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Indicators of Early School Success and Child Well-Being

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Cognitive skills, engagement in school, social skills, and physical well-being are all important for children's early success in school. However, some groups of children begin kindergarten less ready for school than others and, by the end of first grade, still haven't "caught up" with their more successful peers.

This CrossCurrents brief *reports on indicators of cognitive knowledge and skills, social skills, engagement in school, and physical well-being among children entering kindergarten and describes how these indicators change as children progress from kindergarten to first grade. We examine, in particular, how these indicators vary among socioeconomic and demographic subgroups of children. Using newly available, nationally representative data, we find that, on average, all groups of children make progress on five out of seven indicators of well-being and development over the first two years of formal schooling, regardless of their socioeconomic or demographic characteristics. However, we also find that children at lower socioeconomic levels, those from racial or ethnic minority backgrounds, those whose parents do not speak English at home, and those who are disabled tend to be less prepared for school upon kindergarten entry. Furthermore, these more vulnerable children fail to catch up to their peers by the end of first grade.*

These findings illustrate some of the challenges that new education policies are attempting to address. Under the No Child Left Behind Act of 2001,[1] states must assess children's math and reading skills in grades 3 through 8 and in grades 10 through 12,[2] with the goal that all students must be proficient by 2014. Additionally, states must show that subgroups of students by race/ethnicity, economic disadvantage, disability status, and English language ability are all making progress toward the goal of proficiency. Many state policymakers are also creating initiatives focused on ensuring that all children are ready to begin school, regardless of their socioeconomic or demographic background. The information presented here highlights the varied skills that contribute to school readiness and can help policymakers, teachers, and parents identify subgroups of children in need of further support to achieve the academic goals set for all children in our nation.

Background

In the 1990s, researchers and practitioners began to identify the many factors that contribute to a strong beginning in school. Among these factors are parent involvement, home environment, quality of early care and education settings, and school quality. Furthermore, during this time, the understanding of child characteristics that are important as children begin school broad-

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ened. This broader understanding holds that the concept of a child's readiness for school should not be limited to academic knowledge and skills but should encompass the "whole child."[3] In 1995, the National Education Goals Panel (NEGP) worked with a team of researchers to conceptualize five areas of development and skills that are critical to a child's readiness for school.[4,5] The five domains are: (1) physical well-being and motor development, (2) social and emotional development, (3) approaches to learning, (4) language, and (5) cognition and general knowledge.

Children who have competence across all five domains of school readiness are more successful in first grade academically than are children who have competence in only one or two domains, according to previous research by Child Trends.[6] However, among children who lack strong school readiness skills across the board, the ones who fare best are those who are physically healthy and have strong social and emotional skills, but who are below average on language and cognition skills at kindergarten entry.[7] Other research finds that being socially and emotionally ready for school is linked not only with more positive academic outcomes and later school success, but also with positive social and emotional development.[8,9,10]

Children's readiness for school and early success in school tends to vary according to their socioeconomic and demographic characteristics. For instance, Zill and West[11] have identified four family background characteristics linked with poorer academic, social, and physical well-being at kindergarten entry: (1) having a mother with less than a high school education, (2) having a family who received Aid to Families with Dependent Children (AFDC)/Temporary Assistance for Needy Families (TANF) or food stamps, (3) living with a single parent, and (4) having a parent whose primary language is not English. In another study of kindergartners' school readiness, West, Denton, and Germino-Hausken[12] have observed that these four risk factors, as well as younger age, minority race/ethnicity, and male gender, tend to be linked with poorer cognitive skills and knowledge, social skills, physical health and well-being, and approaches to learning. Denton and West have found that differences by race/ethnicity, poverty status, and gender in children's math and reading knowledge and skills persist in the first grade.[13]

A 1998 National Academy of Sciences' report on reading difficulties identified poverty, attending schools with low academic achievement, speaking a primary language other than English or speaking non-standard dialects of English, and cultural differences as risk factors. Targeting interventions to prevent reading failure among children with these characteristics is important, since many children who enter school behind in language and literacy skills have difficulty catching up with their peers in later grades.[14]

This issue brief extends previous work by summarizing selected indicators across domains of young children's well-being and development, by comparing the indicators as children enter kindergarten and complete first grade, and by comparing socioeconomic and demographic subgroup differences and how they change across the two time points.

About The Data Source

To learn about children's cognitive, social, and physical development, we used data from the Early Childhood Longitudinal Study - Kindergarten Class of 1998-1999 (ECLS-K). This nationally representative study is being carried out by the National Center for Education Statistics, which began collecting data on more than 20,000 children who were kindergartners during the 1998-99 school year. The study has gathered data from direct assessments of children and from interviews with parents, teachers, and school administrators. Assessments and interviews have taken place periodically through the spring of 2004. For the analyses reported here, we included only children who were first-time (rather than repeat) kindergartners in 1998-99 and who were also assessed in the spring of the following year.[15] Except where noted, we compare children's performance on indicators of well-being and early

school success at the time they began kindergarten with their performance at the end of first grade.[16*]

To explore children's **cognitive knowledge and skills**, we examined their scores on assessments of language use and literacy (reading), mathematics, and knowledge of the social and physical world (general knowledge). The reading assessment examined basic skills such as letter and word recognition, vocabulary, and comprehension. The math assessment examined children's conceptual and procedural knowledge, as well as their problem-solving skills. The general knowledge assessment examined children's understanding of scientific facts and their ability to formulate, explore, and answer questions about the natural world. The assessments in the fall of kindergarten and spring of first grade were scored using the same scale, so that children's progress over time within each of the three domains could be measured.[17] However, scores cannot be compared across the reading, math, and general knowledge assessments.[18]

To assess children's **social skills**, we examined parents' and teachers' responses to a series of questions about children's self-control. If parents or teachers reported, on average, that a child "often" or "very often" (rather than "never" or "sometimes") exhibited behaviors indicating self-control, then we categorized the child as displaying self-control.[19]

Additionally, we looked at children's **engagement in school**. In order to assess school engagement, we examined whether teachers responded "usually" or "always" (rather than "never" or "seldom") to the question: "How often does this child work to the best of his/her ability?" Since this question was not asked at kindergarten entry, we compared teachers' responses when children were at the end of their kindergarten year to responses at the end of first grade.

Finally, as an indicator of children's **physical well-being**, we assessed whether or not children were overweight.[20]

*All differences reported in this Brief are statistically significant at the $p < .05$ level.

Appendix Table 1 summarizes the seven indicators.

Findings

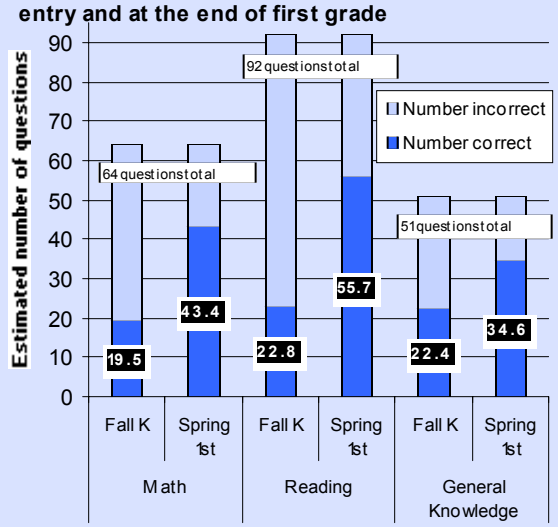
How Are Children Doing At The End of First Grade?

According to the indicators we examined, children's cognitive knowledge and skills increased substantially between kindergarten entry and the end of first grade. The majority of children were also faring well by the end of first grade on measures of social skills, school engagement, and physical well-being.[21]

Cognitive Knowledge and Skills

Children's math skills, reading skills, and general knowledge increased substantially between the time they started kindergarten and finished first grade (see Table 1). While the size of the increase varied for different subgroups of children, it occurred regardless of children's gender, race/ethnicity, native language, or socioeconomic status. On average, children answered 24 more math questions (out of a total of 64) correctly in the spring of first grade than they did in the fall of kindergarten, an additional 33 out of 92 reading questions, and an additional 13 out of 51 general knowledge questions (see Figure 1).[22]

Figure 1 **Average test scores on assessments of children's cognitive development at kindergarten entry and at the end of first grade**



Note: 95% confidence intervals range from +/- 0.3 to +/- 0.6 and are thus too small to be clearly depicted on this figure

Table 1

Average Test Scores on Assessments of Children's Cognitive Development at Kindergarten Entry and the End of First Grade, by Demographic and Socioeconomic Characteristics

Characteristics	Mathematics assessment		Reading assessment		General knowledge assessment	
	Fall K	Spring 1st	Fall K	Spring 1st	Fall K	Spring 1st
	Estimated mean score (out of 64 questions)	Estimated mean score (out of 64 questions)	Estimated mean score (out of 92 questions)	Estimated mean score (out of 92 questions)	Estimated mean score (out of 51 questions)	Estimated mean score (out of 51 questions)
All Children	19.5	43.4	22.8	55.7	22.4	34.6
Gender						
Boy	19.6	43.5	22.2	54.4	22.6	34.9
Girl	19.4	43.2	23.4	57.0	22.2	34.2
Race / ethnicity						
Non-Hispanic black	16.8	38.7	20.4	50.9	17.4	29.9
Hispanic	16.1	40.4	20.1	52.0	19.3	30.3
Non-Hispanic other race	19.4	42.3	22.5	55.0	20.3	32.9
Non-Hispanic white	21.2	45.5	24.0	57.9	24.5	37.0
Language spoken in home						
Non-English	15.6	39.9	20.6	51.4	17.5	28.2
English	20.2	44.0	23.1	56.5	22.9	35.5
Disability status						
Disabled	18.2	41.1	21.1	51.8	21.1	33.3
Not disabled	19.7	43.7	23.1	56.3	22.6	34.8
Socioeconomic status						
1st (lowest) quintile	14.7	37.4	17.7	47.0	16.8	28.5
2nd quintile	17.7	41.3	20.6	53.0	20.4	32.8
3rd quintile	19.3	43.6	22.1	56.0	22.0	34.8
4th quintile	20.9	45.5	24.1	58.4	24.0	36.8
5th (highest) quintile	24.3	48.4	27.8	62.6	27.1	39.1

Note: Change between the two time points is statistically significant for every subgroup of children ($p < .05$)

Social Skills

Roughly six or seven out of ten children also developed positive social skills by the end of first grade. The majority of children were rated by their teachers or parents as "often" or "very often" showing self-control (71 percent and 57 percent, respectively, for the teacher and parent ratings; see Table 2). Additionally, the percentage increased over time. The improvement was more substantial based on parent report (which increased by 10 percentage points) than on teacher report (which increased by 3 percentage points). The percentage of children who "often" or "very often" showed self-control, according to the parent rating, increased within each socioeconomic and demographic subgroup of children. According to the teacher rating, however, some subgroups did not show an increase. For example, the percentages of non-Hispanic black and Hispanic children rated by their teachers as "often" or "very often" exhibiting self-control did not change between kindergarten entry and the end of first grade.

School Engagement

Nearly nine out of ten children (87 percent) had teachers who rated them as "usually" or "always" working to the best of their ability by the end of first grade. Since the percentage of children who were engaged in school was already quite high at the end of kindergarten (89 percent), it is not surprising that this percentage changed very little by the end of first grade.

Physical Well-Being

In kindergarten and in first grade, slightly more than one in ten children were overweight. The prevalence of being overweight increased between kindergarten entry and the end of first grade (11 percent, compared with 13 percent). Even though only a minority of children were overweight, this prevalence is still a concern. Not only did the rate increase by two percentage points for the kindergarten class of 1998-99 as they progressed to first grade, but the prevalence of being overweight has been increasing gradually among young children since the mid-

Table 2

Percentage of Children Exhibiting School Engagement, Social Skills, and Overweight at Kindergarten Entry and in First Grade, by Demographic and Socioeconomic Characteristics

	Self-control, Parent rating		Self-control, Teacher rating		Works to best of ability, Teacher rating		Overweight, Direct assessment	
Characteristics	Fall K Percent	Spring 1st Percent	Fall K Percent	Spring 1st Percent	Spring K Percent	Spring 1st Percent	Fall K Percent	Spring 1st Percent
All Children	47.2%	56.9% *	67.5%	71.2% *	88.6%	86.7% *	11.4%	12.7% *
Gender								
Boy	44.4%	53.7% *	60.6%	64.8% *	84.4%	82.5% *	12.9%	13.4%
Girl	50.0%	60.2% *	74.7%	77.7% *	92.9%	91.0% *	9.8%	12.0% *
Race / ethnicity								
Non-Hispanic black	49.1%	56.7% *	56.5%	58.1%	80.3%	78.7%	11.5%	14.1% *
Hispanic	45.6%	52.3% *	66.1%	69.8%	86.9%	85.2% *	15.8%	17.6% *
Non-Hispanic other race	44.7%	55.0% *	67.4%	72.8%	90.6%	87.7% *	11.1%	13.0% *
Non-Hispanic white	47.4%	58.4% *	70.7%	74.6% *	91.0%	88.9% *	10.1%	11.0%
Language spoken in home								
Non-English	45.7%	50.6% *	66.8%	74.6% *	88.5%	88.3%	17.7%	19.5% *
English	47.4%	57.6% *	67.9%	71.4% *	89.0%	86.9% *	10.8%	12.1% *
Disability status								
Disabled	39.6%	50.9% *	60.5%	66.5% *	84.3%	82.8%	13.1%	14.4% *
Not disabled	48.5%	58.0% *	68.7%	72.0% *	89.3%	87.4% *	11.1%	12.5% *
Socioeconomic status								
1st (lowest) quintile	36.6%	43.8% *	55.9%	62.6% *	80.0%	77.2% *	13.6%	15.8% *
2nd quintile	42.7%	50.0% *	65.6%	68.3%	87.1%	83.6% *	14.2%	15.1% *
3rd quintile	48.6%	61.2% *	69.5%	71.6%	88.3%	88.5%	12.1%	14.5% *
4th quintile	51.5%	60.9% *	70.1%	73.6% *	91.4%	89.2% *	10.4%	11.0%
5th (highest) quintile	53.6%	64.6% *	74.3%	79.6% *	95.2%	93.5% *	8.0%	8.6%

* Change between the two time points is statistically significant ($p < .05$)

1970s. While the prevalence of being overweight varies among subgroups of children, patterns of change over time were similar regardless of children's socioeconomic or demographic characteristics, with the percentage of children who were overweight either increasing slightly or remaining unchanged.[23]

How Do Boys and Girls Differ?

At both kindergarten entry and the end of first grade, levels of well-being and early school success differed according to child gender for six of the seven indicators examined here, with girls, on average, faring better on five of the indicators and boys faring better on one indicator (the general knowledge assessment).

Cognitive Knowledge and Skills

At kindergarten entry, boys and girls performed similarly on the math assessment (see Table 1). However, on average, girls performed slightly better than boys did on the reading test, while boys performed slightly better than girls did on the general knowledge test. By the end of first grade, the advantage of girls over boys in reading skills and the advantage of boys over girls in general knowledge had increased slightly.

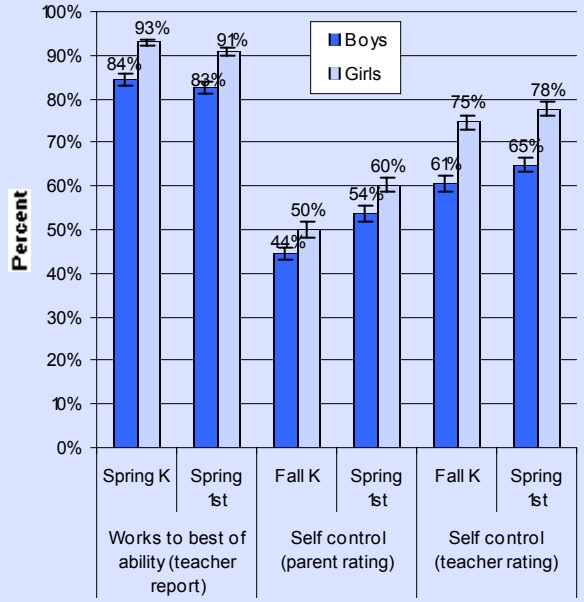
Social Skills

On the indicators of social skills, girls performed better than boys did. Parents and teachers rated girls more highly than boys on the measure of self-control at the end of first grade, a difference that parallels the more common positive ratings of girls, relative to boys, at kindergarten entry. Across subgroups, 54 percent and 65 percent (according to their parents and teachers, respectively) of boys "often" or "very often" showed self-control, compared with 60 percent and 78 percent of girls at the end of first grade (see Figure 2).

School Engagement

Additionally, girls were more likely to be engaged in school than boys. Specifically, about nine out of ten girls (91 percent) "usually" or "always" worked to the best of their ability at the end of first grade, according to their teachers, compared with slightly more than eight out of ten boys (83 percent). This gender difference parallels the gender difference apparent at the spring of kindergarten.

Figure 2 Percentage of children who were rated as exhibiting school engagement and positive social skills, by various indicators, at kindergarten entry and at the end of first grade, by child gender



Note: Cross-hatches above and below bars represent 95% confidence intervals.

Physical Well-Being

Finally, at the end of first grade, girls were slightly less likely than boys to be overweight (12 percent, compared with 13 percent). However, the likelihood for girls of being overweight increased slightly between kindergarten and first grade (from 10 percent to 12 percent, respectively), while it did not change for boys.

How Do Children Differ by Racial and Ethnic Status?

Non-Hispanic white children consistently fared better, on average, both in kindergarten and in first grade than did children of other racial/ethnic groups on the indicators of cognitive knowledge and skills, school engagement, physical well-being, and teacher-rated social skills. However, parents' ratings of children's social skills did not differ by children's race/ethnicity.

Cognitive Knowledge and Skills

At kindergarten entry and at the end of first grade, non-Hispanic black children and Hispanic children performed worse than non-Hispanic white children in all three areas of cognitive knowledge and skills that were assessed (see Table 1).

In math and reading, the gap between non-Hispanic white children and non-Hispanic black children widened slightly between the first and second years of school, although it remained stable for the assessment of general knowledge. By the end of first grade, the gap in performance between non-Hispanic black and non-Hispanic white children was sizeable, with non-Hispanic white children answering an average of seven more questions correctly than black children on each of the three assessments.

In contrast, the gap between non-Hispanic white children and Hispanic children narrowed slightly for the assessment of general knowledge, with non-Hispanic white children answering, on average, seven more questions correctly than Hispanic children in first grade. However, on the math and reading assessments, the differences remained constant, with non-Hispanic white children answering about five more questions correctly than Hispanic children.

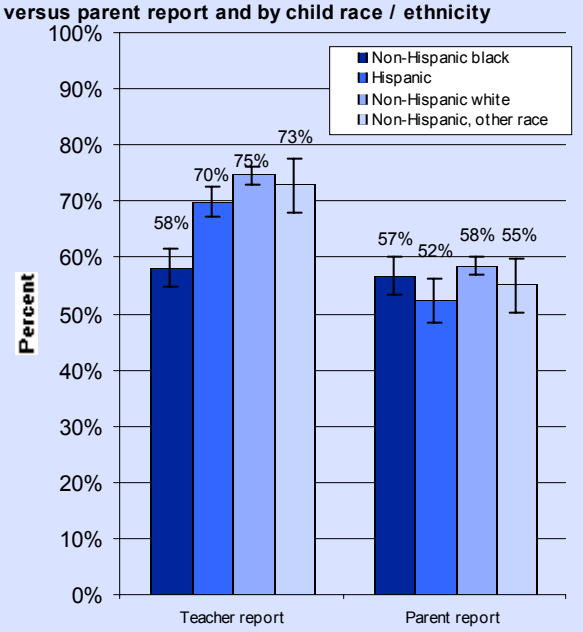
Comparing non-Hispanic black children and Hispanic children at the end of first grade, non-Hispanic black children had lower average math scores, but these two groups had similar scores on the reading and general knowledge assessments.

Social Skills

Non-Hispanic black children and Hispanic children were less likely to exhibit self-control "often" or "very often" at the end of first grade, according to their teachers, than non-Hispanic white children. Specifically, nearly six out of ten (58 percent) non-Hispanic black children and exactly seven out of ten Hispanic children were rated as "often" or "very often" exhibiting self-control, compared with more than seven out of ten (75 percent) non-Hispanic white children. The racial and ethnic differences are also apparent in teachers' ratings of children at the fall of kindergarten. Yet, the parent-reported indicator of self-control did not differ by children's race/ethnicity at either time, except that, at the end of first grade, Hispanic children were slightly less likely than non-Hispanic white children to have parents who said they "often"

or "very often" displayed self-control (52 percent, compared with 58 percent; see Figure 3). The difference in parent and teacher ratings might reflect cultural differences in perspectives, or it might occur because parents and teachers are rating children's behavior in different contexts (home versus school).[24] Further research would need to be conducted in order to elucidate the factors behind these differences.

Figure 3 Percentage of children who exhibited self-control "often" or "very often" at the end of first grade, by teacher versus parent report and by child race / ethnicity



Note: Cross-hatches above and below bars represent 95% confidence intervals.

School Engagement

Children in racial and ethnic minority groups were somewhat less likely to be engaged in school, according to their teachers. Specifically, according to teacher ratings, 79 percent of non-Hispanic black children and 85 percent of Hispanic children "usually" or "always" worked to the best of their ability at the end of first grade, compared with 89 percent of non-Hispanic white children. A similar pattern of differences is apparent at the spring of kindergarten.

Physical Well-Being

Children's physical well-being also differed by race/ethnicity at the end of first grade. Hispanic children were the most likely to be overweight at the end of first grade (18 percent, compared with 14 percent of non-Hispanic black children and 11 percent of non-Hispanic white children; see Figure 4). While the percentages of white and non-Hispanic black children did not differ at kindergarten entry, non-Hispanic black children had become more likely than white children to be overweight by the end of first grade.

How Do Children in English-speaking Homes Differ From those in Non-English Speaking Homes?

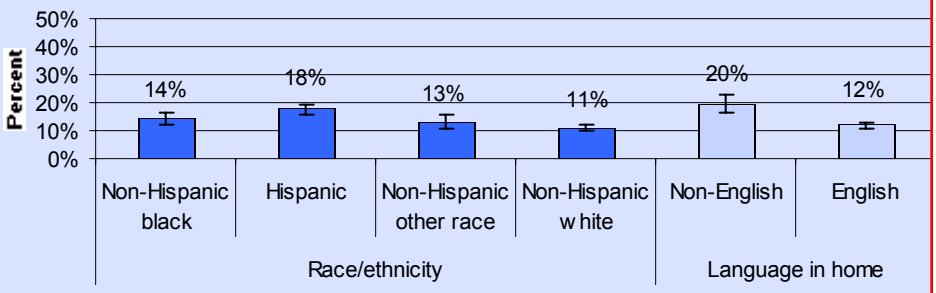
Cognitive Knowledge and Skills

Children living in homes in which English was not spoken scored lower, on average, on the math, reading, and general knowledge assessments. However, the gap in performance between children in English- and non-English-speaking homes had narrowed somewhat in all three areas by the end of first grade (see Table 1). (Some children who did not speak English, in particular, those who spoke neither English nor Spanish, did not participate in the cognitive assessments.)[25]

Social Skills and School Engagement

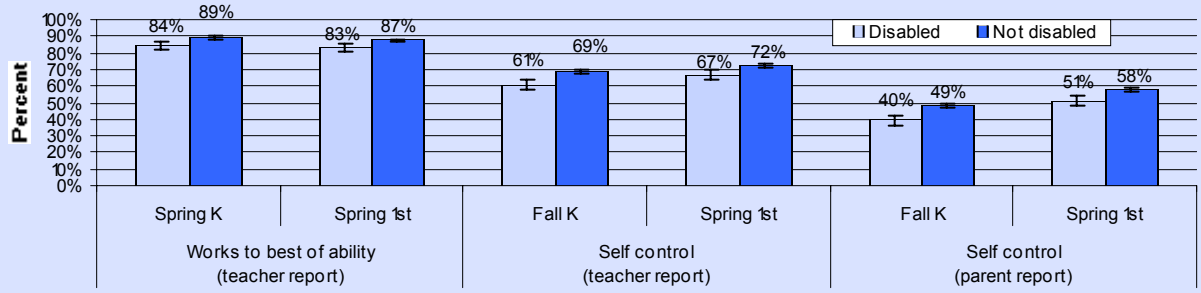
Teachers rated children similarly on measures of social skills and school engagement, regardless of whether English was spoken in the children's homes. However, by the end of first grade, only half (51 percent) of the chil-

Figure 4 Percentage of children who were overweight at the end of first grade, by child race/ethnicity and by language spoken at home



Note: Cross-hatches above and below bars represent 95% confidence intervals.

Figure 5 Percentage of children who were rated as exhibiting school engagement and positive social skills, by various indicators, at kindergarten entry and at the end of first grade, by child disability status



Note: Cross-hatches above and below bars represent 95% confidence intervals.

dren in non-English-speaking homes "often" or "very often" exhibited self-control, according to their parents, compared with 58 percent of children in English-speaking homes. (Bilingual Spanish-English interviewers were available for Spanish-speaking parents, and interviewers worked with interpreters to collect information from parents who spoke other languages.)

Physical Well-Being

At kindergarten entry, children in non-English-speaking homes were substantially more likely than other children to be overweight, and this difference persisted into first grade. As shown in Figure 4, about one in five children in non-English-speaking homes (20 percent) were overweight in the spring of first grade, compared with slightly more than one in ten children from English-speaking homes (12 percent).

How Do Children Differ According to Disability Status?

We also compared the well-being and development of children with and without a disability. In this study, we consider children to have a disability if their parents reported at the fall of kindergarten that a professional has diagnosed a problem with attention; learning, thinking, and solving problems; overall activity level; physical coordination; verbal communication; hearing; or vision; or if their parents reported that the children have previously received therapy or participated in programs for children with disabilities.

Cognitive Knowledge and Skills

At kindergarten entry, disabled children answered correctly one to two questions fewer than did children who were not disabled on the math, reading, and general knowledge assessments. (Up to five percent of disabled children in the sample did not participate in the cognitive assessments; these children probably have lower levels of cognitive knowledge and skills than other disabled children.) These small gaps in the cognitive skills and knowledge between disabled and other children persisted into the spring of first grade. The two groups made comparably sized gains on the general knowledge assessment between kindergarten entry and the spring of first grade, while gains on the math and reading assessments were slightly smaller for disabled children than for non-disabled children.

Social Skills

In the fall of kindergarten, disabled children were less likely, on average, than other children to exhibit self-control "often" or "very often", according to both teacher and parent reports (see Figure 5). Although the percentages of disabled children exhibiting such positive social skills increased by the spring of kindergarten, the percentages continued to be lower than for non-disabled children (67 percent versus 72 percent for the teacher report; 51 percent versus 58 percent for the parent report).

School Engagement

As shown in Figure 5, more than eight out of ten disabled children had teachers who rated them as "usually" or "always" working to the best of their ability, compared with nearly nine out of ten non-disabled children, both at the end of kindergarten and the end of first

grade (83 percent, compared with 87 percent in the spring of first grade).

Physical Well-Being

Disabled and non-disabled children did not differ in the percentages that were overweight, either at kindergarten entry or the spring of first grade.

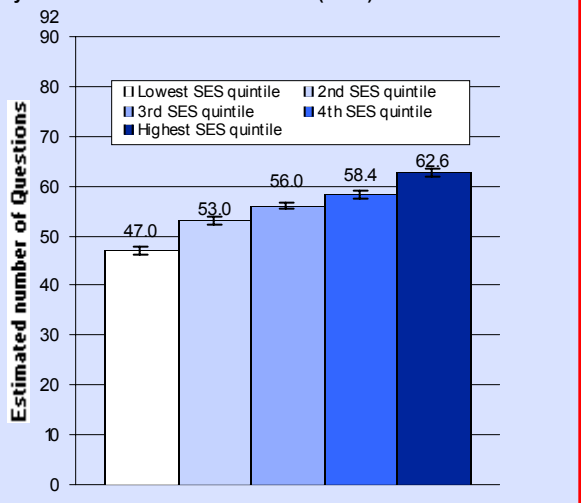
How Do Children Differ According to Socioeconomic Status?

To see how indicators of early school success and well-being might differ by children's socioeconomic status (SES), we compared outcomes for children according to their family's socioeconomic status ranking as of the beginning of kindergarten.[27] We found that low socioeconomic status was consistently linked with lower levels of cognitive achievement, social skills, and physical well-being on the measures examined here, both at kindergarten entry and at the end of first grade.

Cognitive Knowledge and Skills

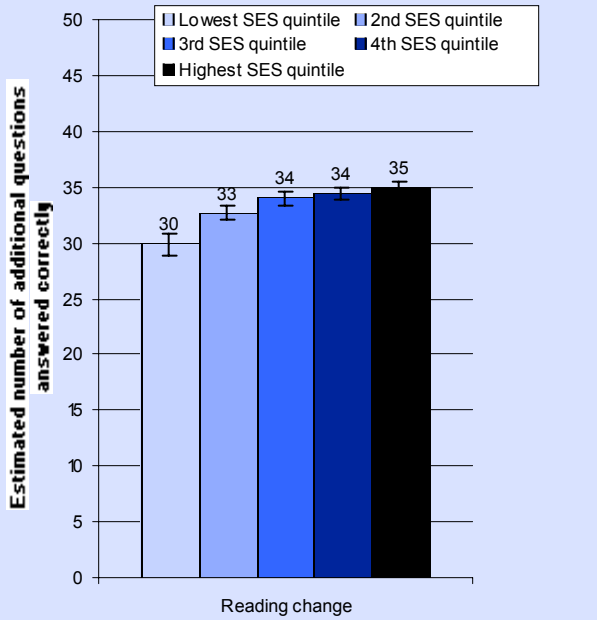
At kindergarten entry and at the end of first grade, children at higher levels of SES answered more math questions correctly than did children at lower SES levels, as Figure 6 illustrates. The same pattern was present for reading and general knowledge scores as well. While the reading, math, and general knowledge scores of children in all five SES groups that we examined increased during the first two years of school, the gap in achievement between lower- and higher-SES children widened slightly during that time (see Figure 7).

Figure 6 **Average scores (out of 92 total questions) on assessments of reading skills at the end of first grade, by child socioeconomic status (SES)**



Note: SES is based on parents' educational attainment, parents' occupations, and household income.Cross-hatches above and below bars represent 95% confidence intervals.

Figure 7 **Change in the number of questions answered correctly between kindergarten entry and the end of first grade on assessments of reading skills, by socioeconomic status (SES)**



Note: SES is based on parents' educational attainment, parents' occupations, and household income. Cross-hatches above and below bars represent 95% confidence intervals.

Social Skills and School Engagement

Looking at the indicators of social skills and school engagement, children at lower SES levels were consistently rated lower by their teachers and parents than were children at higher SES levels. For example, at the end of first grade, 77 percent of children in the lowest SES group had teachers who reported that they "usually" or "always" worked to the best of their ability, compared with 94 percent of children in the highest SES group. Similarly, 44 and 63 percent of children in the lowest SES group had parents and teachers, respectively, who reported that they "often" or "very often" exhibited self-control, compared with 65 and 80 percent of children in the highest SES group.

Physical Well-Being

Socioeconomic status is also related to the likelihood that a child was overweight. At

kindergarten entry, children in the lowest SES group were nearly twice as likely to be overweight as those in the top group (14 percent, compared with 8 percent). This gap increased slightly over time, with 16 percent of children in the lowest SES group overweight at the end of first grade, compared with 9 percent in the top SES group (see Figure 8).

Discussion and Conclusion

Analyses of newly available, nationally representative data show that by the end of first grade, most children fared well on indicators of school engagement, social skills, and physical well-being. According to the measures examined here, nearly nine out of ten children were engaged in school, more than one-half had developed positive social skills, and nearly nine out of ten were not overweight. Additionally, children demonstrated substantial advances on assessments of mathematics, reading, and general knowledge between kindergarten entry and the end of first grade.

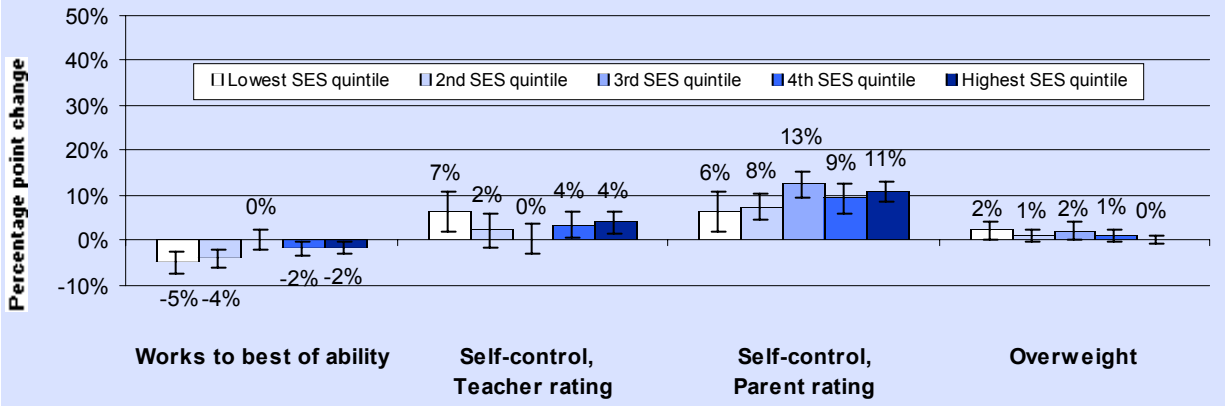
Of concern, however, is the fact that children's academic, social and physical well-being at the end of first grade tended to differ across socioeconomic and demographic subgroups as shown by multiple indicators. For example, non-Hispanic white children consistently fared better than other children on every indicator, as did children in higher socioeconomic status groups. Similarly, children in English-speaking homes fared better than other children (except on teacher-reported measures of school engagement and social skills). The differences across subgroups in cognitive, socioemotional, and physical well-being appear primarily to reflect where children started out when they entered school, rather than differing rates of change between kindergarten and first grade.

It is noteworthy that teachers are less likely to rate non-Hispanic black children and Hispanic children (compared with non-Hispanic white children) and lower SES children (compared with higher SES children) as "usually" or "always" working to the best of their ability. This findings may suggest that teachers do not (fully) attribute non-Hispanic black, Hispanic, and lower-SES children's lower math, reading, and general knowledge scores, and their poorer self-control, to an inherent lack of ability. Some research indicates that maintaining high standards for children and believing that children can meet high standards may be key ingredients in school success.[28]

Also of note is the *magnitude* of difference in children's reading, math, and general knowledge scores at the end of first grade, based on their socioeconomic and demographic characteristics. In order to gain insight into how combinations of child and family characteristics are related to well-being and development, we conducted an additional set of analyses. These additional analyses indicate

Figure 8

Percentage point change between kindergarten entry and the end of first grade on indicators of children's school engagement, social skills, and physical well-being, by socioeconomic status (SES)



Note: SES is based on parents' educational attainment, parents' occupations, and household income.
Cross-hatches above and below bars represent 95%confidence intervals.

that children's race/ethnicity, language, socioeconomic status, and gender alone accounted for nearly two-tenths of the variation in children's math and reading scores, and three-tenths of the variation in children's general knowledge scores.[29] Children's socioeconomic and demographic characteristics were less strongly associated with children's school engagement and social skills, accounting for less than one-tenth of the variation on these indicators.[30] Of the four child and family characteristics examined, socioeconomic status and language spoken in the home were the strongest predictors.[31]

This latter finding is in accord with analyses described in the report, *Inequality at the Starting Gate*, suggesting that, although non-Hispanic white children perform better on math and reading assessments, other characteristics that are associated with race and ethnicity may be driving these differences.[32] Racial and ethnic differences in math and reading achievement diminish once other factors are taken into account, namely: SES, child age, language spoken in the home, family structure, numbers of younger and older siblings, residential mobility and location, and neighborhood conditions. Of the explanatory factors that the authors of *Inequality at the Starting Gate* examined, they found SES differences to be the most important.

Note that the analyses presented here do not provide information about whether children's socioeconomic and demographic characteristics *cause* some children to fare better or worse than others. Children's lives differ in many other ways that might affect their early school success and well-being.

Ideally, children would enter kindergarten engaged in school, with good health, and with age-appropriate social development and cognitive skills. And, ideally, children would maintain their engagement in school and physical well-being throughout their early school years, while developing their social skills and advancing their cognitive achievement. In fact, this pattern of improvement in school is generally the pattern revealed by our analyses of ECLS-K data. Unfortunately, however, the differences in performance on these indicators among socioeconomic and demographic subgroups of children persist over time.[33] Furthermore, while a few gaps between subgroups of children narrowed (for example, differences in the mean math, reading, and general knowledge assessment scores between children in English- and non-English-speaking homes) a number of gaps widened. Notably, children in lower socioeconomic status families and non-Hispanic black children enter kindergarten with lower math and reading scores than other children, and their progress on math and reading between kindergarten entry and the end of first grade is less than for other children.

Previous research indicates that early school success can set the foundation for later educational success. In order to ensure an equal chance for success later in school and in life for children regardless of their different socioeconomic and demographic characteristics, it is important that schools, parents, and communities not only help all children learn, but also find ways to reduce the disparities among groups of children, including during the preschool years.

Some of the conditions of children's lives have not changed substantially in the past five years. For example, while the poverty rate for children under age seven has fluctuated somewhat, roughly one in five children in this age group were poor between 1998 and 2002.[34] However, the educational policies affecting them have certainly changed. The concerns that we have noted about disparities in children's academic performance based on socioeconomic and demographic characteristics are particularly salient now, at a time when new federal legislation concerning children's achievement in school is being implemented. The group of children that we have described, the kindergarten class of 1998-99, had reached the middle of the third grade when the No Child Left Behind Act of 2001[35] was enacted. Policymakers designed this new law in an effort to reduce gaps in academic

achievement between groups of students according to their race/ethnicity, economic circumstances, English skills, and disabilities.

While the newly established federal law is targeted at elementary and secondary school students, policymakers are also currently debating policies that might address the problem of gaps in school readiness *before* children enter school. For example, the "Good Start, Grow Smart" initiative outlined by the Bush Administration proposes 1) assessments of the skills of Head Start students and additional training for Head Start teachers, 2) development of "quality criteria," to be defined by states, for early childhood education programs, and 3) public awareness campaigns to inform parents and teachers about effective strategies to promote children's readiness for school.[36] Furthermore, many states have recently enacted their own, statewide early childhood initiatives.

As the kindergarten class of 1998-99 and subsequent classes of young children progress through their elementary and secondary years, continuing to track how children's socioeconomic and demographic characteristics are related to their well-being and success in school will be important.[37] While such data cannot inform us about the impact of state or national education policies such as the No Child Left Behind Act, they can provide clues about whether some groups of children continue to fare worse than others, or whether gaps in achievement are beginning to close.

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Appendix Table 1. Indicators of child well-being and early school success.

Indicator	Definition	When assessed
Mathematics assessment	Estimated mean number of math questions answered correctly, out of 64 total questions.	Fall of kindergarten, Spring of 1st grade
Reading assessment	Estimated mean number of reading questions answered correctly, out of 92 total questions.	Fall of kindergarten, Spring of 1st grade
General knowledge assessment	Estimated mean number of general knowledge questions answered correctly, out of 51 total questions.	Fall of kindergarten, Spring of 1st grade
Works to best of ability (teacher rating)	Percentage of children whose teachers responded "usually" or "always" (rather than "never" or "seldom") to the question: "How often does this child work to the best of his/her ability?"	Spring of kindergarten, Spring of 1st grade
Self-control (teacher rating)	Percentage of children whose teachers reported, on average, that a child "often" or "very often" (rather than "never" or "sometimes") exhibited behaviors indicating self-control.	Fall of kindergarten, Spring of 1st grade
Self-control (parent rating)	Percentage of children whose parents reported, on average, that a child "often" or "very often" (rather than "never" or "sometimes") exhibited behaviors indicating self-control.	Fall of kindergarten, Spring of 1st grade
Overweight	Percentage of children whose body mass index (BMI) exceeded the threshold for overweight according to Centers for Disease Control guidelines.	Fall of kindergarten, Spring of 1st grade

Data Sources for Figures and Tables

Data for all figures and tables are from Child Trends analyses of data from the Early Childhood Longitudinal Study: Kindergarten Class of 1998-99.

Endnotes

[1]No Child Left Behind Act, 42 USC § 6301(2001). Available online at http://www.ed.gov/policy/elsec/leg/esea02/107-110.pdf.

[2]Data on state assessments of children's reading and math skills, as well as reading and math assessment data from the National Assessment of Educational Progress (NAEP), are available at www.schoolresults.org. Additional NAEP data are available at http://nces.ed.gov/nationsreportcard/.

[3]Zill, N. and West, J. (2001). *Entering kindergarten: Findings from the Condition of Education 2000* (NCES 2001-035). Washington, DC: US Department of Education, Office of Educational Research and Development.

[4]The NEGP was a group of governors, Congresspersons, state legislators, and federal administration officials convened with the task of monitoring progress toward national educational goals set in 1990 by the U.S. President and all the governors. The NEGP has since been dissolved by a Congressional mandate, but a Web site with further information about NEGP continues to be available at http://www.negp.gov/.

[5]Kagan, S.L., Moore, E., and Bredekamp, S. (1995). *Reconsidering children's early development and learning: Toward common views and vocabulary*. Washington, DC: National Education Goals Panel Goal 1 Technical Planning Group.

[6]Hair, E. C., Halle, T., Terry-Humen, E., and Calkins, J. (2003, April). Naturally occurring patterns of school readiness: How the multiple dimensions of school readiness fit together. Paper presented at the 2003 Biennial Meeting for the Society for Research in Child Development; Tampa, FL.

[7]Ibid.

[8]Kurdek, L.A., and Sinclair, R.J. (2000). Psychological, family, and peer predictors of academic outcomes in first through fifth-grade children. *Journal of Educational Psychology*, 92(3): 449-457.

[9]La Paro, K.M., and Pianta, R.C. (2000). Predicting children's competence in the early school years: A meta-analytic review. *Review of Educational Research*, 70(4): 443-484.

[10]Reynolds, A.J., and Bezruczko, N. (1993). School adjustment of children at risk through fourth grade. *Merrill-Palmer Quarterly*, 39(4): 457-480.

[11]Zill, N. and West, J, 2001.

[12]West, J., Denton, K., and Germino-Hausken, E. (2000). America's kindergartners. *Working Paper No. 2000-070*. Washington, DC: National Center for Education Statistics. It is important to note that not every risk factor examined was significantly associated with every indicator of children's school readiness that the authors examined. In particular, no indicators of children's approaches to learning differed according to language spoken in the home.

[13]Denton, K., and West, J. (2002). Children's reading and mathematics achievement in kindergarten and first grade. *Working Paper No. 2002-125*. Washington, DC: National Center for Education Statistics.

[14]National Academy of Sciences (NAS). (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.

[15]Analyses are based on a sample of 13,397 children with data at both time points. All differences reported in this brief are statistically significant at the $p < .05$ level. In addition to using t-tests to determine whether test scores and percentages on each indicator changed significantly between kindergarten and the first grade, we also used t-tests to determine whether statistically significant differences existed between demographic subgroups at each time point. Furthermore, we used difference-of-difference t-tests to determine whether differences between demographic subgroups increased or decreased between the two time points. All data are weighted in order to generate population estimates. Due to the survey's complex sampling methodology, we used the statistical software package WesVar to analyze the data. Detailed tables showing standard error and t-test results are available from the authors, as is further information about the methodology used, such as specific weights.

[16]While we include only children who were first-time kindergartners in 1998-99, our sample does include some children who repeated kindergarten in 1999-2000. The analyses summarized in this brief, except where noted, are descriptive and do not control for confounding factors that might be related to children's cognitive, social, and physical development. We used t-tests to test the following types of differences: 1) differences between kindergarten and first grade in the percentage of all children and the percentage within each socioeconomic and demographic subgroup who were reported to work to the best of their ability, exhibit self-control, and who were overweight, 2) differences between kindergarten and first grade in the mean math, reading, and general knowledge assessment scores, 3) differences at each time point between each socioeconomic and demographic subgroup in the percentage of children who were reported to work to the best of their ability, exhibit self-control, and who were overweight, 4) differences at each time point between each socioeconomic and demographic subgroup in the mean math, reading, and general knowledge assessment scores, 5) differences between socioeconomic and demographic subgroups in the difference between kindergarten versus the first grade in the percentages of children who were reported to work to the best of their ability, exhibit self-control, and who were overweight (i.e., these tests and those described in the following sentence enable us to report whether "gaps" between socioeconomic and demographic subgroups widened or narrowed between kindergarten and first grade), 6) differences between socioeconomic and demographic subgroups in the differences for kindergarten versus the first grade on the mean math, reading, and general knowledge assessment scores.

[17]Item response theory (IRT) was used to derive the scores that children would have achieved, had they answered all possible questions on the test and to compensate for the possibility of low-ability students guessing the correct responses to test questions. For more information about these and other indicators described in this brief, see: U.S. Department of Education, Office of Educational Research and Improvement. (2002). *User's manual for the ECLS-K first grade public-use data files and electronic codebook* (NCES 2002-135). Washington, DC: National Center for Education Statistics; Rock, D.A., and Pollack, J.M. (2002, August). Early Childhood Longitudinal Study - Kindergarten Class of 1998-99 (ECLS-K), Psychometric report for kindergarten through first grade. *Working Paper No. 2002-05*. Washington, DC: National Center for Education Statistics.

[18]Score units are not equivalent across the three domains. Therefore, differences in scores between subgroups, or differences in scores between kindergarten entry and the spring of first grade, cannot be compared across domains. For instance, an increase of 1 in the mean assessment score for reading between the two time points is not equivalent to an increase of 1 in the mean score for math or to an increase of 1 in the general knowledge score.

[19]The self-control scale is part of the Social Rating Scale (SRS). Only children's summary scores were available to us; individual scale questions are not available due to copyright restrictions. The SRS was adapted from "Elementary Scale A ('How Often?')" originally developed by F.M. Gresham and S.N. Elliott. For more details on this measure, see: U.S. Department of Education, Office of Educational Research and Improvement. (2002.) *User's manual for the ECLS-K first grade public-use data files and electronic codebook* (NCES 2002-135). Washington, DC: National Center for Education Statistics; Rock, D.A., and Pollack, J.M. (2002, August). Early Childhood Longitudinal Study - Kindergarten Class of 1998-99 (ECLS-K), Psychometric report for kindergarten through first grade. *Working Paper No. 2002-05*. Washington, DC: National Center for Education Statistics.

[20]To identify whether children were overweight, we used direct assessments of their height and weight to calculate their body mass index (BMI). We then used the 2000 growth charts provided by the Centers for Disease Control and Prevention to see if each child's BMI exceeded the threshold for overweight. For more information about using BMI to calculate overweight, see http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age.htm and http://www.cdc.gov/growthcharts/.

[21]That is, most children scored on the positive side of dichotomous indicators.

[22]The ECLS-K included five types of scores based on direct cognitive assessments. Each type of score has a different purpose. We selected the Item Response Theory (IRT) scores, which are appropriate for assessing longitudinal gain over time in the broad content areas of math, reading, and general knowledge, even when the tests administered at the two points in time are different. Using IRT scores also enables us to compare whether the overall gain in each content area is larger, smaller, or similar among different demographic subgroups of children. The IRT scale score is an estimate of the number of questions that a child would have answered correctly if he/she had answered all questions (i.e., 92 reading questions, 64 math questions, and 51 general knowledge questions), based on the pattern of questions he or she did answer of right and wrong answers. For assessing levels of children's proficiency in specific areas of reading (such as letter recognition or comprehension of words in text), math (such as number and shape, and ordinality and sequence), the ECLS-K provides proficiency scores, which we do not examine in this brief.

[23]Among children ages 6 to 11, the prevalence of being overweight has more than tripled from 4.0 percent to 15.3 percent between 1971-74 and 1999-2000. Fried, V.M., Prager, K., MacKay, A.P., & Xia, H. (2003.) *Health, United States, 2003*. Hyattsville, MD: National Center for Health Statistics.

[24]Kagan, Jerome. (1998). Biology and the child. In N. Eisenberg (Vol. ed.), W. Damon (Series ed.), *Handbook of child psychology, 5th Edition, Vol. 3: Social, emotional, and personality development* (pp.177-235). New York: John Wiley and Sons, Inc.

[25]None of the cognitive assessment findings should be considered rep-

resentative of the non-English-, non-Spanish-speaking population of children who began kindergarten in the 1998-99 school year. In all, 415 sampled children in the fall of kindergarten and 39 children in the spring of first grade were not assessed due to speaking a language other than English or Spanish. Data were obtained for 1,387, 795, and 796 non-English speaking children for the math, reading, and general knowledge assessments, respectively, in the fall of kindergarten, and for 1,512, 1,311, and 1,310 children in the spring of kindergarten.

[26]Eighty-eight sampled children did not participate in the cognitive assessments in the fall of kindergarten; 47 did not participate in cognitive assessments in the spring of first grade. The sample size of disabled children with data ranges from 1,738 to 1,797 for the two time points and the three assessment areas.

[27]Specifically, we separated children into quintiles (that is, we divided children into five equally-sized groups based on their rank among all children). The measure of socioeconomic status (SES) takes into account household income and the education and occupation of the father or male guardian as well as the education and occupation of the mother or female guardian. For more details on how this measure was created, see: U.S. Department of Education, Office of Educational Research and Improvement. (2002). *User's manual for the ECLS-K first grade public-use data files and electronic codebook*. NCES 2002-135. Washington, DC: National Center for Education Statistics.

[28]For example, see: Good, T.L., and Nichols, S.L. (2001.) Expectancy effects in the classroom: A special focus on first-grade classrooms. *Educational Psychologist*, (36)2: 113-126.

[29]In multiple regression models with child gender, race/ethnicity, language, and SES quintile as independent variables predicting the math, reading, and general knowledge scores, R2 values were .187, .152, and .315, respectively.

[30]In multiple regression models with child gender, race/ethnicity, language, and SES quintile as independent variables predicting children's scale scores for whether they work to the best of their ability, and scale scores assessing children's self-control separately based on teacher reports and on parent reports, R2 values were .075, .064, and .040 respectively. Using the coefficient of determination recommended by Nagelkerke, the R2 value in a logistic regression model predicting children's overweight status was .021 Nagelkerke, N.J.D. (1991). A note on the general definition of the coefficient of determination. *Biometrika*, 78: 691-92.

[31]It is important to note that racial and ethnic minority children tend to live in lower socioeconomic status families than do non-Hispanic white children. This is why, although the analyses presented here demonstrate that all four socioeconomic and demographic characteristics are independently associated with indicators of children's early school success and well-being, two of these factors - socioeconomic status and language spoken in the home - account for almost as much variation in children's assessment scores as do all four factors together. In multiple regression models with child language and SES quintile as independent variables predicting the math, reading, and general knowledge scores, R2 values were .159, .136, and .256. Adding independent variables to control for child gender and race/ethnicity increases the R2 value by .028, .016, and .059, respectively. In models predicting children's scale scores for whether they work to the best of their ability, scale scores assessing children's self-control separately based on teacher reports and on parent reports, and overweight status, SES and language account for about half as much variance as do all four socioeconomic and demographic factors together. Comparing models controlling for SES and language with models that control for SES, language, race/ethnicity, and gender, R2s were as follows: .035 versus .075 for models predicting whether children work to the best of their ability, .026 versus .064 for the teacher-reported measure of self-control, .033 versus .040 for the parent-reported measure of self-control, and (using the generalized coefficient of determination recommended for logistic regression models by Nagelkerke, 2001) .017 versus .021 for overweight status.

[32]Lee, Valerie E., and David T. Burkham. (2002). *Inequality at the starting gate: Social background differences in achievement as children begin school*. Washington, DC: Economic Policy Institute.

[33]Indeed, in multiple regression models predicting the change between kindergarten and first grade on children's test scores, the four socioeconomic and demographic characteristics accounted for very little of the variation in children's improvement, with R2s of .023, .037, and .013 for the math, reading, and general knowledge test scores, respectively. Furthermore, the four characteristics did not explain any of the variation in scale scores assessing whether children work to their best ability, or of scale scores for self-control based on teacher or parent reports, or of the change in children's percentile rank for BMI.

[34]Specifically, 21 percent of related children under age 7 were poor in 1998; this figure was 18 percent in 1999, 17 percent in 2000, 18 percent in 2001, and 19 percent in 2002.

[35]No Child Left Behind Act, 42 USC § 6301(2001). Available online at http://www.ed.gov/policy/elsec/leg/esea02/107-110.pdf.

[36]*Good start, grow smart: The Bush administration's early childhood initiative*. Retrieved August 18, 2004 from http://www.whitehouse.gov/infocus/earlychildhood/toc.html.

[37]Information from the ECLS-K will allow us to see how the relationship of children's socioeconomic and demographic characteristics with their well-being and success in school changes over time for the kindergarten class of 1998-99. However, to learn how children in subsequent kindergarten classes fare, it would be necessary to monitor multiple cohorts. The Early Childhood Longitudinal Study: Birth Cohort (ECLS-B) provides one such data source; many children in the ECLS-B will enter kindergarten in 2006 and 2007.