

# the condition 2000 of education

NATIONAL  
CENTER  
FOR  
EDUCATION  
STATISTICS

U.S. Department  
of Education

Office of Educational  
Research and Improvement

NCES 2000-062



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The National Center for Education Statistics (NCES) is the primary federal entity for collecting, analyzing, and reporting data related to education in the United States and other nations. It fulfills a congressional mandate to collect, collate, analyze, and report full and complete statistics on the condition of education in the United States; conduct and publish reports and specialized analyses of the meaning and significance of such statistics; assist state and local education agencies in improving their statistical systems; and review and report on education activities in other countries.

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## Commissioner's Statement

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*The Condition of Education, 2000* addresses the mission of the National Center for Education Statistics (NCES) to gather and publish information on the status and progress of education in the United States. The legislative authorization for these activities (with antecedents to 1867) states that the Center's purpose is to collect and report ". . . statistics and information showing the condition and progress of education in the United States and other nations in order to promote and accelerate the improvement of American education" (section 402(b) of the National Education Statistics Act of 1994). *The Condition of Education* responds to this mandate.

*The Condition of Education* is an indicator report, summarizing the health of education, monitoring important developments, and showing trends in major aspects of education. Indicators examine relationships; show changes over time; compare or contrast sub-populations, regions, or countries; or assess characteristics of students from different backgrounds and types of schools. An indicator is policy relevant and problem oriented; it typically incorporates a standard against which to judge progress or regression. Please remember, however, that indicators are not intended to identify causes or solutions, and cannot individually by themselves provide a completely comprehensive view of conditions in education.

**Organization of this report:** The 2000 edition of the report leads with an essay on the knowledge, skills, and behaviors that entering kindergartners bring to school. The essay summarizes the initial results of a national, longitudinal study that is tracking the progress of these kindergartners through the elementary grades. Data from the study suggest the range of development that kindergarten teachers work with and that subsequent schooling needs to address. I recommend that you read the es-

say; I believe you will find it to be interesting and highly informative.

The indicators that follow the essay are in six sections: (1) Participation in Education; (2) Learner Outcomes; (3) Student Effort and Educational Progress; (4) the Quality of Elementary and Secondary Educational Environments; (5) Context of Postsecondary Education; and (6) Societal Support for Learning. The first section describes the extent of enrollment in different levels of the education system among different population groups in the United States, from preprimary education to adult learning. The second section reports information about the outcomes of education in three domains: core academic subjects, social and cultural behaviors, and the economic outcomes of education for individuals. The third section takes a student perspective. It traces the progress that different groups of students have made from one level of the education system to the next and shows their eventual educational attainments. Some information about factors affecting these transitions is included. The fourth section examines different factors related to the quality of learning in elementary and secondary schools, such as courses taken, teacher characteristics, and how resources are used within institutions. The fifth section does the same but for postsecondary education. The sixth section reminds us that learning occurs in social contexts outside the boundaries of formal education as well as within them, but that formal schooling depends for its success upon financial support and other kinds of more direct involvement.

Supplemental tables and notes that support the indicators follow the six sections.

**Indicator selection:** Each year about 60 indicators are presented in *The Condition*. These indicators represent a consensus of professional

## Commissioner's Statement

Continued

judgment about significant national measures of the condition and progress of education at this time. Many of the indicators reflect a basic core that can be repeated with updated information on a recurring basis; other indicators are based on infrequent or special studies. Although other issues may be of interest and concern to you, the lack of current and valid information occasionally prevents us from examining all issues that deserve attention.

The indicators were developed using data collected by the NCES, as well as from surveys conducted by other organizations, both within and outside the federal government. Thirty-five of the indicators in *The Condition* are new this year. New to *The Condition* this year are groups of indicators presenting a composite picture of a complex educational process or set of relationships. For example, three indicators examine the effects of academic preparedness and other factors on the likelihood that high school students who are at some risk of not enrolling in higher education do so. Three other new indicators show new data from a recent study of student transcripts on the increases that have occurred since 1982 in the amount of advanced mathematics and science coursework taken by high school graduates. A related indicator translates data from the Video Tape Study of the Third International Mathematics and Science Study into an analysis showing how the quality of the mathematical content in 8<sup>th</sup> grade classrooms in the United States compares to two other industrialized countries. Three related indicators show change over time in student performance in mathematics and comparisons of student performance in mathematics with other countries, including student performance in advanced mathematics. A new indicator on student performance shows the civics understanding of students at the elementary, middle, and high school levels. Three new indicators examine issues of

the persistence of students toward degrees in higher education and their rates of completion. Three other indicators on before and after school care; parents' satisfaction with their children's schools, teachers, academic standards, and discipline; and adult learning are based on recent data from the National Household Education Survey. One new indicator on higher education finance explores the costs of undergraduate education, while three new indicators on elementary and secondary education compare the expenditures of local school districts, shifts over time in their sources of revenues, and change over time in the proportion of the disparities in instructional expenditures per student among school districts.

**Availability of NCES data and information:** My colleagues and I strive to make our products available in several ways and in language that is appropriate to your needs. For this reason all new and most recent NCES publications and many data sets are available on-line through the NCES Internet site at <http://nces.ed.gov>. I hope you find this a useful way to read *The Condition of Education*.

With the release of the 2000 edition, there will be one *Condition of Education* on the web site rather than separate versions for different years as in the past. We intend to update indicators published on the web site semiannually as new data become available. Once a year a number of new indicators will be added to the existing collection as new data become available or as new indicators addressing educational issues not previously addressed, but using already available data, are developed. Over time this collection of indicators will grow to provide a broader and more complete view of *The Condition of Education* than is possible with the print publication alone. We will continue to publish the annual print publication for the time being. It will contain selected indicators from the web site.

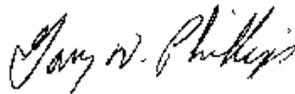
## Commissioner's Statement

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In addition, *The Condition of Education* can be obtained free of charge from ED Pubs, as long as copies last. To contact ED Pubs, call their toll-free telephone number: 1-877-4ED-PUBS (877-433-7827), TTY/TDD: 877-576-7734, e-mail them at [EDPubOrders@aspensys.com](mailto:EDPubOrders@aspensys.com), or send them a written request at ED Pubs, P.O. Box 1398, Jessup, MD 20794-1398.

I hope you will find the material in *The Condition of Education, 2000* to be useful and informative. Equally important, I invite you to send us suggestions about how we can improve future editions and continue to serve your needs well.



Gary W. Phillips, Ph.D.

Acting Commissioner of Education Statistics

## Reader's Guide

As previous readers of *The Condition of Education* will note, much has changed in this year's volume. The number of indicators is somewhat larger and the discussion in each indicator has increased, but most are shorter than in the past. Some indicators are new; others provide new analyses and data to update indicators included in previous volumes of *The Condition of Education*. All indicators use the most recent national data available from the National Center for Education Statistics (NCES) or other sources.

In an effort to increase the utility and accessibility of the *Condition*, several changes have been made in the organization and style of the volume. The indicators are organized into six substantive sections assessing particular dimensions of the condition of education.

Each section begins with an overview essay that summarizes the key points in the indicators to follow. Most indicators contain a discussion and a single graph or table. The icon to the side of the graph or table directs readers to supplemental notes, supplemental tables, or to another source for more information. When the source is an NCES publication, such as NCES 2000–021, that publication can be viewed at the Center's web site ([nces.ed.gov](http://nces.ed.gov)).

Supplemental notes provide information on the sources of data used, how an analysis was conducted or provide explanations of categories used in an indicator. For example, *Supplemental Note 3* summarizes the categories used for race-ethnicity and explains how the Consumer Price Index (CPI) is used to compute dollar amounts that can be compared over time.

Supplemental tables provide more detailed breakouts for an indicator, such as household income, race-ethnicity, or parents' highest education level. Tables of standard errors (see below) are also included for most indicators. A glossary of terms and a comprehensive bibli-

ography of items cited in the *Condition* conclude the volume.

### DATA SOURCES

Data reported in this volume are primarily from two types of sources. Several indicators report data from entire populations, such as *Indicators 55* (faculty salaries) and *37* (bachelor's degrees earned by women). With this kind of data, information is collected from every member of the population surveyed. This "universe" could be all colleges and universities in the country, every school district, or all secondary school teachers.

When such data on the entire population are available, comparisons among different groups within that population can be made with a high degree of confidence. As an illustration, if information about the number of bachelor's degrees awarded is collected from all U.S. colleges and universities, then comparison of the number of degrees awarded to females and males is straightforward. Assuming that institutions have counted and reported the numbers of their graduates accurately, there is no doubt about the true or actual number of bachelor's degrees awarded to males and females.

A universe survey is typically expensive and time consuming, so researchers often collect data from a small sample of the population of interest. Through random sampling and other methods, researchers seek to ensure that this sample accurately represents the larger population to which they wish to generalize. NCES's National Education Longitudinal Study, for example, surveyed a representative sample of nearly 25,000 8<sup>th</sup>-graders from among all 8<sup>th</sup>-graders across the country. Based on this sample, conclusions can be drawn about all 8<sup>th</sup>-graders, such as their family background, characteristics of the schools they attend, their mathematical achievement (as measured with

## Reader's Guide

### Continued

a test administered as part of the survey), and their activities outside of school (NCES 90–458).

Most indicators in *The Condition of Education* summarize data from sample surveys conducted by the NCES or the Bureau of the Census with support from NCES. Detailed explanations of NCES surveys can be obtained at the web site noted above, under “Survey and Program Areas.” Information about the Current Population Survey, another frequent source of survey data used in *The Condition of Education*, can be obtained at <http://www.bls.census.gov/cps/cpsmain.htm> (and also in *Supplemental Note 1*).

### DATA ANALYSIS AND INTERPRETATION

Once data from a census or a sample survey are collected, it is necessary to summarize them in a meaningful way. Estimation of the true population average, or mean, is a common way of summarizing data. The mean is obtained by adding together the values for all members of the sample population and dividing by the sample size. An example of this is the annual mean salaries of professors at private, 4-year universities. A second kind of estimate is the median, which is simply the “middle” value among all members of the population. Half of all values in the population are above the median, and half are below. The percentage of the population having a certain characteristic, such as the percentage of graduates who are female, provides still another kind of estimate.

Analysis of data from a sample of a population requires consideration of several factors before the analysis becomes meaningful. For example, however conscientious an organization may be in collecting data from a sample of a population, there will always be some margin of error in estimating the population mean, median, or any other such statistic from the data. Consequently, data from samples can

provide only an estimate of the true or actual value. The margin of error or the range of the estimate depends on several factors, such as the amount of variation in the responses, the size and representativeness of the sample, and the size of the subgroup for which the estimate is computed.<sup>1</sup>

When data from samples are reported, as is the case with most of the indicators in *The Condition of Education*, the magnitude of this margin of error is measured by what statisticians call the “standard error” of an estimate.<sup>2</sup> The standard errors for all the estimated means, medians, or percentages reported in the tables and graphs of *The Condition of Education* can be found in the Standard Errors section at the end of the volume.

As an illustration, *Indicator 13* reports the average reading scores of various racial-ethnic groups in the 1998 National Assessment of Educational Progress. The mean scores for 12<sup>th</sup>-graders for two groups—Hispanics and American Indians/Alaskan Natives—were 275 and 276, respectively. In contrast, the standard errors were considerably different: 0.7 for Hispanic students and 5.4 for the American Indians/Alaskan Natives.

The mean score with the smaller standard error provides a more reliable estimate of the true value than does the mean score with a higher standard error. Standard errors tend to diminish in size as the size of the sample (or subsample) increases. Consequently, for the same kinds of data, such as enrollment rates in postsecondary education sample surveys (like the National Postsecondary Student Aid Study) or scores on the National Assessment of Educational Progress, standard errors will almost always be larger for American Indians/Alaskan Natives than for whites, blacks, and Hispanics, who represent much larger proportions of the population.

## Reader's Guide

Continued

When data from samples are reported, some caution is warranted in making comparisons. Although one mean or percentage may be larger than another, the difference may be due to the standard errors of the estimates.

Whether differences in means or percentages are statistically significant can be determined using the standard errors of the estimates. When differences are statistically significant, the probability that the difference occurred by chance is usually small, occurring about 5 times out of 100. The method primarily used here for determining whether the difference between two means is statistically significant is described in the introduction to the standard error tables for all of the indicators in the back of the volume.

For all indicators in *The Condition of Education* based on samples, differences between means or percentages (including increases or decreases) are stated in the text only when they are statistically significant. To determine whether differences reported are statistically significant, two-tailed t-tests, at the .05 level, were used. Bonferroni adjustments are made when more than two groups are compared simultaneously (e.g., blacks, whites, and Hispanics). The formula for determining statistical significance is also adjusted when the samples being compared are dependent.

Discussion of two indicators illustrates the consequences of these considerations. *Indicator 59*, for example, notes that the percentage of students who had parents who attended a meeting with a teacher increased between 1996 (70.6 percent) and 1999 (72.2 percent). Although the increase of 1.6 percent is relatively small, as are the standard errors associated with each estimate (0.4 in both instances), the dif-

ference is statistically significant and supports the statement made.

In contrast, *Indicator 16* compares the percentage of 17-year-old males and females who achieved a score of 300 or more on the mathematics portion of the National Assessment of Educational Progress in 1996. About 63 percent of males achieved this score compared with 58 percent of females. The difference of nearly 5 percentage points is larger than in the previous example, but the standard errors are also larger (1.8 and 2.2, respectively). The difference is not statistically significant. In the absence of this significance, the indicator appropriately notes that males and females were equally likely to score 300 or more. *Indicator 19* provides a similar example. The average score of Italian students in their final year of secondary school on an international test of achievement in advanced mathematics was more than 30 points higher than that of U.S. 12<sup>th</sup>-graders. Again, however, the difference is not statistically significant; it is thus proper to indicate that the average scores of U.S. and Italian students are similar.

Although values reported in the supplemental tables are often reported to one decimal place (e.g., 76.5 percent), values reported in each indicator are typically rounded to whole numbers (with any value of .5 or above rounded to the next highest whole number). Due to rounding, cumulative percentages may sometimes equal 99 or 101 percent, rather than 100.

NOTE:

<sup>1</sup> If there are five racial-ethnic groups in a sample of 1,500, the researcher would have less confidence in the results for each of the groups individually than would be the case for the entire sample, because there are fewer people in the subgroup.

## Acknowledgments

---

This volume of *The Condition of Education* was authored by a team of analysts under the general direction of John Wirt and Tom Snyder with technical review by Marilyn McMillen (Chief Statistician of NCES), Ellen Bradburn (Technical Advisor), and many others. Rebecca Pratt of Pinkerton Computer Consultants, Inc. (PCCI), was the managing editor. Richard Tobin of the American Institutes for Research's Education Services Statistics Institute (ESSI) helped in reviewing indicators as they were developed.

Readers of previous editions of this publication will notice the new design and format of *The Condition of Education 2000*. This new design was created by Mark Ricks, Allison Pinckney, and Rebecca Pratt of PCCI, with suggestions by Leslie Retallick and Barbara Kridl of MPR Associates (MPR) and many others.

The key contributors to *The Condition of Education* are the authors of the individual indicators. As a matter of practice the authorship of individual indicators is not given in the volume since each indicator is the product of many people. Nonetheless, substantial expertise and analytical ability are required to craft an indicator from data that tells an important story in a compelling manner using text, graphs, and tables economically. Many indicators in this volume were originally conceived for the Condition of Education and involved extensive analyses of data. Others were adapted from existing NCES reports or analyses authored by others.

The authors of the indicators are primarily from three organizations. The authors of indicators at MPR include Susan Choy, Robin Henke, Lawrence Kojaku, Xianglei Chen, Robert Fitzgerald, Phillip Kaufman, and Martha Alt. From PCCI, the authors include Jennifer Sable, Yupin Bae, Janis Stennett, James Sexton, and Daniele Beahm. From the American

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Programming and other analytical assistance was provided by Huong Huyen, Daniele Beahm, Steve Agbayani, Mark Glander, YaFen Mu, Michelle Brown, Thuy Dam, Imin Hung, and Dan Hefron of PCCI; and Yann-Yann Sheih of ESSI. Each indicator was checked and edited by a team of editors. The editors included Rebecca Pratt, Ross J. Pfile, and Sonia Connor of PCCI; Andrea Livingston, Barbara Kridl, and Karyn Madden of MPR; and Julia Marshall of ESSI.

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Allison Pinckney desktopped the publication and prepared it for printing.

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## Entering Kindergarten: A Portrait of American Children When They Begin School

Nicholas Zill and Jerry West

What knowledge and skills do children possess when they start school? How prepared are they for the social and academic demands of the classroom? Can they get along in a large group of children? Can they sit still and pay attention? Are they interested in learning? How do knowledge, skills, and behavior vary across individuals and among groups of children, such as older versus younger pupils, girls versus boys, and children from high-risk as opposed to more ordinary family circumstances?

### ■ *Why is it important to know what children are like at school entry?*

The answers to this question are important for policy and practice. What a child knows and how he or she behaves are products of both genetic endowment and the child's experiences before entering school (Willerman 1979; Plomin 1990). Thus, measures of children's knowledge and behavior at school entry can serve as indicators of how well families, child-care institutions, and preschool programs prepare children for school. At the same time, these measures provide guidance about what kind of curriculum might be appropriate for the first year of school (Freeman and Hatch 1989; Knudsen-Lindauer and Harris 1989). If teachers are aware of the skills and abilities that the typical child has mastered before the first day of class, teachers and school systems are less likely to design a course of study that is either too challenging or not challenging enough for the typical child. In this regard, it is useful to appreciate not only what the average child knows at school entry but also what the range of knowledge is across an entire class of children.

Group differences at school entry are important for appraising how well the schools have done at the end of the first and subsequent school years. Although differences in achievement found at the end of the school year may have been present at the beginning of the year,

we cannot know this unless skills are measured at the beginning of the year. Without this information, we cannot properly appraise how much growth has occurred. It may be concluded erroneously that schools are producing superior achievement because of the high caliber of their instruction, when, in fact, schools may be maintaining (or even diminishing) advantages that their pupils had when entering school.

### ■ *Why is it difficult to assess early knowledge and skills?*

Although measures of children's knowledge, skills, and behavior at school entry are valuable, such measures are not easy to obtain. Most children can neither read nor write when they enter school, so we cannot simply distribute test booklets and ask young children to provide machine-scoreable answers to a series of multiple-choice questions. In-person, one-on-one assessments are required. Each assessment session should not be lengthy because young children tire easily and have limited attention spans. Even individualized assessments may not reflect a beginning pupil's knowledge because of individual differences in shyness with unfamiliar adults or because the child comes from a family in which English is not the primary language spoken at home.

To complicate matters further, experts in child development have recommended that appraisals of children's status at school entry not be limited to academic knowledge and skills but should include evaluations of "the whole child" (Resource Group on School Readiness 1991). For example, the National Education Goals Panel's Technical Planning Group on School Readiness identified five domains of development that are important to a child's preparation for school: physical well-being and motor development; social and emotional development; approaches to learning; language usage; and cognition and general knowledge (Goal

## Entering Kindergarten: A Portrait of American Children When They Begin School

Continued

One Technical Planning Group 1993). The Group recommended that assessments of school readiness should involve the collection of information from parents and teachers, as well as the direct assessments of the children themselves.

There is also the question of which year should be considered as the first year of school, kindergarten or first grade. Although school attendance is not mandatory in most states until first grade, national surveys of parents of early elementary pupils show that 98 percent of primary school children attended kindergarten before entering first grade (West, Germino-Hausken, Chandler, and Collins 1992). Thus, kindergarten is now the initial year of formal schooling for nearly all children in the United States.

### NEW SOURCE OF DATA ON YOUNG CHILDREN

Until recently, we have lacked systematic information about what children know and can do at school entry. The data that have been available depended on reports about children's skills from the parents of preschool children (Zill, Collins, West, and Germino-Hausken 1995; Zill 1999), rather than on direct assessments of the children themselves. With the launching of the U.S. Department of Education's Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K) in the fall of 1998, however, measures of the knowledge, skills, health, and behavior of a large and nationally representative sample of American kindergartners are available.

In fall 1998, trained assessors conducted standardized, one-on-one assessments with about 19,000 children from a national probability sample of kindergartners attending 940 public and private schools.<sup>1</sup> Of the children assessed, 95 percent were in kindergarten for the first time. These children are the focus of this essay. The remaining children were either repeat-

ing kindergarten or attending the second year of 2-year kindergarten programs. Information about the children, their families, and their schools was also gathered through interviews with parents, questionnaires to teachers and school administrators, and abstracts of school records. The ECLS-K plans to follow the sample of American kindergartners through the 5<sup>th</sup> grade.

### ASSESSING EARLY ACADEMIC SKILLS

Core academic skills that children learn in elementary school are the traditional “three R’s” of reading, writing, and arithmetic. Before they can read, write, or calculate, however, children must acquire rudimentary skills that serve as stepping stones toward mastery of the more advanced and complex skills. For reading, these rudimentary skills include becoming familiar with the conventions of print (such as the English-language convention of reading from left to right and from top to bottom); learning to recognize letters by name; associating sounds with letters or letter combinations; and understanding the meaning of many spoken words and phrases (Snow, Burns, and Griffin 1998). Rudimentary skills that form the foundation for mastery of arithmetic include rote counting; making one-to-one correspondences between spoken numbers and series of counted objects; recognizing written numerals; and understanding greater, lesser, and equal relationships (Ginsburg 1989).

These skills are not usually required for admission to kindergarten. Indeed, most kindergarten teachers feel that knowing letters and numbers is not crucial for school readiness because they can and do teach children these skills in kindergarten (West, Germino-Hausken, and Collins 1993). Nonetheless, many young children have learned some of these skills before entering school from interacting with their parents and siblings. Others learn the rudimentary skills in center-based child-care or

## Entering Kindergarten

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prekindergarten programs. Developmental research indicates that children who have mastered these skills in the preschool years are more likely to learn to read, write, and calculate earlier and more proficiently than those who have not (Siegler and Richards 1982). What is less clear, however, is whether explicitly teaching these skills in preschool boosts children's later literacy and numeracy. Some developmentalists believe this to be the case, but the evidence is not yet definitive.

The ECLS-K assessments were designed to measure children's early academic skills in each of three domains: reading, mathematics, and general knowledge. (General knowledge includes primarily questions of fact and understanding about nature, science, social studies, and citizenship.) The assessment batteries were intended for use with both kindergartners and first-graders. The batteries contained items suitable not just for the average child but also for those whose development is advanced or substantially delayed. Because the batteries were designed to be administered repeatedly to the same children, the study will be able to measure growth in children's knowledge and skills from kindergarten entry to the end of kindergarten, into first grade, and beyond. A first-stage routing test in each domain helped to ensure that children received items that were neither much too easy nor much too difficult for their current levels of knowledge.

Although the assessors read all questions to each child, the tasks did require a basic knowledge of spoken English to be administered successfully. Therefore, preliminary screening was done of children from families in which English was not the primary language spoken at home. Those who did not score above a certain level were excluded from the English-language assessments.<sup>2</sup> Children from Hispanic families who were excluded on this basis did receive a psychomotor assessment and oral lan-

guage and mathematics assessments in Spanish. The cognitive assessment data presented here and elsewhere in this volume are only for the children who completed the assessments in English. Approximately 19 percent of Asian children and 30 percent of Hispanic children attending kindergarten for the first time were not assessed in English.

Every effort was made to include children with disabilities in the assessment process. Despite this effort, children with disabilities that precluded them from hearing the questions, seeing the stimulus plates, or responding orally or by pointing had to be excluded. Children with individualized instruction plans that prohibited them from being assessed were also excluded. Less than 1 percent of all first-time kindergartners were excluded from the assessment for these reasons.

*Proficiency levels in reading.* In addition to an overall scale score, clusters of items included in the ECLS-K assessments of reading and mathematics appraised whether children were proficient in several stepping-stone skills toward literacy and numeracy. The reading assessment included five proficiency levels: (1) identifying uppercase and lowercase letters of the alphabet by name; (2) associating letters with sounds at the beginning of words; (3) associating letters with sounds at the end of words; (4) recognizing common words by sight; and (5) reading words in context. These five levels reflected a progression of skills and knowledge: if a child had mastered one of the higher levels, he or she passed the items that comprised the earlier levels as well. Another reading skill assessed in the ECLS-K battery (conventions of print) did not fit neatly into this progression but was at about the same level of difficulty as recognizing letters. Several tasks asked the children which way to go when reading and where they would find the end of a printed story.

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*Proficiency levels in mathematics.* The items in the mathematics assessment could also be grouped into a five-level progression of skills, though the mathematics clusters were less homogeneous in content than the reading clusters. The clusters of mathematics items included (1) identifying some one-digit numerals, recognizing geometric shapes, and one-to-one counting of up to ten objects; (2) reading all single-digit numerals, counting beyond 10, recognizing a sequence of patterns, and using nonstandard units of length to compare objects; (3) reading 2-digit numerals, recognizing the next number in a sequence, identifying the ordinal position of an object, and solving a simple word problem; (4) solving simple addition and subtraction problems; and (5) solving simple multiplication and division problems and recognizing more complex number patterns.

*General knowledge.* The subject matter of the assessment of general knowledge was too diverse and insufficiently ranked or graded to permit forming a set of proficiency levels. A score was calculated to represent each child's breadth and depth of understanding of the world around them. This assessment captured information on children's conception and understanding of the social, physical, and natural world and on their ability to draw inferences and comprehend implications. It also measured the skills children need to establish relationships between and among objects, events, or people and to make inferences and comprehend the implications of verbal and pictorial concepts. The assessment addressed such topical areas as history, geography, and science.

### NONCOGNITIVE ASPECTS OF SCHOOL READINESS

Many teachers and researchers believe that a child's ultimate success in school does not depend primarily on the knowledge and academic skills that the child brings to the classroom (West, Germino-Hausken, and Collins 1993).

Rather, they view noncognitive aspects of school readiness—such as a child's physical health and motor coordination, emotional well-being and ability to cooperate with other children, and curiosity and eagerness to learn—as being equally or more important for school success (National Association for the Education of Young Children 1990; Kagan 1990; Kagan, Moore, and Bredekamp 1995). The ECLS-K adopted this “whole child” view of school readiness. The direct child assessment in the fall of the kindergarten year included measures of physical growth and fine and gross motor development. The assessment collected reports about children's health, social skills, problem behavior, and approaches to learning from parents and teachers.

### ■ *What does the typical child know at school entry?*

A typical child who enters kindergarten in the United States is five-and-a-half years old at the beginning of the school year. What does this typical kindergartner know, and what kinds of early reading and mathematical skills and general knowledge does this child possess?<sup>3</sup> Many of the descriptions of first-time kindergartners and the ECLS-K findings reported in these sections come from *America's Kindergartners* (West, Denton, and Germino-Hausken 2000).

#### Most children know their letters

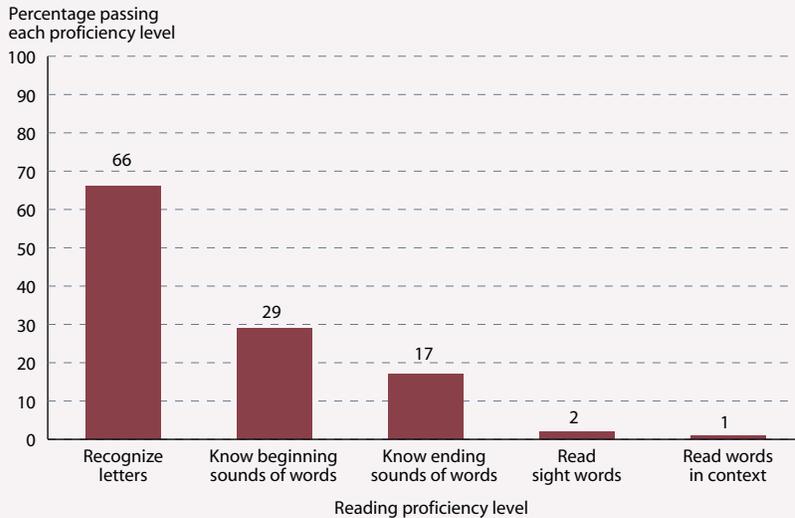
A majority of entering kindergartners (66 percent) can recognize letters of the alphabet by name, whether they are in upper or lower case (figure 1). Many (61 percent) have two or more print familiarity skills such as knowing that English print is read from left to right and from the end of one line to the beginning of the next line and knowing where a story ends.

The ECLS-K found that the modal kindergartner does not yet possess other early reading skills. He or she cannot point to letters repre-

# Entering Kindergarten

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**Figure 1.— Reading skills of first-time kindergartners: Fall 1998**



NOTE: Based on those assessed in English. Excludes 19 percent of Asian and 30 percent of Hispanic children.

SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, “Kindergarten Class of 1998–99,” Fall 1998.

senting sounds at the beginning or end of simple words, read basic words by sight, or read more complex words in the context of a sentence. Of five proficiency levels identified in the ECLS-K reading assessment, the average kindergartner had attained the first level, but no more. Two-thirds successfully performed tasks at this level.

### Most children can count more than 10 objects

Most first-time kindergartners (94 percent) can recognize some single-digit numerals, identify simple geometric figures like squares and circles, and count to 10 (figure 2). Many of the children (58 percent) can recognize all single-digit numbers, count beyond 10, identify the similarities in patterns, and compare the relative length of objects using nonstandard units. Kindergarten teachers can build on these skills to help children learn basic number operations and other mathematical skills.

On the other hand, relatively fewer kindergartners (20 percent) can read a two-digit numeral;

identify the ordinal position of an object (e.g., third flower in a row of flowers); or recognize the next number in a sequence (e.g., 2, 4, 6, 8, and 10). Also, very few (4 percent) can do simple addition or subtraction or do simple multiplication or division (less than 1 percent). Of five proficiency levels identified in the ECLS-K mathematics assessment, a majority of kindergartners (58 percent) have attained the second level.

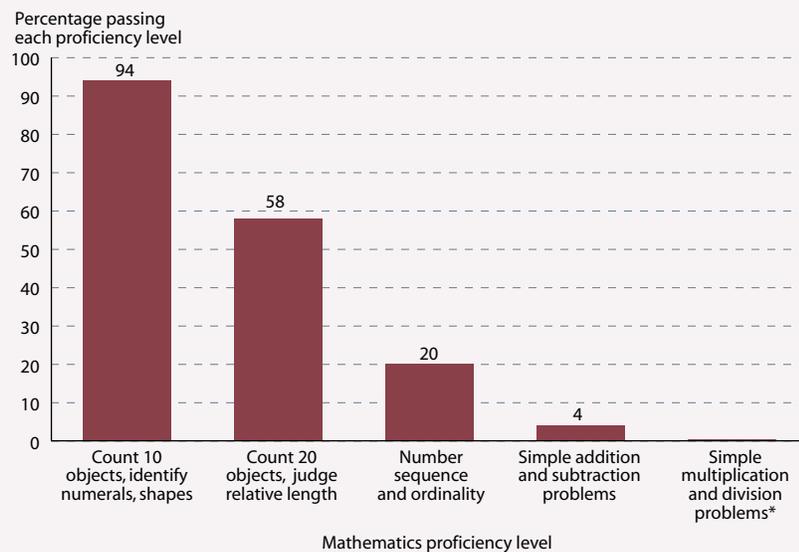
### ■ *What is the typical child’s health and behavior like at school entry?*

What can be said about the noncognitive aspects of school readiness? What is the average kindergartner like with respect to physical health and growth, coordination, and ability to pay attention to the teacher, cooperate with other children, and display curiosity and eagerness to learn? What proportions of entering kindergartners have significant problems with their health or behavior? *America’s Kindergartners* (West, Denton, and Germino-

# Entering Kindergarten

Continued

**Figure 2.— Mathematics skills of first-time kindergartners: Fall 1998**



\* Data point for “simple multiplication and division problems” is less than 0.5 percent and is too small to be discernable in the graph.

NOTE: Based on those assessed in English. Excludes 19 percent of Asian and 30 percent of Hispanic children.

SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, “Kindergarten Class of 1998–99,” Fall 1998.

Hausken 2000) provides a portrait of these characteristics.

### Most are in very good to excellent health

On a five-category scale of general health status, ranging from “excellent” to “poor,” 51 percent of kindergartners are rated in the highest category by their parents, and 83 percent are in at least “very good” health. No more than 3 percent are in “fair” or “poor” health.

Children’s height and weight are other, more objective indicators of their general health and well-being. At kindergarten entrance, the average boy is 3 feet, 9 inches tall and weighs 47 pounds. The average girl stands 3 feet, 8 inches tall and weighs 46 pounds. Although there is considerable variation in height and weight from child to child, practically no children in the United States today are so underweight as to be deemed clinically malnourished (Reed

1984). In contrast, more than one child in 10 has too much weight for his or her height. Twelve percent of males and 11 percent of females have body mass indexes high enough to be labeled at risk for being overweight (West, Denton, and Germino-Hausken 2000; Rosner, Prineas, Loggie, and Daniels 1998).

### Some experience developmental difficulties

Although most kindergarten children are in good to excellent health, substantial minorities have developmental difficulties that are relevant to their performance in school. According to parents, nearly one entering kindergartner in five (18 percent) is reported to be considerably more active than his or her peers (i.e., shows signs of hyperactivity). One in six (13 percent) is described as having difficulty paying attention for sustained periods. And 11 percent have difficulty articulating words or being able to communicate clearly with oth-

## Entering Kindergarten

### Continued

ers. Relatively small percentages experience problems with vision (6 percent), hearing (3 percent), or coordination (4 percent). Although parental reports of developmental difficulties do not necessarily indicate the presence of a diagnosed impairment, these reports do indicate that the child has a greater vulnerability to poorer grades and lesser academic attainment in the future (Horn and Packard 1985; Pianta and McCoy 1997).

#### Most are reasonably well behaved

According to both teachers and parents, most kindergartners are able to get along with other children in a group situation. A minority of children exhibit aggressive or combative behavior with any frequency. According to teachers, about three-quarters readily accept peer ideas for group activities and form and maintain friendships without difficulty. Fewer children, but still a majority, often comfort or help others. Parents are more positive about their children's cooperative behavior: 80–89 percent were described as easily joining others in play, forming friendships without difficulty, and helping or comforting others.

Most kindergartners do not lose their temper easily or get into arguments or fights with other children with any frequency. According to the teachers surveyed, most children (90 percent) exhibit these problem behaviors “never” or “sometimes.” Parents are more likely to report that their children get angry easily or frequently argue or fight with others. Even according to parents, however, most children (between 67 and 85 percent) engage in such behavior no more than “sometimes” or “never.”

#### Most exhibit a positive approach to classroom tasks

According to teachers, the typical kindergarten child is eager to learn new things, pays attention reasonably well in class, and persists

in completing tasks. Between two-thirds and three-quarters exhibit these positive approaches to learning “often” or “very often.” Nonetheless, substantial minorities of children do not have a particularly positive attitude toward classroom tasks: one-quarter are “never” or “sometimes” eager to learn, and one-third have difficulty paying attention in class.

#### ■ *What range of skills do kindergarten teachers encounter?*

The findings from *America's Kindergartners* (West, Denton, and Germino-Hausken 2000) provide a profile of what beginning kindergartners know and can do. Most first-time kindergartners have basic reading and mathematics skills, basic social skills, and are healthy. In addition to this news, *America's Kindergartners* found that the diverse population of children entering school demonstrates a considerable range of knowledge and skills.

#### Some kindergartners have advanced skills

Sizable minorities of kindergartners start school with early reading or mathematics skills that are one or two proficiency levels higher than the skills of the modal kindergartner. Small numbers come to school with very advanced skills, three or four proficiency levels higher than most. For example, the ECLS-K found that:

- Twenty-nine percent of kindergartners can do more than recognize letters by name: they can associate them with sounds at the beginning of words. Seventeen percent can associate letters with sounds at the end of words as well.
- Two percent of pupils (1 in 50) begin kindergarten able to read simple sight words, and 1 percent are also able to read more complex words in sentences. These children already know how to read.

## Entering Kindergarten

Continued

- Twenty percent of kindergartners can do more than count and read single-digit numerals: they can read two-digit numerals, identify the ordinal position of an object in a series, determine the next number in a sequence, and solve simple word problems.
- Four percent of pupils begin kindergarten able to solve addition and subtraction problems. These children are already doing arithmetic.

### Some kindergartners have skills that lag behind

Most first-time kindergartners can recognize some single-digit numerals, identify simple geometric figures, and count to 10. A majority can recognize all single-digit numbers, count beyond 10, identify the similarities in patterns, and compare the relative lengths of objects using nonstandard units. However, many children still do not have these skills at the beginning of kindergarten. The results of the ECLS-K indicate that, among entering kindergartners:

- Eighteen percent cannot demonstrate familiarity with the conventions of print: they do not know that English print is read from left to right and from top to bottom or where a story ends.
- Thirty-four percent cannot identify letters of the alphabet by name: they are not yet at the first level of reading proficiency.
- Forty-two percent cannot count 20 objects, read more difficult single-digit numerals, and judge the relative lengths of several rod-like objects; however, most of these pupils (36 percent of all children) can count 10 objects and read easier numerals.
- Six percent cannot count 10 objects and identify simple numerals and shapes; they are not yet at the first level of mathematics proficiency.

### ■ *What factors help account for variations in knowledge, health, and behavior at school entry?*

Who are the children who enter kindergarten with skills that exceed or lag behind those of the average child? Who are the children with significant problems with respect to their health or behavior? The findings in *America's Kindergartners* demonstrate significant differences in children's early academic skills across pupils of various ages, between girls and boys, as well as between children from high-risk versus more ordinary family circumstances. Age, sex, and family risk factors are also related to some of the observed variation in children's health status and behavior at school entry.

### Age-related differences in school readiness

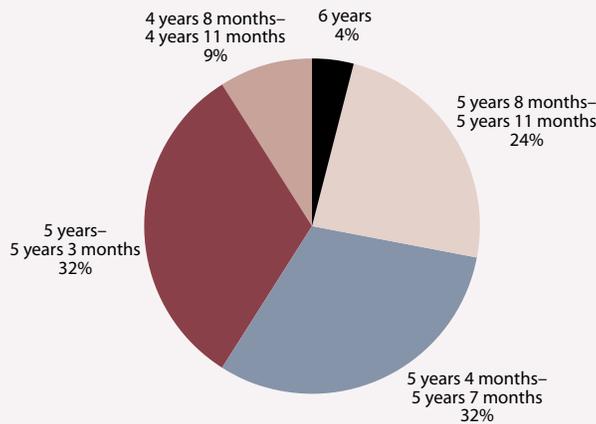
Variation in children's ages is associated with differences in their knowledge, skills, and behavior. The ECLS-K found that nearly two-thirds of kindergartners were between 5 years and 5 years, 8 months as of September 1<sup>st</sup> of the reference year (1998) (figure 3). Nine percent were not yet 5 years old as of the same date. Nearly one-quarter were almost 6 years old (5 years, 8 months to 5 years, 11 months), and 4 percent were already 6.

The variation in age at entry is primarily due to three causes. First, school systems differ in their policies regarding how old children must be and by what date in order to qualify for kindergarten entry. Second, children are born throughout the year, so some just make and others just miss the cutoff date. Third, some parents choose to delay their children's entry into kindergarten. The ECLS-K findings support the contention (Zill, Loomis, and West 1997) that older students often have advantages with respect to the knowledge and self-regulation skills they bring to the classroom.

# Entering Kindergarten

Continued

**Figure 3.— Percentage distribution of first-time kindergartners, by age at kindergarten entrance: Fall 1998**



NOTE: Percentages may not add to 100 due to rounding.

SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, “Kindergarten Class of 1998–99,” Fall 1998.

### Older kindergartners are closer to being able to read

A larger majority of the older than the younger children have attained the first level of reading proficiency (recognizing letters of the alphabet), and larger minorities of the older children have passed the higher proficiency levels. The ECLS-K data show the following:

- Seventy-three percent of kindergartners who are about to turn 6 at the start of the school year are able to identify letters by name (i.e., they pass reading proficiency level one), whereas 56 percent of children who have not yet turned 5 are able to do this. The proportion of those who pass reading level one in the 5 to 5 and two-thirds age group falls inbetween the younger and older pupils.
- Twice as many of the older than the younger children are at reading proficiency level three: they are able to associate letters with sounds at the beginnings and ends of words. Twenty-two percent of pupils about to turn 6 can do this, compared with

11 percent of those about to turn 5. Again, those 5 to 5 and two-thirds fall inbetween the younger and older children.

- The small number who are at an advanced reading level is four times larger among the older than the younger children. Four percent of pupils about to turn 6 can read easy words by sight, compared with 1 percent who can do this among pupils about to turn 5 or who became 5 within the past 4 months (May–August births).

### Older kindergartners are closer to being able to do arithmetic

A similar positive relationship between knowledge and age was found with respect to proficiency in early mathematics skills. Here the average older pupil is at a higher proficiency level than the typical pupil in the youngest age group. Specifically:

- Two-thirds of those about to turn 6 are at mathematics proficiency level two. They are able to read numerals, count beyond 10, recognize patterns of figures, and com-

## Entering Kindergarten

Continued

pare the relative lengths of objects. By contrast, 42 percent of those who have not yet turned 5 can do these things. About half (51 percent) of pupils who have turned 5 within the past 4 months are able to demonstrate level two mathematics skills.

- Two to three times as many of the older than the younger children are at the third mathematics proficiency level: they are able to read two-digit numerals and recognize the ordinal position of an object. Twenty-nine percent of pupils who are about to turn 6 have these skills. By contrast, 14 percent of pupils who have just turned 5, and 10 percent of those who are not yet 5, can demonstrate level three mathematics skills.
- The proportion at an advanced mathematics level is 4 to 5 times larger among the older kindergartners. Seven percent of pupils who enter at almost age 6 can do addition and subtraction problems, compared with 2 percent of pupils who enter at age 5.

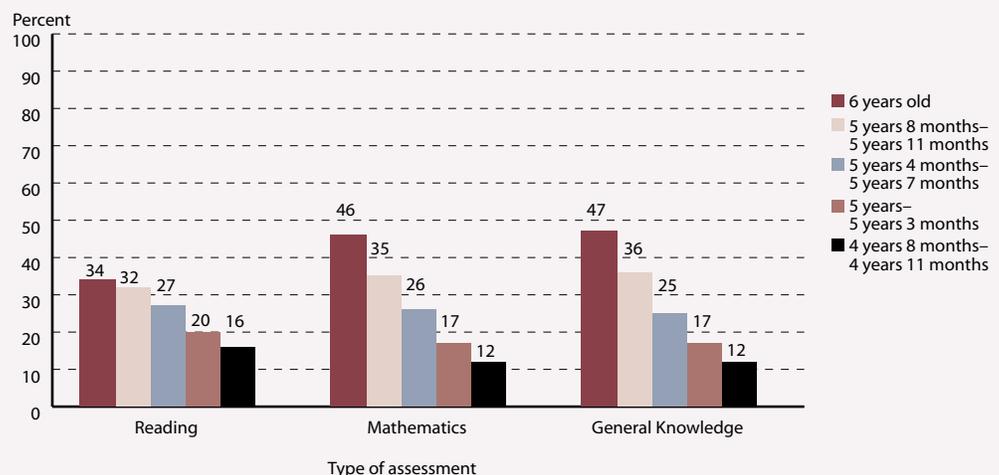
### Older kindergartners know more about nature, science, and human society

As with reading and mathematics, the ECLS-K results indicated a positive relationship between age at school entry and performance on the general knowledge assessment. For example:

- Roughly one-third of pupils who are almost age 6 achieve general knowledge scores in the top quartile of the score distribution. By contrast, 17 percent of pupils who have just turned 5, and 12 percent of those who are not yet 5, score in the top quartile (figure 4).
- Forty-two percent of the youngest group have scores in the bottom quartile of the score distribution, compared with 16 percent of the children just turning 6.

Although the ECLS-K results showed significant positive relationships between children’s age and their reading and mathematics skills and general knowledge, age differences do not account for all of the variation in pupils’ knowl-

**Figure 4.— Percentage of first-time kindergartners in highest quartile of assessments, by age at entry and type of assessment: Fall 1998**



NOTE: Based on those assessed in English. Excludes 19 percent of Asian and 30 percent of Hispanic children.

SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, “Kindergarten Class of 1998–99,” Fall 1998.

## Entering Kindergarten

### Continued

edge and skills at school entry. Even among kindergartners of the same age, there are considerable differences from pupil to pupil in what each one knows and can do.

#### Older children have more advanced motor skills

Older children have better coordination than do younger children. This is true with respect to both fine motor skills, such as using a pencil to copy a geometric figure, and gross motor skills, such as walking backward on a line or hopping on one foot. The psychomotor assessment showed, for example, that:

- Children who are nearly 6 at the start of the kindergarten year are twice as likely as those who have not yet turned 5 to score in the top third of the distribution on fine motor skills. Forty-four percent of the former group scored in the top third, compared with 22 percent of the latter group. The older students were half as likely as the youngest students to score in the bottom third of the distribution (20 versus 45 percent).
- Likewise, children about to become 6 were two-thirds more likely than those about to turn 5 to score in the top portion of the distribution in the assessment of gross motor skills (46 versus 28 percent). The older group was 60 percent as likely to score in the bottom third in gross motor skills (21 percent versus 37 percent).

#### Some developmental problems are more common among the oldest kindergartners

The population of first-time kindergartners includes a group of children who are much older than their peers. These children are already 6 at the start of kindergarten and could have begun kindergarten the year before (January–August 1992 births). Children in this older group have higher frequencies of some developmental difficulties. For example, these 6-

year-olds are (1) twice as likely as any other age group to have problems with their coordination (8 versus 3–4 percent), and (2) more likely than any other group to have difficulties with speech articulation (18 versus 10–11 percent). This may be one reason why the parents of this group of older children choose to delay their children's entrance to kindergarten by a year.

#### Older children are more socially adept and less prone to problem behaviors

According to teachers and, to a lesser extent, parents, older children engage in cooperative behavior more frequently than younger children, and are less prone to angry, argumentative, or combative behavior. For example, the results show that:

- Compared with children not yet 5, larger majorities of those about to turn 6 are described by teachers as often accepting peers' ideas for group activities (75 versus 69 percent) and forming and maintaining friendships (80 versus 74 percent). A majority of the older children, as opposed to a minority of the younger ones, comfort or help other children often (54 versus 46 percent).
- Compared with children not yet 5, smaller minorities of those about to turn 6 are described by teachers as getting angry easily (10 versus 14 percent) and as fighting with others often or very often (9 versus 12 percent).

Parents' ratings of children's positive social behavior show that students who are almost 6 are more likely to easily join others in play than are the youngest kindergartners (87 versus 82 percent). However, according to parents, there is little difference between older and younger kindergartners with respect to making and keeping friends or comforting or help-

## Entering Kindergarten

Continued

ing others. Parents' reports also indicate that fewer older children get angry easily but that no significant age differences exist with respect to the frequency of arguing and fighting with others.

### Older children are more persistent

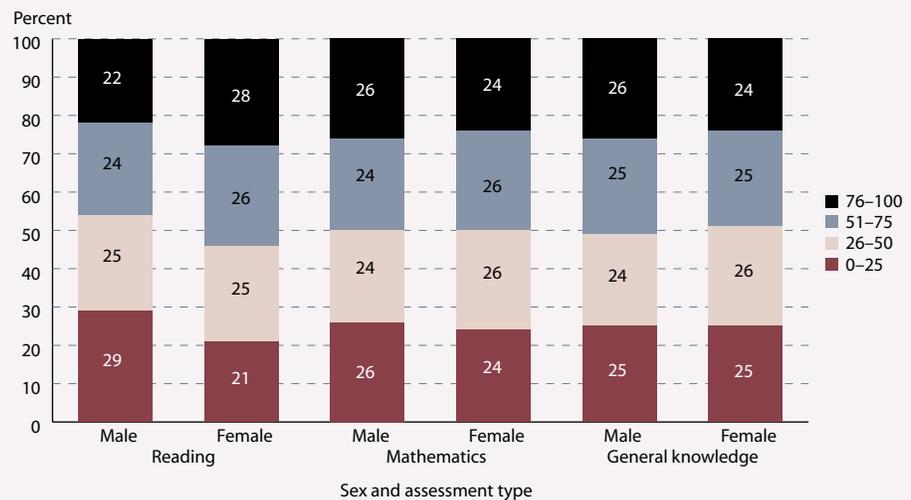
According to teachers and, to a lesser extent, parents, older children exhibit a more positive approach to classroom learning tasks. In teachers' ratings, for example, compared with children not yet 5, larger majorities of those about to become 6 are described as showing eagerness to learn new things (80 versus 66 percent); paying attention well (73 versus 57 percent); and persisting in completing tasks (78 versus 63 percent). Parents' ratings of children's approaches to learning also show age differences with respect to the frequency of working at something until finished but no significant differences with respect to eagerness to learn new things.

With knowledge and skills as well as social maturity, age differences do not explain all or even most of the variation in children at school entry. Nor can the differences account for the bulk of the variation in problem behavior or approaches to learning. Even among kindergartners of the same age, there are considerable differences from pupil to pupil in social skills and behavior.

### ■ Are there sex-related differences in school readiness for kindergartners?

The fact that a kindergartner is a girl or boy accounts for little of the variation observed in children's knowledge and skills. Previous studies (e.g., Gullo and Burton 1992) have found girls to mature earlier than boys, but the ECLS-K showed that sex differences are more consistent for children's social skills and classroom behavior than for early academic skills (figure 5).

**Figure 5.— Percentage distribution of male and female pupils, by assessment quartile in 3 skill domains at kindergarten entry: Fall 1998**



NOTE: Based on those assessed in English. Excludes 19 percent of Asian and 30 percent of Hispanic children.

SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, "Kindergarten Class of 1998–99," Fall 1998.

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### Continued

#### Girls and boys have similar skills, although girls are slightly ahead in reading

On average, girls' reading skills are slightly more advanced than those of boys, but most girls and boys in kindergarten are at the first level of reading proficiency. The proportions of children who are one or two proficiency levels ahead of the average are larger among females than among males. However, for the small numbers who are advanced—those who are actually reading words or sentences at school entry—these fractions are essentially equal for the two sexes. Here are some illustrative findings:

- Seventy percent of female kindergartners know their letters at school entry, compared with 62 percent of males.
- More girls than boys can associate letters with sounds at the beginning (32 versus 26 percent, respectively) and ending of words (19 and 15 percent, respectively).
- Three percent of boys and 2 percent of girls can read words by sight at school entry (the fourth proficiency level).

Female and male kindergartners have equal mean scores and similar score distributions in the ECLS-K assessments of mathematics and general knowledge. Though males may excel in math and science by middle and secondary school (NCES 1998), no differences are apparent at school entry.

#### More boys experience developmental difficulties

Parents' descriptions of the general health status of their children are similar for male and female children. There are more sex differences with respect to the relative frequency of several developmental problems. According to reports from parents, for example:

- Twice as many boys as girls (14 versus 7 percent) have difficulty articulating words clearly and communicating with others.
- Twice as many boys as girls (18 versus 9 percent) have difficulty paying attention for sustained periods.
- One-quarter more boys than girls (20 versus 16 percent) are a lot more active than their peers.

#### Girls are more prosocial and less prone to problem behavior

According to both teachers and parents, girls and boys differ in caring and sharing behavior. For example:

- Teachers report that 60 percent of girls versus 43 percent of boys are often comforting or helpful to classmates.
- Teachers describe larger majorities of girls than boys as often accepting peers' ideas for group activities (77 versus 71 percent) and forming and maintaining friendships (80 versus 73 percent).

Parents generally describe their children as engaging in friendly or cooperative behavior more frequently than teachers do. No gender difference is evident in parents' ratings of how frequently their children easily join others in play or make and keep friends. Like teachers, parents describe more female than male kindergartners as comforting or helping others frequently.

Although a minority of either sex is described as engaging in angry or combative behavior often or very often, teachers describe more boys than girls as often engaging in these forms of antisocial conduct. For example, at least half again as many boys as girls are said to get angry easily (14 versus 9 percent) and to argue with others (13 versus 8 percent).

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Parents describe more children as often engaging in aggressive behavior, and parents see fewer differences between boys and girls in this regard. Parents perceive slightly more boys than girls as getting angry easily (19 versus 15 percent). But about as many girls as boys are said to be argumentative (32 and 33 percent, respectively) or to fight with others frequently (14 and 16 percent, respectively).

### Girls have a more positive approach to classroom tasks

Teachers report that girls are more likely than boys to have a positive orientation to structured learning activities. More girls than boys are eager to learn, more pay attention in class, and more persist in completing tasks. According to teachers:

- Seventy-eight percent of girls versus 71 percent of boys are often eager to learn.
- Seventy-four percent of girls and 58 percent of boys usually pay attention well.
- Seventy-eight percent of girls versus 65 percent of boys often persist in completing assigned tasks.

Parents perceive more children to be eager to learn new things than teachers do, and parents say this is true of as many boys (91 percent) as girls (93 percent). Parents report that girls are more likely to persist at learning tasks than are boys (77 percent versus 69 percent).

Thus, even early in kindergarten, although boys and girls have similar academic skills, boys display more developmental difficulties, more disruptive conduct in class, and less positive orientations to learning activities.

- *What family background characteristics affect children's skills and knowledge?*

Several family background characteristics have repeatedly been found to be associated with poor educational outcomes among school-aged children, such as low achievement test scores, grade repetition, suspension or expulsion, and dropping out of high school. These risk factors include having parents who have not completed high school (Bianchi and McArthur 1993; West and Brick 1991; Zill 1996a) and coming from a low-income or welfare-dependent family (Zill et al. 1995). They also include living in a single-parent family (Dawson 1991; Entwisle and Alexander 1995; McLanahan and Sandefur 1994; Zill 1996b) and having parents who speak a language other than English in the home (Bianchi and McArthur 1993; Kao 1999; Rumberger and Larson 1998). Research has found that children who have one or more of these characteristics are more likely to be educationally disadvantaged or have difficulty in school (Pallas, Natriello, and McDill 1989). Although not all children who are at risk do poorly in school, those with such risk factors are, on average, more prone to poor achievement (Kaufman and Bradby 1992).

Children from multiple-risk families seem to be most in danger of achievement difficulties. Nord, Zill, Prince, Clarke, and Ventura (1994) found inverse relationships between cumulative risk scores and vocabulary and mathematics test scores, as did Sameroff, Seifer, Barocas, Zax, and Greenspan (1987) between measures of verbal IQ and social adjustment. Previous studies have also found direct relationships between cumulative risk and the chances of grade repetition or school suspension (Nord, et al. 1994).

The same family factors associated with poor performance in school-aged children have been linked with fewer developmental accomplishments in preschool children, as reported by parents (Zill et al. 1995). What the ECLS-K

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Continued

results showed was that these risk factors are also associated with lower reading and mathematics skills and general knowledge among entering kindergartners in the fall of 1998.

### Nearly half of all entering kindergartners come from families with one or more risk factors

For purposes of the ECLS-K, 4 risk factors were defined:

- having a mother with less than a high school education;
- living in a family that received food stamps or cash welfare payments;
- living in a single-parent household; and
- having parents whose primary language is something other than English.

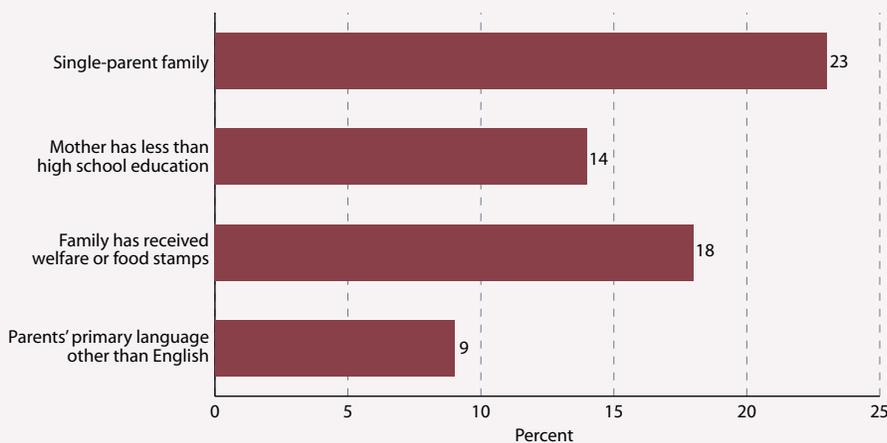
The ECLS-K findings indicated that 46 percent of kindergartners have one or more of these 4 risk factors. Thirty-one percent—nearly one in three—have only one risk factor, while another 16 percent have two or more risk factors

(see figures 6 and 7). The preponderance of risk factors may be due to the dramatic changes in living patterns in the United States over the last quarter century, the persistence of poverty, and high rates of immigration, especially from Latin America (Zill 1999).

### Two-thirds of children in large cities are at risk

The proportion of kindergartners who come from at-risk families changes dramatically from urban to suburban and rural America and across different racial-ethnic groups. In cities with populations above 250,000, nearly two-thirds of entering kindergartners have one or more risk factors, and 26 percent have multiple risk factors (see figure 8). In contrast, in the suburbs of large cities and in small towns, the situation is almost reversed. In those communities, nearly two-thirds of kindergartners have none of the four risk factors, and about 1 in 10 have two or more. Rural areas and mid-size cities and their suburbs are similar to the national averages in the frequency of risk factors.

Figure 6.—Percentage of first-time kindergartners with each of 4 risk factors: Fall 1998



SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, "Kindergarten Class of 1998–99," Fall 1998.

# Entering Kindergarten

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Figure 7.—Percentage distribution of first-time kindergartners, by number of family risk factors: Fall 1998

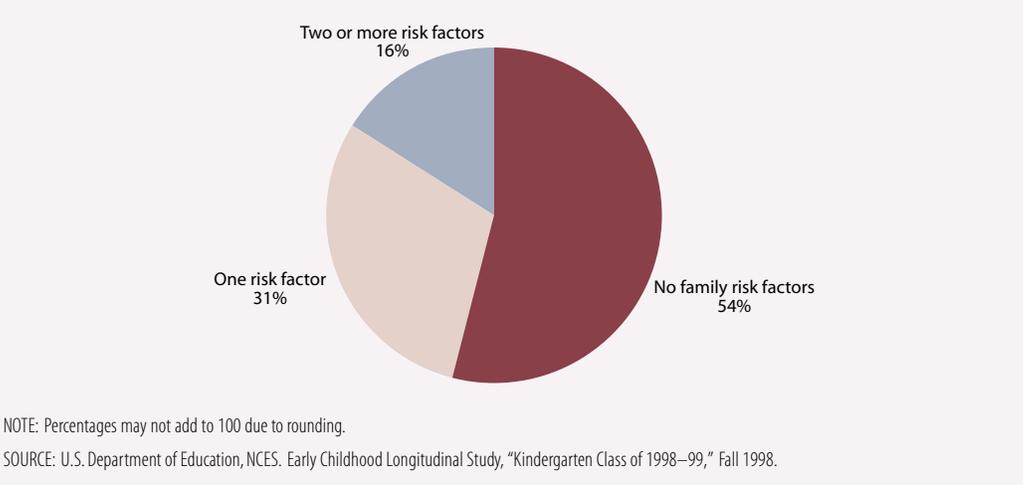
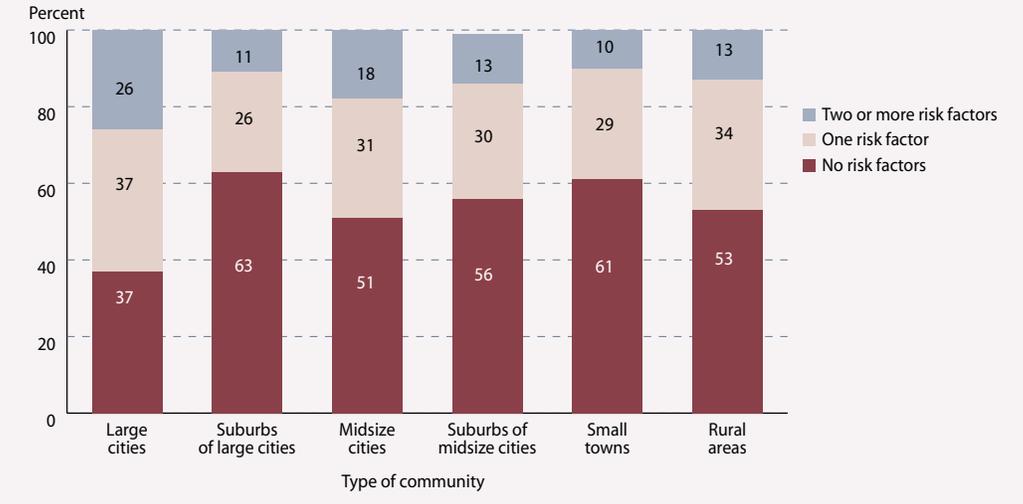


Figure 8.—Percentage distribution of first-time kindergartners, by number of risk factors and type of community: Fall 1998



## Entering Kindergarten

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### Minority children are more likely to be at risk

Sociodemographic risk factors are considerably more common among kindergartners from racial-ethnic minorities than among those from white families (see figure 9). Nearly three-quarters of entering kindergartners from black or Hispanic families have one or more risk factors, compared with 29 percent of those from white families. The proportion of children with two or more risk factors is five times larger among Hispanics (33 percent) and four times larger among blacks (27 percent) than among whites (6 percent). Risk factors are also more common among Asian kindergartners. A majority of Asian children (61 percent) have at least one risk factor, but 44 percent have one risk only. The proportion of Asian children with multiple risk factors is 17 percent, about the same proportion as that of all U.S. kindergartners.

The frequency of risk factors does not vary by age, except for those children in the oldest age group (those who are already 6 years old as of

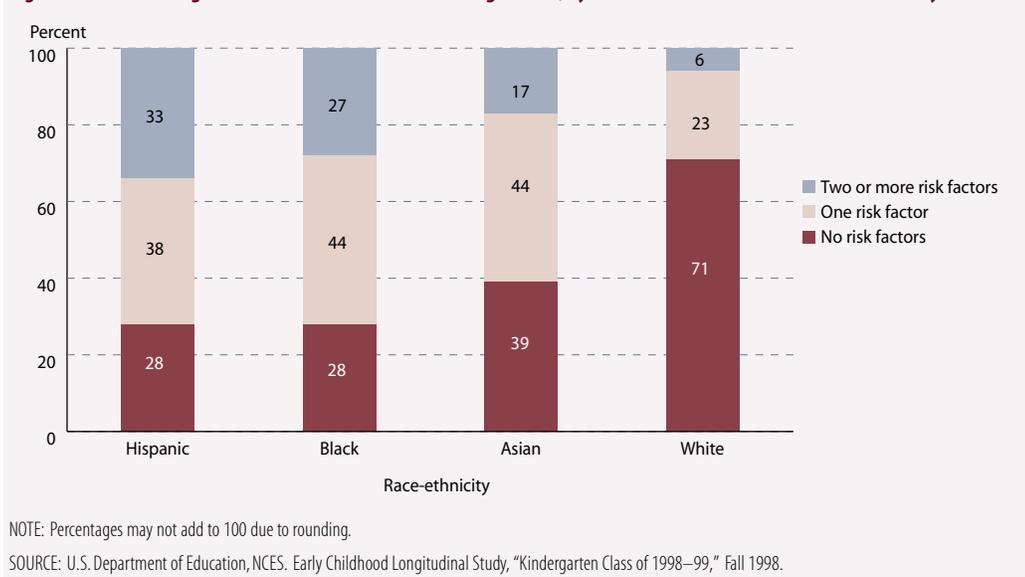
September 1<sup>st</sup>). Older children have significantly fewer risk factors than do younger children. Two-thirds of the 6-year-olds have none of the four risk factors, and 10 percent have two or more.

### Multiple risk factors

Nearly half of those with multiple risk factors score in the bottom quartile in early reading and mathematics skills, and general knowledge.

Children with one of the four risk factors have early reading and mathematics skills that lag behind those of children with none of the four risk factors (see figure 10). These children’s scores in general knowledge on the ECLS-K assessment are also lower than those of children from families with no risk factors (see figure 11). Furthermore, children with two or more risks significantly lag behind those with one risk. Thus, the results from the ECLS-K are consistent with the notion of a cumulative effect of multiple risks on children’s early intel-

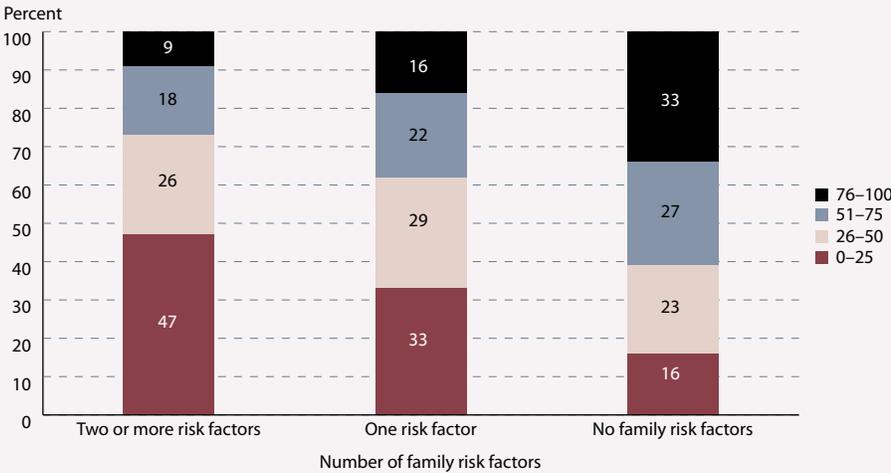
Figure 9.—Percentage distribution of first-time kindergartners, by number of risk factors and race-ethnicity: Fall 1998



# Entering Kindergarten

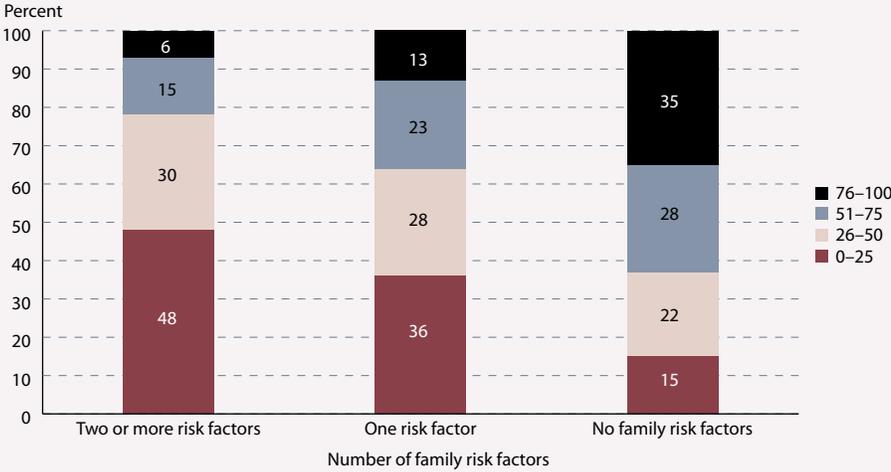
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**Figure 10.—Percentage distribution of first-time kindergartners' reading scores, by number of family risk factors: Fall 1998**



NOTE: Based on those assessed in English. Excludes 19 percent of Asian and 30 percent of Hispanic children. Percentages may not add to 100 due to rounding.  
SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, "Kindergarten Class of 1998–99," Fall 1998.

**Figure 11.—Percentage distribution of first-time kindergartners' general knowledge scores, by number of family risk factors: Fall 1998**



NOTE: Based on those assessed in English. Excludes 19 percent of Asian and 30 percent of Hispanic children. Percentages may not add to 100 due to rounding.  
SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, "Kindergarten Class of 1998–99," Fall 1998.

## Entering Kindergarten

### Continued

lectual development. Here are illustrative survey results:

- Children with one risk factor are twice as likely to have reading scores that fall in the lowest 25 percent of the overall skill distribution as children with no risk factors. Thirty-three percent of the single risk group was in the lowest fourth of the distribution, compared with 16 percent of the no risk group.
- Children with two or more risk factors are about three times as likely as those with no risk factors to score in the bottom quartile in reading (47 percent of the multiple risk group were in the bottom quartile).
- Conversely, children with one risk are half as likely to achieve reading scores that are in the highest 25 percent of the skill distribution as those with no risk factors (16 versus 33 percent). Those with multiple risks are one-third as likely to be in the top quartile (9 percent of these children scored in the top quartile).

The relationship between the number of risk factors and the proportions of each group that fall in the bottom and top quartiles of the test score distribution is the same for mathematics and general knowledge as it is for reading. As an illustration, children with multiple risks are about one-sixth as likely to be in the top quarter of general knowledge scores as children with none of the four risk factors.

#### **Children from families with multiple risks typically do not know their letters and cannot count to 20**

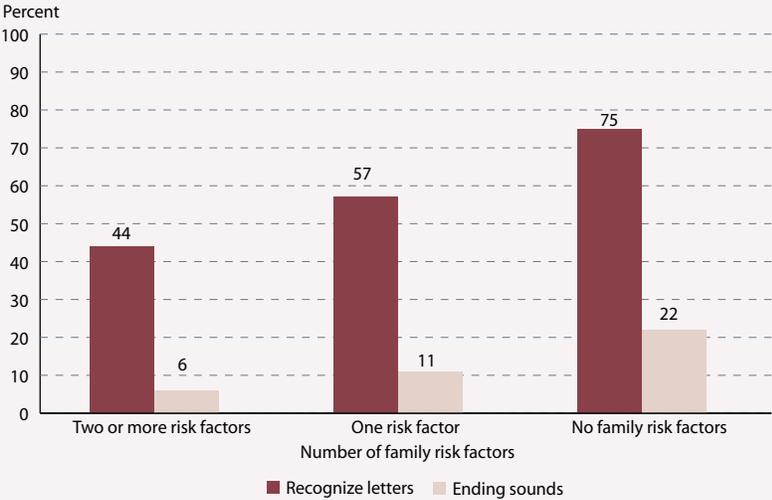
In terms of specific reading and mathematics skills that kindergartners with risk factors do or do not have when entering school, the ECLS-K results showed the following:

- Less than half of multiple risk children were at the first proficiency level in reading. Forty-four percent of them could identify letters of the alphabet, compared with 57 percent of children in the single risk group and 75 percent of those in the no risk group (see figure 12).
- Children from families with multiple risk factors were roughly one-third as likely to be able to associate letters with sounds at the ends of words as children from families with none of the four risk factors. Children from families with one risk factor were half as likely to do so. Twenty-two percent of the no risk group, 11 percent of the single risk group, and 6 percent of the multiple risk group were at this third proficiency level in reading.
- Although a large majority (87 percent) of the kindergartners with multiple risk factors were at the first proficiency level in mathematics, less than half were at the second level (see figure 13). Thirty-eight percent of the multiple risk group could count beyond 10 or make judgments of relative length, compared with 48 percent of the single risk group and 68 percent of the no risk group.
- Children from families with multiple risk factors were one-third as likely to be able to recognize 2-digit numerals and identify the ordinal position of an object in a series as children from families with no risk factors. Children from families with one risk factor were half as likely to have these skills. Twenty-seven percent of the no risk group, 13 percent of the single risk group, and 8 percent of the two or more risk group were at this third proficiency level in mathematics.

# Entering Kindergarten

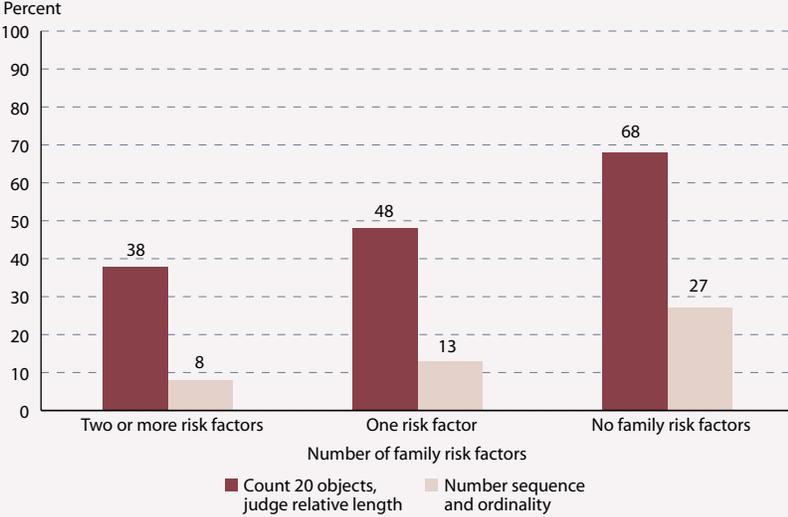
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**Figure 12.—Percentage of first-time kindergartners with specific reading skills, by number of family risk factors: Fall 1998**



NOTE: Based on those assessed in English. Excludes 19 percent of Asian and 30 percent of Hispanic children. Detail may not add to 100 due to rounding.  
SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, "Kindergarten Class of 1998–99," Fall 1998.

**Figure 13.—Percentage of first-time kindergartners with specific mathematics skills, by number of family risk factors: Fall 1998**



NOTE: Based on those assessed in English. Excludes 19 percent of Asian and 30 percent of Hispanic children.  
SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, "Kindergarten Class of 1998–99," Fall 1998.

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### Continued

#### Some children from high-risk families come to school with advanced skills

Although their numbers are comparatively small, some children from multiple risk families are able to overcome their disadvantage and perform at advanced levels from the start of kindergarten. About one child in 20 from the high risk group is two proficiency levels ahead of the typical kindergartner in reading (able to associate letters with sounds at the ends of words). A similar proportion is one level ahead of the typical pupil in mathematics (able to identify the ordinal position of an object in a series). One child in a hundred from the high risk group is advanced in reading or mathematics at school entry: he or she is reading sight words or doing addition and subtraction problems.

#### ■ *How do risk factors affect noncognitive aspects of school readiness?*

The ECLS-K analyses revealed negative relationships between the risk factors and children's health, social development, and behavior. The more risk factors a child has, the greater the chances that the child is rated by parents as in less than very good health, exhibits classroom conduct problems, and displays less positive approaches to learning. However, not all aspects of children's health and growth are linked in detrimental ways to the risk factors.

#### Risk factors are linked to poorer child health but not to impaired growth or coordination

Risk factors are generally associated with lower parent ratings of the child's health status and poorer performance on the assessment of fine motor development. Parents' ratings of child health reveal, for example:

- Whereas a majority of children from families with no risk factors (59 percent) are in excellent health, less than half of children from families with one risk factor (44 per-

cent) or multiple risk factors (37 percent) are in comparable health (figure 14).

- Children are four to six times more likely to be described as in fair or poor health if they come from at-risk families than if they come from families with no risk factors.

The more risk factors a child has, the less likely that child is to display fine motor skills that are in the top third of the distribution (figure 15). On the direct assessment of skills involving an activity such as building a tower with blocks or copying designs with a pencil, for example:

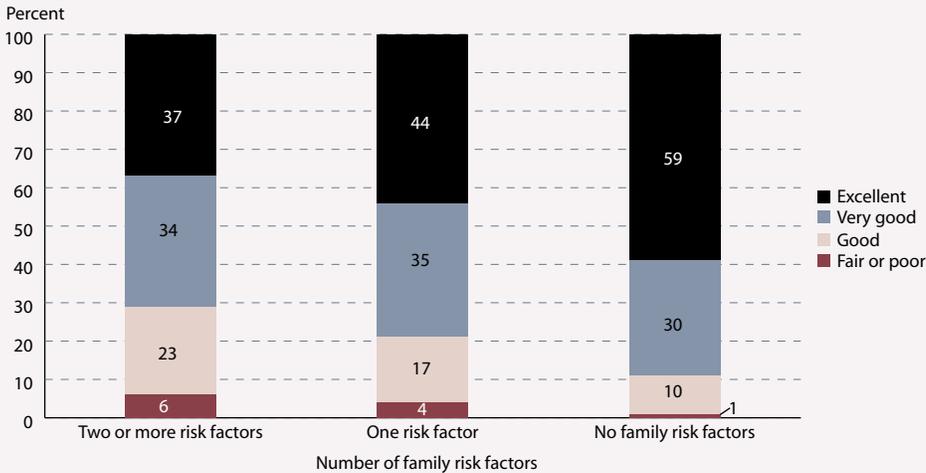
- Twenty-six percent of children with multiple risk factors scored in the top third of the distribution on fine motor skills, compared with 30 percent of those with one risk factor, and 41 percent of those with no risk factors.
- Thirty-eight percent of children with multiple risks and 35 percent of children with a single risk factor scored in the lowest third of the distribution of fine motor skills. In contrast, 22 percent of children from families with none of the four risk factors did so. (Data not shown.)

Risk factors generally do not have negative associations with children's physical growth or gross motor development. The average height and weight of male kindergartners with a single family risk or even multiple risk factors are similar to the height and weight of boys from families with no risk factors (figure 16). However, females from families with one risk or multiple risks are, on average, one inch shorter and one pound heavier than females from families with no risk factors (figure 17). Children's performance on the assessment of gross motor development varies little with the number of family-risk factors (figure 15). However, the percentage of children in the lowest third of the distribution in gross motor performance is

# Entering Kindergarten

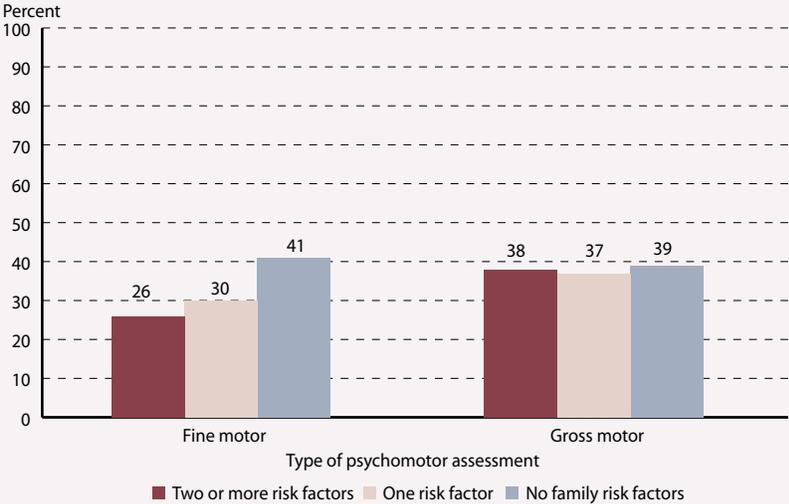
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**Figure 14.—Percentage distribution of parental ratings of first-time kindergartners’ health status, by number of family risk factors: Fall 1998**



SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, "Kindergarten Class of 1998–99," Fall 1998.

**Figure 15.—Percentage of first-time kindergartners in top third of distribution on fine motor and gross motor development, by number of family risk factors: Fall 1998**

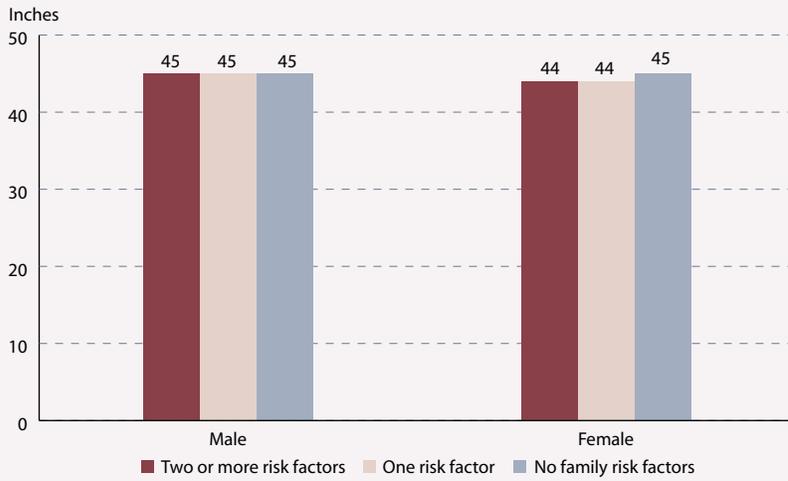


SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, "Kindergarten Class of 1998–99," Fall 1998.

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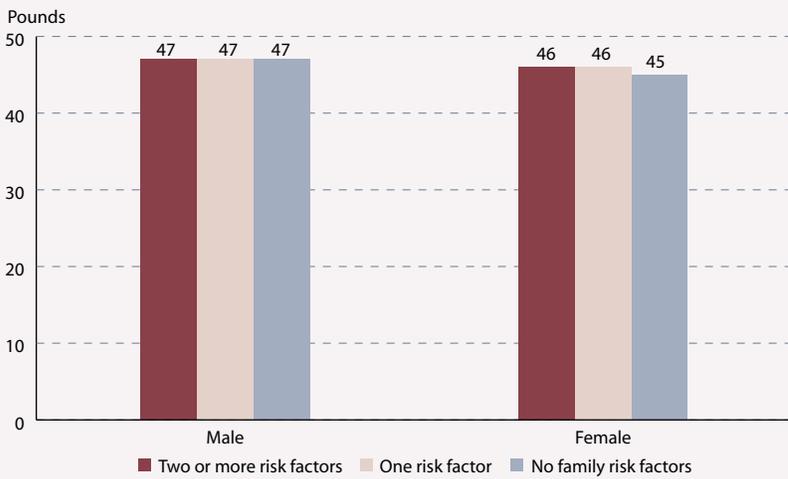
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Figure 16.—Mean height in inches of first-time kindergartners, by sex and number of family risk factors: Fall 1998



SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, “Kindergarten Class of 1998–99,” Fall 1998.

Figure 17.—Mean weight in pounds of first-time kindergartners, by sex and number of family risk factors: Fall 1998



SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, “Kindergarten Class of 1998–99,” Fall 1998.

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Continued

somewhat larger among children from families with one risk (29 percent) or multiple risks (28 percent) than among children from families with no risk factors (25 percent). (Data not shown.)

### At-risk children are less likely to be socially adept and more likely to be aggressive

Teachers report that a majority of children from higher risk family environments make friends readily and accept peers' ideas. Nonetheless, the percentages of at-risk children who engage in these positive social behaviors are generally smaller than among children from lower risk family environments. According to teacher ratings, for example:

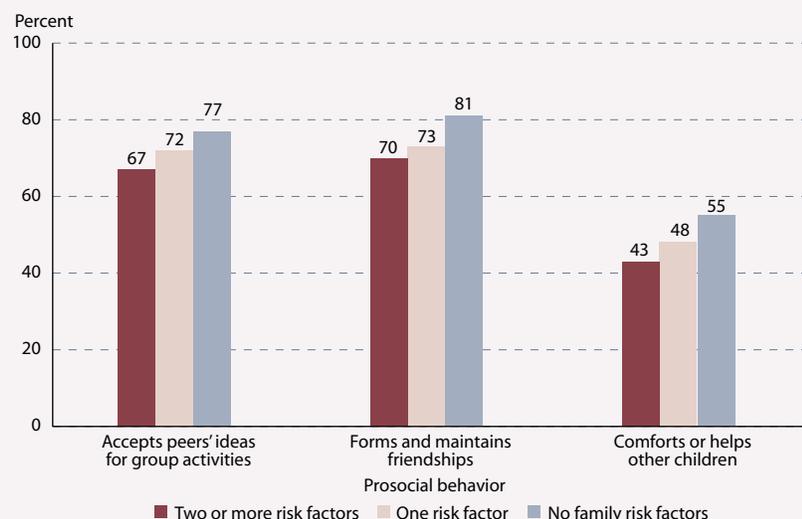
- Two-thirds of children from multiple-risk families and 72 percent of those from single risk families often accepted peers' ideas for group activities. In comparison, 77 percent of children from families with no risk factors did so (figure 18).

- Seventy percent of children from multiple-risk families and 73 percent of those from single-risk families often made and maintained friendships. The comparable proportion was 81 percent for children from no-risk families.
- No more than half of children from multiple-risk families (43 percent) or single-risk families (48 percent) often comforted or helped their classmates. In contrast, 55 percent of children from families with no risk factors displayed these behaviors.

According to teachers, a minority of children from higher risk family environments engage in angry or combative behavior often. The size of the minority is larger among at-risk children than among those from other family environments. According to teachers, for example:

- Twice as many children from multiple risk families (14 versus 7 percent of those from families with no risk factors) and about as

**Figure 18.—Percentage of first-time kindergartners described by teachers as engaging in selected prosocial behaviors often or very often, by number of family risk factors: Fall 1998**



SOURCE: U.S. Department of Education, NCES. Early Childhood Longitudinal Study, "Kindergarten Class of 1998–99," Fall 1998.

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### Continued

many from single-risk families (12 percent) often fight with their classmates (figure 19).

- Similar proportions of children from multiple risk and single risk families get angry easily (14 and 13 percent, respectively, versus 10 percent of those from families with no risk factors) and argue with others frequently (15 and 13 percent, respectively, versus 9 percent of the lower risk group).

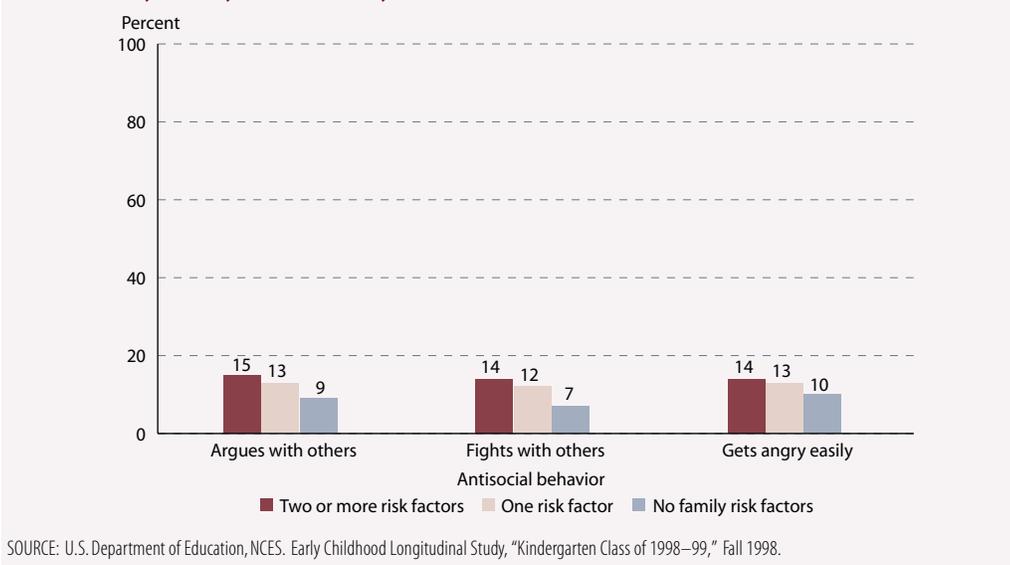
#### Fewer at-risk children have a positive approach to learning activities

Kindergarten teachers describe most at-risk kindergartners as exhibiting a positive approach to classroom learning activities. Even among those from multiple-risk families, majorities seem eager to learn new things, pay attention, and persist in learning tasks often or very often. Despite this evidence, the percentages who display these positive approaches to learning are considerably smaller than among

children from families with no risk factors. Conversely, larger proportions of at-risk children display these positive approaches rarely or never. According to teacher ratings:

- Thirty-six percent of children from multiple risk families are eager to learn no more than “sometimes” or “never,” compared with 20 percent of children from families with no risk factors. Children from single risk families fall in between, with 30 percent being described as being eager to learn “sometimes” or “never.”
- Almost half of kindergartners from multiple risk families (44 percent) “sometimes” or “never” pay attention well. The comparable proportions are 39 percent of children from single-risk families and 28 percent of those from lower risk families.
- Thirty-eight percent of children from multiple risk families rarely persist in completing classroom tasks. In comparison, 33

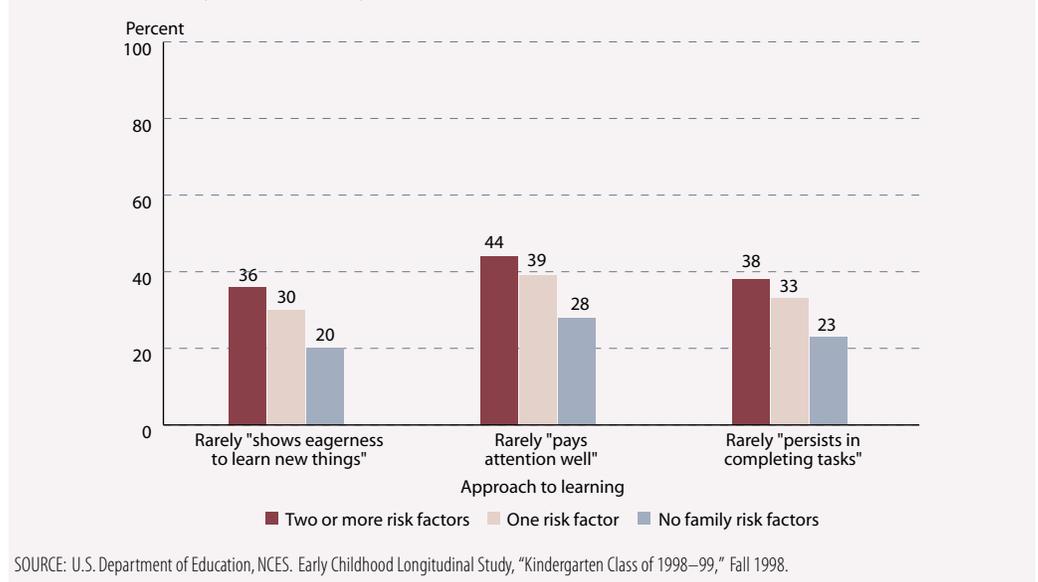
**Figure 19.—Percentage of first-time kindergartners described by teachers as engaging in selected antisocial behaviors often or very often, by number of family risk factors: Fall 1998**



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Continued

**Figure 20.—Percentage of first-time kindergartners described by teachers as engaging in positive approaches to learning sometimes or never, by number of family risk factors: Fall 1998**



percent of children from single risk families and 23 percent from families with no risk factors rarely persist.

### DISCUSSION

The Early Childhood Longitudinal Study, Kindergarten Class of 1998–99, provides a first-ever look at the knowledge, skills, health, and behavior of a nationally representative sample of U.S. kindergarten children upon entry to school. On the whole, the study provides a portrait of what today’s American children are like when they begin school. While many of the results are positive, not all of the news is good. Parents report that substantial minorities of children are already experiencing risks for developmental difficulties, with one in five being described as overly active, one in six having problems concentrating for sustained periods, and one in nine not articulating words clearly or fluently. Teachers report that sizable minorities display less conducive ap-

proaches to learning tasks. One-quarter of beginning kindergartners are described as eager to learn no more than sometimes or never, and one-third as paying attention in class with similar frequency. The significance of these findings becomes clearer in light of earlier surveys on qualities that teachers and parents consider important for school readiness. Majorities of both teachers and parents rate a child’s ability to sit still and pay attention in class as essential or very important for school readiness (West, Germino-Hausken, and Collins 1993). Most teachers also rate children’s ability to communicate needs and wants to others as crucial for school success (Heaviside and Farris 1993).

The findings of the new study show considerable variation in children’s knowledge and skills as they enter kindergarten. The variations in children’s knowledge and skills are partly related to differences in how old children are when they begin school and to developmental

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### Continued

differences between boys and girls. These variations are also associated with family risk factors, which, in turn, are related to some of the observed variation in children's health status and behavior at school entry.

#### AGE DIFFERENCES

Children who are close to 6 or already 6 when they begin kindergarten have several advantages over children who start school when they have just turned 5 or are not yet 5 years old. In some ways, the findings regarding age-related differences in cognitive and noncognitive skills are consistent with what many parents and teachers already believe, namely that older children tend to be larger and more mature than younger children and that children learn much before they come to school. In addition, the findings lend some support to the contentions of policy analysts who have questioned the practice of allowing parents to withhold their children from kindergarten for a year, because it gives these children advantages over other children who enter at younger ages (Zill, Loomis, and West 1997). The critics argue that this practice places other younger children at a disadvantage because they are not as fully developed as the withheld child. Developmental disparities between older and younger children are compounded by the fact that better educated parents are more likely than less educated parents to delay their child's entrance to school (Meisels 1992). The ECLS-K results showed that first-year kindergartners who are already 6 have significantly fewer family-risk factors than younger groups, although they displayed a higher rate of some developmental difficulties as well.

#### SEX DIFFERENCES

Female kindergartners come to school with reading skills that are slightly more advanced,

on average, than those of males. They are also less likely to have developmental difficulties and are more likely to exhibit good social skills and classroom behavior. The higher frequency of behavior and adjustment problems that males exhibit when entering kindergarten foreshadows the greater number of males who experience conduct and disciplinary problems later in elementary and secondary school (Coiro, Zill, and Bloom 1994). Though some of the early problems may be transitory and simply reflect different developmental trajectories for boys and girls, others may be predictive of later and more serious disturbances. In contrast, despite the equivalent mathematics skills and general knowledge and better behavioral adjustment that females typically display at school entrance, females lag behind males in mathematics and science achievement in the later grades (NCES 1998). It is possible that this pattern is related to differences in development and social roles between the sexes that emerge as children reach adolescence. The longitudinal data on curriculum, instructional practices, and achievement that the ECLS-K will produce as it follows boys and girls through elementary school should be of value in exploring these questions.

#### RISK FACTORS

Family risk factors that are associated with poor performance in school-aged children are also linked with lower proficiency in early reading and mathematics skills and general knowledge among children as they enter kindergarten. These risk factors are low maternal education, welfare dependency (as a marker of family poverty), having only one parent in the home, and having parents whose primary language is not English. As with previous studies (Zill et al. 1995), the ECLS-K data show that there is a cumulative effect of the number of risks to which a child is exposed early in life.

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While children with one risk factor do not fare as well as those with none, children who have two or more risk factors exhibit greater achievement lags, poorer health, more problem behavior, and less positive approaches to learning than do children with a single risk factor. Further examination of the data are required to reveal whether each risk factor is of approximately equal importance or whether some are more significant than others. Some researchers have theorized that the number of risk factors in a child's background may be more important than the nature of the particular risk or risks (Meisels and Wasik 1990). Others believe that low parental education or family income are far more significant than growing up in a single-parent family or having parents whose primary language is not English (Scott-Jones 1996). Multivariate analyses of the ECLS-K data should help evaluate these positions.

The results also show that the risk factors have no or relatively slight negative associations with children's physical growth or gross motor development. What these results suggest is that the health conditions affecting at-risk children are more apt to be developmental and emotional, rather than physical.

Many of the children with multiple risk factors have attended Head Start or prekindergarten programs. How does participation in these programs affect the early achievement and behavior of at-risk children? This is a question that remains to be investigated with the ECLS-K data and that can be better addressed by the companion birth cohort study to the ECLS-K. The results of such analyses will assist researchers and policymakers in determining whether such programs as Head Start and prekindergarten have their intended effects and what can be done to improve children's preparation for school.

Although many children from multiple-risk families lag behind their classmates in early academic skills, some can overcome the odds and perform at advanced levels when entering kindergarten. This finding seems to argue against stereotyping children from educationally disadvantaged families and assuming that they are all behind when they begin school. Education researchers can examine these children further to understand better the individual, family, and preschool program factors that are associated with such high performance in the face of adversity.

American children show considerable variation in skills and knowledge as they enter kindergarten. The ECLS-K results demonstrate that children are neither alike at school entry, nor ready to be stretched and molded by the varying qualities and demands of different kindergarten programs. In other words, for kindergartners, one size does not fit all. How do kindergarten programs and teachers meet the instructional needs of children whose skills far exceed or greatly lag behind those of the average child? The ECLS-K data will provide a rich and detailed profile of the progress of groups of children who enter kindergarten at different levels.

It is common to attribute the achievement difficulties that educationally disadvantaged children experience in elementary and secondary school to the inferior schools that they are required to attend (e.g., Kozol 1991). What the ECLS-K shows is that these difficulties cannot be attributed solely to bad schools: many children are already behind when they open the classroom door. Does kindergarten help disadvantaged children catch up to other children? If so, does it do so at the expense of children who come to school with more advanced skills? Do the advanced children just mark time while the class reviews things that they already know?

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Or are kindergarten teachers able to work effectively with children at different skill levels? These are important questions that researchers will address with data from future rounds of the ECLS-K.

### NOTES

<sup>1</sup> Westat is implementing the ECLS-K for the U.S. Department of Education's National Center for Education Statistics.

<sup>2</sup> These children were included in the rest of the study (and data from them are included in the noncognitive assessment results presented below).

<sup>3</sup> The kindergarten pupils described throughout this essay are those who are in their first year of kindergarten.

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