

**Language-minority Students'
Cognitive School Readiness and
Success in Elementary School**

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Review Process

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LANGUAGE-MINORITY STUDENTS' COGNITIVE SCHOOL READINESS AND SUCCESS IN ELEMENTARY SCHOOL

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Abstract

A significant amount of research treats students who speak a language other than English at home, or language-minority students, as a single demographic group and compares them to students who speak only English at home. If important disparities in early school experiences among language-minority students have been overlooked, then policies aimed at helping them as they begin formal schooling may fall short, as they will not attend to the needs of specific subpopulations. This paper uses data from the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) to address this gap in the literature by exploring language-minority students' experiences with grade retention and special education placement and specifically examining variation among language-minority students based on race, immigrant status and socioeconomic status. Findings indicate that language-minority students are no more likely to be retained than their English-only counterparts, while they are less likely than their English-only counterparts to be placed in special education. Furthermore, there was no variation among language-minority students by race or immigrant status. These findings and their implications for language-minority students are explored in the conclusion.

Introduction

A significant amount of research treats children from households that regularly speak a language other than English, or language-minority children, as a single demographic group and compares them to children from households that primarily speak English. This type of analysis, while important in many respects, overlooks considerable variation among language-minority children.¹ Most language-minority children are Asian and Hispanic (Connell, 2004; Lee & Burkam, 2002; Suarez-Orozco & Suarez-Orozco, 2001), two groups who have demonstrated largely divergent results in a variety of educational outcomes, including school readiness (Lee & Burkam, 2002). Although language-minority children as a group tend to be disadvantaged compared with English-only children (Connell, 2004; Lee & Burkam,

¹Another approach has been to look at one specific racial or ethnic group, such as Mexican-Americans (e.g., Rumberger & Larson, 1998). While this approach recognizes the diversity among language-minority students, it offers little in terms of comparisons between different language-minority groups.

2002), specific subgroups, such as Asians, tend to fare better than others (Kao, 1995). If important disparities in school readiness among language-minority children have been overlooked, then policies aimed at helping language-minority children as they begin formal schooling may fall short, as they will not address the needs of specific subpopulations. This report begins to address this gap in the literature by exploring the following questions.

1. Do language-minority children differ in their cognitive school readiness conditions based on their race/ethnicity and immigrant status?
 - a. More specifically, do language-minority children differ in their academic school readiness, as indicated by reading and math test scores and teacher reports of reading and math ability/performance, based on their race/ethnicity and immigrant status?
 - b. Do language-minority children differ in their English-language ability, as indicated by Oral Language Development Scale (OLDS) score, based on their race/ethnicity and immigrant status?
2. If differences in school readiness do exist based on language-minority children's race/ethnicity and immigrant status, how do these disparities affect language-minority children's beginning school transition?
 - a. Do language-minority students' odds of being retained by third grade vary by race/ethnicity and immigrant status?
 - b. Do language-minority students' odds of being placed in special education by third grade vary by race/ethnicity and immigrant status?
3. What demographic and family characteristics facilitate a successful beginning school transition for language-minority children?
 - a. Are language-minority children from high socio-economic status (SES) families less likely to be retained or placed in special education by third grade?

Thus, this paper addresses several issues that are central to the education of language-minority children: 1) school readiness; 2) the beginning school transition, including retention and special education placement; and 3) variation among language minorities by race/ethnicity and immigrant status; and 4) the effects of SES on language-minority students' beginning school transition.

In the next section, I review literature on school readiness and the beginning school transition, highlighting language-minority children specifically. Then, I discuss findings from my analyses of the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K), a nationally-representative panel study of children

who were in kindergarten in 1998-99. Finally, I offer some concluding thoughts about what these findings mean for language-minority students in elementary school.

Literature Review

School Readiness and the Beginning School Transition

Considerable evidence suggests that children's transition into formal schooling can have lasting and profound effects throughout their educational careers. Because children beginning kindergarten are at a critical period in their cognitive and social development, what happens to children at this age can impact them more powerfully than at later stages in their development (Entwisle & Alexander, 1989; Pianta & Cox, 1999; Takanishi, 2004). If students cannot avoid certain roadblocks during these important transitional years, they may be placed on a lower-achieving track that limits their eventual educational attainment (Entwisle & Alexander, 1993). During this critical period, several institutional roadblocks can impede children's progress, usually with lasting consequences. These include retention, special education placement, and placement in low classroom ability groups, all of which are associated with negative long-term educational outcomes (Entwisle & Alexander, 1989; Entwisle, 1995; Alexander, Entwisle, & Dauber, 1993).

This transition may be more difficult for language-minority children for several reasons. First, because the majority of American elementary school teachers stress the social aspects of school readiness (Lin, Lawrence, & Gorrell, 2003; Wesley & Buysse, 2003; Tudge et al., 2003), and difficulty with English may impede children's social interactions with both other students and teachers, teachers may be more likely to see students as less ready for school than their non-language-minority counterparts. Furthermore, a lack of facility with the English language may appear as lack of skills and could land immigrant students in special education or low ability groups (Lin et al., 2003; Connell, 2004; Takanishi, 2004). Indeed, Takanishi argues that young children of immigrants, many of whom speak a language other than English at home, begin school with an educational deficit compared to their non-immigrant counterparts, due in part to their disadvantaged socioeconomic status. This is most pronounced for children from families with limited English proficiency (LEP)² (Takanishi, 2004).

² Limited English Proficient (LEP) is a term that has been used to label language-minority students who lack competence in the English language (Olsen, 1996).

These differences in school readiness are important because of their tendency to grow, rather than diminish, over time (Entwisle, Alexander, & Olson, 1997, 2003; Rathbun, West, & Hausken 2004). Olsen (1996) points out that by high school, students are kept increasingly separate from “mainstream” classes and are often placed in understaffed programs with under-qualified or uncertified teachers. LEP students, according to Olsen, receive very little instruction in their native language and fall further and further behind their non-LEP peers. Thus, differences in students’ educational performance at the beginning of school and how these differences play out during the first few years of elementary school lay the foundation for students’ long-term educational trajectories (Entwisle et al., 2003).

Although the importance of the beginning school transition is clear (Entwisle & Alexander, 1989; Pianta & Cox, 1999), researchers have failed to explore how it affects language-minority students specifically. Based on research on the lasting effects of early schooling, it follows that not being able to speak English well at the beginning of school may disadvantage children throughout their schooling careers, and thus place them at a disadvantage in terms of attending college and obtaining employment (Cornelius, 1995). What is needed is a thorough examination of how language-minority students negotiate roadblocks, such as retention and special education placement, during the beginning school transition and how initial disparities in school readiness based on race/ethnicity and immigrant status affect students’ educational pathways during the first years of elementary school.

Potential Mediating Factors during the Beginning School Transition

Family socioeconomic status has consistently been the most predictable determinant of how children progress through the educational system (e.g., Blau & Duncan, 1967; Coleman et al., 1966; Entwisle et al., 1997; Lee & Burkam, 2002). Lee and Burkam (2002) find that children from high SES families come to school with more advanced reading and math skills than their counterparts from lower SES families. One may extrapolate from these findings that coming from an economically well-off family may offset some of the negative effects of speaking a language other than English at home. However, most language-minority students are from extremely low SES backgrounds (Cornelius, 1996; Lee & Burkam, 2002).

Results

The first research question addressed in this report asks whether language-minority children differ in their cognitive school readiness conditions based on their

race/ethnicity and immigrant status. More specifically, do language-minority children differ in their academic school readiness, as indicated by reading and math test scores³ and teacher’s ratings of their literacy and math ability/performance, based on their race/ethnicity and immigrant status? Furthermore, do language-minority children differ in their English-language ability, as indicated by Oral Language Development Scale (OLDS) score, based on their race/ethnicity and immigrant status?

Weighted population percentages of student test scores and teachers’ ratings of students for each language-minority racial/ethnic group and for language-minority children of immigrants and language-minority children of native-born can be found in Tables 1 and 2. The cell count for non-Hispanic black language-minority students who have an OLDS score is too small for results to be presented in later analyses.

Table 1

Weighted Population Percentages for Cognitive School Readiness Indicators at Beginning of Kindergarten for Language-Minority Students by Immigrant Status and Race/Ethnicity

	LM Asian	LM Hisp	LM Black	LM Other	LM White	Non-LM	Missing	Total Pop.
Test Scores								
Reading	1.44	7.87	0.77	0.97	3.49	79.17	6.29	100
Math	1.36	12.34	0.74	0.92	3.30	74.88	6.46	100
OLDS*	7.65	63.44	0.83	1.10	5.73	7.42	13.83	100
Teacher's Academic Rating Scale								
Literacy	1.71	12.48	0.76	0.95	3.33	74.22	6.55	100
Math	1.59	13.11	0.72	0.90	3.29	74.88	5.51	100
Other Outcomes								
Special Education	1.44	11.40	0.84	1.09	3.92	76.00	5.31	100
Retention	1.67	12.30	0.73	0.95	3.34	74.20	6.81	100

Source: ECLS-K

Notes: “LM” stands for Language-Minority; all race/ethnic groups except for Hispanics are non-Hispanic.

*Oral Language Development Scale (OLDS)

³ Spanish-speaking students who fail the OLDS test take the math test in Spanish, while non-Spanish-speaking students who fail the OLDS test do not take the math test at all. More information on this can be found in the Technical and Methodological Appendix.

Table 2

Weighted Population Percentages for Cognitive School Readiness Indicators at Beginning of Kindergarten for Language-minority Students by Immigrant Status

	LM Imm	LM NB	Non-LM	Missing	Total Pop.
Test Scores					
Reading	6.07	6.38	79.17	8.38	100
Math	9.63	6.18	74.88	9.31	100
OLDS*	56.83	7.78	7.42	27.97	100
Teacher's Academic Rating Scale					
Literacy	9.90	6.31	74.22	9.57	100
Math	10.14	6.55	74.88	8.43	100
Other Outcomes					
Special Education	8.79	6.73	76.00	8.48	100
Retention	9.93	6.12	74.20	9.75	100

Source: ECLS-K

Notes: "LM" stands for Language-Minority; "Imm" refers to children of immigrant parents; "NB" refers to children of native born parents.

*Oral Language Development Scale (OLDS)

Table 3 compares these indicators of cognitive school readiness for language-minority students versus non-language-minority students, as well as for language-minority children of immigrants versus language-minority students from native born parents. Table 4 presents the same comparisons among language-minority racial/ethnic groups.

Language-minority students appear to be performing at lower levels than their non-language-minority peers, posting significantly lower scores in both reading and math, as well as being rated lower by teachers.⁴ Because some language-minority students were excluded from direct cognitive assessments (i.e., the reading, math, and general knowledge tests taken by students) because of their difficulty with English, the mean test score for language-minority students may even be slightly inflated. If this is the case, the disparity between language-minority students and non-language-minority students would be even greater. However, Spanish-speaking students who failed the OLDS test did take the direct math cognitive assessment in Spanish, unlike students who spoke other languages and failed the

⁴ The teacher's academic rating scale (ARS) values range from 1 to 5.

OLDS test, and these students' scores are included in the means presented here. Thus, the mean math score for Hispanic language-minority students is probably not inflated to the same extent as means of other language-minority racial/ethnic groups.

Table 3

Weighted Means for Cognitive School Readiness Indicators at Beginning of Kindergarten for Language-Minority vs. English-Only Students and Language-Minority Students by Immigrant Status, ECLS-K

Variable Name	LM vs. Eng-Only			LM Imm vs. LM NB		
	Mean	Mean	Sig.	Mean	Mean	Sig.
Test Scores						
Reading	21.70	23.15	***	22.47	21.58	*
Math	17.24	20.13	***	16.75	18.70	***
Oral Language Development Scale				27.40	42.34	***
Teacher's Academic Rating Scale						
Literacy	2.23	2.58	***	2.18	2.40	***
Math	2.36	2.63	***	2.33	2.45	**
N [^]	2100	7500		1000	500	

Note: *p < 0.05, **p < 0.01, ***p < 0.001.

[^] Due to missing values N ranges from 2057-2640 for Language-minority, 6762-8940 for English-native-born parents.

Looking only at gross differences between language-minority and non-language-minority students masks considerable variation among language-minority students. Table 3 shows that language-minority students whose parents were born in the United States tend to post higher test scores and teacher ratings than language-minority children of immigrants. Children of immigrants scored higher only in reading, and this difference is not large and barely reaches statistical significance. Most notably, language-minority children of native-born parents scored much higher than language-minority children of immigrants on the Oral Language Development Scale (OLDS), an assessment of the child's English language ability.

Many striking racial/ethnic differences exist among language-minority students as well (see Table 4). Each language-minority racial/ethnic group is compared to non-Hispanic white language minorities. On average, Asians⁵ tend to score higher on direct cognitive assessments than non-Hispanic whites, but are rated lower by teachers, while Hispanics, non-Hispanic blacks, and other race⁶ students both score lower and are rated lower by teachers. No statistical difference exists among non-Hispanic whites, non-Hispanic blacks and other race students in OLDS scores. Only Asian and Hispanic language-minority children score much lower than non-Hispanic white language minorities.

Table 4

Weighted Means of Cognitive School Readiness Indicators at Beginning of Kindergarten for Language-Minority Students by Racial/Ethnic Group, ECLS-K

Variable Name	LM Asian	LM Hispanic	LM Black ^a	LM Other	LM White (ref.)
Test Scores					
Reading	27.00**	19.51***	22.89***	19.29***	24.74
Math	22.96*	15.44***	18.22***	16.51***	21.58
Oral Language Development Scale	37.80***	26.33***		39.85	45.35
Teacher's Academic Rating Scale					
Literacy	2.40***	2.10***	2.24***	2.25***	2.63
Math	2.63*	2.23***	2.29***	2.27***	2.75
N [^]	400	1200	60	125	400

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[^] Due to missing values N ranges from 332-518 for Asians, 922-1501 for Hispanics, 52-76 for Non-Hispanic Blacks, 43-198 for Other Race, and 98-445 for Non-Hispanic Whites.

^a The unweighted cell size for Non-Hispanic Blacks who took the OLDS test is too small to report results.

Language-minority Non-Hispanic Whites are the reference category.

⁵ Hispanics are treated as a separate racial/ethnic group, and all other racial/ethnic groups (Asians, whites, blacks, and 'other race') are all non-Hispanic.

⁶ Other race students include Hawaiian/Pacific Islander, American Indian and multiracial students. All language-minority racial/ethnic groups were compared to language-minority non-Hispanic white students.

While these bivariate means comparisons provide a useful glimpse at how different groups measure up to one another, they fail to account for other factors that could influence academic school readiness and English-language ability. Thus, Table 5 presents results from two series of ordinary least-squares (OLS) regression models predicting teachers' rating of students' literacy and math competencies at the beginning of kindergarten. The teacher's academic rating scales (ARS) were used because not all language-minority students took the direct cognitive assessment tests, but teachers rated all students.

In the first models presented in Table 5, language-minority students are rated lower than their non-language-minority peers, even controlling for race/ethnicity. Children of immigrants, non-Hispanic blacks, Hispanics, and other race students are also rated lower than children from native-born families and non-Hispanic whites, respectively. When family background measures are included, language-minority students continue to be rated lower in literacy than their non-language-minority peers, but the negative effect for math is no longer significant. Students with higher family SES, who are female, and who have married parents are rated higher in both math and literacy than students with lower family SES, males, and whose parents are not married. Interestingly, when family background measures are controlled for, non-Hispanic blacks are no longer rated lower than non-Hispanic whites in literacy (although the negative effect persists for math). Finally, language-minority status seems to negatively affect Hispanics' ratings in particular, evidenced by significant negative interactions between language-minority and Hispanic for both literacy and math. Language-minority status also appears to differentially affect non-Hispanic blacks' literacy rating, such that non-Hispanic black language minorities are rated lower than non-Hispanic black non-language-minority students or language-minority students from other racial/ethnic groups.

Table 5

Unstandardized Coefficients Predicting Teachers' Academic Rating Scale for Students in Literacy and Math at the Beginning of Kindergarten, ECLS-K (Standard Errors in Parentheses)

	<i>Literacy</i>			<i>Math</i>		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Language-minority	-0.11** (0.02)	-0.08* (0.03)	0.04 (0.05)	-0.08* (0.03)	-0.05 (0.03)	0.06 (0.05)
Immigrant Status	-0.10* (0.04)	-0.10** (0.04)	-0.05 (0.05)	-0.06 (0.04)	-0.05 (0.04)	-0.08 (0.06)
Non-Hispanic Black	-0.26*** (0.04)	-0.05 (0.04)	-0.03 (0.04)	-0.36*** (0.08)	-0.15** (0.05)	0.05** (0.05)
Hispanic	-0.35*** (0.05)	-0.17*** (0.04)	-0.10 (0.06)	-0.35*** (0.06)	-0.16 (0.05)	-0.08 (0.07)
Asian	-0.02 (0.08)	-0.10 (0.07)	-0.14 (0.16)	0.06 (0.10)	-0.03 (0.08)	-0.09 (0.13)
Other Race	-0.27*** (0.06)	-0.15** (0.05)	-0.17** (0.06)	-0.33*** (0.08)	-0.21** (0.07)	-0.20* (0.09)
Female		0.13*** (0.02)	0.13*** (0.02)		0.09*** (0.03)	0.09*** (0.03)
Family SES		0.27*** (0.02)	0.27*** (0.02)		0.31*** (0.03)	0.30*** (0.03)
Parents Married		0.13*** (0.02)	0.13*** (0.02)		0.09*** (0.02)	0.09*** (0.02)
Number of Siblings		-0.06*** (0.01)	-0.06*** (0.01)		-0.05*** (0.01)	-0.05*** (0.01)
Language-minority* Hispanic [^]			-0.20** (0.07)			-0.23** (0.08)
Language-minority* Black [^]			-0.29** (0.09)			
Intercept	2.68*** (0.02)	2.54*** (0.03)	2.53*** (0.03)	2.75*** (0.03)	2.64*** (0.04)	2.63*** (0.04)
R-Squared	0.07	0.18	0.18	0.06	0.15	0.15
N	9699	9515	9515	7939	7784	7784

Note: * p < 0.05, ** p < 0.01, *** p < 0.001.

Non-Hispanic White is the omitted category for race. All models account for design effects.

[^] Other interactions were not significant and are thus not presented here. These include language-minority-race (Hispanic, non-Hispanic black, Asian and other race), language-minority-immigrant, and language-minority-SES.

Table 6 presents results from linear regressions predicting language-minority students' OLDS scores at the beginning of kindergarten.⁷ In Model 1, language-minority children of immigrants score considerably lower OLDS scores than language-minority children from native-born families. Hispanic and Asian language-minority students score lower than non-Hispanic white language minorities, and these effects persist even when controlling for family background measures (Model 2). Female language-minority students and those with a greater number of siblings tend to score lower on the OLDS than males and students with fewer siblings, respectively. As with literacy and math, higher family SES positively influences OLDS scores. These results further attest to the need to disaggregate language-minority students and examine within-group variation.

Table 6

Unstandardized Coefficients Predicting Language-Minority Students Oral Language Development Scale Scores at the Beginning of Kindergarten, ECLS-K (Standard Errors in Parentheses)

	<i>Model 1</i>	<i>Model 2</i>
Immigrant Status	-15.72** (1.28)	-13.6***1 (1.48)
Hispanic	-19.32*** (2.22)	-12.32*** (2.31)
Asian	-4.98* (2.20)	-5.02* (2.32)
Other Race	-4.93 (4.37)	-2.10 (4.34)
Female		-0.50** (1.05)
Family SES		8.07*** (0.92)
Number of Siblings		-0.75*** (0.48)
Intercept	59.07*** (1.98)	57.04*** (2.35)
R-Squared	0.19	0.28
<i>N</i>	1215	1215

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The unweighted cell size for Non-Hispanic Blacks is too small to report results (N=11).

Non-Hispanic White is the omitted category for race/ethnicity.

All models account for design effects.

⁷ Because only language-minority students were evaluated for English language ability using the OLDS, regression models predicting OLDS scores do not include non-language-minority students.

Table 7 presents the results from two series of binary logistic regressions, predicting students' odds of being retained anytime during their first four years of school and students' odds of being placed in special education anytime during their first four years of school. Language-minority students are no more or less likely to be retained than non-language-minority students. Non-Hispanic blacks are nearly twice as likely to be retained as non-Hispanic whites, although there are no other significant differences by race/ethnicity. Females, students from higher SES families, and students whose parents are married have lower odds of retention than males, students from lower SES families and students with unmarried parents, respectively. No language-minority/race-ethnicity or language-minority/immigrant status interactions were significant, indicating that there is little variation among language-minority students' odds of being retained.

Surprisingly, given their consistently lower test scores and teacher rankings, language-minority students have lower odds of being placed in special education than their non-language-minority counterparts. Children of immigrants, non-Hispanic blacks, and Hispanics are more likely to be retained than their native-born and non-Hispanic white counterparts, respectively. As with retention, females, students from higher SES families, and students with married parents have lower odds of being placed in special education than males, and students from lower SES families or with unmarried parents. Students with more siblings have higher odds of both retention and special education than students with fewer siblings. Finally, an interaction between Asian and language-minority was significant, indicating that language-minority Asian students have higher odds of being placed in special education than non-language-minority Asian students or language-minority students of other racial/ethnic groups.

Table 7

Estimates and Odds Ratios from Binary Logistic Regression Models Predicting Odds of Grade Retention and Special Education Placement by the Fourth Year of School, ECLS-K. (Standard Errors in Parentheses)

Variable	Grade Retention				Special Education ^a					
	Model 1		Model 2		Model 1		Model 2		Model 3	
	Beta	Exp (B)	Beta	Exp(B)	Beta	Exp(B)	Beta	Exp(B)	Beta	Exp (B)
Language-minority	0.02 (0.10)	1.02	-0.05 (0.14)	0.95	-0.34* (0.16)	0.71	-0.42* (0.10)	0.66	-0.43* (0.10)	0.65
Immigrant Status	-0.31 (0.18)	0.73	-0.30 (0.19)	0.74	0.27* (0.13)	1.31	0.35** (0.14)	1.42	0.67** (0.24)	1.95
Non-Hispanic Black	0.67*** (0.14)	1.95	0.31* (0.14)	1.36	0.69*** (0.11)	1.99	0.33** (0.12)	1.39	0.34** (0.13)	1.40
Hispanic	0.26 (0.21)	1.30	0.04 (0.23)	1.04	0.60*** (0.14)	1.82	0.28* (0.14)	1.32	0.13 (0.21)	1.14
Asian	0.19 (0.36)	1.21	0.28 (0.41)	1.32	-0.27 (0.26)	0.76	-0.23 (0.25)	0.79	-0.72* (0.32)	0.49
Other Race	0.35 (0.40)	1.42	0.11 (0.35)	1.12	0.43 (0.22)	1.54	0.15 (0.22)	1.16	0.1 (0.27)	1.11
Female			-0.50*** (0.13)	0.61			-0.27** (0.08)	0.76	-0.27** (0.08)	0.76
Family SES			-0.35*** (0.07)	0.70			-0.46*** (0.08)	0.63	-0.46*** (0.07)	0.63
Parents Married			-0.28* (0.11)	0.76			-0.39*** (0.09)	0.68	-0.38*** (0.09)	0.68
Number of Siblings			0.20*** (0.05)	1.22			0.10** (0.04)	1.11	0.09* (0.04)	1.09
Language-minority*Asian [^]									0.87* (0.42)	2.39

Intercept			-1.19 (0.06)		
N	10,492	10,295	5253	5174	5174

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Non-Hispanic White is the omitted category for race/ethnicity.

^ Other interactions were not significant and are thus not presented here. These include language-minority-race (Hispanic, Asian, and other race), language-minority-immigrant, and language-minority-SES.

All models account for design effects.

^a Special Education models include only students who had some special education service offered at their school at any point from kindergarten through their fourth year of school.

Summary and Conclusion

This paper has presented several key findings. First, language-minority students tend to be disadvantaged in their cognitive school readiness compared to their non-language-minority peers. They score lower on direct cognitive assessments and are rated lower by teachers. However, this type of comparison overlooks considerable variation among language-minority students. Particularly with regard to their English language development, language-minority students are a very diverse group. Children of immigrants, Asians, and Hispanics tended to be disadvantaged in their English language skills compared to their native-born and non-Hispanic white language-minority peers. Finally, there was little variation among language-minority students' odds of grade retention or special education placement. As an aggregate group, language-minority students were less likely to receive special education than their non-language-minority peers, but no less or more likely to be retained. By examining language-minority students by race/ethnicity and immigrant status, rather than as a homogeneous group, this analysis sheds light on which language-minority subgroups are at a particular disadvantage.

Technical and Methodological Appendix

Variables Used in the Analysis

Cognitive School Readiness Indicators

I focus on academic indicators of school readiness, as opposed to behavioral indicators, because these are at the heart of current policies on school preparation. Thus, the outcomes of interest are children's scores in two standardized tests, administered at the beginning of kindergarten: *math* and *reading*. These tests were administered immediately after children began kindergarten; hence these results represent children's pre-kindergarten knowledge, rather than what they learned in kindergarten. Unfortunately, these assessments can be problematic when studying language-minority students, because they were not administered to students with very low English language proficiency.⁸ Thus, another measure of cognitive school readiness was also used, the *Academic Rating Scale (ARS)*. In the fall of kindergarten, teachers rated each student's competency in literacy and math on a scale of 1 to 5. All students were included in these ratings, regardless of language-minority status or English language ability.

Another indicator of school readiness for language-minority students is their English language ability. This is measured by the Oral Language Development Scale (*OLDS*), administered to students struggling with the English language during the fall of their kindergarten year.

Retention and Special Education

Retention was ascertained from the child's grade level in the fifth wave of the ECLS-K, when students who progressed one grade each year were in third grade. Thus, students who were in second grade or lower during the fifth survey wave were coded 1 for retained; all others were coded as 0. *Special education* was measured using data from each survey wave on whether students had been involved in any programs for students with special needs. If a student was involved in special education programs at any point, *special education* was coded 1; it was coded 0 if a student had never been involved with special education.

⁸ Spanish-speaking students who failed the OLDS test were administered the math assessment in Spanish, but language-minority students from other language groups who failed the OLDS test did not take the direct cognitive assessments at all. Because of this limitation, I do not use direct cognitive assessments for most of my analyses.

Data on special education involvement suffers some notable limitations. Because many schools do not offer any special education programs, many students never had the opportunity to be placed in special education, and are coded as missing for this variable (hence, models exploring special education utilize about half the cases the other models do). Furthermore, a comparison of cases with a 1 or 0 for special education versus cases with missing data demonstrates considerable differences among the two groups. Specifically, students at schools that offered some type of special education had significantly higher family SES than students from schools that offered no special education. A higher proportion of students at schools that did not offer special education were Asian, Hispanic, and non-Hispanic black, children of immigrants, and language-minority children. Also, a higher proportion of students from schools that did not offer special education were retained at least once in their first four years of school than students who attended schools with special education programs. Despite these limitations, this is the best measure available at the time and still provides useful information about students in schools that offer some sort of special education program.

Demographic Characteristics

Demographic characteristics included in the analysis are language-minority status, mother's immigrant status, child's race/ethnicity and sex, and family SES. *Language-minority* was measured based on the language regularly spoken at home when the child started school (i.e., in the first survey wave),⁹ and it was coded as 1 if a language other than English was reported as regularly spoken at home, 0 if not. Immigrant status is represented by a dummy variable, *children of immigrants*, and was measured using the parents' country or countries of birth. If either parent was born outside of the United States, *children of immigrants* is coded one. A series of dummy variables were constructed for child's race/ethnicity: *non-Hispanic white*, *non-Hispanic black*, *Asian*, *Hispanic*, and *other*. Other race includes Hawaiian/Pacific Islander, American Indian, and multiracial children; these groups were too small to analyze separately. Sex is represented by the dummy variable *female*. The ECLS-K data set provides a five-category composite SES measure that includes parents' education, parents' occupational prestige, and household income. Each of these categories was standardized to have a mean of 0 and a standard deviation of 1. The average of the available categories (some children had less than five because of an

⁹ The variable used to determine this was P1ANYLNG. A "yes" answer to the question, "Is any language other the English regularly spoken in your home?" indicated a language-minority student.

absent parent, for example) was then taken to produce the composite measure used here (values range from -4.75 to 2.75) (NCES, 2001).

Family Characteristics

The two family structure variables used in this analysis are whether the parents are married and number of siblings. *Parents married* is a dummy variable indicating that the child's parents are married, while *number of siblings* is a continuous variable indicating the number of siblings the child has (values range from 0 to 11).

Analytic Strategy: Question 1¹⁰

One of the primary goals of this investigation was to explore variation among language-minority children. Thus, a series of comparisons comprised the foundation of the analysis. Because looking at language-minority students as one large group may obscure important differences by race/ethnicity or immigrant status, my analysis focuses on comparing language-minority students by racial/ethnic group and by their immigrant status. Specifically, I calculated mean scores for reading, math, general knowledge tests taken in the fall of kindergarten, as indicators of academic school readiness. The following groups' scores were compared:

- English-only children versus all language-minority children (as a reference point);
- Language-minority children of immigrants versus language-minority children of native-born parents;
- Language-minority students by racial/ethnic group (Hispanic, Asian, non-Hispanic white, non-Hispanic black, and "other race").

T-tests were computed to test whether differences in means were statistically significant. Furthermore, I compared mean OLDS scores for the following groups:

- Language-minority children of immigrants versus language-minority children of native-born parents,

¹⁰ All analyses presented account for sampling design effects by using Taylor-Series estimation in SAS procedures *surveymeans*, *surveyreg*, and *surveylogistic*. All analyses use a sample weight (*c1_5fc0*) that limits the sample to waves 1 (beginning of K), 2 (end of K), 4 (end of 1st grade) and 5 (end of 3rd grade). Wave 3 was not used because only a small subsample was taken at that time. All analyses also use the accompanying strata (*c15fcstr*) and primary sampling unit variables (*c15fcpsu*).

- Language-minority students by racial/ethnic group (Hispanic, Asian, non-Hispanic white, non-Hispanic black, and other race).

While bivariate means comparisons provide a useful glimpse at how different groups measure up to one another, they fail to account for other factors that could influence academic school readiness and English-language ability. Thus, I also constructed a series of ordinary least-squares (OLS) regression models predicting reading, math, general knowledge, and OLDS scores at the beginning of kindergarten.¹¹ Key independent variables included language-minority status, race/ethnicity and immigrant status, as well as two sets of interaction terms (language-minority by each racial group and language-minority by immigrant status). Control variables in these models included gender, family socioeconomic status (SES), whether the parents were married, and number of siblings.

Analytic Strategy: Questions 2 and 3

To explore the second and third sets of research questions, I estimated a series of logistic regression models predicting the odds of being retained and the odds of being placed in special education by the end of third grade. Because both of these have dichotomous outcomes (i.e., retention or no retention, special education placement or no special education placement), logistic regression is an appropriate method of statistical analysis. As in the earlier models, covariates of interest will include language-minority status, immigrant status, and race/ethnicity, as well as interaction terms for language-minority status by race/ethnicity and language-minority by immigrant status. Control variables will include gender, family SES, whether parents are married, and number of siblings.

To examine Question 3, whether family SES facilitates language-minority students' beginning school transition, I constructed an interaction term for language-minority status and family SES. In this way, I was able to examine whether family SES differentially affects language-minority students.

Due to the complex sampling design of the ECLS-K, sampling weights were used in all analyses. I also adjusted for the complex, multi-stage, clustered sampling design by using specific procedures in SAS,¹² so standard error estimates will not be artificially low. These procedures use the Taylor Series method of estimation, rather than jackknife replication.

¹¹ Because only language-minority students were evaluated for English language ability using the OLDS, regression models predicting OLDS scores will not include non-language-minority students.

¹² Specific procedures used in SAS include *proc surveymeans*, *proc surveyreg*, and *proc surveylogistic*.

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