English Language Learners' Math and Reading Achievement Trajectories in the Elementary Grades: Full Technical Report

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Abstract

Using the ECLS-K database, I examine language minority students' math and reading learning trajectories between kindergarten and fifth grade taking into account differences in oral English proficiency, race/ethnicity, and socioeconomic status. There are five main findings. First, compared to native-English speaking students, children deemed as language minority in kindergarten show important educational disadvantages that remain significant through fifth grade. Second, achievement gaps decrease over time, particularly in math, even though achievement gaps remain at the end of fifth grade. Third, Hispanic language minority students, students who are not proficient in oral English at the beginning of kindergarten, and students from economically disadvantaged backgrounds have greater math and reading disadvantages than do Asian language minority students, English proficient and bilingual students, and those of higher socioeconomic status. Fourth, oral English proficiency at kindergarten entry predicts language minority student's math and reading achievement outcomes in subsequent years. Fifth, different trends in achievement gaps are observed for reading and math across language minority subgroups, suggesting that language background and oral English proficiency may differently impact children's content learning. Implications of these findings for teaching, research and policy are briefly explored in the discussion section.

Language Minority Students' Math and Reading Achievement in Early Childhood

In the United States, many ELL students lag behind native-English speaking students in their educational achievement. Compared to English-speaking students, ELL students have lower math and reading test scores, academic grades, and educational and occupational aspirations (Portes & Schauffler, 1996; Rumberger & Larson, 1998). According to National Assessment of Educational Progress, in 2005, 46 and 73 percent of ELL 4th grade students scored "below basic" in math and reading, respectively, compared to 11 and 25 percents for White students (Fry, 2007). In 2000, only 19 percent of ELL students met state norms for reading in English (Kindler, 2002). In California, where 40 percent of kindergarten and first grade students are ELL, English language learners have lower Stanford 9 reading test scores than do English-speaking students in all grades and only 4 percent of ELL 10th graders passed the English Language Arts exam in 2005 (Gándara, Rumberger, Maxwell-Jolly, & Callahan, 2003; Maxwell-Jolly, Gándara, & Méndez Benavides, 2007).

This chapter focuses on language minority students' achievement patterns and investigates the relationship between language skills at kindergarten entry, ethnicity, socio-economic status and achievement in elementary school. The early school years are crucial for children's later learning. As students acquire basic skills, they construct their identity as students (Farkas & Berton, 2004; Rouse, Brooks-Gunn, & McLanahan, 2005). Young students also learn to navigate the formal school setting and teachers begin to sort students through ability groups, special education classes, and grade retention (Alexander, Entwisle, & Bedinger, 1994; Entwisle & Alexander, 1993). The early school years may be even more important for English language learners given that these years coincide with the processes of English language acquisition, and with their initial exposure to formal English.

The main aim of this paper is to provide detailed *descriptive* analyses of the patterns of language minority students' achievement, rather than to explain the primary causes of these patterns. This study differs from and builds on previous research on language minority students' education in several ways. First, instead of analyzing language minority students as a homogenous group, the analyses disaggregate these students based on additional characteristics. Second, this study informs the literature on early childhood education. Third, by analyzing longitudinal data, this study goes beyond a static measure of achievement to examine achievement trajectories over time. The results of these analyses can inform research on educational interventions for language minority children prior to school entry.

Data and methods

Data

The data for this study come from the Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K), sponsored by the National Center for Education Statistics (National Center for Education Statistics, 2001). ECLS-K provides a nationally representative sample of approximately 21,000 kindergarteners. This chapter presents analyzes of reading and math assessments at six time points (fall 1998, spring 1999, fall 1999, spring 2000, spring 2002, and spring 2004) in order to describe patterns in cognitive development among language minority students from kindergarten through fifth grade.

Main Variables

Achievement measures. The ECLS-K math and reading assessment frameworks were based on national and state standards. The assessments measured skills typically taught in the relevant grades. These assessments were individually-administered, untimed, adaptive tests administered by trained ECLS-K assessors, and scored using IRT procedures. Details of the assessments are provided in ECLS-K psychometric reports (Pollack, Narajian, Rock, Atkins-Burnett, & Hausken, 2005; Pollack et al., 2005; Rock and Pollack, 2002).

This chapter employs t-scores (IRT scores standardized to mean of 50 and standard deviation of 10), to analyze children's performance relative to their peers. For example, a mean t-score of 30 in the fall of kindergarten reading test indicates that a particular group performed two standard deviations below the average reading achievement level at that time. Another important advantage of using standardized scores is that they allow for interpretation and comparability with other research (Reardon & Galindo, 2009). Most of this chapter focuses on achievement "gaps" which measure the difference in scores between each group of interest and a reference group in standard deviation units.

Language minority status. A student is classified as language minority if a language other than English is the primary language used at home. For most students, this information was available from their school records, or was gathered from teachers' reports. Language minority status classification at kindergarten is used to illuminate the relationship of skills at kindergarten entry to later school success.

Oral English proficiency at kindergarten entry. Language minority students were administered the English Oral Language Development Scale test (OLDS) to determine whether they had the minimum oral English skills to take cognitive assessments in English at each wave of data collection during kindergarten and first grade (Rock & Pollack, 2002). A language minority student was classified as proficient in oral English at the fall of kindergarten if she/he scored 37 points or higher on the OLDS at that time. OLDS scores range from 0-60 points.

Race/ethnicity. Based on parents' reports, students were classified as non-Hispanic White, non-Hispanic Black, Hispanic of any race, Asian, and other. The "other" category includes: Native Hawaiian and other Pacific islanders, American Indians and Alaska natives, and those reporting more than one non-Hispanic background.

Socioeconomic status (SES). A continuous measure of SES is employed that is based on students' mother's and father's educational attainment, mother's and father's occupation, and family income as reported by parents (National Center for Education Statistics, 2001). The continuous SES measure is divided into quintiles to describe achievement patterns over time. However, when included as an independent variable in regression analyses, the continuous SES measure is used.

Immigrant generational status. Based on students' and their parents' place of birth, students are identified as first generation, second generation, and third-plus generation. First generation students are non-U.S. born to non-U.S. born parents.[1] Second generation students are U.S. born to non-U.S. born parents. Third-plus generation students are U.S. born students with U.S. born parents.[2]

Sample and Sample Selection

Results presented in this chapter are based on three different samples described in Table 1. The full ECLS-K sample is used to describe the language minority student population in the

[1] Students born in Puerto Rico were classified as first generation immigrants. In spite of being U.S. citizens, Puerto Ricans are commonly studied as immigrants because they often face similar adaptation difficulties/experiences as other Hispanic immigrants (Oropesa & Landale, 2000)

[2] For students with missing information, the following decisions were made: If students' place of birth was missing and parents were foreign-born living in the U.S *less* than 6 years, the students were defined as first generation. If students' place of birth was missing and parents were foreign-born living in the U.S for *more* than 6 years, these students were defined as second generation. If students' country of birth was missing and parents were U.S. born, these students were defined as third-plus generation.

Kindergarten Class of 98-99 (n= 21,260 students). Two analytical samples are used (reading and math) to model students' learning trajectories and achievement gaps between kindergarten and fifth grade. Math learning achievement gap analyses are based on information from 11,792 students and reading achievement gap analyses are based on 11,787 students. After each additional year of data collection, students' scores had to be re-estimated including the most recent items so test scores can be compared across waves. Re-estimation procedures are based on the sample of students from the most recent wave of data collection. In this case, re-estimated scores are based on the fifth grade sample which is significantly smaller (n=11, 820) than the full ECLS-K kindergarten sample (n=21,260).[3] Thus, the reading and math analytical samples include students who were part of the fifth grade sample with at least one reading or math test score, respectively.[4]

Table 1 about here

In general, students' characteristics vary little across samples, but there is a smaller proportion of Black students and slightly higher proportion of language minority students in the analytical samples than in the full ECLS-K kindergarten sample. Fewer test scores are available in earlier waves than in later waves, especially in the reading sample. During each of the four first waves of data collection (fall and spring of kindergarten and first grade), students from non-English

[3] For a detailed explanation of the scoring and re-estimation procedures, see Pollack, Narajian, Rock, Atkins-Burnett, and Hausken (2005).

[4] Similar analyses of achievement gaps over time were conducted only with students with valid reading scores in the fall of kindergarten and therefore excluding students who became English proficient after the fall of kindergarten. Overall math trends do not change substantially based on the sample analyzed but reading trends do. When analyzing reading achievement for students with valid reading test scores in the fall of kindergarten we are analyzing only those language minority students that are proficient in English. These models can be provided upon request by the author.

speaking homes, or language minority students, answered the OLDS to determine whether they had enough English skills to answer the cognitive tests in English. Language minority students who were not English proficient were not able to take the reading test. Thus, during each of the four first waves, only students proficient in oral English were assessed in reading, which resulted in fewer test scores in earlier waves of data collection and a higher concentration of English proficient students in early waves than in later waves. By third grade, all language minority students were deemed oral English proficient.[5]

The estimated reading achievement gaps for Asian and Hispanic language minority students at fall of kindergarten are based on only those Asian and Hispanic students who were proficient in oral English. Achievement gap analyses of later reading achievement include students who were and were not English proficient at kindergarten entry. However, this is not the case for math. Language minority students who were not proficient in oral English took the math test in Spanish. Readers need to take into account this information when revising patterns of achievement; particularly when analyzing reading achievement trends over time for Asian and Hispanic language minority students.[6] Also, it is important to notice that the much smaller number of test scores in the fall of first grade, which is a consequence of the NCES decision to intentionally reduce the sample size to 30 percent of the original kindergarten sample in this wave.

Methods

[5] The percent of language minority students that passed the OLDS increased significantly between kindergarten and first grade. In the fall of kindergarten, about 51 percent of language minority students did not pass the OLDS, but by spring of first grade, only 12 percent of the students that took the OLDS did not pass.

[6] Asian students did not have math tests if they were not proficient in oral English. Note, the proportion of Asian students that were proficient in oral English at the fall of kindergarten is relatively high (62 percent, see Table 2).

Following Reardon and Galindo (2006; 2009), achievement gaps are in standard deviation units, derived by dividing students' true scores by the pooled standard deviation at each wave.[7] A score of 0 corresponds to the average score for the reference group (e.g., native-English speaking students). The average achievement gap score for any given group can be interpreted as the difference between that group and the reference group, expressed in terms of pooled standard deviation units. See Reardon and Galindo (2006; 2009) for further details on the estimation of the standardized gaps.

Descriptive statistics for the main variables were computed using Stata 10 survey commands, which take into account the complex sample design of the ECLS-K data by specifying stratification levels, sampling units, and sampling weights. The ECLS-K study followed a stratified and clustered sample design rather than a simple random sample design (National Center Educational Statistics, 2001).[8] Before conducting the descriptive analyses, I specified the stratum (*"c1tcwstr")* and primary sample unit (*"s1_id")* identifiers, as well as the weight variable (*"c1cw0"*) to adjust for sample weighting. Regression analyses also were conducted with Stata 10, using regular OLS regression clustered by school and weighted by cross-sectional weight provided by ECLS-K.

Results

Language Minority Students in the Kindergarten Class of 98-99

[7] Pooled standard deviations tell us how big or small the achievement gaps are relative to the average standard deviation of all groups (i.e. Language minority and native-English speaking students) rather than relative to the overall standard deviation for the entire sample.
[8] For a detailed description of the ECLS-K sample design review National Center for Education Statistics, 2001.

Table 2 presents some important characteristics of the language minority population in kindergarten. This information is based on the full ECLS-K kindergarten sample of students (n= 21,260 students). About 14 percent of students in the kindergarten class of 98-99 were identified by their teachers/schools as language minority and about half of these students (52.30 percent) were not proficient in oral English in the fall of kindergarten.

There are important differences between language minority students and native-English speaking students. On average, language minority students are more likely to be in a racial/ethnic minority group, to have immigrant families, and to live in poverty. Only 7 percent of language minority students are non-Hispanic Whites compared to 64 percent of native-English speaking students. Also, 32 percent of language minority students are in the lowest socioeconomic quintile, and only 6 percent belong to the highest quintile. These results corroborate studies showing that language minority students, not only have to overcome their language barriers, they also face important economic and cultural barriers due to poverty and immigrant status.

<u>Insert Table 2 about here</u>

Table 2 also provides information about the two most predominant language minority groups: Hispanics and Asians. Overall, at least half of Hispanic and Asian students are defined as language minority, which is not surprising given the large number of these students with foreign-born parents. A higher percentage of Asian students (60 percent) are classified as language minority compared to Hispanic students (51 percent). However, Asian students are more likely than Hispanic children to be proficient in oral English at the beginning of kindergarten (62 percent vs. 41 percent).

There is important variability in SES levels between Asian and Hispanic language minority students. More than half of Hispanic language minority students belong to the lowest SES quintile, but only 11 percent belong to the two highest SES quintiles. In contrast, 27 percent of Asian language minority students belong to the highest SES quintiles while 22 percent belongs to the lowest SES quintile, suggesting two distinct populations of Asian language minority students.

In terms of generational status, students from both racial/ethnic groups are equally likely to be second generation children (i.e., U.S.-born children to non-U.S.-born parents). Asian students are more likely to be first generation (i.e., non-U.S.-born children to non-U.S.-born parents) than are Hispanic students.[9] Thus, the economic and English proficiency differences observed between Asian and Hispanic language minority students may have important consequences for these students' math and reading cognitive trends over time.

Achievement Gap Trends from Kindergarten to Fifth Grade

Trends in math and reading achievement gaps between language minority students and others from kindergarten through fifth grade are described using a series of graphs. Figures 1A and 1B depict the trends in the achievement gaps for language minority children overall and separately for those who were and were not proficient in English at kindergarten entry. Figures 2A and 2B depict the trends in gaps for language minority children by SES quintile. Figures 3A and 3B depict these trends disaggregated by ethnicity and proficiency at kindergarten entry;

[9] Given the high correlation between language minority status and immigrant generational status and the sample size restrictions, I did not include generational status in the analyses of math and reading achievement trends.

showing achievement gaps for Asian and Hispanic students and for a sub sample of these students who were proficient in oral English at the beginning of kindergarten (i.e., students with valid reading scores at fall of kindergarten). In the first two sets of figures the gap is measured relative to all native English speakers. In Figures 3A and 3B the gap is measured relative to white non-Hispanic, native English Speakers. In each figure a dashed line at "0" on the vertical axis represents the reference group. As an additional reference, Table 3 presents estimated gaps (unadjusted and controlling for SES) for math and reading at each grade level for language minority students by kindergarten oral English proficiency (yes or no) and for the subgroup who had Reading scores at wave 1 (fall of kindergarten). Because of the sample issues described in the data and methods section, most of the analyses of reading achievement gaps focus on the time period between spring of first grade and spring of fifth grade.

Achievement Gap Trends by Oral English Proficiency

As Figure 1A indicates, compared to native-English speaking students, language minority students begin kindergarten with math scores that are about three-fourths of a standard deviation lower. By spring of fifth grade their scores remain about one-fourth of a standard deviation lower. The math achievement gap at the beginning of kindergarten is one standard deviation for students who are not proficient in English, but only one-third of a standard deviation for students who are proficient in oral English. By spring of fifth grade, the math achievement gap is reduced by more than half for the first group and is entirely eliminated for English proficient students so that by fifth grade only non-English proficient language minority have lower math achievement than do native-English speaking students. Nevertheless, as noted in Reardon and Galindo (2006), steeper gap decreases are observed for non-English proficient students than for English proficient students in math achievement over time.

Figure 1B shows that in reading, language minority students' scores are roughly one-third of a standard deviation lower than those of native English speaking students at fall of kindergarten and by spring of fifth grade the achievement gap remains about two-fifths of a standard deviation. Note that the achievement gap at the beginning of kindergarten denotes differences only between English proficient language minority and native-English speaking students. This estimate likely under represents the "true" initial reading achievement gap given that it does not apply to language minority students who are not proficient in English. Figure 1B also indicates that students who begin kindergarten proficient in oral English have better reading scores than students who are non-proficient. The reading achievement gap between native-English speaking and English proficient language minority students is eliminated by spring of fifth grade. For non-English proficient language minority students, the reading gap slightly narrows between spring of first grade and spring of fifth grade, yet it remain large (about three-fourths of a standard deviation). By the spring of fifth grade, reading gaps are larger than math gaps. It appears that language minority students who have limited English proficiency at kindergarten entry have much more difficulty making progress in reading than in math.

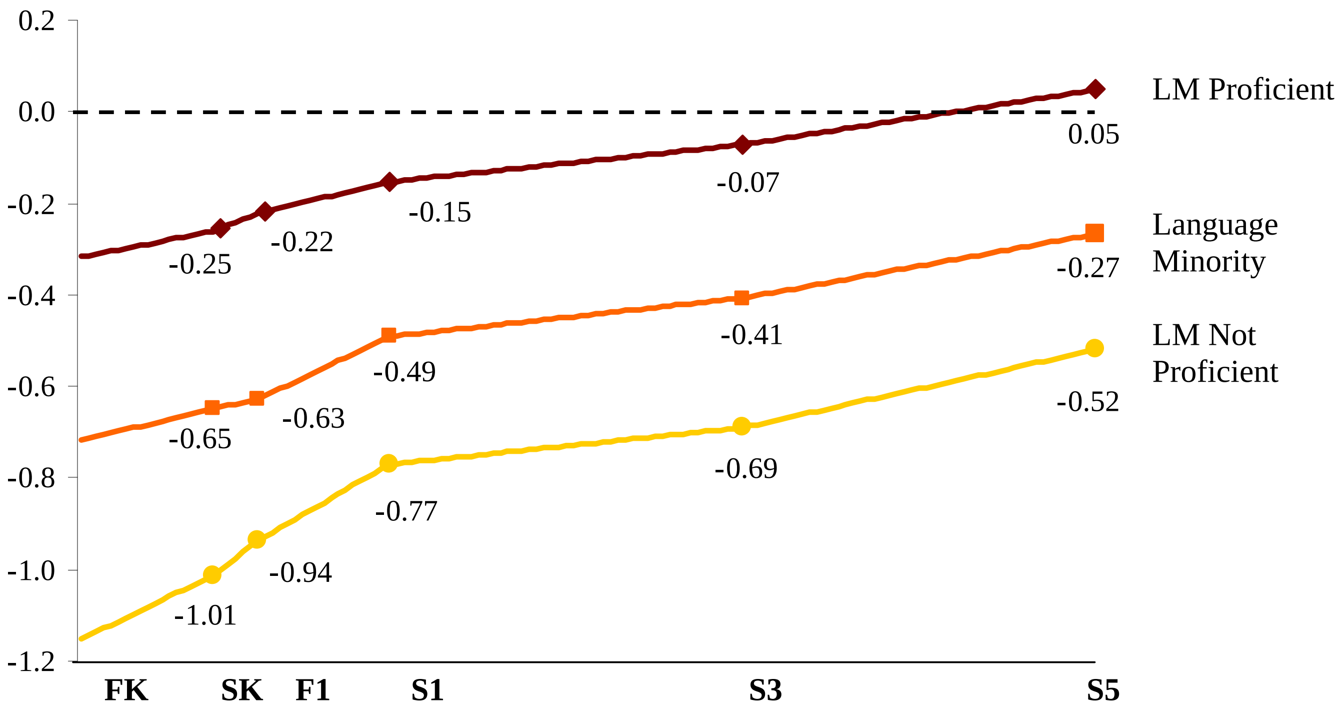
<u>Insert Table 3 about here</u>

Given the concentration of economic disadvantages among language minority students, it is also useful to examine trends in adjusted math and reading gaps after controlling for students socioeconomic status.[10] Overall, the trends are similar to those for the unadjusted gaps (see Table 3). However, math and reading achievement gaps are smaller by about half, at least in the

[10] In these models, I use the continuous kindergarten SES measure created by NCES.

first two years of schooling. Part, but not all language minority students' educational disadvantages are due to their economic circumstances and parental education and occupation.

Figure 1A: Trends in Math Achievement Gaps for Language Minority Students by Oral English Proficiency at Entry

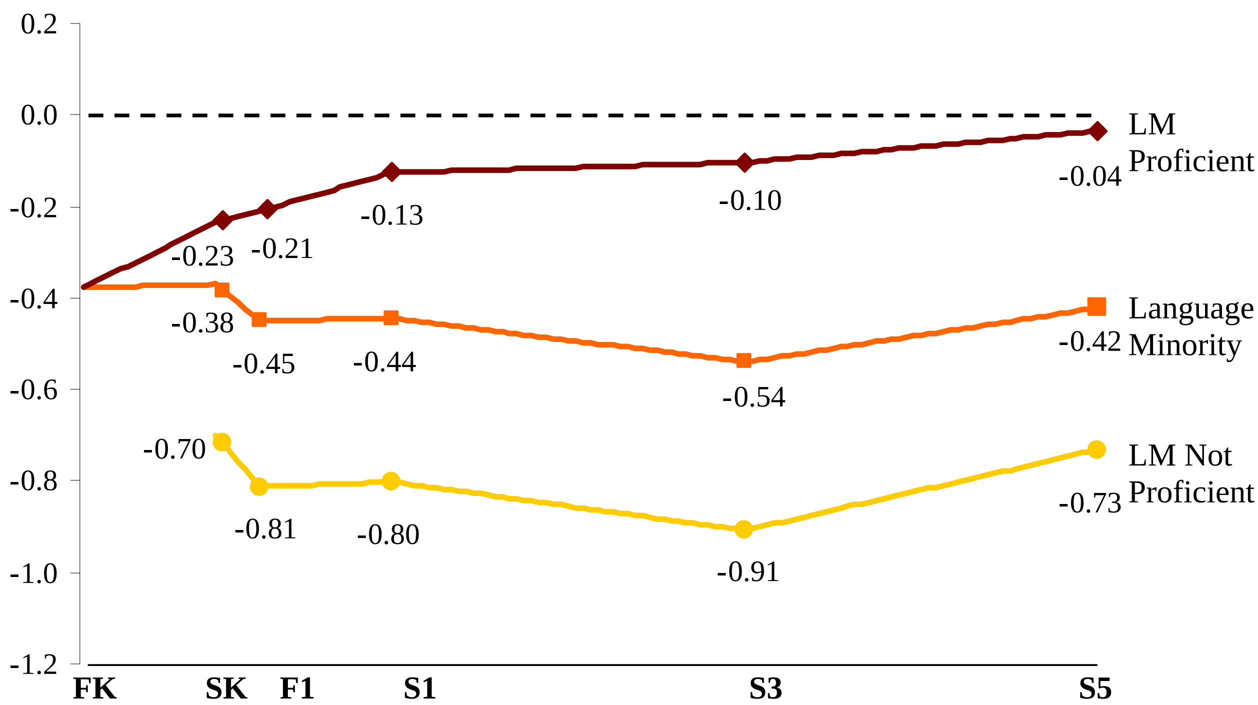


# of cases by group and time point

	FK	SK	F1	S1	S3	S5
LM: proficient at fall K	927	962	256	934	926	918
LM: not proficient at fall K	658	840	287	962	975	975
Language minority	1,585	1,802	543	1,896	1,903	1,895

Note: Native-English speaking students are the reference group, represented by the value of "0" on the "Y" axes. Gaps measured in pooled standard deviation units.

Figure 1B: Trends in Reading Achievement Gaps for Language Minority Students by Oral English Proficiency



# of cases by group and time point

	FK	SK	F1	S1	S3	S5
LM: proficient at fall K	924	958	256	932	923	917
LM: not proficient at fall K	0	368	156	734	970	973
Language minority	924	1,326	412	1,666	1,895	1,892

Note: Native-English speaking students are the reference group, represented by the value of "0" on the "Y" axes. Gaps measured in pooled standard deviation units.

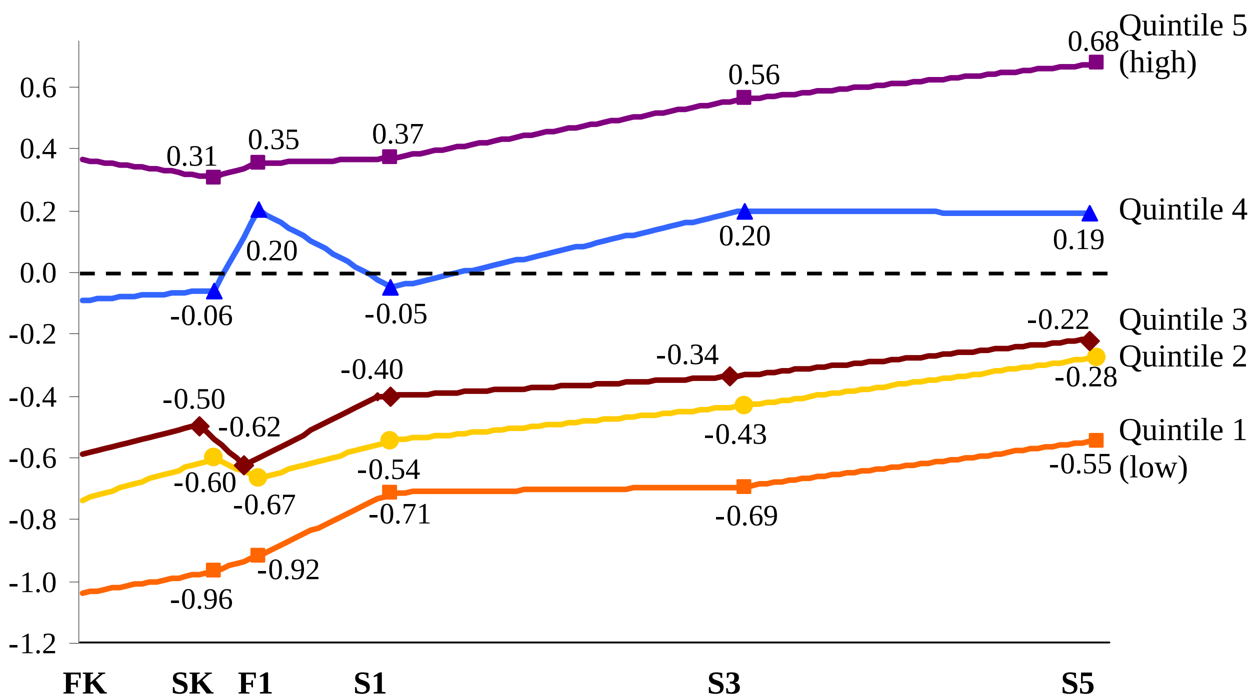
Achievement Gap Trends by Socioeconomic Status

Figures 2A and 2B depict achievement differences between the average language minority student in a given SES quintile and the average native-English speaking student regardless of her/his socioeconomic status. Language minority students' achievement gaps decrease as SES rises. Achievement gaps are large for language minority students in the lowest SES quintiles, but students in the fourth quintile show relatively similar achievement levels to and students in the highest quintile have better achievement than the comparison group of native-English speaking students. However, most language minority students are in the lowest socioeconomic quintiles, so the cognitive advantages observed among the students in the highest socioeconomic quintile are experienced only by a small number of language minority students.

Figure 2A reveals that language minority students in the lowest SES quintile begin kindergarten with a math score about one standard deviation below native-English speaking students. In contrast, language minority students in the highest SES quintile begin kindergarten with a math score one-third of a standard deviation above their native-English speaking counterparts. Math achievement gaps decrease by half between kindergarten and fifth grade for students in the lowest SES quintiles, falling from one standard deviations in fall of kindergarten to roughly one half of a standard deviation in the spring of fifth grade. The math advantage of language minority students in the highest SES quintile almost doubles by the end of fifth grade, rising to two-thirds of a standard deviation above native-English speaking students.

Figure 2B shows similar patterns for initial gaps in reading achievement, but decreases in reading gaps over time are minimal. Language minority students in the lowest SES quintile begin kindergarten with reading achievement scores two-fifths of a standard deviation below native-English speaking students. In contrast, students in the highest SES quintile begin kindergarten with reading scores almost two-thirds of a standard deviation above their native-English counterparts. Between first and fifth grades, the reading achievement gaps of language minority students remain relatively stable across the SES quintiles. For three of five quintiles, there is little or no progress toward closing the gap.

Figure 2A: Trends in Math Achievement Gaps by Socioeconomic Status

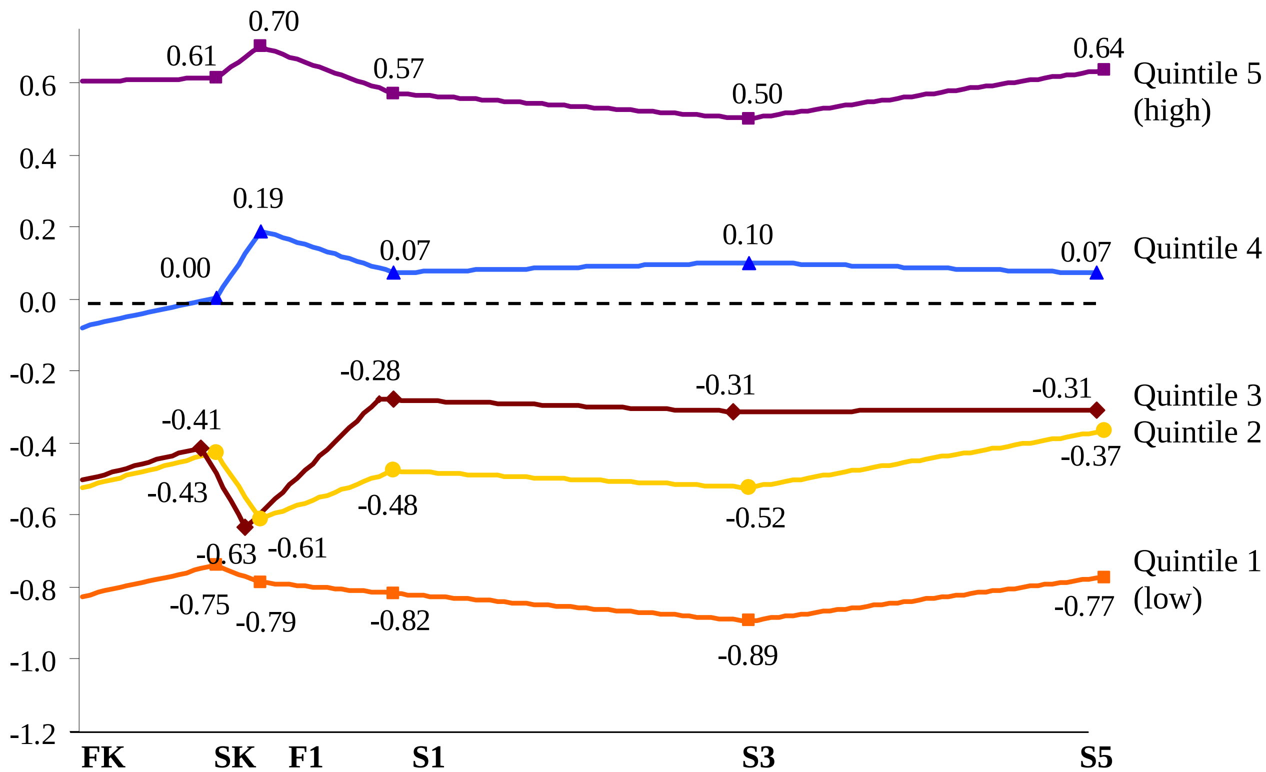


# of cases by group and time point

	FK	SK	F1	S1	S3	S5
LM, quintile 1 (low)	710	787	243	823	820	822
LM, quintile 2	284	330	99	342	334	335
LM, quintile 3	187	214	63	231	232	237
LM, quintile 4	176	201	57	207	205	201
LM, quintile 5 (high)	179	202	66	204	208	204

Note: Native-English speaking students are the reference group, represented by the value of "0" on the "Y" axes. Gaps measured in pooled standard deviation units.

Figure 2B: Trends in Reading Achievement Gaps by Socioeconomic Status



# of cases by group and time point

	FK	SK	F1	S1	S3	S5
LM, quintile 1 (low)	238	434	134	643	812	821
LM, quintile 2	182	261	82	310	335	335
LM, quintile 3	136	185	58	222	232	237
LM, quintile 4	159	194	57	205	205	201
LM, quintile 5 (high)	173	198	66	203	208	203

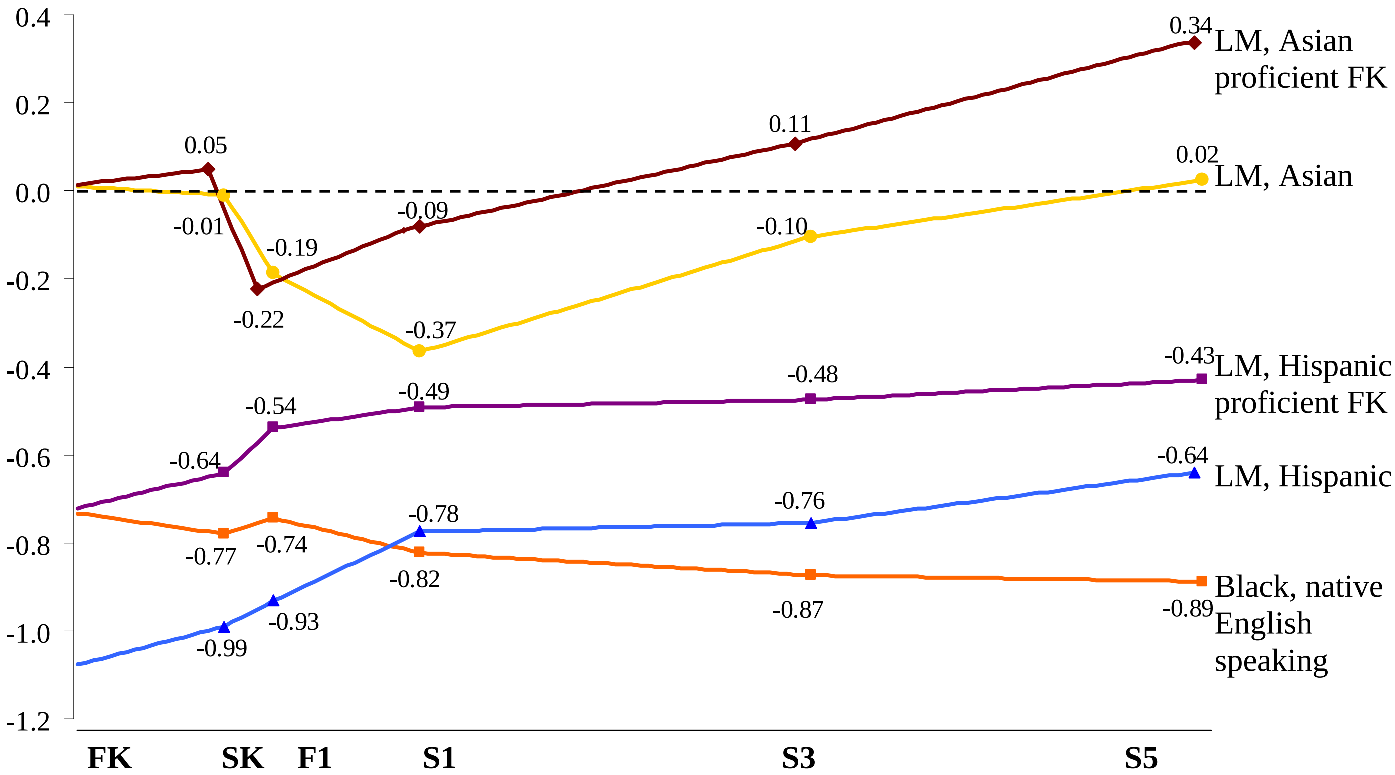
Note: Native-English speaking students are the reference group, represented by the value of "0" on the "Y" axes. Gaps measured in pooled standard deviation units.

Achievement Patterns by Race/Ethnicity

From Figure 3A it is clear that, in math, language minority Asian students significantly outperform language minority Hispanic students and native English speaking Black students. Nevertheless, substantial math achievement gaps compared to white native English speakers are evident by first grade, if not earlier, for both language minority groups. These gaps decline over time. By the end of fifth grade, language minority Asian students who were English proficient at kindergarten entry have surpassed white students by about one-third standard deviation and language minority Asian students generally have reached parity. For language minority Hispanic children the gap falls from over one standard deviation to less than two-thirds of a standard deviation. Despite this gain, language minority Hispanic children remain far behind white native English speakers in math and do not appear to be on a trajectory that would lead to much further closing of the gap. Black children fall behind through fifth grade and have a larger gap than language minority Hispanic children by the end of first grade.

The trends for reading achievement are quite different as can be seen in Figure 3B. There is little evidence that gaps close over time, particularly after first grade. If anything, language minority Asian and Hispanic children fall somewhat further behind third and fifth grade, though the decline is not as steep as for Black children. By the end of fifth grade, language minority Hispanic children are about at parity with Black children in reading achievement. Both are about three-quarters of standard deviation behind white children. Language minority Language minority Hispanic children who were proficient in English at kindergarten entry perform much better, but still lag by nearly a half standard deviation. Asian language minority children are just under one-quarter standard deviation behind white native English speakers; those were proficient in English at kindergarten entry score slightly higher than white native English speakers.

Figure 3A: Trends in Math Achievement Gaps by Race/Ethnicity and Oral English Proficiency

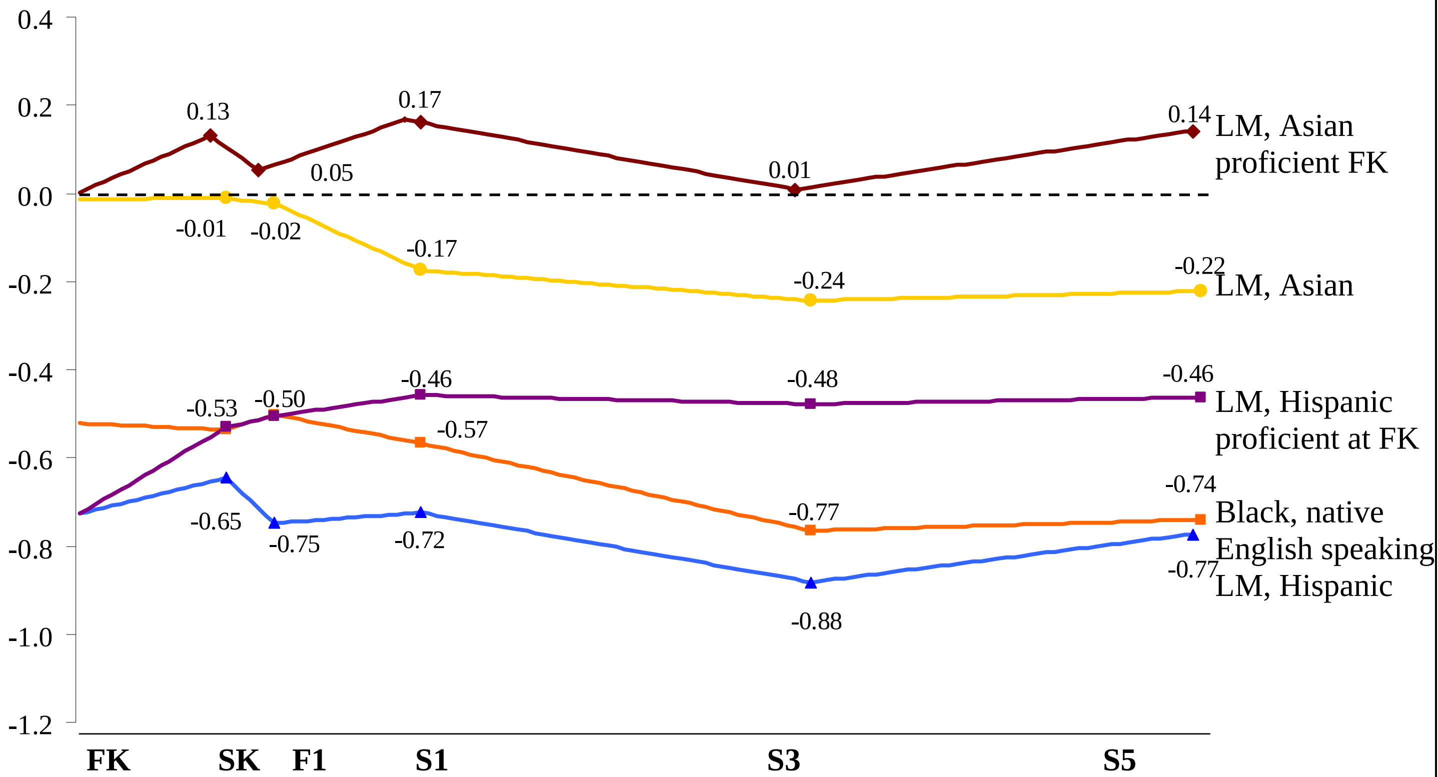


# of cases by group and time point

	FK	SK	F1	S1	S3	S5
Black, native English speaking	1,157	1,264	420	1,249	1,240	1,242
Language Minority, Asian	257	370	96	459	482	487
Language Minority, Asian, proficient at FK	256	250	52	241	252	250
Language Minority, Hispanic	1,176	1,252	389	1,244	1,224	1,219
Language Minority, Hispanic proficient at FK	515	511	142	499	484	481

Note: Native-English speaking White students are the reference group, represented by the value of "0" on the "Y" axes. Gaps measured in pooled standard deviation units.

Figure 3B: Trends in Reading Achievement Gaps by Race/Ethnicity and Oral English Proficiency



\# of cases by group and time point

	FK	SK	F1	S1	S3	S5
Black, native English speaking	1,157	1,267	420	1,249	1,221	1,241
Language Minority, Asian	256	370	96	459	483	487
Language Minority, Asian, proficient at FK	256	250	52	241	252	250
Language Minority, Hispanic	516	776	258	1,014	1,215	1,216
Language Minority, Hispanic, proficient at FK	516	507	142	497	482	480

Note: Native-English speaking White students are the reference group, represented by the value of "0" on the "Y" axes. Gaps measured in pooled standard deviation units.

Isolating the Effects of Oral English Proficiency at Kindergarten Entry

A key question raised by the trends in achievement gaps is the extent of English proficiency at school entry's independent impact on language minority students' achievement over time. A preliminary investigation was conducted using regression analysis with English proficiency at kindergarten entry as an independent variable and math and reading test scores at spring of first, third, and fifth grades as dependent variables in separate models. To sort out the effects of other background variables the following additional independent variables were included in each regression model: gender (male as the reference group); race/ethnicity (White as the reference group); generational status (third plus as the reference group); family type (two biological parents as the reference group); WIC subsidy (no as the reference group); child age at kindergarten entry in months; socioeconomic status; number of siblings at home, number of children's books in the home; parents' educational expectations for the child; child weight at birth in pounds; and mother's age at first birth. These models were estimated for a sample limited to language minority students.

In all six regression equations, the estimated effect of English language proficiency at entry to kindergarten was highly statistically significant. For math, kindergarten oral English proficiency had an estimated effect of about two-fifths of a standard deviation in each grade (0.38 at first grade, 0.41 at third grade, 0.40 at fifth grade). For reading, kindergarten oral English proficiency had an estimated effect that grew over time from just over one quarter standard deviation (0.27) at first grade to about half of a standard deviation at third (0.49) and fifth (0.52) grades. These results support the hypothesis that oral language proficiency in English at kindergarten entry has an important independent effect on later achievement for language minority children. They also suggest that the strength of this effect may increase over time for reading achievement (though caution is warranted because the sample for reading achievement increases from 1666 to 1895 students between first and third grades).

Additional relevant findings were reported by Galindo (2005). Using piecewise multilevel growth modeling and measuring oral English proficiency as a continuous variable, Galindo (2005) found a strong association between oral English proficiency and initial math achievement at kindergarten entry and growth rates between kindergarten and third grade for Hispanic origin students. Thus, early oral English proficiency seems to be a predictor of later achievement outcomes and a factor in reducing achievement gaps between White and Hispanic students.

Discussion and Conclusion

In the past 30 years, there have been major advances in research on language development and literacy interventions for English language learners. Yet, discussions about how to help language minority students successfully navigate the educational system are immersed in intense battles in political, public, and academic arenas. The manipulation of critical information and fragmented research affect and bias the debate about English language learners.

Many language minority students are at risk of failing in schools because of language barriers, family poverty, low parental education, and unfamiliarity with U.S. schools and society. Regardless of the substantial challenges that language minority children pose to schools and society, these students also bring important cultural and linguistic assets. Language minority children, potentially, can reach similar levels of competences in two different languages. Dual language skills are associated with cognitive and linguistic advantages, including greater cognitive flexibility, better classification and reasoning skills, and increased awareness and control over language (Krashen, 1999; Winsler, Diaz et al. 1999; Cummins, 2000). At the same time, language minority students and their immigrant parents are reportedly more optimistic about the future and have higher educational expectations than children of native-born parents. They tend to cultivate cohesive ethnic communities that facilitate social control, affirm cultural values, and may provide exposure to positive role models. (Hao & Bonstead-Bruns, 1998; Pong, Hao, & Gardner, 2005; Valenzuela & Dornbusch, 1994; Zhou & Bankston, 1994).

Five important findings emerge from this study. First, compared to native-English speaking students, language minority students, particularly students who lack oral English proficiency, have important educational disadvantages. At kindergarten entry, language minority students' have significantly lower scores than do native-English speaking students and, although these differences are reduced over time, they remain significant for through grade 5.

Second, there are important variations among language minority student subgroups in their patterns' of achievement. Larger achievement gaps are observed for students who are not proficient in oral English at fall of kindergarten, Hispanic students, and students in the lowest socioeconomic quintiles. In contrast, smaller achievement gaps are observed for students who are proficient in oral English at entry to kindergarten, Asian, or from the highest socioeconomic quintiles.

Third, achievement gaps decrease over time, particularly in math, yet important achievement gaps remain at the end of fifth grade. Language minority Hispanic students score nearly two-thirds of a standard deviation lower than native-English speaking White students in math and three-fourths of a standard deviation lower than native-English speaking students in reading by spring of fifth grade.

Fourth, oral English proficiency at kindergarten entry has a significant impact on students' math and reading achievement during the elementary school years. The effect of oral English proficiency remains strong over time suggesting that improving language minority students' English proficiency prior to kindergarten may be a critical mechanism to improve their later educational outcomes.

Fifth, different trends in achievement gaps are observed for reading and math across language minority subgroups, suggesting that language background and oral English proficiency may have different consequences for children's content development. On average, math achievement gaps between language minority groups and native-English speaking students close steadily over time, yet reading achievement gaps remain stable between the spring of third grade and fifth grade. By the spring of fifth grade, reading achievement gaps are much larger than math achievement gaps.

Given the rapid growth of the language minority population, the United States will benefit from a thorough, comprehensive, and multifaceted approach to understanding these children's educational experiences and outcomes. This research shows that being a language minority is not a risk factor by itself for persistent poor achievement. Proficiency in oral English at kindergarten entry, the poverty levels commonly observed among these students, and other disadvantages most dramatically limit their long-term educational achievement.[11]

The findings from this research have important implications for preschool education given the dramatic math and reading achievement gaps already observed at the beginning of kindergarten and the strong association observed between oral English proficiency and math and

[11] It is important to point out that findings presented in this chapter should not be used as evidence to support English-only education given that I have not tested in my analyses different teaching strategies for non-English speaking students nor have incorporated issues about bilingualism and fluency in more than one language.

reading achievement over time. Effective preschool practices to support language minority children and to increase their English ability may help neutralize their educational disadvantages. To redeem this promise it will be necessary to identify specific teaching practices relating to language and other mechanisms through which English proficiency can be increased among young language minority students. Future studies of language minority students also will benefit from taking into account the diversity of the language minority population, a longitudinal approach, and other key school-relevant variables (i.e., teacher quality, curricular richness, school characteristics, school segregation, student behavior, and family involvement) that affect students' educational experiences. Other studies find that school quality (Entwisle & Alexander, 1993; Alexander et al. 1994; Downey et al. 2004) and active parental involvement (Epstein, 2001) can help reduce the effects of social and economic disadvantages on students' educational outcomes. From a policy perspective, it is essential that research identify in detail key mechanisms that may contribute to the improvement of educational outcomes of the language minority population in the U.S. Policy-makers should understand that interventions to improve language minority students' educational paths should begin with preschool education. It is important to invest in the development of highly effective approaches and in those who can staff such programs.

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Table 1
Full Kindergarten ECLS-K Sample and Final Analytic Samples (unweighted counts and percentages)

	Samples					
	Full Kindergarten		Final Analytic Samples: Math		Final Analytic Samples: Reading	
Language / Race/ Test scores	N	%	N	%	N	%
Language minority						
Native-English speaking	18,025	84.78	9,775	82.90	9,776	82.94
Non-English speaking	3,219	15.14	2,011	17.05	2,005	17.01
Language minority unknown	16	0.08	6	0.05	6	0.05
Proficient in oral English						
Proficient at fall kindergarten	1,529	47.26	956	47.54	956	47.68
Non-proficient at fall kindergarten	1,651	51.04	1,053	52.36	1,047	52.22
Proficiency level unknown	55	1.70	8	0.10	2	0.10
Race/Ethnicity groups						
White, not Hispanic	11,597	54.55	6,630	56.22	6,631	56.26
Hispanic, any race	3,953	18.59	2,364	20.05	2,359	20.01
Black, not Hispanic	3,181	14.96	1,330	11.28	1,329	11.28
Asian, not Hispanic	1,349	6.35	802	6.80	802	6.80
Other, not Hispanic	1,130	5.32	648	5.50	648	5.50
Race/Ethnicity unknown	50	0.24	18	0.15	18	0.15
Socioeconomic Status						
Quintile 1 (low)	3,875	18.23	2,036	17.27	2,031	17.23
Quintile 2	3,968	18.66	2,188	18.55	2,187	18.55
Quintile 3	4,014	18.88	2,274	19.28	2,274	19.29
Quintile 4	4,180	19.66	2,416	20.49	2,417	20.51
Quintile 5 (high)	4,384	20.62	2,645	22.43	2,645	22.44
SES unknown	839	3.95	233	1.98	233	1.98
Test scores						
Kindergarten, math wave 1	18,636	87.66				
Kindergarten, math wave 2	19,649	92.42				
Kindergarten, reading wave 1	17,622	82.89				
Kindergarten, reading wave 2	18,937	89.07				
Re-scaled kindergarten-fall, wave 6			10,413	88.31	9,750	82.72
Re-scaled kindergarten-spring wave 6			11,364	96.37	10,897	92.45
Re-scaled first grade-fall, wave 6			3,555	30.15	3,425	29.06
Re-scaled first grade-spring, wave 6			11,367	96.40	11,137	94.49
Re-scaled third grade, wave 6			11,307	95.89	11,244	95.39
Re-scaled fifth grade, wave 6			11,274	95.61	11265	95.57
Total	21,260	100	11,792	100	11,787	100

Notes: The full ECLS-K sample is based on the entire kindergarten sample regardless of whether the students took a cognitive test. The final analytical samples are based on students with valid rescale scores at spring of fifth grade.

Table 2

Characteristics of the Kindergarten Class of 98-99, by Language Status, and Race/Ethnicity (weighted percentages)

Students' Characteristics	Total Sample	Language Status		Race/Ethnicity			
		LM	Native-English	LM Hispanic	LM Asian	White	Black
Language Status and English proficiency							
Language Minority	13.58	-	-	-	-	1.75	1.35
English proficiency at fall Kindergarten		47.70	-	40.65	62.21	78.03	85.97
Race/ Ethnicity							
White, non-Hispanic	56.29	7.27	63.97	-	-	100.00	-
Black, non-Hispanic	15.82	1.57	18.05	-	-	-	100.00
Hispanic, any Race	20.18	75.92	11.45	51.00	-	-	-
Asian	2.99	13.38	1.36	-	60.71	-	-
Other	4.72	1.86	5.17	-	-	-	-
Socioeconomic Status							
Quintile 1 (low)	19.94	31.63	15.72	56.65	21.61	9.05	33.60
Quintile 2	20.22	12.94	20.30	20.40	15.26	18.82	22.98
Quintile 3	20.14	8.42	21.27	11.99	17.59	21.43	20.18
Quintile 4	19.76	7.11	21.16	6.89	18.07	23.41	15.09
Quintile 5 (high)	19.93	6.13	21.56	4.08	27.46	27.30	8.15
Generational Status							
1^{st} generation	2.99	16.77	0.89	15.07	24.23	0.88	1.10
2^{nd} generation	17.34	73.47	8.80	74.99	74.43	5.54	7.14
3^{rd} + generation	79.67	9.76	90.31	9.94	1.34	93.72	91.76

Note: LM= Language Minority. Data from the Full ECLS-K kindergarten sample (n= 21,260). All statistics are computed using STATA survey commands and weighted by cross-sectional weight "*c1cw0*" provided by ECLS-K.

Table 3

Standardized Math and Reading Achievement Gaps of Language Minority Students Oral English Proficiency at Kindergarten Entry

	Math											
	Unadjusted Coefficients						Adjusted Coefficients after Controlling for SES					
	Fall K	Spring K	Fall 1st	Spring 1st	Spring 3rd	Spring 5th	Fall K	Spring K	Fall 1st	Spring 1st	Spring 3rd	Spring 5th
All Language Minority	-0.717	-0.649	-0.628	-0.491	-0.407	-0.267	-0.368	-0.330	-0.287	-0.203	-0.100	0.037
	(0.038)	(0.039)	(0.076)	(0.042)	(0.037)	(0.044)	(0.031)	(0.034)	(0.064)	(0.042)	(0.035)	(0.043)
Not proficient in oral English	-1.152	-1.013	-0.937	-0.770	-0.690	-0.520	-0.626	-0.557	-0.452	-0.365	-0.246	-0.070
	(0.041)	(0.046)	(0.087)	(0.052)	(0.047)	(0.059)	(0.042)	(0 .047)	(0 .095)	(0.058)	(0.049)	(0.062)
Proficient in oral English	-0.317	-0.261	-0.222	-0.153	-0.072	0.048	-0.154	-0.113	-0.093	-0.024	0.056	0.159
	(0.045)	(0.046)	(0.088)	(0.051)	(0.048)	(0.052)	(0.037)	(0 .039)	(0.070)	(0.047)	(0.042)	(0.048)
Proficient in oral English (only with Reading scores at W1)	-0.319	-0.277	-0.228	-0.190	-0.109	-0.003	-0.154	-0.119	-0.092	-0.042	0.035	0.131
	(0.045)	(0.047)	(0.092)	(0.051)	(0.049)	(0.053)	(0.036)	(0.040)	(0.074)	(0.047)	(0.044)	(0.050)
	Reading											
	Unadjusted Coefficients						Adjusted Coefficients after Controlling for SES					
	Fall K	Spring K	Fall 1st	Spring 1st	Spring 3rd	Spring 5th	Fall K	Spring K	Fall 1st	Spring 1st	Spring 3rd	Spring 5th
All Language Minority	-0.377	-0.370	-0.450	-0.444	-0.540	-0.422	-0.216	-0.158	-0.220	-0.192	-0.191	-0.226
	(0.046)	(0.045)	(0.080)	(0.045)	(0.039)	(0.042)	(0 .037)	(0.039)	(0 .070)	(0.043)	(0.038)	(0.041)
No proficient in oral English		-0.700	-0.813	-0.802	-0.908	-0.732		-0.325	-0.432	-0.427	-0.459	-0.286
		(0.069)	(0.096)	(0.058)	(0.046)	(0.058)		(0.065)	(0.100)	(0.060)	(0.049)	(0.060)
Proficient in oral English	-0.377	-0.235	-0.210	-0.126	-0.104	-0.035	-0.216	-0.093	-0.086	0.005	0.025	0.076
	(0.046)	(0.050)	(0.094)	(0.054)	(0.046)	(0.050)	(0.037)	(0.044)	(.077)	(0.047)	(0.041)	(0.044)
Proficient in oral English (only with Reading scores at W1)	-0.377	-0.239	-0.203	-0.153	-0.135	-0.079	-0.216	-0.090	-0.074	-0.007	0.008	0.054
	(0.046)	(0.052)	(0.099)	(0.054)	(0.047)	(0.050)	(0.037)	(0.045)	(0.081)	(0.047)	(0.041)	(0.045)

Notes: Gaps are based on scores rescaled in fifth grade. Sample includes students with valid information on language minority status and English proficiency. Reference group=native English speaking students. Survey design corrected standard errors are in parentheses. Standard errors are significantly bigger for fall of first grade estimates given the reduced sample size.