, and inhibitory control.

<sup>9</sup> The one exception was the science assessment fielded in the spring of kindergarten, which had only one stage consisting of 20 items.

cause distortion of scores, as long as enough items have been answered to establish a consistent pattern of right and wrong answers.

This report presents information on children's IRT-based overall scale scores in reading, math, and science in the fall and spring of kindergarten and in the spring of first, second, third, fourth, and fifth grades. The IRT-based overall scale score for each content domain is an estimate of the number of items a child would have answered correctly in each data collection round if he or she had been administered all of the questions ever administered for that domain from kindergarten through fifth grade. To calculate the IRT-based overall scale score for each domain, a child's IRT ability estimate ( $\theta$ ) is used to predict a probability for each assessment item that the child would have gotten that item correct. Then, the probabilities for all of the items fielded as part of the domain in every round are summed to create the overall scale score. Because the computed scale scores are sums of probabilities, the scores are not integers.

The methodology for the scaling of the reading, math, and science direct assessments was reevaluated after the fifth-grade data collection to assure that the methods chosen at the beginning of the study were producing the most precise scores possible. While the overall methodology was confirmed as appropriate, it was determined that a variation of the methods used would be optimal. Therefore, the kindergarten through fifth-grade assessment data were recalibrated using this approach, and revised assessment scores were developed for release for all rounds of collection on the study's final longitudinal kindergarten through fifth-grade data files. Use of the revised scaling approach does not imply that analyses using the previous data file are incorrect or any less valid. For more information about the previous and revised scaling methodologies, please see *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User's Manual for the ECLS K:2011 Kindergarten–Fifth Grade Data File and Electronic Codebook, Restricted Version* (Tourangeau et al. 2019).

In addition to reexamining the scaling approach for the last release of data from the study, an analysis of outlier assessment data was conducted for each round of collection and each domain (reading, math, and science) separately. Using unweighted data, an outlier score was defined as one that falls either four standard deviations below the score mean (for that particular round and subject) or four standard deviations above the score mean (for that particular round and subject). Four standard deviations of the mean was selected as the outlier threshold to identify extreme outliers. Researchers may wish to exclude these cases from their analyses as an outlier value may indicate that precision of measurement may be less than desirable for these cases. In reading, less than 0.4 percent of cases, in math less than 0.3 percent of cases, and in science less than 0.3 percent of cases were identified as outliers. These outlier cases were excluded from the analyses presented in this report.

## **Glossary: Constructs and Variables Used in the Analyses**

### ***Reading, Math, and Science Scores***

For this report, estimates pertain to children who entered kindergarten for the first time in the 2010–11 school year and were in fifth grade in the spring of 2016. Table A-2 below presents the possible range of scores for each domain, and when weighted by W9C9P\_20, the mean and standard deviation for the scale scores for each round of data collection.

Table A-2. Characteristics of reading, math, and science IRT scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016

Score	Variable name	Range	Mean	Standard deviation
<b>Reading</b>				
Fall kindergarten	X1RSCALK5	0–167	55.1	11.20
Spring kindergarten	X2RSCALK5	0–167	70.4	13.86
Spring first grade	X4RSCALK5	0–167	97.2	16.35
Spring second grade	X6RSCALK5	0–167	114.6	15.31
Spring third grade	X7RSCALK5	0–167	122.7	14.16
Spring fourth grade	X8RSCALK5	0–167	131.0	13.47
Spring fifth grade	X9RSCALK5	0–167	138.0	14.18
<b>Math</b>				
Fall kindergarten	X1MSCALK5	0–159	36.8	11.23
Spring kindergarten	X2MSCALK5	0–159	51.3	12.77
Spring first grade	X4MSCALK5	0–159	74.5	14.35
Spring second grade	X6MSCALK5	0–159	92.0	16.78
Spring third grade	X7MSCALK5	0–159	105.9	16.57
Spring fourth grade	X8MSCALK5	0–159	114.3	16.19
Spring fifth grade	X9MSCALK5	0–159	121.4	15.90
<b>Science</b>				
Fall kindergarten	—	—	—	—
Spring kindergarten	X2SSCALK5	0–100	34.4	7.28
Spring first grade	X4SSCALK5	0–100	43.7	10.07
Spring second grade	X6SSCALK5	0–100	53.6	11.11
Spring third grade	X7SSCALK5	0–100	61.0	11.41
Spring fourth grade	X8SSCALK5	0–100	67.9	11.16
Spring fifth grade	X9SSCALK5	0–100	74.7	11.76

— Not available. The direct science assessment was not fielded in the fall of kindergarten (fall 2010).

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

### **Child and Family Characteristics**

A number of variables used in this report were derived by combining information from one or more questions in the ECLS-K:2011 study instruments. More information on the derivation of key variables is provided in chapter 7 of the following user’s manuals: *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User’s Manual for the ECLS-K:2011 Kindergarten Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User’s Manual for the ECLS-K:2011 Kindergarten–First Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2015); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User’s Manual for the ECLS-K:2011 Kindergarten–Second Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2017); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User’s Manual for the ECLS-K:2011 Kindergarten–Third Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); the *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User’s Manual for the ECLS-K:2011 Kindergarten–Fourth Grade Data File and Electronic Codebook, Public Version* (Tourangeau et al. 2018); and *Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011), User’s Manual for the ECLS K:2011 Kindergarten–Fifth Grade Data File and Electronic Codebook, Restricted Version* (Tourangeau et al. 2019).

**Student's sex [X\_CHSEX\_R].** Information about child's sex was collected from schools at the time of sampling and stored in the study's administrative database, collected from parents in the fall kindergarten parent interview, confirmed by parents in the spring kindergarten parent interview, and asked again in later-round interviews if the data were either missing or had never been confirmed by the parent.

**Student's race/ethnicity [X\_RACETH\_R].** This composite variable, which takes into account both ethnicity and race, is derived from information collected from parents in the parent interview or, if parent-reported information was missing, from the school. Parents provided information during the kindergarten year (2010–11). In the spring of 2012, the spring of 2013, the spring of 2014, and the spring of 2015, parents were asked to provide information on child's ethnicity and race if these data were missing or had not been confirmed by a parent in a prior round. Race/ethnicity information was collected from almost all parents by the end of the spring 2015 collection so it was not necessary to include these questions in the spring 2016 parent interview.

Parent respondents were asked to indicate whether their child belonged to one or more of the following races: White, Black or African American, American Indian or Alaska Native, Asian, and Native Hawaiian or Other Pacific Islander. In addition, each parent respondent was asked to identify whether his or her child was Hispanic or Latino. Hispanicity and race were used to create eight mutually exclusive categories: White, not Hispanic; Black or African American, not Hispanic; Hispanic, race specified; Hispanic, no race specified; Asian, not Hispanic; Native Hawaiian or Other Pacific Islander, not Hispanic; American Indian or Alaska Native, not Hispanic; and Two or more races, not Hispanic.

The data file includes the categories "Hispanic, race specified" and "Hispanic, no race specified" because some parents reported a race for their Hispanic children, while others did not. For this report, these two categories are collapsed into one category indicating that a child is Hispanic. A student is classified as Hispanic if a parent indicated the child's ethnicity was Hispanic regardless of whether a race was identified and what that race was. When race/ethnicity differences are presented in this report, White refers to White, non-Hispanic; Black refers to Black, non-Hispanic; Asian refers to Asian, non-Hispanic; Native Hawaiian or Other Pacific Islander refers to Native Hawaiian or Other Pacific Islander, non-Hispanic; American Indian or Alaska Native refers to American Indian or Alaska Native, non-Hispanic; and Two or more races refers to Two or more races, non-Hispanic.

**Poverty status in the spring of 2011 [X2POVTY].** The federal poverty-level status composite variable is derived from household income and the total number of household members. Parent respondents first were asked to report their household income using a standard list of income categories. If a respondent reported a household income that indicated that 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 respondent was asked to report household income to the nearest \$1,000 (referred to as exact income). Poverty classification was determined using the reported income category; exact income, when necessary; and household size.

Preliminary weighted 2010 Census poverty thresholds were used to define household poverty status.<sup>10</sup> Households with a total annual income below the appropriate threshold were classified as being below the federal poverty level. Households with a total income at or above 100 percent, but below 200 percent, of the poverty threshold were classified in a middle category (100 to 199 percent of the federal poverty level). Households with a total income at or above 200 percent of the poverty threshold were categorized as being at or above 200 percent of the federal poverty level. For example, if a household with two members had an income lower than \$14,220, the household was classified as below the federal poverty level. If a household with two members had an income of \$14,220 or more, but less than \$28,440 (200 percent of the poverty threshold for a household of two), the household was classified at 100 to 199 percent of the federal poverty level. If a household with two members had an income of \$28,440 or more, the household was classified at or above 200 percent of the federal poverty level.

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<sup>10</sup> These were the thresholds available at the time the kindergarten poverty composite variable was created.

**Parents' highest level of education in the 2010–11 kindergarten year [X12PAR1ED\_I, X12PAR2ED\_I].**

Parents' highest level of education is the highest level of education achieved by either of the parents or guardians in a two-parent household or by the only parent or guardian in a single-parent household. This composite variable is derived from parent interview information about parents' educational attainment. Data were imputed using a hot-deck procedure if they were not obtained during the parent interview, but a parent had completed at least a portion of the parent interview in either the fall or spring kindergarten data collection.

For this report, the parent education composite variable available in the data file was collapsed into five categories: less than a high school credential; a high school diploma or alternative credential; some college, associate's degree, or career/technical education; a bachelor's degree; and graduate/professional school.

**Family type in the fall of 2010 [X1HPARNT].** This composite variable is derived from information collected during the fall 2010 parent interview about the number and type of parents in the home. For this report, the composite was collapsed into a three-category variable: two parents, one parent, and other. "Two parents" includes two biological parents, two adoptive parents, and one biological/adoptive parent and one other parent/partner. "One parent" refers to one biological or adoptive parent only. "Other" refers to related and/or unrelated guardians.

**Primary home language in the 2010–11 kindergarten year [X12LANGST].** This composite variable 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 was 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 was 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 also categorized in the third category.

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## **Appendix B. Standard Error Tables**

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Table B-1. Standard errors for table 1: Percentage distribution of children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Spring 2016

Characteristics	Percent
Total	†
Sex	
Male	0.45
Female	0.45
Child's race/ethnicity	
White, non-Hispanic	1.71
Black, non-Hispanic	1.16
Hispanic	1.23
Asian, non-Hispanic	0.69
Native Hawaiian or Other Pacific Islander, non-Hispanic	0.09
American Indian or Alaska Native, non-Hispanic	0.43
Two or more races, non-Hispanic	0.23
Poverty status, spring 2011	
Income below 100 percent of the federal poverty level	1.03
Income between 100 and 199 percent of the federal poverty level	0.73
Income at or above 200 percent of the federal poverty level	1.23
Parents' highest level of education, 2010–11 kindergarten year	
Less than high school credential	0.46
High school diploma or alternative credential	0.57
Some college, associate's degree, or career/technical education	0.90
Bachelor's degree	0.73
Graduate/professional school	0.74
Family type, fall 2010	
Two parents	0.91
One parent	0.86
Other	0.14
Primary home language, 2010–11 kindergarten year	
Not English	0.66
English	0.71
Multiple home languages, no primary language specified	0.18

† Not applicable.

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

Table B-2. Standard errors for table 2: Mean reading scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016

Characteristics	Kindergarten		Spring first	Spring second	Spring third	Spring fourth	Spring fifth
	Fall	Spring					
Total	0.25	0.32	0.40	0.35	0.32	0.28	0.30
Sex							
Male	0.31	0.38	0.44	0.41	0.38	0.33	0.33
Female	0.28	0.39	0.48	0.42	0.38	0.33	0.37
Child's race/ethnicity							
White, non-Hispanic	0.31	0.40	0.48	0.38	0.35	0.30	0.34
Black, non-Hispanic	0.47	0.57	0.85	0.80	0.65	0.70	0.65
Hispanic	0.35	0.32	0.56	0.68	0.60	0.60	0.57
Asian, non-Hispanic	0.70	1.00	1.06	0.88	0.79	0.81	0.80
Native Hawaiian or Other Pacific Islander, non-Hispanic	1.83	2.72	2.84	2.91	2.73	2.04	2.26
American Indian or Alaska Native, non-Hispanic	0.87	1.29	2.61	2.05	1.77	2.30	2.58
Two or more races, non-Hispanic	0.89	1.19	1.18	1.17	0.97	0.91	0.91
Poverty status, spring 2011							
Income below 100 percent of the federal poverty level	0.32	0.34	0.62	0.63	0.56	0.47	0.50
Income between 100 and 199 percent of the federal poverty level	0.33	0.53	0.61	0.55	0.55	0.56	0.55
Income at or above 200 percent of the federal poverty level	0.29	0.37	0.43	0.34	0.32	0.26	0.28
Parents' highest level of education, 2010–11 kindergarten year							
Less than high school credential	0.50	0.48	0.76	0.88	0.67	0.63	0.71
High school diploma or alternative credential	0.33	0.30	0.53	0.48	0.47	0.42	0.44
Some college, associate's degree, or career/technical education	0.28	0.40	0.42	0.41	0.42	0.38	0.35
Bachelor's degree	0.33	0.46	0.56	0.37	0.35	0.34	0.36
Graduate/professional school	0.48	0.54	0.53	0.42	0.39	0.37	0.34
Family type, fall 2010							
Two parents	0.27	0.36	0.45	0.39	0.33	0.30	0.33
One parent	0.35	0.42	0.55	0.53	0.50	0.48	0.50
Other	0.88	1.14	2.11	1.69	1.73	1.52	1.72
Primary home language, 2010–11							
Not English	0.49	0.58	0.86	0.80	0.70	0.71	0.77
English	0.25	0.36	0.41	0.33	0.30	0.25	0.27
Multiple home languages, no primary language specified	1.11	1.15	1.83	1.98	1.46	1.85	1.67

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

Table B-3. Standard errors for table 3: Mean math scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Fall 2010, spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016

Characteristics	Kindergarten		Spring first	Spring second	Spring third	Spring fourth	Spring fifth
	Fall	Spring					
Total	0.29	0.34	0.34	0.40	0.35	0.38	0.37
Sex							
Male	0.35	0.37	0.38	0.43	0.39	0.41	0.39
Female	0.31	0.40	0.40	0.48	0.42	0.45	0.44
Child's race/ethnicity							
White, non-Hispanic	0.35	0.45	0.37	0.43	0.37	0.35	0.35
Black, non-Hispanic	0.40	0.48	0.62	0.89	0.96	1.09	1.00
Hispanic	0.32	0.37	0.58	0.79	0.47	0.57	0.61
Asian, non-Hispanic	0.62	0.50	0.73	0.93	0.68	0.77	0.77
Native Hawaiian or Other Pacific Islander, non-Hispanic	2.00	2.68	2.24	3.32	2.70	2.73	2.13
American Indian or Alaska Native, non-Hispanic	1.34	1.36	2.37	2.78	3.09	3.01	2.07
Two or more races, non-Hispanic	0.74	0.86	0.97	1.26	1.03	1.15	1.05
Poverty status, spring 2011							
Income below 100 percent of the federal poverty level	0.42	0.47	0.49	0.64	0.61	0.66	0.62
Income between 100 and 199 percent of the federal poverty level	0.38	0.49	0.48	0.58	0.58	0.61	0.55
Income at or above 200 percent of the federal poverty level	0.32	0.37	0.33	0.44	0.36	0.38	0.35
Parents' highest level of education, 2010–11 kindergarten year							
Less than high school credential	0.50	0.57	0.60	0.79	0.72	0.78	0.72
High school diploma or alternative credential	0.33	0.35	0.43	0.50	0.50	0.51	0.50
Some college, associate's degree, or career/technical education	0.32	0.39	0.42	0.45	0.43	0.49	0.43
Bachelor's degree	0.30	0.38	0.36	0.47	0.46	0.46	0.41
Graduate/professional school	0.40	0.43	0.34	0.49	0.41	0.37	0.42
Family type, fall 2010							
Two parents	0.33	0.40	0.36	0.44	0.35	0.38	0.39
One parent	0.43	0.47	0.51	0.68	0.72	0.70	0.66
Other	1.04	1.30	1.68	1.98	2.37	2.11	2.05
Primary home language, 2010–11							
Not English	0.54	0.55	0.66	0.88	0.72	0.83	0.91
English	0.28	0.36	0.33	0.39	0.38	0.41	0.39
Multiple home languages, no primary language specified	1.15	1.13	1.73	2.12	1.69	1.87	1.71

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

Table B-4. Standard errors for table 4: Mean science scale scores for children who were in kindergarten for the first time in the 2010–11 school year and in fifth grade in the spring of 2016, by child and family characteristics: Spring 2011, spring 2012, spring 2013, spring 2014, spring 2015, and spring 2016

Characteristics	Kindergarten		Spring first	Spring second	Spring third	Spring fourth	Spring fifth
	Fall	Spring					
Total	—	0.18	0.26	0.26	0.26	0.28	0.28
Sex							
Male	—	0.19	0.28	0.29	0.27	0.32	0.31
Female	—	0.22	0.31	0.32	0.32	0.31	0.33
Child's race/ethnicity							
White, non-Hispanic	—	0.18	0.23	0.24	0.23	0.21	0.24
Black, non-Hispanic	—	0.34	0.46	0.49	0.62	0.70	0.65
Hispanic	—	0.26	0.41	0.46	0.42	0.53	0.35
Asian, non-Hispanic	—	0.35	0.52	0.60	0.65	0.54	0.57
Native Hawaiian or Other Pacific Islander, non-Hispanic	—	1.15	1.25	1.96	2.27	2.34	2.02
American Indian or Alaska Native, non-Hispanic	—	1.20	1.77	1.39	1.81	1.81	1.91
Two or more races, non-Hispanic	—	0.44	0.74	0.94	0.86	0.83	0.83
Poverty status, spring 2011							
Income below 100 percent of the federal poverty level	—	0.28	0.41	0.46	0.42	0.51	0.44
Income between 100 and 199 percent of the federal poverty level	—	0.28	0.36	0.34	0.41	0.42	0.44
Income at or above 200 percent of the federal poverty level	—	0.17	0.24	0.24	0.25	0.22	0.26
Parents' highest level of education, 2010–11 kindergarten year							
Less than high school credential	—	0.35	0.53	0.62	0.50	0.64	0.59
High school diploma or alternative credential	—	0.21	0.32	0.36	0.35	0.37	0.38
Some college, associate's degree, or career/technical education	—	0.20	0.27	0.27	0.27	0.32	0.33
Bachelor's degree	—	0.22	0.33	0.34	0.30	0.32	0.35
Graduate/professional school	—	0.24	0.32	0.33	0.34	0.28	0.33
Family type, fall 2010							
Two parents	—	0.20	0.28	0.26	0.27	0.27	0.28
One parent	—	0.26	0.37	0.47	0.51	0.55	0.45
Other	—	0.85	1.14	1.21	1.38	1.46	1.78
Primary home language, 2010–11							
Not English	—	0.28	0.47	0.60	0.53	0.68	0.50
English	—	0.17	0.25	0.25	0.28	0.27	0.28
Multiple home languages, no primary language specified	—	0.60	0.95	1.27	1.42	1.53	1.47

— Not available. The direct science assessment was not fielded in the fall of kindergarten (fall 2010).

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