Spring 2010

A Hierarchical Examination of the Immigrant Achievement Gap: The Additional Explanatory Power of Nationality and Educational Selectivity Over Traditional Explorations of Race and Socioeconomic Status

Kathryn A. Simms
Old Dominion University

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by

Kathryn A. Simms
B.S. December 1987, University of Alabama
M.T.A. December 1988, University of Alabama
Ph.D. 1996, University of Georgia

A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirement for the Degree of

DOCTOR OF PHILOSOPHY

EDUCATION
WITH A CONCENTRATION IN EARLY CHILDHOOD EDUCATION

OLD DOMINION UNIVERSITY
May 2010

Approved by:

Stephen Tonelson (Director)

John A. Nunnery (Member)

William Owings (Member)

ABSTRACT

A HIERARCHICAL EXAMINATION OF THE IMMIGRANT ACHIEVEMENT GAP: THE ADDITIONAL EXPLANATORY POWER OF NATIONALITY AND EDUCATIONAL SELECTIVITY OVER TRADITIONAL EXPLORATIONS OF RACE AND SOCIOECONOMIC STATUS

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Director: Dr. Stephen Tonelson

This study compared immigrant and nonimmigrant educational achievement (i.e., the immigrant gap) in math and reading by reexamining the explanatory power of race and socio-economic status (SES)—two variables, perhaps, most commonly considered in educational research and policy formation. Four research questions were explored through growth curve modeling, factor analysis, and regression analysis based on a sample of participants in the Early Childhood Longitudinal Study-Kindergarten Cohort of 1998 (ECLS-K) from kindergarten to eighth grade (N = 6,861). Findings indicated that immigrant students who had been in the United States since at least their preschool years had lower math and reading achievement than nonimmigrants when they began kindergarten. In both achievement areas, 1.75-generation students caught up to their nonimmigrant counterparts, but second-generation students did not. Additionally, nationality played a greater role in determining immigrant performance than did race. Furthermore, educational selectivity had explanatory power with regard to math outcomes in (a) accounting for gaps between immigrant and nonimmigrant achievement, (b) accounting for racial gaps in achievement among both 1.75- and second-generation immigrants, (c) accounting directly for achievement among 1.75-immigrants, and (d) moderating the explanatory power of SES among both 1.75- and second-generation

immigrants. Finally, mother's educational selectivity was positively associated with both parental involvement and center-based early childhood education, but not with parental warmth, relative care, nonrelative care, or participation in Head Start—independent of whether children were 1.75- or second-generation immigrants.

ACKNOWLEDGEMENTS

First and foremost, I would like to acknowledge my dissertation chairman, Steven Tonelson, for his dedication, optimism, and numerous contributions to this study. Additionally, I thank my other committee members--John Nunnery and William Owings--for their helpful comments, other revisions, and delightful senses of humor. I also credit all of those who educated me to the point of being able to undertake this study--in particular (a) Early Childhood faculty members (i.e., Andrea Debruin-Parecki, Katharine Kersey, Jack Robinson, Alice Wakefield, and Marsha White), (b) my methodology professors (i.e., James Henson, Jamie Lester, Linda Bol, and Danica Hays), (c) professors at the University of Georgia who have been highly influential in developing my understanding of research (especially, Jeff Netter and Annette Poulsen), and, of course, (d) my first teachers--my family and lifelong friends--especially, Donald Simms, Philip Coulter, Peggy Coulter, and Martha Howell. Additionally, I recognize the administrative support that has been provided to me at various points throughout my education at Old Dominion University by William Graves, Sharon Judge (who also provided me with beneficial training in survey research), Nicholas Bountress, and Barbara Webb.

Finally, I thank the American Educational Research Association (AERA) for funding this study, and the National Center for Educational Studies (NCES) for selecting me to participate in an all-expense-paid, 3-day workshop on the Early Childhood Longitudinal Study-Kindergarten Cohort of 1998 (ECLS-K) database. The AERA receives funds for its "AERA Grants Program" from the National Science Foundation under Grant #DRL-0941014. This study reflects research I have conducted and does not necessarily reflect opinions of these granting agencies.

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CHAPTER I: INTRODUCTION

"Understanding this reality requires a reminder of how we arrived at this point. As William Faulkner once wrote, 'The past isn't dead and buried. In fact, it isn't even the past.'" Barack Obama (2008, np.)

United States citizens' attitudes toward immigrants can be described as bifurcated throughout U.S. history. At one extreme, many citizens laud the U.S. as a nation of immigrants. As a hallmark of this position, the Statute of Liberty beckons majestically, "Give me your tired, your poor, your huddled masses yearning to breathe free" (Lazarus, 1883). Unabashed xenophobia dominates attitudes at the other extreme. Archdeacon (1983) reported evidence of such xenophobic tendencies as early as the colonial days when Benjamin Franklin lamented "that 'Palatine boors' were trying to 'Germanize' the province [of Pennsylvania] and *would not adopt the English language* [italics added]" (p. 20). Subsequent accounts of U.S. attitudes toward immigrants in the 1920s provide evidence that race was socially constructed to insulate nonimmigrant Caucasians from the influx of Irish, Slavs, Poles, Italians, and Jews (Perlmann & Waldinger, 1997). Intentionally excluded from being classified as white and often compared to blacks, these new immigrants "engaged in deliberate strategies that distinguished themselves from blacks and which, in turn, yielded 'whitening'" (Perlman & Waldinger, 1997, p. 902).

With immigration rates having resurged to nearly the same heights as existed in the 1920s (Hirschman, 2005; U.S. Census Bureau, 2009), these extremes in American

American Psychological Association. (2001). *Publication Manual of the American Psychological Association (5th* ed). Washington, DC: Author.

attitudes toward immigration seemed to have changed little. *The New York Times* applauded the value of immigration in the U.S, particularly as it pertains to depopulated states such as Iowa (Klinkenborg, 2000). By contrast, the American Cause's released "a report arguing that anti-immigration absolutism was still the solution for the [Republican] party's deep electoral woes." ("The Nativists are Restless," 2009, np). More specifically, Marcus Epstein, author of the American Cause report, suggested that:

> Diversity can be good in moderation—if what is being brought in is desirable. Most Americans don't mind a little ethnic food, some Asian math whizzes, or a few Mariachi dancers---as long as the trends don't overwhelm the dominant culture. ("The Nativists are Restless," 2009, np)

Furthermore, there is new evidence of the historical frictions between more recent immigrant groups and blacks. The *San Diego Union Tribune* (Sanchez, 2008) reported on McClain's ongoing research about Latino attitudes toward blacks, which indicted that Latinos tend to believe that all or most blacks are on welfare. "Seventy-two percent of Latinos in Durham, for instance, said they believe this, eclipsing the 18 percent of whites who hold the same view" (Sanchez, 2008, np).

Interlaced with this ongoing history of American attitudes toward immigration are studies related to immigrant intelligence and achievement. Brigham's (1923) *A Study of American Intelligence* was a pivotal exemplar of this interrelationship (Graves, 2005). Brigham asserted that army intelligence tests corroborated a hierarchy of racial intelligence from highest to lowest: (1) Nordic races, (2) combined Alpine and Mediterranean races, and (3) Negro races. He further claimed that "American intelligence is declining, and will proceed [to do so] with an accelerating rate as the racial admixture becomes more and more extensive" (p. 210). Brigham's work was largely influential in the passage of the Immigration Act of 1924, which stymied immigration in the U.S. until the 1960s (Graves, 2005).

Achievement and educational attainment continue to be analyzed primarily with reference to demographic factors, especially race. Consider (a) the achievement gap disclosures of No Child Left Behind (NCLB), (b) the reporting style of the National Assessment of Educational Progress (NEAP) as well as (c) a host of studies on immigrants that focus specifically on only one race or ethnicity (e.g., Crosnoe, 2005, 2007; Lutz, 2007; Mau, 1997). I argue that disclosing achievement scores based on demographics is not without merit from a policy perspective, particularly due to the history of discrimination in the U.S. However, I also argue that it is insightful that these disclosures appear to be more closely aligned with history rather than organized in a more prescriptive manner providing an agenda for national change (e.g., disclosing scores segmented according to low-birth weight or according to average number of hours of weekly television viewing).

In the midst of this highly charged, never ending debate about the social and intellectual merit of immigrants that has permeated even the evolution of academic research, my research attempts to provide an objective, rigorous comparison between immigrant and nonimmigrant educational outcomes by giving particular consideration to the efficacy of the explanatory power of race and socio-economic status (SES).[1] This research is relevant particularly given the current resurgence of immigration in the U.S. Recent estimates suggest that foreign-born immigrants comprise 12.46% of the total U.S.

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[1] I identified SES as a salient factor in this study because SES often accounts for social and economic disparities sometimes attributed to race.

population (U.S. Census Bureau, 2009). With the addition of the children of immigrants, these estimates increase to approximately one-quarter of the U.S. population (Hirschman, 2005). Furthermore, immigrants' educational outcomes are particularly relevant among young children: The mean age of immigrants' arrival in the U.S. is about 5 years old and 16% of Americans under 10 are second-generation immigrants (Palacios, Guttmannova & Chase-Lansdale, 2008). Finally, immigrants' positive educational outcomes are a critical factor associated with immigrant's long-term success in the workforce as well as with lowered incidents of incarceration and early pregnancy (Rumbaut, 2005; Trejo, 1997; Waldinger, Lim, & Cort, 2007).

The remainder of this chapter consists of four additional sections. The next section provides the statement of the problem and research questions. The following sections provide a summary of research methods, definitions of key terms, and a chapter summary.

Statement of the Problem and Research Questions

Conventional wisdom suggests that immigrants' educational outcomes tend to be below those of nonimmigrants. However, a growing body of evidence indicates that, on average, immigrants' educational outcomes are superior to those of nonimmigrants (Chiswick & DebBurman, 2004; Farley & Alba, 2002; Feliciano, 2005a; Fuligini, 1997; Kao & Tienda, 1995; Palacios et al, 2008; Perreira, Harris & Lee, 2006; Rumbaut 1997a, 1997b; Schwartz & Stiefel, 2006; Tillman, Guo, & Harris, 2006). This phenomenon will henceforth be referred to as the immigrant educational paradox or the immigrant paradox, based on Rumbaut's (1997a, 1997b) seminal work.

Evidence of the immigrant educational paradox is pervasive by type of educational outcome, including grade point average (GPA) (Kao & Tienda, 1995), standardized tests scores (Kao & Tienda, 1995), high school completion rates (White & Glick, 2000), overall educational attainment (Chiswick & DebBurman, 2004), and to an extent, grade retention (Tillman et al., 2006). Furthermore, the immigrant paradox has been documented in municipal datasets[2] (e.g., Schwartz & Stiefel, 2006) as well as in a variety of nationally representative datasets (i.e., the National Educational Longitudinal Study of 1988, the Educational Longitudinal Study of 2002, the Longitudinal Study of Adolescent Health, and the Current Population Survey) (Feliciano, 2005a; Kao & Tienda, 1995; Pong, Hao, & Gardner, 2005; Rosenbaum & Rochford, 2008). However, the immigrant educational paradox requires further investigation for at least three reasons.

First, the paradox is not identified in all databases. In fact, Schnepf (2007) found its converse and reported that nonimmigrants significantly outperformed both first- and second-generation immigrants in the U.S. on standardized tests in math and reading in three prominent datasets--Trends in International Maths and Science Study (TIMSS), Programme of International Reading Literacy Study (PIRLS) and the Programme of International Student Assessment (PISA). Marks' analysis (2005) provides confirmatory evidence for Schnepf's findings regarding the PISA. Additionally, Glick and White's (2003) findings partially corroborated the immigrant educational paradox in terms of standardized reading and math scores in the National Educational Longitudinal Study of 1988, but supported its converse in the High School and Beyond sample.

[2]Municipal level findings can be argued to take on more meaning than they typically might because of the high concentration of immigrants within key municipal areas. (For a discussion about the tendency of immigrants to reside in large urban areas (especially in California, New York, New Jersey, Florida, Texas and Illinois), see Rumbaut (1994).)

The second reason the immigrant paradox requires future investigation is that the bulk of the literature supporting it relates to adolescents and adults. A nascent literature has examined the immigrant paradox among young children in terms of reading scores (Palacios et al., 2008) and math scores (Glick & Hohmann-Marriott, 2007) followed up to third grade via the Early Childhood Longitudinal Study-Kindergarten Cohort of 1998 (ECLS-K). However, that literature does not reveal the presence of the paradox until after the introduction of control variables (such as race, English language proficiency, early childhood education, and parental school involvement). Additionally, Palacios et al. did not weight their sample, so that only Glick & Hohmann-Marriott's results apply to a nationally representative sample. Hence, evidence is insufficient for determining whether the paradox fails to exist among the children in this sample studied at any time at all (without the use of control variables) or whether the paradox develops some time after third grade. More broadly speaking, the more robust literature based on adolescent samples has yet to be linked directly to this nascent literature on young children for any outcome, potentially because longitudinal studies have followed young children's performance at most to the third grade.

A final reason the immigrant paradox requires further exploration is that the explanatory power of the two measures most frequently used to "explain" the paradox—race and SES—often yield contradictory results within and between studies (Fuligini, 1994; Kao & Tienda, 1995; Pong, Hao, & Gardner, 2005; Schwartz & Stiefel, 2006). Additionally, with regard to race, research on the immigrant paradox (a) often fails to take into account diversity within races that is frequently attributed to nationality (Kao & Tienda, 1995; Palacios et al., 2008; Rosenbaum & Rochford, 2008) and (b) is not theoretically grounded in general (Farley & Alba, 2002; Fuligini, 1997; Rosenbaum & Rochford, 2008). Furthermore, with regard to SES, Feliciano (2005a, 2005b) implies that traditional conceptualizations of SES may be incomplete, at least in terms of parents' education levels. In other words, traditional assessments compare immigrants' educational attainments only to those of nonimmigrants in the U.S. Such measurements fail to consider how immigrants' educational attainments compare to those in the general populations in their countries of origin (also called educational selectivity), which Feliciano (2005a) found has considerable explanatory power regarding their children's own educational attainment. However, the associations between educational selectivity and immigrant achievement (in terms of standardized test scores) as well as the process by which educational selectivity improves educational outcomes have not been explored in the literature.

This discussion suggests four research questions:

1. Is there evidence of the immigrant paradox in terms of math and reading achievement for students from kindergarten through eighth grade?
2. Do immigrants' nations of origin within race explain the variability typically attributed to race alone regarding differences in immigrants and nonimmigrants' math and reading achievement for students followed from kindergarten through eighth grade?
3. Does expanding the definition of SES to include educational selectivity provide additional explanatory power in analyzing immigrant versus nonimmigrant reading and math achievement outcomes among students followed from kindergarten through eighth grade?
4. Which (if any) parenting characteristics are associated with educational selectivity?

In answering these research questions, this study seeks to accomplish five main objectives. First, it tests the robustness of the immigrant paradox over a different time period in a nationally representative database (as the next section explains in more detail). Second, it unites the literature on adolescents and adults to the limited literature on young children. Consequently, this study describes the immigrant educational paradox's trajectory with regard to (1) when the paradox is initially detectable (i.e., in kindergarten, primary school, or secondary school children), and (2) whether the gap between immigrant and nonimmigrant educational outcomes tends to increase, decrease, or remain constant over time. Third, this study offers evidence about whether nation of origin within race explains the variability in immigrants' educational outcomes typically attributed to race. Fourth, it tests whether adjusting SES for educational selectivity helps account for previously unexplained differences in immigrant and nonimmigrant educational achievement. Fifth, this study provides the first known evidence regarding the process by which educational selectivity enhances educational outcomes.

Summary of Method

All analyses have been conducted using the ECLS-K (U.S. Department of Education, 2006)--a secondary database originally collected by the National Center for Educational Statistics (NCES). The ECLS-K provides a nationally representative sample based on 21,260 students who started kindergarten in 1998 with data currently having been collected at six time points for the full sample (i.e., fall of kindergarten and spring of (a) kindergarten, (b) first grade, (c) third grade, (d) fifth grade and (e) eighth grade). The ECLS-K's database was derived from (a) physical, cognitive, and psychosocial assessments collected at the child level and (b) structured interview data collected at the parent, teacher, and school level.

Analyses of research questions 1 to 3 consist primarily of growth curve modeling (conducted in *HLM 6.08, 2009*) (Raudenbush & Bryk, 2002; Raudenbush, Bryk, Cheong, Congdon, & Toit, 2004). Growth curve modeling is a parsimonious technique for analyzing the trajectory of longitudinal data. Key measures related to the development of this study's growth curve models include students' math and reading test scores from kindergarten through eighth grade in addition to race, nation of origin, SES, generational status, and immigrant parents' educational selectively (i.e., their educational attainment relative to the general populations in their native countries). Control variables consist of children's genders, levels of English language proficiency, school-level SES, urban status, school-level minority percentages, and parents' ages at immigration.

By contrast, analyses of research question 4 are based on regression analysis. Educational selectivity serves as the dependent variable, whereas, the main independent variables are derived from factor analysis. The a priori assumption based on the literature was that factors would relate to parental home and school involvement as well as to parental warmth and choice of early childhood education. Control variables similar to those relied upon for the first three research questions are considered for the fourth research question.

Definitions

Definitions related to my study are provided as follow:

1. *Immigrant*. An immigrant is generally defined in the literature as being either a first- or second-generation immigrant.

a. *First-generation immigrant.* A first-generation immigrant generally is described as a person who was born outside of the United States to foreign-born parents and who, subsequently, moved to the U.S. Subcategories of first-generation immigrants based on the time of arrival in the U.S. are common in the literature, but are not uniformly defined. This study relies on Rumbaut's (1997c) classification system. Under Rumbaut's system, the 1.25 generation includes those who arrived during adolescence; the 1.5 generation includes those who arrived at age 6 or later (but prior to adolescence); and the 1.75 generation includes those came to the U.S. prior to age 6 (also called preschool immigrants in the literature).

b. *Second-generation immigrant.* A second-generation immigrant is a person born in the U.S. whose mother or father is a first-generation immigrant.

2. *Nonimmigrant.* Nonimmigrants consist of all persons who are not first- or second-generation immigrants. In the literature, nonimmigrants commonly are referred to as third-generation or above immigrants. This designation recognizes that American Indians are the only true nonimmigrants (from a European perspective). Nonimmigrants also sometimes are referred to as U.S. natives. This study does not rely on the term native because it can be confused with Native American, meaning American Indian.

3. *Involuntary immigrant.* This type of immigrant did not come to the U.S. willingly, but instead was "conquered, colonized, or enslaved" (Ogbu & Simons, 1998, p. 165).
4. *Voluntary immigrant.* This type of immigrant came to the U.S. willingly because of perceptions of greater opportunity in the U.S. (Ogbu & Simons, 1998).
5. *Immigrant educational paradox.* The immigrant educational paradox is a term derived from Rumbaut (1997a, 1997b) to describe a common empirical finding that, on average, immigrants' educational outcomes tend to exceed those of nonimmigrants.
6. *Educational selectivity or relative educational attainment.* These terms refer to the fact that immigrants' educational attainment levels are not well represented by random samples of their home populations (Feliciano, 2005a, 2005b). Consequently, as a whole immigrants from a given country may be more or less highly educated than their home populations.
7. *Socioeconomic status (SES).* SES is a measure of families' household incomes in the U.S., parents' educational attainment, and parents' occupational status in the U.S.
8. *Race.* Education research commonly relies on the terms European American and African American used when referring to race. Like the majority of research on immigration, this study does not rely on these terms because they are not accurate reflections of national origin. (For example, an immigrant who could be labeled European American might be from Australia or Canada.

Likewise, those labeled African American may have immigrated from Haiti, Jamaica, or the West Indies.) Instead, this study utilizes the terms non-Hispanic whites and blacks in keeping with the literature.

Conclusion

This chapter has served as an introduction to this dissertation. It has described viewpoints that have permeated research on immigrant intelligence. Furthermore, this chapter has summarized this study's research questions, objectives, methods and relevant definitions. The next chapter reviews the literature in greater detail to facilitate a better understanding of this study's research questions and methods.

CHAPTER II: LITERATURE REVIEW

The prior chapter provided the rationale for this study, which culminated in four research questions. This chapter begins with a brief overview of the process by which articles were selected for this review. Then, each of the main sections in this chapter reviews the extant empirical and theoretical literature related to each research question. The first main section departs slightly from this general format in that it begins with a description of how immigrant paradoxes originally were conceptualized in the literature.

Selection of Literature

I conducted literature searches in Web of Science supplemented by follow up searches in Educational Resource Information Center (ERIC), Education Full Text, and Education Research Complete. Web of Science is an interdisciplinary database with objective tools useful in evaluating the quality of articles. In particular, this database provides the number of times each reference has been cited by other journals in the database as well as the each journal's impact factor (i.e., the average number of times that an article has been cited by journals in the past two years). I used these tools in conjunction with a review of the titles and abstracts to assure that extant literature was well represented. I also reviewed additional literature that these initial articles cited as being relevant to my research questions.

Research Question 1: Literature Related to the Immigrant Educational Paradox

Rumbaut's Conceptualization of Immigrant Paradoxes

Rumbaut (1997a, 1997b) suggested that researchers typically conceptualize assimilation as a naturally occurring, linear, and highly beneficial process by which immigrants abandon old practices in favor of their new country's more accepted ones. He identified at least the following nine paradoxes that call into question this traditional conceptualization of assimilation:

1. The infant health paradox (i.e., despite lower socio-economic status (SES), immigrants tend to have more favorable prenatal and post-pregnancy outcomes, such as fewer incidents of low birth weight, perhaps due to better diet, other health habits, and psychosocial differences);

2. The adolescent health paradox (i.e., greater exposure to life in the United States is associated with poorer health outcomes and more risk-taking behaviors among adolescents);

3. The identity paradox (i.e., immigrants' self-concepts with respect to their new country many not change in a linear fashion toward greater identification with being an American; rather self-concepts appear to shift over time, often in favor of greater identification with parents' native countries);

4. The socioeconomic paradox (i.e., instead of working toward "achieving [economic] 'parity' with the native majority" (Rumbaut 1997a, p. 946) millions of immigrants are already professionals with high SESs prior to immigrating to the United States);

5. The cultural assimilation paradox (i.e., instead of having no prior knowledge of American culture, immigrants tend to join relatives and social networks with deep, historical U.S. ties);

6. The linguistic paradox (i.e., research indicates that at least two-thirds of immigrants report speaking English only, speaking English very well, or

speaking English well, rather than coming to America with no knowledge of English);

7. The naturalization-political assimilation paradox (i.e., naturalization processes may increase the power of immigrants' dissenting political voices, instead of decreasing such dissent);

8. The selectivity assimilation paradox (i.e., although assimilation might be viewed as a natural process that affects all peoples in the same way, barriers such as self-selection, legal selection, and emigration selection greatly influence assimilation's outcomes); and

9. The immigrant educational paradox (i.e., on average immigrants' educational outcomes tend to exceed those of nonimmigrants).

Although this study is focused on the immigrant educational paradox, I have provided information on all nine paradoxes because the literature on their interrelationships is sparse. However, a review of these interrelationships may indicate factors related to their mutual causation. For example, low-birth weight generally is acknowledged to be related to poor educational outcomes so that the educational paradox and the infant health paradox may have a common connection. Indeed, it would be possible to theorize a connection between all the immigrant paradoxes and educational outcomes in the U.S.

Before reviewing the empirical support for the immigrant educational paradox in the next section, the reader should note that use of the term immigrant education paradox itself is not ubiquitous throughout the literature, even though there is a growing body of literature on the related subject matter (Chiswick & DebBurman, 2004; Farley & Alba, 2002; Feliciano, 2005; Fuligini, 1997; Kao & Tienda, 1995; Palacios, Guttmannova & Chase-Lansdale, 2008; Perreira, Harris & Lee, 2006; Rumbaut 1997a, 1997b; Schwartz & Stiefel, 2006; Tillman, Guo & Harris, 2006). My dissertation also adopts the term immigrant educational paradox out of utility and due to its historical origins within the literature.

Empirical Evidence for the Immigrant Educational Paradox

Corroborating Evidence: Educational Outcomes

Evidence of the immigrant educational paradox is pervasive over a wide variety of educational outcomes, including Grade Point Average (GPA) (Kao & Tienda, 1995), standardized tests scores (Kao & Tienda, 1995), high school completion rates (White & Glick, 2000), overall educational attainment (Chiswick & DebBurman, 2004) and, to an extent, grade retention (Tillman et al., 2006). The following subsections review the corroborating literature related to each of these educational outcomes. Additionally, variables found to have explanatory power with respect to these outcomes are reported. Subsequent subsections review contradictory and ambiguous evidence as well as gaps in the literature related to the immigrant educational paradox.

GPA. Kao and Tienda (1995) found that first- and second-generation eighth-grade immigrants had higher GPAs than their nonimmigrant counterparts based on a nationally representative sample of 24,599 participants in the National Educational Longitudinal Study of 1988 (NELS88). Multivariate regression analysis further suggested that race and SES had explanatory power with respect to immigrants' superior performances. However, for the full sample, the immigrant paradox persisted after controlling for race and SES so that the overall GPAs for first-generation immigrants were on average .17

greater than those of nonimmigrants, whereas second-generation immigrant GPAs were .12 points greater than those of nonimmigrants. (Differences in GPA prior to the introduction of these control variables were not provided.) Kao and Tienda also concluded that behavioral differences between immigrant and nonimmigrant parents were likely to be related to differences in student performance. However, Kao and Tienda demonstrated only that immigrant and nonimmigrant parents' behaviors differed (i.e., in terms of family rules, communication, and school-based parental involvement). They did not introduce these variables into the multivariate regression analysis to test direct associations with GPA.

Fuligini (1997) provided corroborating evidence of Kao and Tienda's findings in terms of grades in math and English for a sample of 1,100 adolescents in grades 6, 8, and 10 from four schools in a California school district. More specifically, on average, first-generation immigrants had GPAs that were .25 higher in math and .30 points higher in reading after controlling for grade level and gender. On average, second-generation immigrants had GPA's that were .14 higher in math and .15 higher in English after controlling for grade level and gender. Fuligini also determine that course enrollment did not differ by generational status (i.e., by first-, second- or third-generation status). Fuligini's findings indicated that the students' own values and behaviors through the amount of time they studied had significant explanatory power in terms of the immigrant educational paradox.

Standardized tests scores. The immigrant educational paradox has been documented via a variety of standardized test scores in addition to being documented in terms of GPA. Kao and Tienda's (1995) results were consistent for NELS88 participants' scores on standardized math and reading achievement tests developed and administered by the National Centers for Educational Statistics (NCES). Likewise, Rosenbaum and Rochford's (2008) found preschool immigrants (i.e., those who immigrated before age 6) outperformed nonimmigrants in reading (but not in math). These findings were derived through hierarchical regression performed on a sample of 9,985 tenth graders in 750 schools throughout the United States participating in the Educational Longitudinal Study of 2002 (ELS2002). Similar to Kao and Tienda's (1995) results, these findings were also based on cognitive tests developed and administered by the NCES. Rosenbaum and Rochford provided additional evidence that immigrants' academic performances were associated with within family capital (i.e., family meals and parental expectations). It also should be noted that Rosenbaum and Rochford's findings do not entirely corroborate the immigrant paradox as is noted in a subsequent section about ambiguities in the immigrant paradox.

Additionally, Schwartz and Stiefel (2006) found evidence of the paradox among fifth and eighth graders in New York public schools from 1997 to 1998 and from 2000 to 2001, where sample sizes ranged from 57,152 to 72,509 based on ordinary least squares regression with robust standard errors. Measures of performance consisted of the McGraw-Hill Test of Basic Skills, the New York State English Language Assessment, the California Achievement Test, and the New York State Math Assessment. In general the explanatory factors regarding the paradox were similar to those previously reported for GPA, although Schwartz and Stiefel also found significant explanatory power regarding (a) whether a language other than English was spoken at the student's home and (b) limited English proficiency (LEP). Finally, Palacios et al. (2008), which is discussed subsequently, is another study that claims to have corroborated the immigrant paradox based on findings from standardized tests. However, these researchers did not uncover the immigrant paradox until after controlling for English language proficiency.

High school completion and overall educational attainment. Although no causal evidence links immigrants' higher achievement to greater levels of educational attainment, some studies do provide evidence that immigrants have higher rates of high school completion as well as greater overall educational attainment. With regard to evidence of greater high school completion, White and Glick (2000) reevaluated the enrollment statuses of 13,152 high school sophomores in 1980 who participated in the High School and Beyond (HSB) survey during the winter of their senior year in February 1982. Multinomial logistic regression indicated that sophomores who immigrated to the United States during adolescence were more likely than nonimmigrants to continue to be enrolled in high school toward the end of their senior year, so that eventual high school graduation appeared to be more probable.

Perreira et al. (2006) found somewhat analogous results for the third wave of the National Longitudinal Study of Adolescents Health (Add Health) sample, a nationally representative sample of seventh to twelfth graders from 1994 to 1995 followed to early adulthood (i.e., ages 18 to 26). High school dropout rates were 14%, 12%, and 15%, respectively, for (a) first-generation immigrants who arrived after age 6, (b) first-immigrant generation immigrants who arrived prior to age 6, and (c) nonimmigrants. Perreira et al. defined dropping out as those who dropped out of high school and had not completed their GEDs by the third wave of data collection. Note that Perreira et al. (2006) did not report significance levels on these descriptive statistics so that only relative magnitudes can be assessed. Additionally, just as with White and Glick (2000), all of Perreia et al.'s findings were not consistent with the immigrant paradox. More information about these inconsistencies are reported in the section about ambiguities in the immigrant paradox.

Chiswick and DebBurman (2004), Farley and Alba (2002), and Glick and White (2004) all reported that the immigrant educational paradox extends to overall educational attainment. Additionally both Farley and Alba (2002) and Glick and White (2004) provided supplemental information about attainment in terms of high school completion. Chiswick and DebBurman utilized a sample of 68,485 adults between the ages of 25 and 64 from the 1995 Current Population Survey (CPS), a secondary data source gathered by the U. S. Census Bureau. Their analyses were based on multivariate regression where educational attainment served as the dependent variable defined by 16 categories ranging from completion of less than first grade to graduate school completion. Findings indicated that, on average, second-generation immigrants obtained about half a year more schooling than nonimmigrants. However, further analysis revealed that this result was concentrated among second-generation immigrants who arrived prior to age 5 and did not hold for first-generation immigrants compared to nonimmigrants.

Like Chiswick and DebBurman (2004), Farley and Alba (2002) relied on the CPS. However, they studied a different time period (from March 1998 to March 2002) and their main sample consisted of 50,613 first-generation immigrants, second-generation immigrants, and nonimmigrants who were between the ages of 25 and 39 in 1999. Analysis consisted of simple bar charts and percentage comparisons based on ethnic groupings without tests of statistical significance. Different ethnic categories for immigrants versus nonimmigrants obscured comparisons. More specifically, ethnic groups for both first- and second-generation immigrants were Asian, European and Canadian, South American, Afro Caribbean, Spanish Caribbean, Central America, Puerto Rican, and Mexican; by contrast, nonimmigrant Americans were defined more racially as non-Hispanic whites, non-Hispanic Asians, non-Hispanic blacks, Puerto Ricans, Mexicans, other Hispanics, and non-Hispanic American Indians.

A greater percentage of first- and second-generational immigrants had bachelors' degrees compared with nonimmigrant Americans, with the exception of those from Puerto Rico and Mexico. Second-generation immigrants had higher percentages of high school diplomas compared to nonimmigrants, except those from Mexico and Puerto Rico. However, as discussed further in the next subsection, the percentage of first-generation Americans without a high school diploma greatly exceeded that of all nonimmigrant categories for all ethnic groups.

In a third study on overall educational attainment, Glick and White (2004) relied on 11,096 participants in the NELS88 at age 20 in 1994. Multinomial logistic regression analysis tested the probability of enrollment in at least a junior college, high school completion only, and less than high school completion. The percentage of first-generation immigrants, second-generation immigrants, and nonimmigrant enrolled at post secondary institution were 67.6%, 63.7%, and 57.8%, respectively. The percentage who had not completed high school two years after their eighteenth birthday were 12.4%, 11.5,% and 10.8%, respectively, for first-generation immigrants, second-generation immigrants, and nonimmigrants. None of these descriptive statistics were tested for statistical significance.

The main explanatory factors found in these studies with regard to the immigrant educational paradox include generational status or age at arrival in the United States (Chiswick & DebBurman, 2004; Farley & Alba, 2002; Glick & White, 2004; Perreira et al., 2006; White & Glick, 2000), gender and race (Chiswick & DebBurman, 2004; Farley & Alba, 2002), educational expectations (Glick &White, 2004), country of origin (Farley & Alba, 2002), and social capital (Perreira et al, 2006;White & Glick, 2000). After controlling for these factors, the immigrant educational paradox tended to persist.

Grade retention. Tillman et al. (2006) relied on two different samples to compare retention rates among immigrant versus nonimmigrant students. The first sample consisted of 6,015 Latino participants in the Panel Study of Income Dynamics (PSID) in both 1990 and 1995 who ranged in age from 5 to 22. The second sample consisted of 1994-1995 participants in the Add Health, in this case a nationally representative sample of 13,593 students enrolled in grades 7 to 10. Survival analysis indicated that first- and second-generation immigrants were no more likely than nonimmigrants to be retained over all their years in school, despite the fact that immigrant children had higher risk factors for retention. These trajectories for retention did differ in that immigrants were more likely to be retained in later school years than were nonimmigrants, although these differences averaged out to be insignificant over students' entire school careers. Once cognitive scores (which were not available for the PSID sample) were added as control variables for analysis of the Add Health sample, first-generation immigrant children were less likely to be retained than nonimmigrant children—which, in a sense, is more directly consistent with the immigrant paradox. This lower likelihood of retention appeared to be driven by gender, with (a) first-generation males being less likely to be retained than nonimmigrant males and (b) first-generation females being equally likely to experience retention as nonimmigrants.

Despite the corroborating evidence for the immigrant educational paradox reported in this section, other attenuating evidence does exist. This evidence can be broken down into (a) entirely or partially contradictory findings, (b) ambiguous constructs and findings, and (c) gaps in the literature related to young children. The next three subsections discuss each of these three areas.

Entirely or Partially Contradictory Evidence

Although the immigrant educational paradox has been identified in numerous datasets, researchers have not always detected the paradox. In fact, Schnepf (2007) found its converse (i.e., that nonimmigrants significantly outperformed both first- and second-generation immigrants in the U.S.) in three prominent international NCES datasets where participants were selected based on national probability-weighted samples. These samples were the Trends in International Maths and Science Study (TIMSS) in 1999, Programme of International Reading Literacy Study (PIRLS) in 2001, and the Programme of International Student Assessment (PISA) in 2003. More specifically, both first-generation immigrants and second-generation immigrants significantly underperformed relative to nonimmigrants on all standardized tests included in these datasets except that the performance of second-generation immigrants was not statistically different from that of nonimmigrants on the PIRLS reading inventory. After controlling for English language proficiency via regression analysis, Schnepf reported that these differences in immigrant and nonimmigrant performances were no longer significant.

Marks' (2005) analysis provided confirmatory evidence for Schnepf's findings regarding the PISA in 2000. Regression analysis indicated that in the United States, all first-generation and second-generation students who spoke a language other than English at home significantly underperformed relative to nonimmigrants in both reading and math. However, second-generation immigrants who spoke English at home did not score significantly differently on PISA measures relative to nonimmigrants. Adding SES as a covariate via hierarchical regression modeling reduced all differences between immigrant and nonimmigrant scores to insignificance.

Neither Schnepf (2007) nor Marks (2005) provided any discussion of the immigrant educational paradox, nor were their studies, which were based on regression analysis performed on nationally representative samples, different from those previously discussed in terms of their fundamental methodologies. Consequently, any comment about why their results differed from those of corroborating studies would be supposition. However, neither study was focused primarily on the U.S. Instead, each study was designed explicitly to provide generalizations about immigrant versus nonimmigrant educational achievement from an international perspective, Schnepf across 10 Organization for Economic Cooperation and Development (OECD) countries and Marks across 20 OCED countries.

Unlike Schnepf's (2007) and Marks' (2005) findings, Glick and White's (2003) results were mixed, rather than entirely contradictory, of the immigrant educational paradox. Their analysis partially corroborated the immigrant paradox regarding educational achievement for 16,376 participants in the NELS88 sample (1990 to 1992), but revealed its converse for 12,810 participants in the HSB sample (1980 to 1982). Both samples followed participants' math and reading achievement performances during their sophomore and senior years of high school. About 20% of NELS88 participants who were missing data in 1990 had math and reading scores in 1992. By contrast, about 7% of HSB participants who were missing data in 1980 had math and reading scores in 1982. Therefore, Glick and White relied on two-step Heckman regression analysis to adjust for the probability of taking each test.

For the HSB cohort, both preschool immigrants (i.e., those who arrived in the U.S. at least six or more years prior to their sophomore year) and second-generation immigrants significantly underperformed nonimmigrants in math. Recent immigrants (i.e., those who arrived in the U.S. no more than five years prior to their sophomore years) and preschool immigrants underperformed compared to nonimmigrants in reading. These findings were consistent after the introduction of control variables for SES, gender, age, grade retention, and family structure. For the NELS88 cohort, preschool immigrants outperformed nonimmigrants in math prior to the introduction of covariates. By contrast, both preschool and second-generation immigrants outperformed nonimmigrants in reading and math after the introduction of the covariates previously listed.

White and Glick (2000), as reported previously, detected some evidence in support of the paradox in the HSB dataset regarding the probability of high school completion. Glick and White's (2003) later findings regarding achievement may hinge on instrumentation differences between the HSB and the NELS88, given that each sample utilized different standardized tests. However, this possibility appears to be somewhat mitigated by the fact that Schnepf's (2007) results were consistent across a variety of standardized tests. Additionally, Glick and White (2003) reported in a footnote that they utilized only half of the original HSB sample of about 30,000 participants because of students' lack of senior year participation. Alternatively, all aspects of the immigrant educational paradox may not hold over all time periods.

Ambiguities in the Evidence about the Immigrant Paradox

Taken as a whole, evidence about the immigrant educational paradox is unclear about which generations of immigrants outperform nonimmigrants. For example, Perreira et al. (2006) found that the magnitudes of only first-generation immigrants' high school completion rates exceeded those of nonimmigrants. The magnitudes of second-generation's completion rates were lower than those of nonimmigrants. However, Farley and Alba's (2002) findings indicated that second-generation immigrants' high school completion rates were greater than that of nonimmigrants, but that first-generation immigrant completion rates were lower. The differences in findings may have occurred because Perreira's sample was based on immigrants who were enrolled in U.S. schools, whereas Farley and Alba's sample was based on the entire U.S. population regardless of whether immigrants ever attended U.S. schools.

Another ambiguity in the literature arises with regard to evidence about the importance of immigrants' ages at arrival in the U.S., which is associated with several nebulous classifications of generational status. White and Glick (2000), for instance, found that children who immigrated as adolescents were less likely to drop out of school compared to those who immigrated prior to adolescence, so that later immigration was more favorable. Chiswick and DebBurman (2004), however, found that overall educational attainment was more likely to be greater for second-generation immigrants who arrived prior to age 5. Additionally, Rosenbaum and Rochford (2008) found that the immigrant paradox held regarding achievement for students who immigrated prior to age 6, whereas nonimmigrants outperformed immigrants who arrived in the country after age 6.

In addition to ambiguities in empirical findings, studies of the immigrant paradox are difficult to compare due to ambiguities in their empirical constructs. First, immigrant status is not always defined consistently. In some studies, immigrant status is determined only by whether students' mothers were foreign-born (e.g., Kao & Tienda, 1995; Palacios et al., 2008). In other studies, both parents' heritages are considered (e.g., Farley & Alba, 2002; Perreira et al., 2006). Additionally, many studies distinguish only between first- and second-generation immigrants (e.g., Chiswick & DebBurnam, 2004; Farley & Alba, 2002; Glick & Hohmann-Marriott, 2007). Others make further distinctions between the ages at which students immigrated to the U.S. when determining generational status (e.g., White and Glick, 2000) or consider not only when students themselves arrived in the U.S., but also when their parents arrived in the U.S. in the determination of children's generational status (Glick & Hohmann-Marriott, 2007). An additional distinction between studies is that, although they typically rely on a cohort approach by comparing educational outcomes across same-aged peers (Kao & Tienda, 1995; Chiswick & DebBurnam, 2004), some studies consider at least in part educational outcomes for the same families across generations (Farley & Alba, 2002; Perreira et al., 2006). Finally, some studies claim to corroborate the immigrant paradox if it holds only after the introduction of control variables (Palacios et al.'s, 2008), although the paradox was not originally conceptualized in this manner (Rumbaut 1997a, 1997b).

Sparse Evidence in the Literature Regarding Young Children

Comprehensive evidence about the immigrant educational paradox is attenuated further by a gap in the literature related to the timing of its development. Key questions related to the paradox's development include: (1) When is the paradox initially detectable (i.e., in preschool, primary school, or secondary school children), and (2) does the gap between immigrant and nonimmigrant educational outcomes tend to increase, decrease, or remain constant over time? These questions about the initial statuses and changes in the paradox cannot be resolved entirely based on the extant empirical evidence because neither of the two available studies about the paradox during early childhood (Glick & Hohmann-Marriot, 2007; Palacios et al., 2008) follows participants beyond third grade. Hence, no evidence connects the early trajectory of the paradox to outcomes based on the more robust literature that relies chiefly on adolescent samples.

The remainder of this section reviews Palacios et al.'s (2008) and Glick and Hohmann-Marriott's (2007) evidence about the development of the paradox. Palacios et al. (2008) claimed to corroborate the immigrant educational paradox with regard to reading skills based on a sample of 16,395 participants in the Early Childhood Longitudinal Study—Kindergarten Cohort of 1998 (ECLS-K). However, Palacios et al.'s (2008) did not weight their analytical sample. Hence, their findings do not pertain to a nationally representative sample. In particular, the raw ECLS-K sample is intentionally over representative of certain minority groups such as Asians. Furthermore, the paradox was not uncovered via hierarchical linear modeling (HLM) analysis for raw standardized test scores alone; instead immigrant and nonimmigrant scores were not statistically different. Only after controlling for English language proficiency (ELP) did (a) first- and second-generation children's initial scores in the spring of kindergarten and (b) first-generation children's growth rates through spring of third grade exceed those of nonimmigrants.

More specially, after controlling for English proficiency, first-generation and second-generation students outscored their nonimmigrant peers by 2.31 points and 1.98 points in reading, respectively, in spring of kindergarten. Additional controls for race and maternal education eliminated immigrants' initial advantages in kindergarten. By third grade, the gap between first-generation students' scores and nonimmigrant scores had increased to 4.46, more than a fifth of a standard deviation. Including additional control variables (i.e., SES, parenting quality, and preschool education) explained only about 20% of this difference. Following the inclusion of these same control variables, second-generation immigrants' growth rates exceeded those of nonimmigrant students with an effect size of less than a tenth of a standard deviation for all models analyzed.

In contrast to Palacios et al.'s (2008) examination of immigrant paradox with regard to reading achievement, Glick and Hohmann-Marriott (2007) relied on the ECLS-K to examine math achievement. However, these authors did so only across two time points in the database (i.e., spring of first grade to spring of third grade). Based on raw standardized math scores, immigrant children underperformed relative to nonimmigrant children. Using hierarchical regression to control for differences in demographics, second-generation immigrants continued to underperform relative to their nonimmigrant peers. Students who Glick and Hohmann-Marriott (2007) refer to as the 1.5-generation (which is analogous to what Palacios calls the first-generation) outperformed nonimmigrants only after the introduction of variables controlling for race, English language proficiency, early childhood education, and parental school involvement. The performance of second-generation immigrants was not statistically different from that of nonimmigrants after the introduction of these control variables.

Theoretical Framework for the Educational Immigrant Paradox

Three potentially related theories--immigrant optimism (Kao & Tienda, 1995), immigrant selectivity (Borjas, 1987), and the cultural ecology theory of school performance (Ogbu & Simons, 1998)--serve as possible explanations for the immigrant educational paradox. Kao and Tienda (1995) hypothesized that immigrant optimism might drive first- and second-generation immigrants' educational outcomes in the following manner: Many immigrants face worse obstacles outside the U.S., which prepare them for the adversities they encounter when they arrive in the U.S. These immigrants further expect upward mobility for themselves and for their children after addressing these initial adversities, and, thus, are "more creative in inventing pragmatic solutions to their current predicaments . . . [whereas, nonimmigrant] minorities . . . [are] disillusioned with prospects of upward mobility because of their real experiences with discrimination" (p. 5).

In addition to being related to optimism, immigrants' educational outcomes may be related to immigrant selectivity. In other words, immigrants' traits do not typically mirror the true population characteristics of those in their native countries (Borjas, 1987). Theoretically, for selection to explain the immigrant educational paradox, positive selection would need to outweigh negative selection. In other words, more immigrants with strong educational orientations and abilities would be required to immigrate to the U.S. compared to those without such orientations and abilities. A somewhat related theory, Ogbu's cultural ecology theory of school performance (Ogbu & Simons, 1998) suggests that voluntary immigrants are likely to have strong educational orientations, whereas involuntary immigrants are not (Ogbu & Simons, 1998). Hence, the paradox could be explained by more voluntary than involuntary immigration to the U.S.

Research Question 2: Literature on the Explanatory Power of Race and Nation of Origin

The Explanatory Power of Diversity Between Races

Although research often supports the immigrant paradox, it also identifies diversity in immigrants' educational outcomes, a considerable portion of which is typically attributed to race (Farley & Alba, 2002; Glick & White, 2000; Kao & Tienda, 1995; Perreira, et al., 2006). As this portion of the literature review demonstrates, the explanatory power of race, however, (a) varies by type of educational outcome within studies and (b) is difficult, if not impossible to compare, across studies. The literature itself is mute about both of these issues.

Kao and Tienda (1995), which was described in more detail in the prior section, provides what appears to be the only study in the literature that examines four educational outcomes: grades, math test scores, reading test scores, and college aspirations. Therefore, assessing the variability of the immigrant paradox across educational outcomes is possible without concern about differences in designs across studies. More specifically, Kao and Tienda detected the presence of the educational paradox consistently only for Asian children across all educational outcomes. The paradox was uncovered (a) for Hispanics students' college aspirations only, (b) for first-generation black students' grades and math scores, (c) for second-generation black students' reading scores only, and (d) for second-generation non-Hispanic white students' grades only.

The remainder of this section compares the evidence related to academic outcomes segmented by race across studies on GPA, standardized test scores, and educational attainment. Grade retention is excluded from this portion of the review because only one study relates to that outcome (Tillman et al., 2006). More information about of all the studies presented here is available in the first main section of this chapter.

GPA

After controlling for SES and generational status, Kao and Tienda's (1995) regression analysis indicated that being Asian (compared to being white) was not significantly associated with GPA. Students who were Hispanic or black had significantly lower GPAs relative to white students. By contrast, after controlling for grade level, generational status, SES, and home language usage, Fuligni (1997) reported that being East Asian (compared to being non-Hispanic white) was associated significantly with having a higher GPA. Similar to Kao and Tienda's findings, being Latino relative to being non-Hispanic white was associated negatively with GPA. Instead of including black students as did Kao and Tienda, Fuligni also studied Filipino students who were not found to have GPAs that were different from non-Hispanic whites.

Forming a consistent generalization across these studies is complicated by Kao and Tienda's (1995) use of a nationally representative sample and Fuligni's (1997) use of sample of four schools in California. Furthermore, neither study examined the same set of races nor included the same set of other covariates. (Specific information about these covariates is provided in the preceding paragraph.) Additionally, each study is over ten years old and does not necessarily generalize to more recent student populations.

Standardized Tests Scores[3]

After controlling for generational status and SES, Kao and Tienda (1995) found that Asian, Hispanic, and black children all had lower math and reading scores than white children did, except that Asian children's math scores were not statistically different from those of white children. Palacios et al. (2008) and Schwartz and Stiefel (2006) results for Hispanic and black children were similar to Kao and Tienda's. However, both determined that Asian children significantly outperformed white children. Palacios et al. (2008) results applied to reading scores for children in kindergarten through third grade. Although Schwartz and Stiefel's (2006) sample consisted of both eighth and fifth graders in New York public schools, comparisons of reading and math scores by race were presented for fifth graders only.

When the interaction effects between generation and race were examined, Kao and Tienda (1995) reported that both first- and second-generation Asian students outperformed nonimmigrant Asians. Additionally, first-generation blacks outperformed nonimmigrant black children in math, and second-generation black children outperformed nonimmigrant black children in reading. Schwartz and Stiefel (2006), however, concluded that foreign-born Asians underperformed U.S. born Asians in both fifth and eighth grade reading with information on math performance not being provided. Schwartz and Stiefel (206) did not provide this information for first-generation black students in reading or for second-generation black students in math. Additionally,

[3]Rosenbaum and Rochford (2008) is omitted from this section because although it does control for race, it does not provide results about race.

Schwartz and Stiefel's interaction effects were not defined in the same manner as Kao and Tienda's because Schwartz and Stiefel included second-generation Asians as being U.S. born. Palacios et al. (2008) did not provide interaction effects between race and generational status.

For similar reasons as those cited for the studies related to GPA, differences in study designs that rely on standardized test scores may preclude generalizations regarding race. Schwartz and Stiefel's (2006) sample was regional, whereas Kao and Tienda's (1995) and Palacios et al.'s (2008) samples were nationally representative of different periods and different grade levels (i.e., (a) 1988 compared with 1998 and (b) eighth graders compared with kindergartners followed through third grade). Additionally, each study incorporated different covariates and the interaction effects that are available were not defined in a comparable manner.

High School Completion

White and Glick (2000) found that black and Asian students had significantly higher odds of dropping out by February of their senior years compared to non-Hispanic white students after controlling for generational status, age, gender, and sophomore test scores. Mexican, Cuban, Puerto Rican, other Hispanics, and West Indian students did not have statistically different probabilities of dropping out compared to white students. By contrast, Perreira et al. (2006) found that all generations of Hispanic students had significantly greater probabilities of dropping out compared to nonimmigrant whites. Only first-generation Asians had a significantly lower chance of dropping out than nonimmigrant whites. Nonimmigrant blacks also had a significantly greater chance of dropping out than nonimmigrant whites, but the dropout rates for immigrant black students did not differ statistically from that of nonimmigrant whites. This analysis controlled only for race, gender and age. Although Perreira et al. and White and Glick utilized nationally representative samples, the studies differed fundamentally because participants in Glick and White's sample were seniors in high school, but Perreira et al.'s sample consisted of young adults ages 18 to 26. As previously discussed, Perreira et al. defined dropout rates as those who did not graduate from high school on time as well as those who did not obtain their GEDs.

Educational Attainment

Conclusions about total educational attainment by race cannot be made based on Farley and Alba (2002). They reported immigrants' ethnic statuses mainly by country of origin, and nonimmigrants' ethnic status primarily by race. Chiswick and DebBurman (2004) accounted for race among black and Hispanic participants only in regression models, which also controlled for age, age squared, gender, urban dwelling, marital status, living in the south, and age at immigration. Results indicated only that (a) first-generation black and Hispanic educational attainments were lower than first-generation immigrants of other racial groupings, (b) second-generation Hispanics' attainments were lower than all other second-generation groups and (c) both black and Hispanic nonimmigrant underperformed relative to all other nonimmigrant racial groups.

Glick and White (2004) found that both first- and second-generation Asians had greater likelihoods of post-secondary enrollment relative to nonimmigrant Asians after controlling for SES, family structure, and previous school performance. The likelihood of first-generation blacks post-secondary enrollment was greater than that of black nonimmigrants. First- and second-generation participants of non-Mexican Hispanic origin had a greater likelihood of post-secondary enrollment than nonimmigrants of non-Mexican Hispanic origin. Finally, first-generation non-Hispanic whites had greater likelihoods of post-secondary enrollment compared with non-Hispanics whites.

As the prior discussion reveals, the designs of these studies differed in terms of their specifications related to racial comparison. Additionally, their covariates differed fundamentally. Finally, their samples differed. Chiswick & DebBurman (2004) was based on a sample of the entire U.S. population (where immigrants might have received education outside the U.S.). By contrast, participants in Glick and White's (2004) sample had been enrolled in U.S. high schools.

Diversity of Educational Outcomes Within Race

The prior section suggests that although race consistently has explanatory power regarding the immigrant paradox, the hierarchy of immigrant performance by race is unclear, if it indeed exists. Additionally, the literature reviewed in this section suggests that diversity within races has significant explanatory power regarding the immigrant paradox. This subsection reviews diversity within race organized according to the largest racial categories in the United States: non-Hispanic whites, Hispanics, Asians, and blacks (U.S. Census Bureau, 2007).

Diversity within Non-white Hispanic Immigrants

Eastern Europeans have represented a considerable portion of new U.S. immigrants following the dissolution of the Soviet Union (Robila, 2007). In fact, the Russian Federation, Poland, and Ukraine placed in the top 10 countries with peoples immigrating to the U.S at least six times measured annually from the period from 1991 to 2001. Rather than being homogenous, Eastern European immigrants represented at least

17 diverse nationalities based on the 2000 U.S. Census. When segmented by prior nationality, educational attainment and measures often associated with educational outcomes, such as SES and English language skills, also varied considerably among these immigrants. Robila reported that the percentage of Eastern European immigrants who graduated from high school or higher varied from a low of 65.6% to a high of 92% when ranked by prior nationality, whereas as the percentage of Eastern European immigrant families who lived in poverty ranged from 3.9% to 20.3%. In addition, the percentage who reported speaking English very well ranged from 30.7% to 66.1%.

Robila (2007) noted a dearth of studies that examine Eastern European immigrant groups. Instead, she stated that most studies on immigrants have concentrated on immigrants of Asian and Hispanic origins. Similarly, this review uncovered no study on the immigrant education paradox that considers diversity within European countries. In fact, only three studies considered Eastern Europeans as a separate, homogenous group at all (Chiswick & DebBurman, 2004; Glick & Hohmann-Marriott, 2007; Schwartz & Stiefel, 2006). Glick and Hohmann-Marriott's (2007) analysis of the combined performances of first- and second-generation immigrants' math performances indicates that Eastern Europeans performances were significantly greater than those of white nonimmigrants on third grade math scores after controlling for race and country (or region) of origin only. Chiswick & DebBurman's (2004) analysis indicated that Eastern and Central Europeans immigrants (viewed as a combined group) had higher educational attainments compared to nonimmigrants. This analysis included 12 other covariates to control for demographic characteristics, generational status, and English speaking countries. Schwartz and Stiefel (2006) provided results of similar significance in terms of academic achievement among fifth and eighth grade students in New York public schools. Their analysis classified Eastern Europeans as a self-contained group, relied on nonimmigrants as the reference group, and controlled only for country (or region) of origin.

Diversity within Black Immigrants

In their literature reviews on black immigrants, Rong and Fitchett (2008) and Rong and Brown (2002) cited a lack of empirical literature on black immigrants relative to the literature on Hispanic and Asian immigrants. Additionally, these authors explained that studies on diversity in black immigrant groups have been restricted primarily to an examination of black immigrants of Caribbean origins. Similarly, my own literature search uncovered no studies of the immigrant paradox that analyzed diversity within black immigrants in addition to including Asian and Hispanic participants.

Rong and Brown (2001), however, provided an analysis of European white, African, and Caribbean black immigrants educational attainments compared to the corresponding nonimmigrant pan-nationalities. Two separate questions, one for race and one for ancestry, on the U.S. Census Bureau's 1990 Public Use Microdata Samples (PUMS) determined each participant's pan-nationality. Rong and Brown limited participants in their analytical sample to those were from ages 15 to 24 and living with a parent or guardian in 1990. They also excluded immigrants who arrived in the U.S. after age 18 from their analytical sample to assure that participants had at least some exposure to the U.S. educational system. The resulting analytical sample contained 702,844 European whites, 121,676 African blacks, and 2,388 Caribbean blacks (from Haiti or Jamaica).

Descriptive statistics standardized for participants' ages indicated that both first-generation and second-generation Africans and Caribbean immigrants had more years of educational attainment than nonimmigrants. More specifically, Africans of first-generation, second-generation, and nonimmigrant status had mean age-adjusted total years of education of 10.97, 11.12, and 10.71, respectively. Caribbean blacks of first-generation, second-generation and nonimmigrant status had mean age adjusted years of education of 10.96, 11.31, and 10.77, respectively. However, European whites had numerically higher age adjusted means of 11.13, 11.27, and 10.98 for the first-generation, second-generation and nonimmigrant, respectively. Rong and Brown did not assess these descriptive statistics in terms of their statistical significance.

Multivariate regression analysis controlling for age, generational status, gender and years of parental education indicated that both first- and second-generation Africans had greater educational attainments than nonimmigrant Africans. Second-generation Caribbean blacks had greater educational attainments than nonimmigrants, but the attainments of first-generation and nonimmigrants Caribbean blacks were not significantly different. Rong and Brown did not report whether Caribbean blacks and Africans had significantly different educational attainment by generational status. However, their age standardized levels of educational attainment (reported in the prior paragraph) appear to be relatively the same.

Nonetheless in their discussion and implications Rong and Brown (2001) argued for greater recognition of the diversity in black immigrants' identities among educators. Rong and Fitchett (2008) and Rong and Brown (2002) reiterated this argument without additional evidence that these differences are connected to differences in academic outcomes. As part of their evidence for diversity in immigrant black identities, Rong and Brown (2001) referred to Waters (1994), a qualitative study of 83 second-generation, black, adolescent immigrants living in New York City. Waters' sample was part of a larger study designed to analyze patterns of immigrant assimilation and immigrants' opinions on U.S. race relations. The larger study consisted of 212 one to two hour interviews of 72 first-generation immigrants, 83 second-generation immigrants and 27 whites, and 30 native born blacks conducted from 1990 to 1992. Waters (a white female), two second-generation Caribbean research assistants, or a black research assistant conducted all of the interviews. The second-generation sample contained 45 students from inner city New York City high schools, 14 students from Catholic parochial school, 15 teenagers interviewed on the streets, and 9 teenagers from a middle class sample whose families had moved or who were attending magnet schools or colleges outside of New York City. Participants ranged in age from 14 to 21 and the average age was 17.

Analysis of these interviews indicated that 42 percent of immigrants identified with black Americans and foresaw limited opportunities in their futures and perceived racial discrimination; 30 percent identified with their parents' nationality (which included Haiti, Jamaica, Trinidad, and the West Indies) and had greater perception of future opportunities; and 28 percent identified themselves as being essentially neutral (i.e., having both a strong connection to their parents' native countries, but not being concerned about whether others classified them as white or black). Waters did not provide any analysis about whether these racial identities were associated with parents' countries of origin. Instead, her analysis suggested that these identities were associated with SES. In particular, those who identified most closely with their parents' nationality tended to be more middle class (57%) than working class or poor (17%). Students who lived in the greatest amount of poverty tended to have neutral identities or to identify with U.S. born blacks.

Additionally, these identities were associated with whether or not the students were U.S. born: 67% of those who identified with U.S. blacks were born in the U.S., 13% of those who were neutral were born in the U.S., and 42% of those who identified with their parents nationality were born in the U.S. These percentages suggest that Waters departed from the usual definition of second-generation immigrants being children born in the U.S. to foreign-born parents. However, her text did not provide her of definition second-generation immigrant. Finally, despite the identification of these ethnic identities among black immigrants, Waters does not provide any connection between these identities and participants' educational outcomes.

Benson (2006) provided perhaps the only evidence of diversity in educational attainment among black immigrants in addition to providing a connection between educational and ethnic identity. However, in the association he detected educational attainment served as an independent variable and ethnic identify as the dependent variable. More specifically, Benson relied on the Multi-City Study of Urban Inequality (MCSUI) sample, a probability weighted sample gathered from 1992 to 1994 in Boston, Atlanta, and Los Angeles in which respondents were required to be 21 or older. The analytical sample consisted of 2,251 native born black adults and 233 blacks born in the West Indies, Africa, Dominican Republic, Haiti, Puerto, or Central America. Race was self-reported and a designation for second-generation immigrants was not included in the analysis.

Descriptive data indicated that foreign-born blacks were more educated than U.S. born blacks (i.e., 13.82 years compared to 12.94 years). Foreign-born blacks from Africa had significantly more education (14.73 years) than average foreign-born blacks, whereas Puerto Rico and Dominican Republic were significantly less educated at 11.57 and 8.75 years, respectively. Foreign-born blacks also had greater levels of unemployment than U.S. born blacks (i.e., 82% compared with 61%) and were more likely to live in the same neighborhood as whites.

Hierarchical regression models with robust standard errors indicated that foreign-born blacks were less likely to perceive the labor market as discriminatory compared with U.S. born blacks. However, immigrants with higher levels of education are more likely to perceive the labor market as discriminatory against blacks. Foreign-born blacks also had 30% lower odds of identifying with native-born blacks.

In sum, the extant literature provides little analysis of diversity of educational outcomes within black immigrants. Differences in educational outcomes have been argued to be connected to differences in racial identity (Rong & Brown, 2001). Evidence of diversity in immigrant attitudes is available (Waters, 1995). However, the available evidence suggests that racial identity is an outcome of years of educational attainment, although Benson (2006) provided no theoretical evidence for this directionality.

Diversity within Hispanic Immigrants

The majority of studies on the immigrant paradox defined Hispanics as a homogeneous group so that diversity within the Hispanic race was not analyzed (Farley & Alba, 2002; Fuligini, 1997; Kao & Tienda, 1995; Palacios et al., 2008; Perreira et al., 2006; Rosenbaum & Rochford, 2008; Schwartz & Stiefel, 2006). Of the five studies uncovered that do present information about Hispanics by country of origin, four indicated that educational outcomes differ by nation of origin (Chiswick & DebBurman, 2004; Glick & Hohmann-Marriott, 2007; Glick & White 2004; Tillman et al., 2006). One study did not find any diversity in Hispanic outcomes by nation of origin (White & Glick, 2000).

Chiswick and DebBurman (2004) examined three Hispanic subgroups: those from (a) Mexico, (b) Cuba, and (c) South and Central America (combined). First-generation Cuban's educational attainment was not significantly different than that of the reference group (i.e., all foreign-born adults from English speaking countries), whereas, first-generation (a) Mexican's and (b) South and Central American's educational attainments were significantly less than the reference group's. These results were reported after the inclusion of 10 other demographic control variables. Chiswick and DebBurman did not provide analogous information about second-generation Hispanic's educational attainment.

Glick and White (2004) found that students of Mexican origin did not have a significantly different probability of post-secondary enrollment (over simply graduating from high) school compared with nonimmigrant Hispanics. However, other non-Mexican first- and second-generation Hispanics did have greater probabilities of post-secondary enrollment over graduating from high school compared with other non-Mexican, nonimmigrant Hispanics. Demographic factors and SES served as the only control variables for this portion of the analysis. By contrast, White and Glick (2000) found that Mexican, Cuban, Puerto Rican, and other Hispanic students did not have statistically different likelihoods of high school completion relative to whites. This analysis was controlled for generational status, gender, participant's ages, and sophomore test scores.

Additionally, Glick and Hohmann-Marriott (2007) examined five categories for the following combined groups of second- and first-generation Hispanics: Mexicans, Puerto Ricans, Central Americans, South Americans, and Cubans. South American and Cuban children did not perform statistically differently from nonimmigrant on third grade math achievement tests relative to nonimmigrant, non-Hispanic whites. By contrast, Mexican, Puerto Rican, and Central American children performed significantly lower than nonimmigrant, non-Hispanic whites. These findings were reported after controlling for race and country of origin only.

Tillman et al. (2006) found that Puerto Rican students had higher odds of grade retention relative to non-Hispanic white students after controlling for grade level and generational status. However, Cuban, Mexican, and other Hispanic students did not have greater odds of grade retention relative to non-Hispanic white students after controlling for the same covariates.

Qualitative and mixed method studies also indicated variability in Hispanic immigrants' educational outcomes by country of origin and beyond country of origin. Portes and Zhou (1993), attributed diversity in some Hispanic educational outcomes to nation of origin when they developed their highly cited theory on segmented assimilation (i.e., all immigrants do not experience upper mobility, but instead assimilate into different socio-economic layers of U.S society). In particular, Portes and Zhou explained that Cuban Americans generally were well established in the U.S. with their children experiencing few challenges from discrimination and little exposure to poorer minority groups, but having relatively extensive economic opportunities. However, Portes and Zhou characterized Nicaraguans as being later U.S. arrivals who were less welcomed by those in the U.S. mainstream. These researchers stated that Cubans aided the Nicaraguans because of common political ideologies, so that Nicaraguans tended to advance in society but were typically less economically prosperous than Cubans. Additionally, based on a sample of 1,786 second-generation immigrants in Miami and Ft. Lauderdale inner city, private, and suburban schools,[4] Pores and Zhou determined that second-generation Cuban students had higher mean SES and higher college education aspirations than Nicaraguans.

Portes and Zhou (1993) also highlighted difference in Hispanic groups within nationality by recounting Matute-Bianich's (1986) ethnography of 35 Mexican students conducted at a high school in the coastal region of California over a two-year period. Matute-Bianich selected students for her study based on their grades, attendance records, their curricular tracks, and their agreement to participate in her study. Additionally, she consulted school personnel so that her sample included what she termed successful and unsuccessful students. This ethnography revealed five types of Mexican students: recent Mexican immigrants who tended to do well academically if they spoke Spanish well (which was attributed to better education in Mexico); the highest academic performers, bicultural Mexican students; Mexican-American students, who were at least second-generation immigrants and Americanized to the extent that they often did not understand Spanish; and the more dissident Chicanos and the Cholos who often did poorly in schools.

[4]No other information on this sample was provided other than all participants had been in the U.S. for at least five years and that all eligible participants were included in the sample. Whether or not additional eligibility restrictions applied was not stated.

Finally, Carreón, Drake, and Barton's (2005) ethnography based on grounded theory suggests diversity in parental practices and social capital, variables potentially associated with immigrant paradox (Glick &White, 2004; Kao & Tienda, 1995; Perreira et al, 2006; White & Glick, 2000). The three participants in this study were assigned the pseudonyms Celia, Pablo, and Isabel. Carreón et al. (2005) selected these participants because their parenting styles represented a full range of parental engagement strategies. Additionally, Celia, Pablo, and Isabel's children were all originally enrolled in one of two Texas elementary schools where more than 90% of students were eligible for free lunch.

Despite linguistic and cultural barriers, Celia was involved in most aspects of her son's education including participating in PTA meetings and forging personal relationship with teachers. Carreón et al. (2005) labeled her parental involvement as that of a strategic helper. Pablo's limited English proficiency as well as his job prevented him from having active involvement in his three son's school-based activities. He was able to build relationships with some of his children's teachers as well as to rely on support in this community to assist his children with their educations, but his main form of school engagement was interacting with his children at home while they did their homework. He concluded that his presence and interest alone might convey the importance of education although he was not always able to help his children with their schoolwork itself. Carreón et al. (2005) labeled Pablo's involvement as teaching by example. Finally, Carreón et al. (2005) labeled Isabel's parental involvement as being a listener. Uncomfortable with her daughter's school environment and her own inability to speak English, Isabel lacked community support and did not build relationships with any of her child's teachers.

Instead, Isabel attempted to talk with her daughter about school on a daily basis and to read all materials that teachers sent home.

Diversity within Asian Immigrants

The majority of studies on the immigrant paradox defined Asians as a homogeneous group so that diversity within the Asian race could not be analyzed (Farley & Alba, 2002; Glick & White, 2004; Kao & Tienda, 1995; Palacios et al., 2008; Perreira et al., 2006; Rosenbaum & Rochford, 2008; White & Glick, 2000). Of the five studies that do examine diversity within Asian immigrants (Chiswick & DebBurman, 2004; Fuligini 1997; Glick & Hohmann-Marriott, 2007; Schwartz & Stiefel, 2006; Tillman et al., 2006), four revealed evidence of diversity within the Asian race. Evidence from the fifth study (Schwartz & Stiefel, 2006) also might be classified as providing marginal evidence in support of diversity in educational outcomes within the Asian race.

Fuligini (1997) reported that East Asians in his sample had higher GPAs compared with whites after controlling for generational status, grade level, SES, and home language usage. However, the other Asian group he examined, Filipinos, did not have significantly different GPAs than white students. Tillman et al. (2006) found that Chinese and Filipino students are less likely to be retained than non-Hispanic white children after controlling for grade level, generational status, and gender. By contrast, the likelihood that other Asians would be retained was not statistically different than that of non-Hispanic white children.

Chiswick and DebBurman (2004) examined six Asian subgroups: those from the Philippines, China, Vietnam, East Asia, South Asia, and all other Asian countries. When viewed from this perspective, three out of six of these groups did not exhibit the immigrant paradox with respect to first-generation educational attainment. Instead, attainment was (a) not significantly different than that of the reference group (i.e., all foreign-born adults from English speaking countries) for first-generation Chinese immigrants and (b) significantly lower than that of the reference group for Vietnamese and other Asian immigrants. These results were reported after the inclusion of 10 other control variables including gender, two adjustments for age, two adjustments for age at immigration, marital status, urban status, and two adjustments for race (i.e., being black or Hispanic). (This information about Asian performance was not provided for second-generation immigrants.)

Additionally, Glick and Hohmann-Marriott (2007) examined six categories for a combined group of first- and second-generation Asians in terms of math achievement scores: Philippines, Laos and Cambodia, Chinese, East Asian, Vietnam, and other Asian. Both children from (a) Laos and Cambodia and (b) other Asian countries did not perform statistically differently from nonimmigrant, non-Hispanic whites. The other groups of Asian immigrants did outperform nonimmigrant, non-Hispanic whites. These findings are reported after controlling for race and country of origin only.

Schwartz and Stiefel (2006) found that in their sample of New York public school students, all groupings of Asian students (i.e. those from China, East Asia, South Asia, and West Asia) significantly outperformed nonimmigrants students in fifth and eighth grading reading ($p < .05$) with the exception of West Asian students in eighth grade reading. When the prior year reading scores were added as a control variable, neither Southern Asian nor West Asian students significantly outperformed nonimmigrants. Unlike most other studies reported in this section, the reference group was not white students, but all nonimmigrant students regardless of their racial background. Additionally, Schwartz and Stiefel did not present specific results for math scores, but a footnote described these results as being similar.

Theories for Using Race and Nation of Origin to Explain Academic Outcomes

As chapter 1 discussed, the histories of the immigration laws and intelligence testing have been intermingled with race to the extent that race was once seen as a proxy for immigrant intelligence (Graves, 2005). Currently, this historical association between race and intelligence has eroded to the extent that a growing body of genetic research questions the genetic existence of race (Barbujani, 2005; Barbujani, Magagni, Minch, & Cavalli-Sforza, 1997; Duprè, 2008; Graves, 2005; Keita et al., 2004). However, it is beyond the scope of this dissertation to evaluate the quality of such evidence.

Much of the research on the immigrant educational paradox itself provides no explicit theory for including explanatory variables for race or country of origin (Farley & Alba, 2002; Fuligini, 1997; Kao & Tienda, 1995; Rosenbaum & Rochford, 2008; Palacios et al., 2008; Schwartz & Stiefel, 2006; Tillman et al., 2006; White & Glick, 2000). Instead, when these studies provide justification for including these variables, they cite prior empirical findings. A few studies do provide a theoretical basis for the inclusion of race or country of origin. Perreira et al. (2006) relies on Alba and Nee's (2003) new assimilation theory and Portes & Zhou's (1993) theory of segmented assimilation. Additionally, Glick and White (2004), Rong and Brown (2001), and Chiswick and DebBurman (2004) test Ogbu's cultural-ecological theory of school performance.

A review of these theories reveals that none are based entirely on race or on nation of origin (Alba & Nee, 2003; Portes & Zhou, 1993) and that one is based on neither

(Ogbu & Simmons, 1998). Under the theory of new assimilation (Alba & Nee, 2003), the mainstream U.S. culture is purported to evolve with the arrival of new immigrants. Interconnected layers of U.S. society contain considerable diversity, so that although assimilation reduces ethnic distinctions, ethnicity is not necessarily eliminated. Proximal causes of assimilation function at the individual and social network level, and distal causes of assimilation arise from the cultural norms of the government and labor markets. Finally, social, financial, and human capital determine immigrants' rates of assimilation. When discussing the concept of ethnicity—which is central to their theory--Alba and Nee typically referred to immigrants' nations of origin. However, they conceded "to be sure, racial differences have important effects [on assimilation]; but skin color is not the only trait by which immigrants and their children are evaluated" (p.48).

As previously discussed, the theory of segmented assimilation (Portes & Zhou, 1993) concludes that all immigrants do not experience upper mobility, but instead assimilate into different socio-economic layers of U.S. society. The prior subsection explains that this theory was developed in part through comparisons of immigrants by nation of origin as well as by examining diversity within nation of origin. However, Portes and Zhou also state that immigrant skin color is one of three main reasons for downward mobility, with the other two reasons being living in a central portion of a city and being unqualified for jobs in the upper sector of the U.S. economy.

Ogbu & Simmons (1998) traces the origins of Ogbu's career as a theorist and qualitative researcher who studies why minority students perform less well than students in the majority. After a conducting a cross-cultural comparison of minority groups in Britain, India, Israel, Japan, New Zealand, and the United States, Ogbu developed his cultural-ecological theory of school performance. As his theory relates to immigrants, he classified immigrants as voluntary immigrants, those who came to U.S. because they expected better opportunities; refugees, those who were forced to come to U.S. for political reasons and view their time in the U.S. as transitory; and involuntary immigrants, those who came to the U.S. entirely against their own volition. According to the cultural-ecological theory, voluntary immigrants tend to integrate themselves successfully into their new country, refugees are typically motivated to adapt to their host country because they view their situation as temporary, and involuntary immigrants are resentful of mainstream society and perceive that discrimination will prevent them from receiving the same rewards as members of dominate societal groups.

Some empirical research has tested Ogbu's theory by using race (Ainsworth-Darnell & Downey, 1998). However, Ogbu and Simmons (1998) clarified that "the distinction between voluntary and involuntary [immigrant] is not based on race. Rather, it is a part of a general framework that explains the beliefs and behaviors of different minorities regardless of race or ethnicity . . ." (p. 167). Additionally, Ogbu and Simmons emphasized that diversity occurs within voluntary and involuntary immigrant groups and that all voluntary immigrant groups are not the same, just as all involuntary immigrant groups are not the same.

An additional institutionally based reason about why that immigrant academic outcomes vary by country of origin may be related to the differences in quality of the educational systems within each nation. Macias (1993) suggested that often superior performances of Asian students relative to other immigrants can be traced to the historical origins of Asian educational institutions. In particular, he explains the historical role that the United States played in establishing educational systems in the Philippines, Korea, Japan, and Taiwan. Additionally, France established much of the current Vietnam educational system during French rule from 1883 to 1954; the British Empire developed some of the first educational systems in the Philippines; and German practices initially influenced the development of modern educational systems in Japan.

Research Question 3: Literature Related to the Explanatory Power of SES and the Relative Explanatory Power of Parental Education

Empirical Literature

Traditional literature on SES. Besides race, the most widely used explanatory variable in studies of the immigrant paradox is SES (i.e., typically aggregated or disaggregated measurements related to family income, parents' educational attainment, and occupational status). However, no study that detects the immigrant paradox finds that baseline hierarchical models that include SES explains the immigrant paradox (Glick & White, 2004; Kao &Tienda, 1995; Palacios et al., 2008; Rong & Brown, 2001; Schwartz & Stiefel, 2006; Tillman et al., 2006;White & Glick, 2000).[5] Typically, researchers who have detected the immigrant paradox include SES in their baseline model if they utilize hierarchical analysis. Consequently, the isolated effect of SES on immigrants' academic performance goes unreported. Only one exception has been uncovered in the literature. Fuligini (1997) found that SES, measured as parents' occupational statuses and educational attainments, had an uneven impact across

[5]Several researchers relied on alternative measures of SES. Rong and Brown examined only parental education levels. Schwartz and Stiefel (2006) included whether or not students were on free lunch, but not other measures of SES. Fuligini (1997) assessed parents' occupational statuses and educational attainments. Palacios et al. (2008) relied on maternal education levels and income-to-needs ratio.

generations. Although controlling for SES eliminated the gap between second-generation and nonimmigrant students' GPAs, the gap between first-generation and nonimmigrant students remained significant.

Additional evidence indicates not only that SES has differing explanatory power across generations, but also that such differences appear to extend to samples segmented by race. Pong, Hao and Gardner (2005) appears to be the only study that examined the associations among immigrant status, academic outcomes, and SES across race. More specifically, they assessed the GPAs of 17,996 white, Asian, and Hispanic students from the first wave of the Add Health Survey, a nationally representative sample of students in grades 7 to 12 in 1995. GPAs were computed based on self-reported grades in math, science, and English. To account for differences in GPAs between school, Pong et al. calculated GPA as the deviation from school mean GPA. Additionally, multivariate regression analysis captured school-level differences through 129 dummy variables used to represent the 130 schools in the sample. No control variables were added to the model to account for differences in course difficulty (e.g., basic math compared to calculus) nor does the text mention whether grades were significantly different along this dimension. However, all hierarchical models did control for grade level.

Descriptive analysis indicated that Hispanic students' GPAs were significantly lower than those of nonimmigrant whites and that Asian GPAs were higher. Similarly, on average Hispanic students' SESs were lower than of than those of nonimmigrant whites, but Asian students' SESs were higher. Multivariate regression analysis indicated that controlling for SES eliminated the gap in GPAs between first-generation Hispanics and nonimmigrant whites as well as narrowed the corresponding gaps between second-generation Hispanics and nonimmigrant whites; and nonimmigrant Hispanics and nonimmigrant whites. However, the addition of SES made no difference across Asian immigrant generations compared with white nonimmigrants although nonimmigrant Asian student's GPAs did not differ significantly from nonimmigrant whites. These results held for more basic regression models that controlled only for generational status, grade level, gender and SES as well as for more comprehensive models that controlled for parenting styles, parental involvement, and other social capital.

Portes and MacLeod (1996) and Portes and Hao's (2004) findings reveal a component of SES omitted from studies on the immigrant paradox that may have explanatory power with respect to the paradox: school-level SES. Although not a study of the immigrant paradox (due to the absence of nonimmigrant comparison groups), Portes and MacLeod (1996) highlighted the significance of school-level SES via the Children of Immigrants Longitudinal Study (CILS) based on 5,266 second-generation eighth and ninth graders in 1992 from 42 schools in Miami and San Diego. Portes and MacLeod selected these grade levels to avoid any bias that dropout rates might create in later school years. The sample was not random, but the 42 schools were selected purposefully to be representative of SES, ethnicity, and geographical location. Additionally, all students were required to have resided in the U.S. for at least five years.

Portes and MacLeod's (1996) goal was to examine both disadvantaged and advantaged ethnicities. To determine which ethnicities met these definitions they required (1) a sufficient number of cases of a particular ethnicity in the sample, (2) distribution of these cases over the entire school sample, and (3) prior knowledge about how ethnic groups tended to be treated in schools (which is referred in the literature as immigrant reception). Based on these requirements, these researchers classified Cuban and Vietnamese as advantaged; and Haitian and Mexican as disadvantaged.

Hierarchical Linear Modeling (HLM) was used to explore contextual effects at the school level. Models at the individual level included each child's gender, age, length of residence in the U.S., family SES, and advantaged or disadvantaged statuses. At the school level, the analysis controlled for average school level SES (i.e., percentage of students on free-lunch), state (i.e., Florida or California), and inner city school status. Academic achievement was defined as students' Stanford math and reading scores. Findings indicated that school-level SES interacted with students' advantaged or disadvantaged statuses. The higher performances of advantaged students (i.e., Cuban and Vietnamese) were not associated with their school's SES. Disadvantaged students (i.e., Haitians and Mexicans) tended to underperform overall and to do worse in high SES schools. Portes and MacLeod (1996) suggested that these results occurred because of greater competition in higher SES schools. However, it would be possible to form alternative hypotheses for this finding.

In a subsequent study, Portes and Hao (2004) replicated much of Portes and MacLeod's (1996) findings based on a follow up wave of the CILS three years later. In addition, they examined high school dropout rates for the sample. The attrition rate for the sample itself was 18%; however, the authors reported that sampling bias analysis (not specifically provided) indicated that this second sample was representative of the first one. A difference between the two studies is that Mexican students were classified as disadvantaged; and Chinese, Korean, and Vietnamese students were classified as advantaged. A hierarchical generalized linear regression model indicated that Mexican students' overall dropout rate was about twice as high as that of the entire sample. However, second-generation Mexican students also had a greater chance of dropping out of high SES schools compared to low SES schools. Like Portes and MacLeod, Portes and Hao attributed this finding to the more competitive environments in higher SES schools. The next section provides an alternative or possibly a complementary hypothesis concerning SES.

Emerging viewpoints on parental educational levels as an adjustment to SES. In a departure from mainstream empirical literature on immigrant SES (Fuligini, 1997; Pong, Hao, & Gardner, 2005; Portes & MacLeod, 1996), Feliciano (2005a, 2005b) suggests that traditional conceptualizations of SES may be incomplete at least in terms of immigrants' education levels. As it is traditionally assessed, SES compares immigrants' educational attainments only to those of nonimmigrants in the U.S. Such measurements fail to consider how immigrants' educational attainments compare to those of the general populations in their countries of origin (also called educational selectivity). With regard to children's educational attainment, Feliciano (2005a) states:

> Neglecting educational selectivity, or relative educational attainment, assumes that a high school degree earned in one context (say a country where only 10% of the population has one) has the same meaning as a high school degree earned in another context (say, where 80% of the population has one). Because educational opportunities differ substantially by country, immigrants who do not have high educational credentials by American standards may in fact, be quite selective relative to the general populations in their home countries (Lieberson, 1980:213-214). Stratification models may therefore need to be revised for immigrant

> children to reflect the different meanings of educational attainment for different immigrant groups. (pp. 843-844)

Feliciano's (2005a) analyses provided corroborating evidence of her preceding proposition with regard to educational attainment of immigrants from 32 countries (including Puerto Rico), where the related data were derived from combinations of the CPS; the Integrated Public Use Micro Samples (IPUSM) from the U.S. Census; the United Nations Educational, Scientific and Cultural Organization (UNESCO) Statistics Yearbook; and the CILS. Feliciano's first main analysis relied on ordinary least squares (OLS) regression to assess aggregate rates of college attendance by nation of origin (i.e., group-level analysis). Adding a measurement of immigrants' aggregate relative attainment called the net difference index (NDI)[6] to a model which contained only average group SES increased the explained variability in aggregate college attendance rates (a) from 53% to 70% for 1.5-generation immigrants[7] and (b) from 40% to 53% for the second-generation immigrants.

Next, Feliciano (2005a) performed logit regressions at the individual level to examine the association between NDI and college attendance (*N* = 9,832 for 1.5-generation immigrants; *N* = 7,289 for second-generation immigrants). Results indicated that a one-unit change in a nation's average NDI implied that immigrants are 5.11 (3.22) times more likely to attend college. A one-unit change in a nation's average SES implied that they are 4.04 (1.90) times more likely to attend college for the 1.5 (second)

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[6]The NDI is a comparison of the relative educational levels among immigrants to nonimmigrants from the same country. It ranges from 1 (i.e., all immigrants' educational attainments exceed those of nonimmigrants) to 0 (i.e., all nonimmigrants' educational attainments exceed those of immigrants).

[7]In Feliciano (2005a) the 1.5 generation represents immigrants who arrived in the U.S. by age 11.

generation. Relative to other explanatory models for the immigrant paradox (Glick & White 2003; Glick & White, 2004; Rosenbaum and Rochford, 2008; Schwartz & Stiefel, 2006; Tillman et al., 2006; White & Glick, 2000), Feliciano's model was quite parsimonious—consisting only of race, age, age at immigration, gender, NDI, SES, and a measure of immigrants' residence in urban areas. Unlike many more extensive models, this parsimonious model accounted for the significance of race—except for among second-generation Latinos.

Feliciano's (2005a) work on educational selectivity was robust enough to provide longitudinal, confirmatory evidence demonstrating the alignment between decreases in Mexican immigrants' NDIs and their corresponding decreased college attendance from 1960 to 1990. Additionally, Feliciano (2005a) obtained similar results for a second educational "outcome," high school seniors' expectations of graduating from college. However, analyses based on educational selectivity have not extended into the more general literature on the immigrant paradox.

In supplemental work, Feliciano (2005b) found that immigrants from the same 32 countries as Feliciano (2005a) tended to be more educated than those in the general populations in their countries of origin (except for Puerto Rico). Furthermore, immigrants from countries with higher average levels of education were less likely to be more highly educated. Additionally, the further away immigrants' native countries were from the U.S., the higher NDI tended to be, which implies positive educational selection increases with geographical distance from the United States. Educational selectivity was not associated with income inequality in the native country or with immigrating to the U.S. for political reasons.

Theoretical Literature Related to Relative Levels of Immigrant Education

The theoretical rationale for my third research question derives from the theory of immigrant selectivity (Borjas, 1987) (i.e., immigrants do not represent random samples of their countries of origin's populations) already discussed with reference to the second research question suggesting that, as a whole, immigrants tend to be either more or less educated than members of their home populations. Feliciano's (2005a) review of the literature pointed to five reasons why immigrant selectivity may occur. These include (1) self-selection, (2) the country of origin's restrictions on emigration, (3) political and economic factors, (4) demand for particular kinds of labor, and (5) previous relationships between the native country and the new host country.

Research Question 4: Literature Related to Educational Selectivity and Parenting

Although Feliciano (2005a, 2005b) has begun to explore the connection between the immigrant educational paradox and immigrant educational outcomes, no researcher appears to have examined the processes by which parents' educational selectivity might improve educational outcomes. This study takes a first step toward obtaining this understanding by assessing the association between parenting processes and educational selectivity. Because no literature is directly related to this assessment, this portion of the literature review summarizes the relatively sparse literature that explores the connection between three parenting characteristics and immigrant education: parental warmth; parental home and school involvement; and parental choices concerning early childhood education.

Empirical Literature

Parental Warmth

This subsection of the literature review discusses the two themes that emerge from the literature on immigrants' parental warmth. The first theme considers the correlations between immigrant educational outcomes and parental warmth (Kao, 2004; Pong, et al. 2005; Qin, 2006). Although these studies find that measures similar to parental warmth have explanatory power relative to immigrant educational outcomes, the literature as a whole is inconclusive regarding whether parental warmth has a unique effect on immigrant children's educational outcomes in comparison to nonimmigrant children's (Kao, 2004; Pong, et al. 2005). The second theme addresses potential cross-cultural differences in parental warmth (Buriel, 1993; Bernstein, Harris, Long, Iida, & Hans 2005; Chao, 2000). The two studies that are restricted in scope in terms of nationality imply that constructs related to parental warmth vary across culture (Chao, 2000) and across immigrant status (Buriel, 1993). The study with the most diverse sample in terms of ethnicity (Bernstein et al., 2005) finds that constructs related to parental warmth are similar across ethnicity, but exist in varying proportions across ethnicity. However, this study is restricted to families living in poverty. Finally, no study traces differences in measures of parental warmth across ethnicity to academic outcomes.

This portion of the review also indicates the literature often relies on synonyms for parental warmth. Terms such as parental responsiveness (Pong, et al., 2005) and parental closeness (Kao, 2004)--as well as other concepts such as parenting styles (Chao, 2000)--are often defined to be inclusive of parental warmth. Recent empirical analysis, however, cautions that the traditional assumption that parental warmth and parenting styles are associated may be more tenuous than typically assumed (Jackson-Newsom, Buchanan, & McDonald, 2008).

Direct associations between parental warmth and immigrant educational outcomes. Qin's (2006) ethnography of two Chinese immigrant families--the Lai and Zhen families—follows the connection between parental-child warmth and educational outcomes over a 5-year period. More specifically, Qin studied the impact of alienation at adolescence, where alienation is a process of emotional distancing (or lack of warmth) between parents and children. She suggested that alienation is often more pronounced in immigrant families than in nonimmigrant families and arises due to a concept she labeled parallel frame of reference: Children compare their immigrant parents to U.S. parents, and immigrant parents compare their own children to children in their country of birth. Qin further proposed that the effects of parallel frame of reference may be greater in working-class immigrant families.

Qin (2006) is limited because ethnographies cannot be generalized. However, this research does suggest that when parent's educational selectivity is high children's educational outcomes may be more independent of the degree of parental warmth. By contrast, when parent's educational selectivity is low children's educational outcomes may be more dependent on positive parental warmth. A critical caveat to this speculation is that Qin (2006) does not specifically discuss the concept of educational selectivity, although it is a factor that distinguishes the two families studied.

Unlike Qin (2006), Kao (2004) studied the impact of parental warmth on immigrant educational outcomes in a nationally representative sample. In particular, Kao evaluated the explanatory power of key characteristics of parent-child relationships as they pertain to the immigrant paradox via the NELS of 1988, which consisted of 24,599 eighth graders followed two years after high school graduation. Analysis was based on a linear regression model, where the dependent variable was GPA at twelfth grade. Independent variables that accounted for parent-child interactions consisted of student's decision-making (autonomy concerning how to spend money and whether to participate in extracurricular activities, etc.), parent-child discussions about education (as elaborated on in the next subsection of this review), and students' perceived closeness to their parents--as well as each of these terms squared. Other covariates included measures of SES (i.e., each parent's education level and family income), gender, and race (i.e., non-Hispanic white, Asian, Hispanic, and black). All parent-child relationship measures were significantly correlated with GPA and somewhat reduced differences in GPA between (a) non-Hispanic whites and Asians and (b) Hispanics and non-Hispanic whites. In addition, parent-child relationship measures somewhat mitigated the impact of immigrant generational status on GPA. Finally, the significance of curvilinear relationships (i.e., squared terms) indicated that while closeness to parents was associated with improved GPA, at a certain point such closeness had diminishing marginal returns to GPA.

In another large sample, Pong et al. (2005) (which was summarized in detail with regard to question 3a) found that parenting styles and parental responsiveness were significantly related to the GPAs of participants in the Add Health Survey, a nationally representative sample of students in grades 7 to 12 in 1995. However, Pong et al. did not find that parenting responsiveness moderated any immigrant achievement gaps. To control for parenting styles, these researchers added the following independent variables to their hierarchical regression model: unilateral parental decisions (26% of participants), unilateral adolescent decisions (20% of participants), and joint decisions (45% of participants) and a category for decision-making styles that were ambiguous (or indeterminate) (9% of participants). Pong et al. stated that their first three measures of decision-making have been found to correlate with authoritarian, permissive, and authoritative parenting styles, respectively, without providing any supporting references. Additionally they controlled for parental responsiveness--a factor consisting of each adolescent's perceptions of parental warmth, their parent-teen relationship, and closeness to the parent.

Pong et al. (2005) reported that all parenting styles were significantly associated with GPA with the exception of unilateral adolescent decisions compared to joint decisions. However, the association was only positive for joint-decisions. More specifically, ambiguous decision-making and unilateral parental decision-making (both compared to joint decision-making) would be expected to reduce GPA by .1- and .08-points, respectively. Parental responsiveness had a significant positive association with GPA: A 1-unit increase in responsiveness was associated with a .11-point increase in GPA. However, neither Pong et al.'s correlates with parenting style, nor their measures of parent responsiveness, were significantly associated with immigrant achievement gaps.

Universality of parental warmth across nationalities. Although the prior studies assumed that the same constructs of parental warmth exist across cultures, other studies suggest that these constructs may differ in both form and effect across nationality, ethnicity, or racial groups. In one case, Chao (2000) assessed cross-cultural usage of traditional parenting styles (i.e., authoritative, authoritarian, and permissive) along with a parenting style called training. Often observed in Chinese families, training is a parenting style that involves providing children with guidance, monitoring behavior, expressing concern and support, expecting obedience, and providing structure and indirect support regarding school (i.e., assigning additional homework and encouraging participation in extracurricular activities).

Chao's (2000) analysis was based on a nonrandom sample of 52 non-Hispanic white U.S.-born mothers and 95 immigrant Chinese mothers of children in first to third grades. Chao found that Chinese mothers were more likely to utilize training or permissive parenting styles through one-way multivariate analysis of covariance (MANCOVA). In contrast to Chinese immigrant mothers, non-Hispanic white mothers were more likely to use an authoritative parenting style.

This study is limited by its small, nonrandomized sample. Furthermore, discussion in the study hypothesized that authoritative behaviors tend to have greater association with academic success among non-Hispanic whites, and that training is associated with academic success among Chinese students. However, Chao's analysis does not include measures of children's academic achievement. Additionally, because only two ethnic groups are included in the sample, it cannot be determined whether training is unique to Chinese mothers, to all Asian groups, or to all immigrants.

Buriel (1993) provides additional evidence that parenting styles may differ depending on immigrant status and nationality. Buriel's analysis was based on a nonrandom sample of 317 parents of 186 Mexican American seventh graders in Los Angeles public schools. In addition to providing socioeconomic and demographic information, parents responded to a 25-item instrument that measured seven dimensions of parenting (i.e., parental expectation for child autonomy, productivity, child-parent dialogue, obedience, positive (i.e., nonharsh) discipline, emotional support, and high expectations at home and at school). Multivariate analysis of variance (MANOVA) indicated no substantial differences in behaviors among parents of first- or second-generation immigrants.

However, factor analysis suggested that immigrant parents taken as a whole tended to score higher in a factor called responsibility, which emphasized autonomy, productivity, obedience, and positive discipline. By contrast, nonimmigrants scored higher on a factor called concern, which consisted of emotional support and high expectations at home and at school. Additionally, stepwise multivariate regression showed that maternal concern was significantly related to only one variable: mother's education level, where other covariates included a set of socioeconomic variables (i.e., household income and both parents' education levels) and cultural variables (i.e., language usage and number of years of residence in the U.S.).

Like Chao (2000), Buriel (1993) is limited in that it is based on a nonrandom sample without ethnic diversity or tests of correlations between parental behaviors and children's academic outcomes. However, the study does suggest that maternal education levels correlate with parental behaviors. Thus, it provides somewhat of a foundation for testing the correlation between educational selectivity and parental warmth.

Unlike Chao (2000) and Buriel (1993), Bernstein et al. (2005) studied the formation of parenting measures in factor analysis conducted using a diverse cross-cultural sample. More specifically, they examined both (a) whether *different* factors exist across ethnicity and (b) whether the same set of factors *load* differently across ethnicity. Bernstein et al.'s study was the result of the formation of Starting early starting smart (SESS)—12 regionally and ethnically diverse programs—formed to examine the feasibility of incorporating substance abuse and mental healthcare into early childhood education centers and medical settings designed for families living in poverty. The research reported was a step in this overall study, which evaluated the quality of parent-child interactions as a protective factor against the effects of poverty.

Based on a common observational guide (i.e., parent and child putting away groceries, play time and cleanup, and sharing a snack together), researchers filmed 638 children ages 3 to 6 who attended five Head Start programs and two preschool centers serving Chinese immigrants, Hispanics, American Indians, blacks, and rural non-Hispanic whites. Of the families (nonrandomly) recruited, 93% met Head Start's income requirements. Additionally, despite SESS's relationship to treatment of drug abuse, the sample did not consist mainly of parents with substance abuse issues. Instead, only 3% of parents reported using marijuana weekly; fewer than 10% used alcohol weekly. However, about 15% had moderate to severe mental health symptoms.

Factor analysis indicated that the relevant factors related to parenting were sensitivity to the child, teaching, and effective discipline. Substantially similar factors were identified for analysis conducted by ethnic group. Alpha for the entire sample was .84 and ranged from .87 to .81 by ethnicity. MANCOVA analysis indicated that the factors were proportionately different across ethnicity, however. Chinese parents were the least sensitive, with black parents having been found to be less sensitive than either Hispanic or non-Hispanic white parents. Chinese parents used less effective discipline than non-Hispanic white or black parents, and black parents used more effective discipline than Hispanic ones. Finally, Bernstein et al. (2005) found that parental sensitivity was correlated with child involvement (emotional connection with parent, warmth toward parent, interaction, conversation, etc.) and that effective parental discipline was correlated with children's compliance.

Bernstein et al. (2005) does provide evidence that—although parenting factors may be equally applicable across ethnicity—these factors may not load in the same way across ethnicity. However, this study is limited in that participants were not selected randomly nor were measures connected to children's academic outcomes. Additionally, its sample was restricted to those living in poverty.

Parental Home and School Involvement

This subsection of the literature review discusses the two subsets of literature related to immigrant parents' home and school involvement. The first subset of literature examines the correlation between parental involvement and immigrant educational outcomes (Kao, 2004; Keith & Litchtman, 1994; Glick & White, 2004; Pong et al., 2005; Rosenbaum & Rochford, 2008). This literature suggests that at least some aspects of home and school involvement are connected with preferable education outcomes. It is also noteworthy that studies that include multiple measures of parental involvement often find that nearly as many measures (or more) are uncorrelated with students' academic achievements as are thus correlated (Glick & White, 2004; Rosenbaum & Rochford, 2008). No generalizations can be drawn concerning which forms of parental involvement are associated definitively with academic outcomes, however, because measures utilized vary widely (Kao, 2004; Keith & Litchtman, 1994; Glick & White, 2004; Pong et al., 2005; Rosenbaum & Rochford, 2008). Additionally, the preponderance of the evidence suggests that parental involvement does not have a substantively differential impact on educational outcomes among immigrants as opposed to nonimigrants (Glick & White, 2004; Pong et al, 2005). The second subset of literature (Turney and Kao, 2009) suggests that immigrant parents perceive greater barriers to school involvement as well as tend to be less involved in school than non-Hispanic white parents.

The correlation between parental involvement and children's educational outcomes. Keith and Litchtman (1994) studied the impact of home involvement on academic achievement via a structural equation modeling (SEM) conducted on a sample of 1,714 participants in the NELS who identified themselves as being of Mexican-American (Chicano) descent. Home involvement was measured as discussions about school activities, programs, and materials studied; and students' report of parents' educational aspirations; whereas, academic achievement was measured as the average of score on NELS reading, mathematics, science and social studies assessments. Intervening variables in the model included home rules (i.e., TV viewing, maintaining a particular GPA, and chores), family background, parent's language proficiency, gender, parent's birthplace (U.S. or Mexico), and student's prior achievement. Keith and Litchtman found that parental self-reported home involvement had a moderate direct influence on academic achievement, although the strongest influence on current achievement was student's prior achievement. Unlike most other studies on immigrant achievement, participants' parents were not restricted to being foreign-born, but were required only to have a Chicano heritage. However, whether parents were born in the U.S. or Mexico did not effect reported findings.

The study is limited by the fact that it applies only to those of Chicano descent and cannot be generalized to immigrants from other nationalities. Additionally, it is not longitudinal and, therefore, does not consider the impact of parental involvement on prior achievement scores. Finally, some of the intervening variables, particularly parent's requirement that students maintain a particular GPA and rules for TV viewing, are arguably more generally classified as parent home involvement in the literature (Fan & Chen, 2001).

Kao (2004) also examined parental home involvement in its linear regression analysis of the relationship between parent-child relationships and NELS participants' GPAs. More specifically, Kao created two factors regarding parental home involvement: (1) general discussions about school (i.e., discussions about school courses, activities, materials studied, and grades) and (2) discussion about college (i.e., ACT/SAT preparation and discussions about going to college). These factors as well as their squares were included in the final hierarchical regression model. Both general school discussion and discussion about college were significantly related to GPA. More specifically, a one-unit increase in general school (college) discussions was associated with a .05-point (.04-point) increase in GPA. The square of general school discussions was nonsignificant, whereas, the square of discussions about college indicated that increased discussions about college had a decreasing marginal return to GPA of .02 points. Additionally, taken as a whole, all parent-child relationship factors somewhat reduced the impact of generational status on GPA.

Glick and White (2004), which was discussed in greater detail with reference to the first research question, also examined parental involvement in their multinomial logistic regression analysis of high school completion and secondary enrollment among 11,096 participants in the NELS of 1988 at age 20. Of the seven variables assessed related to home or school involvement, only one had explanatory power regarding whether students failed to complete high school. More specifically, parents' contacting the school about their child's behavior was associated with 50% lower odds of high school completion. Two additional variables related to parent involvement were correlated with whether the child sought a post-secondary education following high school. Taking classes outside of high school was associated with 22% greater odds of seeking a post-secondary education. Furthermore, high parental educational expectations were associated with 41% greater odds of continuing on to post-secondary education. The following variables were not found to be significant in terms of either their relationship to high school completion or to seeking a post-secondary degree: parental school contacts regarding student's academic performance, parental school-contact regarding volunteering, parental school-contact for information, and teen-parent communication. Finally, none of the significant relationships detected had substantive explanatory power regarding the immigrant educational gaps detected.

In another large sample, Pong, et al. (2005) found that some aspects of home and school involvement were significantly related to the GPAs of participants in the Add Health Survey, a nationally representative sample of students in grades 7 to 12 in 1995. In particular, the final hierarchical regression model controlled for the following forms of home and school parental involvement: number of weekly dinners with parents, talking with parents about school, and parents' PTA (or other similar) participation. One additional dinner per week with parents, a one-unit increase in talking about school, and a one-unit increase in PTA involvement were significantly associated with a .02-, .06-, and .14-point increase GPA, respectively. None of these variables moderated findings regarding the immigrant paradox, however.

Finally, Rosenbaum and Rochford (2008), which is summarized in detail in the discussion of the first research question, analyzed parental involvement in their regression analysis of 9,985 tenth graders in 750 schools throughout the United States participating in the ELS of 2002. Of the seven groups of variables related to either parent home or school involvement tested, three were significant in relationship to students standardized math scores (i.e., parent-child interactions, parent-child communications, and parental expectations of child earning less than an advanced college degree). One additional variable was significant in terms of explaining standardized reading scores (i.e., eating together less than four days per week compared to eating together six to seven days per week). The number of school activities the parent attended, the number of problems parents had in communicating with the school, and parental monitoring (e.g., checking for homework completion) were not significantly correlated with standardized math or reading scores. Finally, the parental involvement variables did not attenuate the results related to the immigrant paradox in relationship to the final hierarchical model.

Barriers to immigrant parents' school involvement. Instead of studying the impact of parental involvement on student's academic achievement, Turney and Kao (2009) studied barriers to parental school participation by analyzing 12,954 parent interviews from the ECLS-K. (Parents who designated their children as Pacific islanders, American Indians, and multiracial were excluded from analysis.) Parents' self-reported school involvement at spring of kindergarten was measured as the sum of seven binary (yes/no) questions concerning school involvement (e.g., attended open-house or back to school night, volunteered at the school or for committee work). Additionally, eight self-reported barriers to school involvement were measured: inconvenient meeting times, language barriers (i.e., lack of English), lack of child care, safety issues with visiting the school, perceptions of unwelcomeness, transportation problems, lack of interesting content, and work conflicts.

Logistic regression indicated that immigrant parents were more likely to perceive the existence of barriers to school participation, where covariates were race combined with immigrant status, family SES, and three measures of parental English proficiency. More specifically, foreign-born Hispanic and foreign-born blacks perceived significantly greater barriers to school participation than nonimmigrant white parents in four out of eight categories, whereas, foreign-born Asian parents perceived greater barriers in five out of eight categories. Foreign-born Hispanic and foreign-born Asian parents were 5.5 and 9.7 times, respectively, more likely to perceive language as a barrier than were nonimmigrant whites. Foreign-born parents of Hispanic, Asian, and black ethnicity were (a) 2.5, 2.8, and 3.4 times, respectively, more likely to perceive themselves as being unwelcome visiting the school; (b) 4.1, 4.9, and 4.4 times, respectively, more likely to perceive themselves as less safe visiting the school; (c) 1.4, 1.4, and 1.6 times, respectively, more likely to report that meeting times were inconvenient. Additionally, foreign-born black parents were 4.1 times more likely to perceive transportation as being a problem for school participation compared with white nonimmigrant parents. Finally, foreign-born Asian parents were 1.5 times more likely to perceive work conflicts as being a barrier to school participation compared with white nonimmigrant parents.

Next, Turney and Kao (2009) relied on hierarchical regression to compare immigrants' measures of school participation during kindergarten to those of non-immigrant white parents. Covariates for the final model analysis consisted of child's gender, family structure, mother's age at first birth, SES, mother's employment status, and three measures of parents' English proficiency. The analysis also controlled for parental school involvement due to academic and behavior problems by including (a) students' math score at fall of kindergarten and (b) teacher reports of child's self-control and interpersonal skills, respectively. Findings indicated that foreign-born Hispanic and Asian parents were less likely to participate at their child's school than nonimmigrant white parents, although U. S.-born Asian and U.S.-born Hispanic parents were not statistically less likely to participate than nonimmigrant white parents. However, both foreign-born and U.S.-born black parents were less likely to participate than nonimmigrant white parents.

Choice of Early Childhood Education

This final subsection of the empirical literature review describes the relatively sparse literature concerning immigrant parents' selection of early childhood education (Chiswick & DebBurbman, 2006; Crosnoe, 2007; Magnuson, Lahaie, Waldfogel, 2006; Palacios et al., 2008). A synthesis of this literature is relatively complex and, therefore, is deferred until after a summary of each study. However, it can be stated in simple terms that this literature tends to be more descriptive of care arrangements than being oriented toward identifying processes that trigger early care decisions. In particular, none of the extant studies discusses educational selectivity.

Summary of the empirical literature. Chiswick and DebBurbman (2006) examined pre-school enrollment patterns among 80,714 children ages 3 to 5 from two-parent households via the 1% Public Use Microdata Samples (PUMS) from the 1990

Census of Population and Housing. Descriptive statistics alone indicated little difference in preschool attendance across immigrant generations: 42% of first-generation immigrants (*N* = 1,556) attended preschool compared to 43% of second-generation (*N* = 9,392) and non-immigrants (*N* = 69,766). However, analysis via a multivariate probit model, where the dependent variable was school enrollment, yielded different findings.

More specifically, Chiswick and DebBurbman (2006) concluded that in two-parent families, first- and second-generation immigrants were 5 to 10% more likely to be enrolled in preschool than were non-immigrants after controlling for each child's age, whether immigration occur prior to age 2, region (south and rural), disadvantaged minorities (black and Hispanic), gender, parental education level, parental income, family size, mother's employment status, and country of origin. Additionally, these researchers found (a) that second-generation and nonimmigrant blacks from two-parent families were 7% more likely to be enrolled in preschool than non-blacks from two-parent families, and (b) that first- and second-generation Hispanics from two-parent families had about a 5% lower probability of preschool enrollment. Finally, analysis revealed little variability in enrollment based on nation of origin, except for lower probabilities of preschool enrollment among families from Mexico, the Caribbean, East and Central Europe, South Asia, and the Middle East.

Relying on a sample taken eight years following Chiswick and DebBurbman's (2006), Magnuson et al. (2006) examined the relationship between kindergarten readiness and early childcare (i.e., center care, Head Start, parental care, and other care arrangements). Their sample consisted of 12,626 children from the ECLS-K, but was not nationally representative because of the elimination of participants who had repeated kindergarten or had missing data on place of birth and preschool attendance. Descriptive statistics indicated that 46% children of immigrants (i.e., both first- and second-generation immigrants) were enrolled in preschool the year before kindergarten compared to 63% of non-immigrant children, with the majority of this difference being explained by more parental care among first- and second-generation immigrants (29%) compared to nonimmigrant children (16%).

To assess the association between early child care and kindergarten readiness, Magnuson et al. (2006) analyzed three hierarchical regression models, where the dependent variables were basic English proficiency, math achievement, and reading achievement at fall of kindergarten. Because English proficiency was a dichotomous measure, Magnuson et al. reassessed results for the related regression model through probit analysis and found analogous results. Dependent variables in the final model were mother's immigrant status, the early child care arrangement[8] in the year prior to kindergarten (i.e., preschool attendance, Head Start attendance, or other non-parental care arrangements) and two interactions between (1) type of care arrangement and immigrant mother's English language usage (with the child) and (2) type of care arrangement and immigrant mother's education level. To account for demographic factors, child characteristics, SES, and family structure, Magnuson et al. included 17 other covariates in the final analysis.

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[8]Preschool and Head Start attendance were defined as having experienced either of these forms of care in the year prior to kindergarten regardless of whether other care arrangements existed and the number of hours of care in these other arrangements. When children attended both Head Start and preschool, care was determined based on the higher number of hours of care.

Results indicated that attending preschool in the year prior to kindergarten (compared to parental care) had a small significant negative association with English language proficiency overall. However, a positive association existed for children of immigrants with greater benefits being present among children of immigrant mothers who had completed at least high school compared with non-immigrants of similar education levels.[9] Regardless of immigration status, attending a Head Start program during the year prior to kindergarten had a very small, but statistically significant association with English language proficiency. For both groups, attending preschool in the year prior to kindergarten (compared with parental care) resulted in higher reading and math scores at fall of kindergarten with no differences in scores based on immigrant status. Head Start attendance in the year prior to kindergarten was not associated with either reading or math achievement for either immigrants or nonimmigrants.

These findings are limited in the several ways: Magnuson et al. (2006) did not examine early care arrangements prior to the year before kindergarten. Additionally, analysis was not conducted on a truly nationally representative sample. Finally, first- and second-generation immigrant statuses were not coded separately so that it is unclear whether findings are applicable across immigrant generations.

As part of their more extensive study on the immigrant paradox as it pertains to reading achievement among ECLS-K participants, Palacios et al. (2008) controlled for the relationship between early childcare and reading achievement in terms of readiness at spring of kindergarten and longitudinally through spring of third grade. Unlike Magnuson

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[9]Among nonimmigrants 98% of children were English proficient by kindergarten, whereas, 74% of children whose mothers were immigrants were English proficient.

et al. (2006), Palacios et al. measured type of child care based on greatest number of hours spent in any care arrangement the year preceding kindergarten *and* the number of hours per week spent in any early education setting. The addition of early child care did not effect the significance or materiality of the initial immigrant-nonimmigrant achievement gap or its growth after also accounting for immigrant generation, English proficiency, race, gender, socioeconomic factors, and parenting (i.e., parental warmth, cognitive stimulation at home, and perceptions of school readiness). These results are limited in that they do not include an analysis of other forms of achievement, such as math achievement or basic English proficiency, as did Magnuson et al. (2006). Furthermore, these findings only relate to the type and quantity of child care provided in the year prior to kindergarten.

Unlike other studies on the early education of U.S. immigrants, Crosnoe (2007) focused on Mexican immigrants. His sample of 12,711 participants in the ECLS-K included only nonimmigrant identified as Latino, black, or non-Hispanic white and Mexican immigrants (i.e., a combined group of (a) children born in Mexico and (b) U.S. born children with parents born in Mexico). Hence, all other immigrant groups and nonimmigrant races were eliminated from analysis, so that findings are not nationally representative.

Although Crosnoe (2007) reported that Mexican immigrants were less likely to participate in formal early childhood education, he found that differences in math achievement mainly relate to family socioeconomic factors rather than to type of early care. Additionally, he concluded that young Mexican immigrants tend to exhibit significantly fewer externalizing behaviors compared to non-Hispanic white, Latinos, and black children. More specifically, in the first phase of his study, Crosnoe conducted hierarchical logistic regression, where the dependent variable was type of child care (i.e., parental care, relative care, non-relative care, preschool, center-based care, Head Start, multiple arrangements, or missing care arrangements). Covariates consisted of family socioeconomic factors (i.e., SES, below poverty level, family structure, and mother's work status), family environmental factors (i.e., parental involvement variables measured at fall of kindergarten, school involvement measured at spring of kindergarten, number of books in the home, frequency of the child's reading, and family language), and other covariates (i.e., gender, age, urban status, and timing of the assessment). Findings before the introduction of family socioeconomic factors indicated that non-Hispanic white children were 578% more likely to attend preschool versus being in parental care compared with immigrant Mexican children. The introduction of family socioeconomic factors reduced this likelihood to 120%.

Next, Crosnoe (2007) used hierarchical linear regression to analyze differences in math achievement at spring of kindergarten among all groups. He found that all nonimmigrant children were significantly more likely to have better math scores than immigrant Mexican children for his base model. Introduction of family socioeconomic factors and family environmental factors eliminated significant differences in math scores between (a) immigrant Mexican children and (b) nonimmigrant blacks and Latinos. These covariates also reduced the magnitude but not the significance of the immigrant-nonimmigrant non-Hispanic white gap. The further introduction of type of early childhood education did not reduce the statistical significance of the Mexican immigrant-non-Hispanic white gap. In fact, Mexican immigrants fared better or nearly the same in parental care compared to other care arrangements: Interactions indicated that Mexican immigrants would have been expected to score about two points lower in center care versus parental care as well as to score less than a third of a point different when in parental care versus preschool. (The difference between center care and preschool is not defined for parents in the ECLS-K, although parents are asked to draw an ad hoc distinction between these forms of care in the parental interview.)

Finally, externalizing behavior--measured on a four-point Likert scale during the spring kindergarten teacher interview--indicated that all nonimmigrant groups of children showed significantly greater signs of externalizing symptoms than immigrant Mexican children. The introduction of family socioeconomic factors, family environmental factors and early care factors did not eliminate the relative magnitudes and overall significance of these findings, except for that the significance of externalizing symptoms was eliminated for non-immigrant Latinos compared with Mexican immigrant. Interactions between type of care in the year prior to kindergarten and race/ethnicity were not significant indicating a lack of variability in externalizing behavior due to the type of care by race or ethnicity.

The absence of comparisons of early care arrangements across Mexican-immigrant generations limit Crosnoe's (2007) findings. Additionally, comparisons are drawn only to specific nonimmigrant groups and do not include an evaluation of other non-Mexican immigrant children's early care arrangements, making it unclear whether findings are actually unique to Mexican immigrants. Furthermore, the effects of early childhood education and socioeconomic factors are not studied relative to achievement over time, so that the study may provide a snapshot of readiness at first grade only.

Synthesis. A synthesis of the literature on immigrant children's early education experiences indicates that research currently focuses on describing differences in care arrangements by generation or immigrant status (Chiswick & DebBurbman, 2006; Crosnoe, 2007) and on the correlations between type of care arrangements and educational outcomes (Crosnoe, 2007; Magnuson et al., 2006; Palacios et al., 2008). Inconsistencies appear to arise in each of these two areas of investigation. Chiswick and DebBurbman's (2006) descriptive statistics indicated that enrollment in preschool was roughly equivalent across immigrant statuses, whereas, their probit analysis indicates greater preschool enrollment among immigrants. However, descriptive statistics and regression analyses based on the ECLS-K (Magnuson et al., 2006) indicate fewer formal early child care arrangements among immigrant children compared with nonimmigrant children. Discrepancies in these findings may be rooted in (a) the time periods studied, (b) Chiswick and DebBurbman's (2006) dependence on two-parent samples, or (c) ECLS-K researchers' utilization of questions about care in the year prior to kindergarten alone.

Where correlations between educational outcomes and type of care are concerned some studies suggest that preschool is equally or more beneficial for immigrant children (Magnuson et al., 2006), whereas other studies (Crosnoe, 2007) suggest that at least for some educational outcomes (i.e., math) among some large immigrant groups (i.e., Mexicans), early parental care is associated with higher or equivalent educational outcomes. Other studies (Palacios et al., 2008) still indicate that the type and weekly frequency of early childhood education in the year prior to kindergarten no longer matters by spring of kindergarten in terms of reading achievement, nor do these factors appear to influence the growth of immigrant-nonimmigrant educational gaps at least through third grade. Additionally, no study considers the quality of the care arrangement, either as rated by the parent or by a third-party observer.

What is clear is that the literature tends not to examine variables, such as educational selectivity, that can be hypothesized to effect the process that immigrant parents use to select care arrangements. Nor does the literature typically address why the same care arrangements may be effective for some immigrant children but not for others. One exception is that Magnuson et al. (2006) found children of immigrants tended to have greater English language proficiency if their mothers had completed at least high school.

Theoretical Literature

Immigrant selectivity (Borjas, 1987) (i.e., immigrants do not represent random samples of their countries of origin's populations) provides the theoretical basis for this research question. A component of this theory suggests that educational selectivity exists or that as a whole, immigrants tend to be either more or less educated than members of their home populations. This theory, however, does not hypothesize about the processes that may cause children of foreign-born parents with higher educational selectivity to earn academic outcomes that are preferable to those of children with foreign-born parents of low educational selectivity (Feliciano 2005a, 2005b). Therefore, addressing this research question has the potential to fill both a theoretical and an empirical void in the literature.

Conclusion

This chapter has described the empirical literature related to each of my research questions. Additionally, it has discussed the theory related to each question including immigrant optimism (Kao & Tienda, 1995), immigrant selectivity theory (Borjas, 1987; Feliciano 2005a, 2005b), Ogbu's cultural ecology theory of school performance (Ogbu & Simons, 1998), and the theory of segmented assimilation (Portes & Zhou, 1993). The next chapter will discuss research methods. This discussion will feature a description of the study's participants, measures, and analysis plan.

CHAPTER III: METHOD

The prior chapter reviewed the literature related to each research question. This chapter discusses the research methods used to address each of these questions, which are as follows:

1. Is there evidence of the immigrant paradox in terms of math and reading achievement for students from kindergarten through eighth grade?
2. Do immigrants' nations of origin within race explain the variability typically attributed to race alone regarding differences in immigrants and nonimmigrants' math and reading achievement for students followed from kindergarten through eighth grade?
3. Does expanding the definition of SES to include educational selectivity provide additional explanatory power in analyzing immigrant versus nonimmigrant reading and math achievement outcomes among students followed from kindergarten through eighth grade?
4. Which (if any) parenting characteristics are associated with educational selectivity?

More specifically, this chapter first describes the study's participants ($N = 21{,}409$ unweighted and $N = 6{,}861$ weighted). Then it provides an overview of the 13 measures related to the study as well as a summary of the study's analysis plan, which is based primarily on growth curve modeling and factor analysis. The conclusion summarizes the study's research methods and provides a transition to the next chapter.

Participants

Participants in this study were drawn from a secondary data source, the Early Childhood Longitudinal Study, Kindergarten Cohort of 1998 (ECLS-K) (U.S. Department of Education, 2006). The ECLS-K is a nationally representative sample of students who started kindergarten in 1998, where data were collected via (a) physical, cognitive, and psychosocial assessments at the child level and (b) structured interview data at the parent, teacher, and school levels. The National Center for Educational Statistics (NCES) selected the "raw" sample for the ECLS-K through three stages of random probability sampling—which yielded 100 geographic regions, 1,277 schools and an initial sample of 21,260 children for each sampling stage, respectively.

The final release of the dataset contained 18,949 variables for 21,409 participants. These variables were divided into six main groups: (1) student assessment data, (2) teacher interview data, (3) administrator interview data, (4) school safety and facility data, (5) special education data, and (6) sample weights. In the present study, children with complete sets of data have data at six time points: fall of kindergarten (1998), spring of kindergarten (1999), spring of first grade (2000), spring of third grade (2002), spring of fifth grade (2004), and spring of eighth grade (2007). (No data collection occurred in the second, fourth, sixth, or seventh grade.) No participants have been excluded from this study due to missing assessment data at any time point. However, as addressed in the analysis plan, the analyses have been evaluated for robustness due to missing assessment data. Table 1 provides demographic data for both the raw ($N = 21,409$) and weighted samples ($N= 6,861$). The weighted sample is nationally representative of a population of 3,840,784 students.

Researchers rely on complex weights included in the ECLS-K to transform the raw sample into a nationally representative sample. Such weighting also adjusts for (a) purposeful over-selection of some minority sub-samples, (b) non-response at the relevant interview or assessment level, and (c) attrition.

This analysis relied on the weight designated as C1_7FP0, which is the longitudinal weight that allows for the use of parental interviews as well as of children's assessment data and administrator data. A. Rathbun (personal communication, September 21, 2009) confirmed the appropriateness of this weight for the study. Corresponding ECLS-K replicates weights were used to correct the standard errors for descriptive analysis conducted in *Am Statistical Software Beta Version 0.06.03* (2005), which corrects for both non-normalized ECLS-K weights and design effects (G. Mulligan [NCES], personal communication, May 20, 2009).

Table 1

Un-weighted and Weighted Demographic Data for ECLS-K

Kindergarten-Eighth Grade

Descriptor	Un-weighted Sample	Weighted Sample
Female		
N =	10,446	1,848,592
%	48.8	48.1
Male		
N =	10,950	1,992,192
%	51.1	51.9
Gender not ascertained		
N =	13	--
%	.1	--
Black		
N =	3,224	654,197
%	15.1	17
Non-Hispanic White		
N =	11,788	2,204,889
%	55.1	57.4
Hispanic, race specified		
N =	1,839	333,295
%	8.6	8.7
Hispanic, race unspecified		
N =	1,987	361,172
%	9.3	9.4
Asian		
N =	1,366	115,610
%	6.4	3.0

Table 1 (continued).

Un-weighted and Weighted Demographic Data for ECLS-K Kindergarten-Eighth Grade

Descriptor	Un-weighted Sample	Weighted Sample
Hawaiian, other Pacific Islander		
N =	224	27,958
%	1.0	.7
American Indian or Alaska Native		
N =	381	61,160
%	1.8	1.6
Mixed race, non-Hispanic		
N =	549	80,613
%	2.6	2.2
Race, not ascertained		
N =	51	1,890
%	.1	--
Full sample		
N =	21,409	3,840,784
%	100	100

Note. Where indicated, the sample was weighted using the appropriate ECLS-K child-level longitudinal weight (i.e., C1_7FP0). Number of cases with a nonzero weight: *N* = 6,861.

Measures

Dependent Variables: Math and Reading Achievement

For data collection rounds from kindergarten to fifth grade, trained NCES staff administered one-on-one, untimed, standardized math and reading tests, which were scored based on Iterative Response Theory (IRT) (Tourangeau, Nord, Lê, Pollack, Atkins-Burnett & Hausken, 2006). In the final round of data collection, the NCES proctored these tests in group settings for all eighth grade participants who attended the same schools (Tourangeau, Nord, Lê, Sorongon, & Najarian, 2009). Math tests were aligned so that progress in the following areas could be assessed over time: number sense, shapes, relative size, ordinality and sequence, addition and subtraction, multiplication and division, place value, rate and size, fractions, and area and volume. Reading tests were also aligned so that progress in the following areas could be assessed over time: letter recognition, beginning word sounds, ending word sounds, reading sight words, context, comprehension, literal inference, extrapolation, and evaluation of fiction, non-fiction, and high-level syntax.

Reliabilities of math and reading scores, measured as theta for IRT testing, range from .87 to .96. Validity was established in a variety of ways including via (a) expert panel, (b) comparisons with state and national performance standards and (b) comparisons with state and commercial tests. The ECLS-K manual (Tourangeau et al., 2006)) and related psychometric reports (Pollack, Najarian, Rock, Atkins-Burnett, & Hausken, 2005; Pollack et al., 2005; U.S. Department of Education, 2002) do not specify which state and commercial tests were used to establish content and construct validity across each wave of testing from kindergarten through fifth grade. These sources also did not provide any specific information about state and national benchmarks. However, the resulting ECLS-K standards for kindergarten through fifth grade are described as being similar to the National Assessment of Educational Progress (NAEP) framework for fourth graders modified for the grade level being tested (Tourangeau et al., 2006). The expert panel is described further as consisting of teachers and curriculum experts from undisclosed regions throughout the country who recommended how to apportion test content based on the ECLS-K standards. Additionally, the NCES assessed construct validity in the fifth grade by administering the Wood-McGrew-Werder Mini-Battery of Achievement (MBA) to participants.

The NCES established eighth grade assessments' content validity based on frameworks from other large-sample studies of adolescents including the NAEP, the National Educational Longitudinal Study of 1988, the Educational Longitudinal Study of 2002, and the Texas Assessment of Knowledge and Skills (Tourangeau et al, 2009). Additionally, content area specialists evaluated the items for content and construct validity as well as for sensitivity to minorities. The NCES also field-tested eighth grade assessment items in spring of 2006.

Independent Variables: Race, Nation of Origin, Socioeconomic status (SES), Educational Selectivity, Generational Status, and Parenting

The primary independent variables related to testing the research questions were race, nation of origin, SES, educational selectivity, generational status, and parenting. The remainder of this subsection explains how each variable was measured. The next subsection addresses the supplemental covariates included in the analysis.

Race. The NCES reported children's races for the weighted sample in eight categories: (1) white, non-Hispanic (57.4%), (2) black or African American, non-Hispanic (17%), (3) Hispanic, race specified (8.7%), (4) Hispanic, race not specified (9.4%), (5) Asian (3%), (6) Native Hawaiian, other Pacific Islander (.7%), (7) American Indian or Alaska Native (1.6%), and (8) more than one race, non-Hispanic (2.2%) (Table 1). With the exception of the Hispanic race, these categorizations are self-explanatory. The distinction between Hispanic, race specified and Hispanic, race not specified is that the NCES asked parents whether their children were of Hispanic ethnicity in addition to asking all parents to identify their children's races. Parents who did not respond to the race question but did acknowledge their children's Hispanic ethnicity were labeled Hispanic, race not specified. Given their implications under Ogbu's cultural ecology theory of school performance (Ogbu & Simons, 1998), these two categories were not combined. Finally, non-Hispanic white served as the reference category in dummy variable coding to enhance interpretability of results.

Nation of origin. Adequate information about nation of origin was available for the mothers of second-generation immigrants only. Table 2 provides a comprehensive list of these nations of origin for the 100 countries represented. The number of parents in the weighted sample for each country range from 247,594 for Mexico to 108 for Indonesia. Although Mexico also has the highest representation in the unweighted sample at 371 participants, 33 countries have only one participant in the un-weighted sample. In keeping with Feliciano (2005a, 2005b) nations of origin for second-generation immigrants include U.S. Territories. In this case, American Samoa, Guam, Puerto Rico, and the U.S. Virginia Islands are all represented in Table 2.

Table 2

Mothers' Nations of Origin for Second-Generation Participants

	Unweighted		Weighted	
Country	Frequency	%	Frequency	%
Afghanistan	3	.3	1,879	.3
Albania	2	.2	816	.1
American Samoa	2	.2	2,944	.5
Andorra	1	.1	566	.1
Argentina	5	.5	1,790	.3
Armenia	1	.1	393	.1
Bahamas	2	.2	2,906	.5
Bangladesh	1	.1	785	.1
Barbados	2	.2	3,096	.5
Brazil	6	.6	5,530	1.0
Bolivia	1	.1	213	.0
Burundi	1	.1	447	.1
Cambodia	7	.7	3,099	.5
Canada	14	1.4	5,391	.9
Cape Verde	1	.1	174	.0
Chile	3	.3	1,052	.2
China	17	1.7	5,365	.9
Colombia	8	.8	4,015	.7

Table 2 (continued).

Mothers' Nations of Origin for Second-Generation Participants

	Unweighted		Weighted	
Country	Frequency	%	Frequency	%
Costa Rica	3	.3	1,200	.2
Croatia	3	.3	756	.1
Cuba	14	1.4	5,260	.9
Djibouti	1	.1	1,403	.2
Dominica	1	.1	690	.1
Dominican Republic	27	2.6	16,274	2.9
Ecuador	7	.7	4,491	.8
Egypt	1	.1	139	.0
El Salvador	34	3.3	25,885	4.6
Fiji	1	.1	360	.1
Finland	1	.1	322	.1
France	7	.7	2,579	.5
French Southern and Antarctic Lands	1	.1	316	.1
Germany	22	2.2	12,709	2.2
Greece	7	.7	3.204	.6
Guam	1	.1	436	.1
Guatemala	13	1.3	9,900	1.7

Table 2 (continued).

Mothers' Nations of Origin for Second-Generation Participants

	Unweighted		Weighted	
Country	Frequency	%	Frequency	%
Guinea	1	.1	491	.1
Guyana	14	1.4	16,261	2.9
Haiti	7	0.7	3,224	.6
Honduras	10	1.0	5,692	1.0
Hong Kong	8	.8	2,622	.5
India	46	4.5	15,189	2.7
Indonesia	1	.1	108	.0
Iran	4	.4	2,090	.4
Ireland	2	.2	639	.1
Israel	4	.4	1,076	.2
Italy	8	.8	3,501	.6
Jamaica	11	1.1	7,509	1.3
Japan	10	1.0	3,410	.6
Jordan	1	.1	285	.1
Kazakhstan	1	.1	1,027	.2
Korea, North	3	.3	933	.2
Korea, South	10	1.0	6,599	1.2
Kenya	1	.1	293	.1
Laos	26	2.5	8,398	1.5

Table 2 (continued).

Mothers' Nations of Origin for Second-Generation Participants

	Unweighted		Weighted	
Country	Frequency	%	Frequency	%
Lebanon	3	.3	1,436	.3
Luxembourg	1	.1	241	.0
Malaysia	5	.5	2,120	.4
Malta	1	.1	244	.0
Mayotte	1	.1	909	.2
Mexico	371	36.3	247,594	43.5
Nepal	1	.1	327	.1
Netherlands	3	.3	518	.1
Nicaragua	4	.4	1,466	.3
Nigeria	1	.1	709	.1
Norway	1	.1	322	.1
Pakistan	4	.4	1,604	.3
Panama	4	.4	1,642	.3
Peru	8	.8	5,369	.9
Philippines	86	8.4	27,980	4.9
Poland	9	.9	2,826	.5
Portugal	5	.5	2,278	.4
Puerto Rico	18	1.8	13,734	2.4
Romania	1	.1	145	.0

Table 2 (continued).

Mothers' Nations of Origin for Second-Generation Participants

	Unweighted		Weighted	
Country	Frequency	%	Frequency	%
Russia	3	.3	2,091	.4
Saint Vincent and the Grenadines	3	.3	1,379	.2
Samoa	2	.2	631	.1
San Marino	1	.1	319	.1
Sao Tome and Principe	1	.1	322	.1
Saudi Arabia	1	.1	431	.1
Sierra Leone	1	.1	1,431	.3
Singapore	2	.2	708	.1
South Georgia and the South Sandwich Islands	1	.1	350	.1
Spain	6	.6	3,494	.6
Sri Lanka	2	.2	994	.2
Sweden	1	.1	394	.1
Switzerland	1	.1	334	.1
Syria	2	.2	1,374	.3
Taiwan	12	1.2	4,852	.9

Table 2 (continued).

Mothers' Nations of Origin for Second-Generation Participants

	Unweighted		Weighted	
Country	Frequency	%	Frequency	%
Thailand	5	.5	2,917	.5
Tonga	2	.2	931	.2
Trinidad and Tobago	2	.2	623	.1
Ukraine	2	.2	284	.1
United Kingdom	15	1.5	9,445	1.7
U.S. Virgin Islands	9	.9	6,815	1.2
Uruguay	3	.3	1,744	.3
Vatican City	1	.1	227	.0
Venezuela	4	.4	1,260	.2
Vietnam	23	2.2	6,711	1.2
Wallis and Futuna	2	.2	1,375	.2
Total	1,023	100	568,632	100

SES. The ECLS-K provides a continuous measure of SES[10] at fall of kindergarten calculated as the sum of standardized measures of family income, parental education levels, and parental occupational prestige (i.e., each standardized component had a mean of 0 and a standard deviation of 1). In the weighted analytical sample, SES ranged from -2.34 to 2.15 (M = -.31) for 1.75-generation participants, from -4.75 to 2.75 (M = -.26) for second-generation participants, and from -4.75 to 2.67 (M = .09) for nonimmigrants.

Educational selectivity. Educational selectivity was measured as the ratio of immigrant to nonimmigrant education attainment for both the mothers of 1.75- and second-generation students. In the ECLS-K mothers' educational attainments are measured by an indicator variable with nine categories ranging from 1 = eighth grade education or below to 9 = doctorate or professional degree. The general educational attainment in each mother's country of origin was estimated based on the school life expectancy from primary school to tertiary school (United Nations Educational, Scientific and Cultural Organization (UNESCO), n.d.). The school life expectancy is a continuous measurement provided in 5-year intervals beginning with 1970. Each measure of school life expectancy was converted to the same ordinal scale of educational attainment used in the ECLS-K.

More specifically, the school life expectancy of a native in the mother's country of birth was estimated in the following manner:

[10]SES is available in the ECLS-K for only five out of six data waves under study so that the time varying nature of this measure cannot be assessed in growth curve analysis. However, robust descriptive statistics produced in *AM Statistical Software Beta Version 0.06.03 (2005)* indicate that correlations between SES in fall of kindergarten and SES for springs of first, third, fifth and eighth grades are .895, .860, .844, and .825, respectively.

1. The mother's year of birth was estimated via ECLS-K data that provide the mother's age as of spring of her child's kindergarten year; 18 was then added to that year. (The reason 18 was added to the mother's year of birth is that UNESCO provides data based on actual enrollment by academic year. Hence, the measure of educational selectivity relied upon here estimates the number of years of education a native would be expected to obtain in the year that the mother either graduated or would have graduated from high school.)
2. Educational selectivity of a native of the mother's country of birth was then estimated based on the school life expectancy that was available for the 5-year interval closest to the year determined in the prior calculation.
3. UNESCO measures of female school expectancy were obtained as long as they were available (82.4% of the weighted sample), if they were not available, then the blended rate for male-female school expectancy was used (17.6% of the weighted sample).

The resulting measures of school life expectancy ranged from 0.3 years in Laos to 17.6 years in Spain. The mean (median) educational selectivity was 9.88 (10.5) years.

Generational status. The 1.75-generation immigrants were children born outside U.S. to foreign-born parents who immigrated to the U.S. before age 6. These children represented about 2% of the weighted analytical sample (Table 3). Second-generation immigrants were defined as having been born in the U.S. to foreign-born mothers. This generation represents about 15% of the analytical sample. Additionally, nonimmigrants (i.e., U.S.-born children of U.S.-born parents) represent about 82% of the weighted sample. Also, .7% of the sample consisted of foreign-born children whose parents were born in the U.S.[11] Finally .5% of the weighted analytical sample lacked the data necessary to determine whether or not children were immigrants or nonimmigrants. This generation was coded as missing (via dummy coding with the reference group being nonimmigrants).

Mothers' countries of origin were utilized to determine generational status due to a limitation in the data. More specifically, the ECLS-K data on fathers' nations of origin—which was essential for determining generational status--was such that a range of 21% to 99.5% of the data were unknown over the three time points that the ECLS-K provides this information (i.e., for each spring of first grade, third grade, and fifth grade).[12] This degree of missing data likely would have threatened the validity of analysis if children's generational status had been determined based on fathers' nations of origin. Therefore, children's generational statuses were assessed by creating an aggregate measure of mothers' nations of origin over first, third, and fifth grades.[13,14]

[11]Other researchers might classify these children as nonimmigrants under a variety of context (such as in the case of children born to U.S. military members stationed overseas). However, these children were retained in a separate group because technically under the definitions in this literature (1) these children would be classified as second-generation immigrants in their country of birth, (2) their own children would be considered to be second-generation immigrants in the U.S., and (3) these children may have had unique early educations relative to the rest of analytical sample.

[12]An inquiry to NCES about these missing data led to a suggestion that fathers' nations of origin should be examined for third and fifth grades only because an error in NCES data collection processes had caused 99.5% of father's nations of origin to be missing for first grade (A. Rathbun [NCES], personal communication, September 21, 2009). However, 21% or more of fathers' nations of origin were missing for both third and fifth grades. Because of (a) high agreement in the data over these collection waves (i.e., 92% of the data not weighted to zero) and (b) the pattern of changes in paternal type across these years, at best about 18% of cases not weighted to zero would have remained unaccounted for if data were merged across years.

[13]The percentages of missing data regarding mother's nations of origin for spring of first, third, and fifth grades were 3.2%, 2.7%, and 2.4%, respectively.

[14] To aggregate mothers' nations of origin, I merged the data over spring of first, third and fifth grades using the following protocol:

1. Where the data were denoted with the missing data sub-classification code "not ascertained" (which never exceeded 3.1% in any one year), the mother's country of birth was coded based on the data provided in the year(s) for which the data were ascertained;

2. Where there were other disagreements in nation of origin across years, I first attempted to resolve the disagreement by determining whether the mother had changed due to divorce or other changes in the household using ECLS-K roster variables; and

3. If the disagreement in nation of origin was not due to changes in mothers in the household, I coded mothers' nations of origin (a) as "unknown" if there was no agreement across years or (b) as the nation of origin that agreed with at least two out of three of the data waves (unless indications existed that the disagreement related to being born in a U.S. territory, which I coded as foreign-born).

About 23% of mother's countries of origin were inconsistent over the three data waves; around 6% of inconsistencies related missing values in at least one data wave; the remaining 17% of inconsistencies related to discrepancies in country of origin related to at least one data wave.

Table 3

Un-weighted and Weighted Number of Participants for ECLS-K Longitudinal Kindergarten-Eighth Grade by Generation

Descriptor	Un-weighted Sample	Weighted Sample
Generation:		
1.75		
N =	130	83,206
%	1.9	2.2
2nd		
N =	1,023	568,632
%	14.9	14.8
3rd		
N =	5,629	3,140,682
%	82.0	81.8
3rd FB child		
N =	47	26,534
%	.7	.7
Missing		
N =	32	21,730
%	.5	.5
Full sample		
N =	6,861	3,840,784
%	100	100

Note. 3rd generation indicates nonimmigrant; 3rd generation FB child indicates that the child's parents were U.S.-born but the child was foreign-born; missing indicates that it was not possible to determine the generational status due to missing data.

Due to missing data regarding country of origin for the raw sample, the number of cases with nonzero weights ($N = 6{,}861$) serves as the basis for the un-weighted sample.

Parenting. Appendix A provides a detailed listing of the 67 variables related to parenting, which were analyzed via factor analysis for research question 4. ECLS-K staff collected each of these variables from parental interviews conducted during the base year of data collection (i.e., either spring or fall of kindergarten). The base year was selected as the time horizon for this research question due to its closest proximity in time to the date of immigration. Variables that were not requested from parents in fall of kindergarten were taken from spring of kindergarten. At most .9% of weighted responses for each variable was missing. These missing responses were imputed via EM imputation based on the set of existing variables.

Appendix A also groups parenting variables a priori into four main categories based on extant literature: parental warmth (Bernstein, Harris, Long, Iida, & Hans, 2005; Chao, 2000; Qin, 2006), parental home involvement (Kao, 2004; Keith & Litchtman, 1994), parental school involvement (Glick & White, 2004; Rosenbaum & Rochford, 2008), and choice of early childhood education (Chiswick & DebBurbman, 2006; Magnuson, Lahie, & Waldfogel, 2006). Variables ($N = 13$) hypothesized to be associated with parental warmth include "my child and I often have warm, close times together" and "I feel trapped by responsibilities as a parent." Parents rated to these items on a Likert scale (1 = completely true to 4 = not all true). Items that measured lack of parental warmth were reverse coded.

Variables ($N= 23$), which were hypothesized to be associated with parental home involvement, focused on parent-child interactions (reading stories together, visiting libraries together, etc.) prior to kindergarten and during the kindergarten year. These items also assessed participation in cultural events or traditions related to the child's racial and ethnic background as well as specific rules for television viewing. These items were assessed via Likert scale responses, binary (yes/no) responses, and continuous scale responses (Appendix A).

Seven continuous scale items were used to assess parental school involvement based on parental interviews conducted during the spring of kindergarten data collection wave. These items included the number of times parents (or other adults in the household) participated in open houses, PTA meetings, parental advisory meetings, parent-teacher conferences, class events, volunteering, and fund raising. Finally, 24 variables were analyzed in terms of choice of early childhood education. These variables were further divided into four subgroups: relative care, nonrelative (non-center) care, Head Start participation, and private center care. The items assessed included the frequency and duration of care, and--in some cases--subtype of care (in own-home care, part versus full day in Head start, etc.). Other than indicating whether the child ever had experienced a particular care arrangement, items were only measured for the year immediately preceding kindergarten, however. As specified in detail in Appendix, A these items were assessed based on Likert scale responses, binary (yes/no) responses, and continuous scale responses.

Independent Variables: Covariates

Additional covariates suggested by literature are gender (Chiswick & DebBurman, 2004; Farley & Alba, 2002), English Language proficiency (ELP) (Glick & Hohmann-Marriot, 2007; Palacios, Guttmannova & Chase-Landsdale, 2008), school-level SES (Portes & MacLeod, 1996), mother's age at immigration (Glick & Hohmann-Marriot, 2007), and urban status (Feliciano, 2005a). Gender differences in achievement were dummy coded 1 = male and 0 = female. As Table 1 indicates the sample is approximately evenly divided by gender (i.e., the weighted analytical sample consists of 48.1% females and of 51.9% males).

As in Glick and Hohmann-Marriot (2007) and Palacios et al. (2008), ELP was approximated by including an indicator variable that accounts for the data collection wave at which children passed the Oral Language Development Scale (OLDS). The NCES used the OLDS to determine whether to assess children in English, Spanish (for math only), or to forgo cognitive assessments entirely. Over 87% of children were never identified as needing to take the OLDS. All but 2.1% had passed by spring of first grade, with no more OLDS assessments occurring after that point.

Next, percentage of free-lunch participation at spring of kindergarten served as a proxy for school-level SES.[15] In the weighted analytical sample, free-lunch percentage ranged from 0 to 93% for all generations. About 15% of free-lunch percentages were missing for spring of kindergarten. Missing values were imputed in EQS based on the free-lunch percentages reported for first, third, fifth and eighth grades.

Additionally, a continuous measure of mothers' ages at immigration served as a control variable. Mothers' mean age of entry into the U.S. was 20 years old. Only .1% of

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[15]Because free lunch percentage is based on the administrator questionnaire, this variable is available in the ECLS-K for only five out of six data waves under study so that the time varying nature of this measure cannot be assessed in growth curve analysis. However, robust descriptive statistics produced in *AM Statistical Software Beta Version 0.06.03 (2005)* indicate that correlations between children's free lunch percentage in fall of kindergarten and springs of first, third, fifth and eighth grades are .75, .75, .61, and .46, respectively.

the weighted analytical sample had a missing value for mother's age. These missing values were replaced via EM imputation.

Finally, children's urban status during fall of kindergarten[16] were measured as whether they lived in (a) the central part of a city, (b) the outskirts of an urban area or a large town, or (c) a rural area or small town.

Analysis Plan

Research questions 1, 2, and 3. Analysis for the research questions 1 to 3 relied on growth modeling conducted in *HLM 6.08 (2009)*[17] (Raudenbush & Bryk, 2002; Raudenbush, Bryk, Cheong, Congdon, & Toit, 2004). Growth curve modeling was utilized primarily because this approach is a parsimonious method for analyzing longitudinal data. Furthermore, growth curve modeling is ideal for the present analysis because it does not require balanced data. In other words, observations do not need to be equally spaced across time nor collected at the same time for each individual, with neither of these two characteristics being the case in the ECLS-K. Furthermore, growth curve analysis does not require an observation at each time point for each individual; rather its computational algorithms borrow information from groups with more information (Raudenbush & Bryk, 2002).

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[16]Urban status is available in the ECLS-K for only five out of six data waves under study so that the time varying nature of this measure cannot be assessed in growth curve analysis. Robust descriptive statistics produced in *AM Statistical Software Beta Version 0.06.03 (2005)* indicate modest correlations between urban status in fall of kindergarten and those for springs of first, third, fifth and eighth grades of .25, .17, .14, and .16, respectively.

[17]In addition, I relied on (1) *SPSS 15.0* (2006) for my initial descriptive data analysis, (2) *Am Statistical Software Beta Version 0.06.03* (2005), and (3) *EQS 6.1* (2007) for EM imputation. Both *Am Statistical Software* and HLM 6.08 correct for both non-normalized ECLS-K weights and design effects (G. Mel [SSI, inc.], personal communication, May 20, 2009; G. Mulligan [NCES], personal communication, May 20, 2009).

Five statistics were used to evaluate growth curve models (Luke, 2004; Raudenbush & Bryk, 2002). First, the individual significance levels of fixed and random estimates were assessed via *t* and chi-squared statistics, respectively.[18] Additionally both pseudo R^2's and deviance statistics were used to assess overall model fit—with pseudo R^2's being the accepted measure of effect size in multilevel growth curve modeling. Finally reliabilities for each model indicated how well the sample estimates recovered their corresponding population parameters.

The initial step in developing the growth curve models was to determine whether changes in math and reading achievement over time were best described by linear, quadratic, or higher order polynomial models. As is traditional in growth curve modeling, this determination was initially assessed via a random effects analysis of variance (ANOVA) models for math and reading achievement (i.e., the fully unconditional model) as follows:

Level 1 (Time): $Score_{ti} = \pi_{0i} + e_{ti}$, where $e_{ti} \sim N(0, \sigma^2)$.

Level 2 (Person): $\pi_{0i} = \beta_{00} + r_{0i}$, where $r_{0i} \sim N(0, \tau_{00})$.

These ANOVA models were adjusted as appropriate based on a combination of graphing and the statistical tests described in the prior paragraph. After developing two sets of growth curves for reading and math (which represent level 1 in the multilevel model), the first research question was assessed by adding generational status to level 2 (i.e., the person level).

The second research question was evaluated via a three-level growth curve model that relied on the data for second-generation immigrants only due to a lack of data for

[18]For analyses related to all research questions, significance was indicated by a *p*-value of less than .05.

other generations. Level 1 of this growth curve model represented time; level 2 represented the individual, and level 3 represented nationality. Next, to address the third research question, growth curve analysis was conducted on the full sample as well as separately on subsamples of each immigrant generation. The remaining independent variables were added in a hierarchical manner rather than being introduced simultaneously as is generally appropriate for maximum likelihood estimation in HLM (Raudenbush & Bryk, 2002). Hence, covariates were added in the following manner to allow for the assessment of race and SES prior to the inclusion of other covariates: (1) race, (2) SES, (3) educational selectivity along with mothers' ages at time of immigration which may influence the impact of educational selectivity as is suggested by Feliciano's (2005a) analysis, (4) school-level SES,[19] (5) LEP because this measure has been conceptualized as being a chief discriminating factor between immigrant and nonimmigrant performance (Palacios et al., 2008); (6) urban status, and (7) child's gender. All primary growth curve analyses were centered so that time zero was fall of kindergarten.

Research question 4. Two stages of analysis were required to address research question 4. First, factor analysis (Green & Salkind, 2005; Tabachnick & Fidell, 2007) was conducted in *SPSS 15.0* (2006) on the parenting variables described in the measures section. Determination of the number of factors occurred via (a) scree plots, (2) relative and absolute eigenvalues generated through principal components analysis, and (3) a

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[19]Data at the school-level were not examined in a multilevel modeling because the ECLS-K is considered to have low reliability at the school level. For example, a mean of five fifth graders were assessed per school because of school transfers, sample attrition, and the few students initially selected per school ($M = 13$).

prior assumptions based on the literature that primary factors consisted of parental warmth (Bernstein, et al., 2005; Chao, 2000; Qin, 2006), parental home involvement (Kao, 2004; Keith & Litchtman, 1994), parental school involvement (Glick & White, 2004; Rosenbaum & Rochford, 2008), and choice of early childhood education (Chiswick & DebBurbman, 2006; Magnuson et al., 2006). Following the determination of the number of factors involved, VARIMAX rotation yielded interpretable orthogonal factors.

The second stage of addressing research question 4 involved regression analysis (Tabachnick & Fidell, 2007). Educational selectivity served as the dependent variable in this analysis. The measures produced from factor analysis above served as the main independent variables. Additionally, the regression analysis included a similar set of covariates as did the assessment of research questions 1 to 3. The goodness of fit of the overall model was evaluated via R^2 statistics, whereas, t statistics were used to evaluate the significance of individual covariates. *Am Statistical Software 6.03 Beta (2005)* corrected significance levels for both non-normalized ECLS-K weights and design effects.

Supplemental Analyses

Two sets of supplemental analyses were conducted. The first set of analyses pertained to an investigation of non-English speakers' missing assessment data. The second involved detailed country specific analyses. The following subsections describe each of these sets of analyses more thoroughly in terms of both their rationale and related methodology.

Missing assessment data. Including all participants in ELCS-K in the sample yielded a nationally representative sample of children who began kindergarten in 1998 (as well as of children who began first grade in 1999). However, this broad sample included some participants with missing assessment data due to their minority language statuses. More specifically, language minority children were not assessed in reading if they failed an English language screener (i.e., the OLDS). These children were not assessed in math if they failed *both* the OLDS *and* were non-Spanish speaking (Tourangeau, Pollack, Atkins-Burnett, Bose, & Denton, 2004).[20]

The consequences of these missing data are assessed because the missing data can be theorized to be nonignorable, or missing not at random NMAR (Tabachnick & Fidell, 2007). Particularly because of their association with English language proficiency, such missing assessment scores might, on average, (a) be related to students' overall cognitive abilities (and, therefore, to the potential value of the missing assessment scores), rather than (b) be indicative of a limited exposure to English with cognitive abilities being equivalent to those of children in the assessed sample.

Hence, supplemental analyses include:

1. Descriptive statistics regarding participants not assessed due to language minority status.
2. Inclusion of dummy, control variables to assess the significance of missing data (i.e., passage of the English OLDS for reading assessment data and non-Spanish language minority status for math assessment data); and
3. Replication of primary analyses for a subsample that excludes participants with data missing due to their language minority statuses.

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[20]Spanish speaking children who failed the English OLDS where given a math assessment in Spanish regardless of their score on a Spanish version of the OLDS.

Country specific analysis. Primary analyses are designed to produce parsimonious models and generalized findings related to a preliminary estimate of about 100 nations of origin. The number of remaining countries in the sample is likely to be large enough to obfuscate valid overall conclusions if primary analyses were conducted based on separate country-specific analyses.

However, supplemental country-specific analyses is (a) consistent with extant literature (Feliciano, 2005a, 2005b; Glick & Hohmann-Marriott, 2007), (b) part of accepted Hierarchical Linear Modeling (HLM) screening procedures (Raudenbush & Bryk, 2002), and (c) potentially of additional value to policymakers, especially where a specific pattern of results differs from generalized findings. Consequently, supplemental country-specific analyses consists of the following:

1. Graphical and tabular results of descriptive analyses by nation of origin;
2. Findings related to two-level growth curve analyses (for research questions 2 and 3) based on country-specific subsamples (where the number of participants in each subsample is sufficiently large based on reliabilities produced in two-level HLM analysis); and
3. Country-specific regression analysis related to research question 4.

Conclusion

This chapter has discussed my research methods. More specifically, it has described the participants in the ECLS-K as well as this study's analytical sample. Additionally, it has outlined the key measures related to this study with the dependent variables being math and reading achievement scores and the key independent variables being race, nation of origin, SES, and generational status. Covariates related to the analysis included each participant's gender, ELP status, school-level SES, mother's age at arrival in the U.S., and urban status. Finally, the chapter described this study's analysis plan. Next, results are reported in Chapter 4.

CHAPTER IV: RESULTS

The prior chapter outlined the methods related to this study. This chapter summarizes the study's results. More specifically, it initially provides weighted descriptive findings related to math and reading outcomes by immigration status and race. Next, it summarizes the development of growth curve models for research questions 1 to 3, and the results of factor analysis and regression analysis related to research question 4. Additionally, Appendix B discusses the assumptions related to each of this study's three methodologies (i.e., hierarchical linear modeling (HLM), factor analysis, and regression analysis).

Descriptive Results for Math and Reading Achievement by Immigrant Generation and Race

Achievement by Immigrant Generation

As presented in Table 4, univariate *t*-tests[21] indicated that none of children's reading scores were significantly different across immigrant generation.[22] Additionally, 1.75- and second-generation immigrants' math scores did not differ across generation, nor were nonimmigrants' scores significantly different from those (a) of missing generational status or (b) of foreign-born children of U.S.-born parents. However, the 1.75-generation's mean math performance was significantly different from that of nonimmigrants through spring of first grade ($p = .001$). Over this time period from fall of kindergarten through spring of first grade, nonimmigrants' mean math performance exceeded that of the 1.75-generation. Nonimmigrant students also significantly

[21]*Am Statistical Software Beta Version 0.06.03* (2005) corrected reported standard errors for both design effects and non-normalized weights for two-tailed *t*-tests.
[22]However, this univariate analysis does not take into account missing data.

outperformed second-generation students over the entire period studied from fall of kindergarten through spring of eighth grade.

Table 4

Math and Reading Mean IRT Scores by Immigrant Generation

Measure	Fall-K (1998)	Spring-K (1999)	Spring first grade (2000)	Spring third grade (2002)	Spring fifth grade (2004)	Spring eighth grade (2007)
Mean Math IRT scores						
1.75	22.413*,***	32.331*,***	59.181***	96.921	125.630	140.194
SE	1.178	1.709	1.811	2.969	2.927	2.405
2nd	23.497**,****	33.307**,****	57.609**	95.462**	121.477***	138.321***
SE	.427	.678	.733	1.364	.1270	1.323
3rd	27.535*,**	38.346*,**	64.193***,**	102.182**	125.818***	142.217***
SE	.229	.312	.480	.790	.874	.727
3rd FB child	27.396***,****	39.785***,****	62.963	103.021	124.582	141.345
SE	1.590	2.449	4.771	6.249	6.667	6.471
Missing gen.	26.348	36.099	62.780	104.024	129.039	145.857
SE	2.000	2.794	2.864	6.983	4.822	4.766

Table 4 (Continued)

Math and Reading Mean IRT Scores by Immigrant Generation

Measure	Fall-K (1998)	Spring-K (1999)	Spring first grade (2000)	Spring third grade (2002)	Spring fifth grade (2004)	Spring eighth grade (2007)
Mean Reading IRT scores						
1.75	34.215	46.734	84.464	135.069	156.356	179.885
SE	2.196	3.340	6.973	4.692	6.949	4.882
2nd	35.636	48.130	80.624	131.465	153.595	174.382
SE	.701	1.107	1.033	1.527	1.203	1.259
3rd	36.314	47.989	81.034	131.542	154.153	171.734
SE	.243	.343	.665	.839	.827	1.001
3rd FB child	36.097	46.905	80.212	129.905	152.000	172.000
SE	1.236	1.915	4.769	6.479	6.930	7.250
Missing gen.	34.665	45.979	79.869	130.963	154.768	167.178
SE	1.518	2.128	6.387	8.283	6.331	6.235

Table 4 (Continued)

Math and Reading Mean IRT Scores by Immigrant Generation

Measure	Fall-K (1998)	Spring-K (1999)	Spring first grade (2000)	Spring third grade (2002)	Spring fifth grade (2004)	Spring eighth grade (2007)
Missing reading scores	8.08%	6.43%	6.74%	10.20%	12.73%	6.44%
Missing math scores	2.38%	2.65%	4.91%	9.57%	12.53%	5.69%
(Weighted)						

Note. 3rd generation indicates nonimmigrant; 3rd generation FB child indicates that the child's parents were U.S.-born but the child was foreign-born; missing indicates that it was not possible to determine the generational status due to missing data. Pairwise *t*-statistics have been computed across generations for the same time period. Reported significance levels have been calculated via *Am Statistical Software Beta Version 0.06.03* (2005). *Am Statistical Software* corrects for both non-normalized ECLS-K weights and design effects (G. Mulligan [NCES], personal communication, May 20, 2009). *Significantly different, $p = 0.001$. **Significantly different, $p = .001$. ***Significantly different, $p = .01$; ****Significantly different, $p = .05$.

Achievement by Race

Tables 5 and 6 provide math and reading IRT scores by race with a complete explanation of racial descriptors having been provided in the prior chapter. Students who were black, Hispanic race specified, Hispanic race non-specified, and American Indian or Alaska natives significantly underperformed in both reading and math relative to white, non-Hispanic children during each wave of data collection. Asian students' mean scores were not statistically different from those of white, non-Hispanic children, except for in reading in spring of kindergarten and spring of first grade. During each of these data collection waves, Asian students' mean reading scores were numerically greater than white, non-Hispanic reading scores. With the exception of math scores in spring of first and third grades, Native Hawaiian or other Pacific Islanders did not have mean scores on either assessment that were significantly different from those of white, non-Hispanic children. In each of these time periods, Native Hawaiian or other Pacific Islanders mean math scores were numerically lower than those of white, non-Hispanic children. Students reported by parents as being of mixed race significantly underperformed white, non-Hispanic students in math only in spring of fifth and eighth grades.

Table 5

Mean Math IRT Scores by Race for the Weighted Sample

Mean (SE)	Fall kindergarten (1998)	Spring kindergarten (1999)	Spring first grade (2000)	Spring 3rd grade (2002)	Spring fifth grade (2004)	Spring eighth grade (2007)
White, non-Hispanic	29.119 (0.245)	40.355 (0.352)	67.403 (0.484)	107.316 (0.737)	131.319 (0.750)	147.237 (0.586)
Black, African American	22.698* (0.435)	31.668* (0.569)	53.437* (0.716)	85.796* (1.621)	107.707* (1.965)	125.603* (1.759)
Hispanic, race specified	24.031* (0.510)	34.300* (0.776)	59.843* (1.158)	97.151* (1.581)	122.555* (1.357)	139.439* (1.386)

Table 5 (Continued)

Mean Math IRT Scores by Race for the Weighted Sample

Mean (SE)	Fall kindergarten (1998)	Spring kindergarten (1999)	Spring first grade (2000)	Spring 3rd grade (2002)	Spring fifth grade (2004)	Spring eighth grade (2007)
Hispanic, race not specified	21.597*	31.648 *	55.793*	92.026*	117.515**	134.670*
	(0.522)	(0.669)	(1.118)	(1.432)	(1.442)	(1.528)
Asian	29.570	40.232	65.235	106.514	134.866	149.549
	(1.008)	(1.571)	(2.143)	(3.192)	(3.164)	(3.405)
Native Hawaiian/ other Pacific Islander	27.623	37.929	61.064**	98.452**	125.681	142.756
	(2.507)	(2.871)	(2.920)	(3.931)	(4.688)	(4.988)

Table 5 (Continued)

Mean Math IRT Scores by Race for the Weighted Sample

Mean (SE)	Fall kindergarten (1998)	Spring kindergarten (1999)	Spring first grade (2000)	Spring third grade (2002)	Spring fifth grade (2004)	Spring eighth grade (2007)
American Indian or Alaska Native	22.847 *	34.757 *	55.724 *	89.036*	115.913**	133.882**
	(1.312)	(1.685)	(2.498)	(4.502)	(4.992)	(5.313)
More than one race, non-Hispanic	27.986	38.972	65.138	102.092	124.800**	140.950**
	(1.087)	(1.570)	(2.228)	(2.712)	(2.981)	(2.681)

Note. Pairwise *t*-tests have been computed based on the comparison group white, non-Hispanic. Reported significance levels have been calculated via *Am Statistical Software Beta Version 0.06.03* (2005). *Am Statistical Software* corrects for both non-normalized ECLS-K weights and design effects (G. Mulligan [NCES], personal communication, May 20, 2009). *Significantly different from white, non-Hispanic scores in the same year, $p < .001$. **Significantly different from white, non-Hispanic scores in the same year, $p < .05$.

Table 6

Mean Reading IRT Scores by Race for the Weighted Sample

Mean (SE)	Fall kindergarten (1998)	Spring kindergarten (1999)	Spring first grade (2000)	Spring third grade (2002)	Spring fifth grade (2004)	Spring 8^{th} grade (2007)
White, non-Hispanic	37.550 (0.274)	49.458 (.380)	83.857 (0.738)	136.631 (0.723)	159.299 (0.664)	177.921 (0.702)
Black, African American	33.078* (0.557)	43.508* (0.860)	71.701* (1.266)	115.814* (1.905)	136.450* (1.869)	151.373* (2.477)
Hispanic, race specified	33.702* (.0598)	46.668** (1.034)	78.667** (1.994)	131.764** (1.999)	154.409** (1.677)	173.109** (1.723)
Hispanic, race not specified	32.475* (0.579)	44.336* (0.820)	75.750* (1.585)	122.591* (1.798)	147.368* (1.670)	165.486* (1.505)
Asian	39.927 (1.287)	53.260** (1.667)	91.705* (2.230)	137.351 (2.687)	160.032 (2.053)	179.899 (2.547)
Native Hawaiian or other Pacific Islander	35.941 (1.871)	47.602 (1.655)	81.086 (3.705)	131.775 (6.646)	156.098 (7.121)	172.128 (7.976)

Table 6 (Continued)

Mean Reading IRT Scores by Race for the Weighted Sample

Mean (SE)	Fall kindergarten (1998)	Spring kindergarten (1999)	Spring first grade (2000)	Spring third grade (2002)	Spring fifth grade (2004)	Spring eighth grade (2007)
American Indian or Alaska Native	31.903* (1.488)	43.331* (1.567)	72.078* (2.824)	115.250** (5.516)	144.388** (6.590)	163.432** (5.852)
More than one race, non-Hispanic	37.060 (1.616)	49.111 (1.980)	83.209 (2.787)	133.551 (2.521)	156.550 (2.635)	174.190 (2.327)

Note. Pairwise *t*-tests have been computed in comparison with white, non-Hispanic students. Reported significance levels have been calculated via *Am Statistical Software Beta Version 0.06.03* (2005). *Am Statistical Software* corrects for both non-normalized ECLS-K weights and design effects (G. Mulligan [NCES], personal communication, May 20, 2009). *Significantly different from white, non-Hispanic scores in the same year, $p < .001$. **Significantly different from white, non-Hispanic scores in the same year, $p < .05$.

Research Question 1: Is there Evidence of the Immigrant Paradox in Terms of Math and Reading Achievement for Students from Kindergarten through Eighth Grade?

Addressing the first research question involved three steps. The first step was fitting the growth curve models for math and reading achievement. The second step called for adding generational status to each growth curve model, which allowed for an assessment of evidence of the immigrant paradox. Reevaluating results for potentially non-ignorable missing data was the final step.

Development of Growth Curve Models for Math and Reading Achievement

To develop growth curve models, growth in math and reading achievement were examined graphically (Figures 1 and 2), and then separate random effects analysis of variance (ANOVA) models for reading and math achievement (Tables 7 and 8) were developed[23] as follows:

Level 1 (Time): $\text{Score}_{ti} = \pi_{0i} + e_{ti}$, where $e_{ti} \sim N(0, \sigma^2)$.

Level 2 (Person): $\pi_{0i} = \beta_{00} + r_{0i}$, where $r_{0i} \sim N(0, \tau_{00})$.

In each ANOVA model, π_{0i} represents each child's mean math or reading score from fall of kindergarten to spring of eighth grade, and σ^2 represents how much each child's math or reading score varied from that mean at a given time point. At level 2, β_{00} represents the mean test score across children over time, and τ_{00} measures the variance of an individual child's score from that mean. The resulting ANOVA models produced a poor fit of growth in math (reading) achievement as indicated by reliabilities of π_{0i} and interclass correlation coefficients (ICC) of .003 (.003) and .0005 (.0004), respectively.

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[23]All estimates have been calculated using full maximum likelihood estimation due to issues related to missing data described in the subsection on missing data under this main heading.

These results were anticipated given that the ANOVA model depicts no growth in scores over time and is merely a starting point in growth curve modeling.

A linear growth model, a quadratic model, and a higher order (i.e., cubic) model were then tested for an improved fit of growth in math and reading scores. It was determined that the following quadratic growth model (for both math and reading) was preferable compared to a linear model through an evaluation of reliabilities, deviance statistics, and pseudo R^2's:

Level 1 (Time): $Score_{ti} = \pi_{0i} + \pi_{1i}Time_{ti} + \pi_{2i}Time^2_{ti} + e_{ti}$, where $e_{ti} \sim N(0, \sigma^2)$.

Level 2 (Person): $\pi_{0i} = \beta_{00} + r_{0i}$, where $r_{0i} \sim N(0, \tau_{00})$.

$\pi_{1i} = \beta_{10} + r_{1i}$, where $r_{1i} \sim N(0, \tau_{22})$.

$\pi_{2i} = \beta_{20} + r_{2i}$, where $r_{1i} \sim N(0, \tau_{11})$.

Additionally, the quadratic growth models were tested versus higher-order (i.e., cubic) growth curve models as shown in Tables 7 and 8. Although the deviance statistics indicated that the cubic model was a modestly better fit, the point estimates of fixed and random terms as well as the reliabilities and pseudo R^2's were virtually identical across these two models. Therefore, the quadratic growth model was retained as the most parsimonious description of growth in reading and math achievement.

Because this study traces the trajectory of growth from fall of kindergarten to spring of eighth grade, both reading and math outcomes are centered so that time zero is fall of kindergarten. Accordingly, π_{0i} represents mean scores at fall of kindergarten, whereas, π_{1i} represents the linear growth rate, and π_{2i} represents the acceleration in growth. For the final quadratic model, the point estimates for π_{0i}, π_{1i}, and π_{2i} were 25.57, 26.16, and -1.49, respectively, for math, and 33.44, 32.66, and -1.99, respectively, for reading ($p < .001$). The reliabilities for these estimates were .68, .75, and .66, respectively for math, and .60, .66, and .57 for reading. Additionally, the pseudo R^2 for the final quadratic model were .95 for math and .94 for reading.

Table 7

Models for Growth in Math IRT Scores: Baseline ANOVA, Linear Growth, Quadratic Growth, and Cubic Growth

Estimate	ANOVA model Coefficient *(SE)*	Linear growth Coefficient *(SE)*	Quadratic growth Coefficient *(SE)*	Cubic growth Coefficient *(SE)*
Intercept, β_{00}	80.51* (0.34)	36.11* (.24)	25.57* (.18)	25.34* (.18)
Linear growth, β_{10}	n/a	13.82* (.05)	26.16* (.15)	26.78* (.24)
Acceleration, β_{20}	n/a	n/a	-1.49* (.015)	-1.70* (.07)
Rate of change of acceleration, β_{30}	n/a	n/a	n/a	0.02* (.01)
σ^2	2236.37	232.95	52.24	56.15
τ_{00}	1.18	101*	64.45*	64.58*
τ_{11}	n/a	2.85*	45.19*	45.23*
τ_{22}	n/a	n/a	0.39*	0.39*
Reliability, π_0	.003	.545	.679	0.679
Reliability, π_1	n/a	.393	.751	0.751
Reliability, π_2	n/a	n/a	.658	0.659
ICC	.0005	n/a	n/a	n/a
Pseudo R^2	n/a	85%	95%	95%
Deviance statistic, χ^2(DF)	421,178.52(3)	344,953.68(6)**	306,839.45(10)**	306,806.44(11)**

Table 7 (continued)

Models for Growth in Math IRT Scores: Baseline ANOVA, Linear Growth, Quadratic Growth, and Cubic Growth

Notes. All possible specifications of random effects were considered for each of the four types of models above. The final specification for each model was determined based on an evaluation of deviance statistics Pseudo R^2's, reliabilities, and number of iterations to convergence. Pseudo R^2 was calculated as $R^2 = 1 - (\tau_{00\text{comparions model}} + \sigma^2_{\text{comparison model}})/(\tau_{00\text{ANOVA\_MODEL}} + \sigma^2_{\text{ANOVA\_MODEL}})$ at level 1. *Significant at $p < .001$. **Significantly lower deviance statistic compared to the model listed in the column to the immediate left ($p < .001$).

Table 8

Models for Growth in Reading IRT Scores: Baseline ANOVA, Linear Growth, Quadratic Growth, and Cubic Growth

Estimate	ANOVA model Coefficient *(SE)*	Linear growth Coefficient *(SE)*	Quadratic growth Coefficient *(SE)*	Cubic growth Coefficient *(SE)*
Intercept, β_{00}	100.90* (.40)	47.86* (.30)	33.44* (.23)	32.56*(.19)
Linear growth, β_{10}	n/a	16.17* (.06)	32.66* (.19)	35.04*(.35)
Acceleration, β_{20}	n/a	n/a	-1.99* (.02)	-2.78*(.09)
Rate of change of acceleration, β_{30}	n/a	n/a	n/a	0.060*(.01)
σ^2	3188.83	420.77	107.60	106.12
τ_{00}	1.32	115.96*	93.19*	94.42*
τ_{11}	n/a	3.76*	59.03*	59.49*
τ_{22}	n/a	n/a	0.53*	0.54*
Reliability, π_0	.003	.42	.60	.60
Reliability, π_1	n/a	.32	.66	.67
Reliability, π_2	n/a	n/a	.57	.58
ICC	.0004	n/a	n/a	n/a
Pseudo R^2	See ICC.	83%	94%	94%
Deviance statistic, χ^2(DF)	426,606(3)	359,823(6)**	324,586(10)**	324,339(11)**

Table 8 (Continued)

Models for Growth in Reading IRT Scores: Baseline ANOVA, Linear Growth, Quadratic Growth, and Cubic Growth

Notes. All possible specifications of random effects were considered for each of the four types of models above. The final specification for each model was determined based on an evaluation of deviance statistics Pseudo R^2's, reliabilities, and iterations to convergence. Pseudo R^2 was calculated as $R^2 = 1 - (\tau_{00\text{comparions model}} + \sigma^2_{\text{comparison model}})/(\tau_{00\text{ANOVA\_MODEL}} + \sigma^2_{\text{ANOVA\_MODEL}})$ at level 1. *Significant at $p < .001$. **Significantly lower deviance statistic compared to the model listed in the column to the immediate left ($p < .001$).

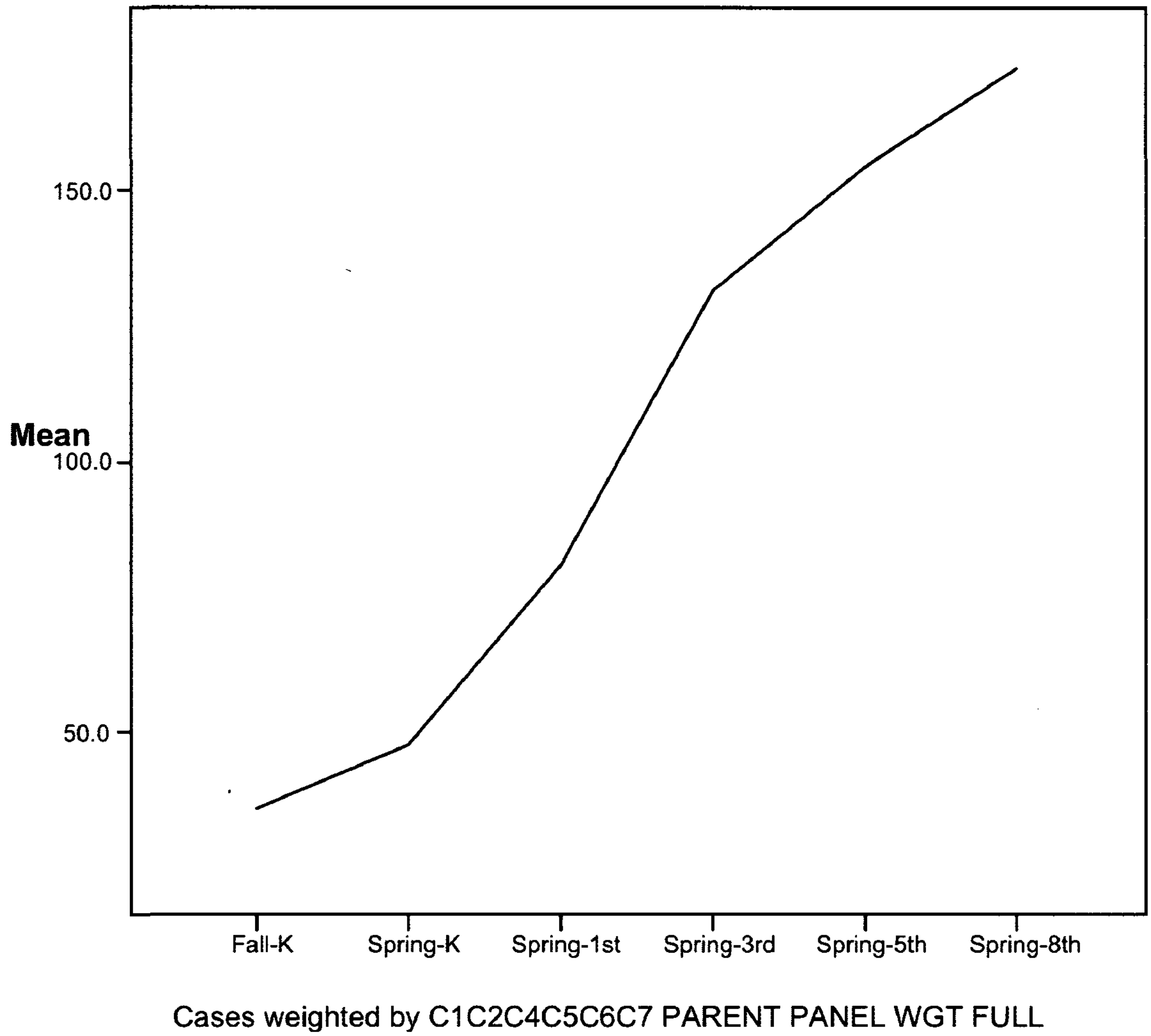

Figure 1. Line graph of IRT reading scores from fall of kindergarten to spring of eighth grade.

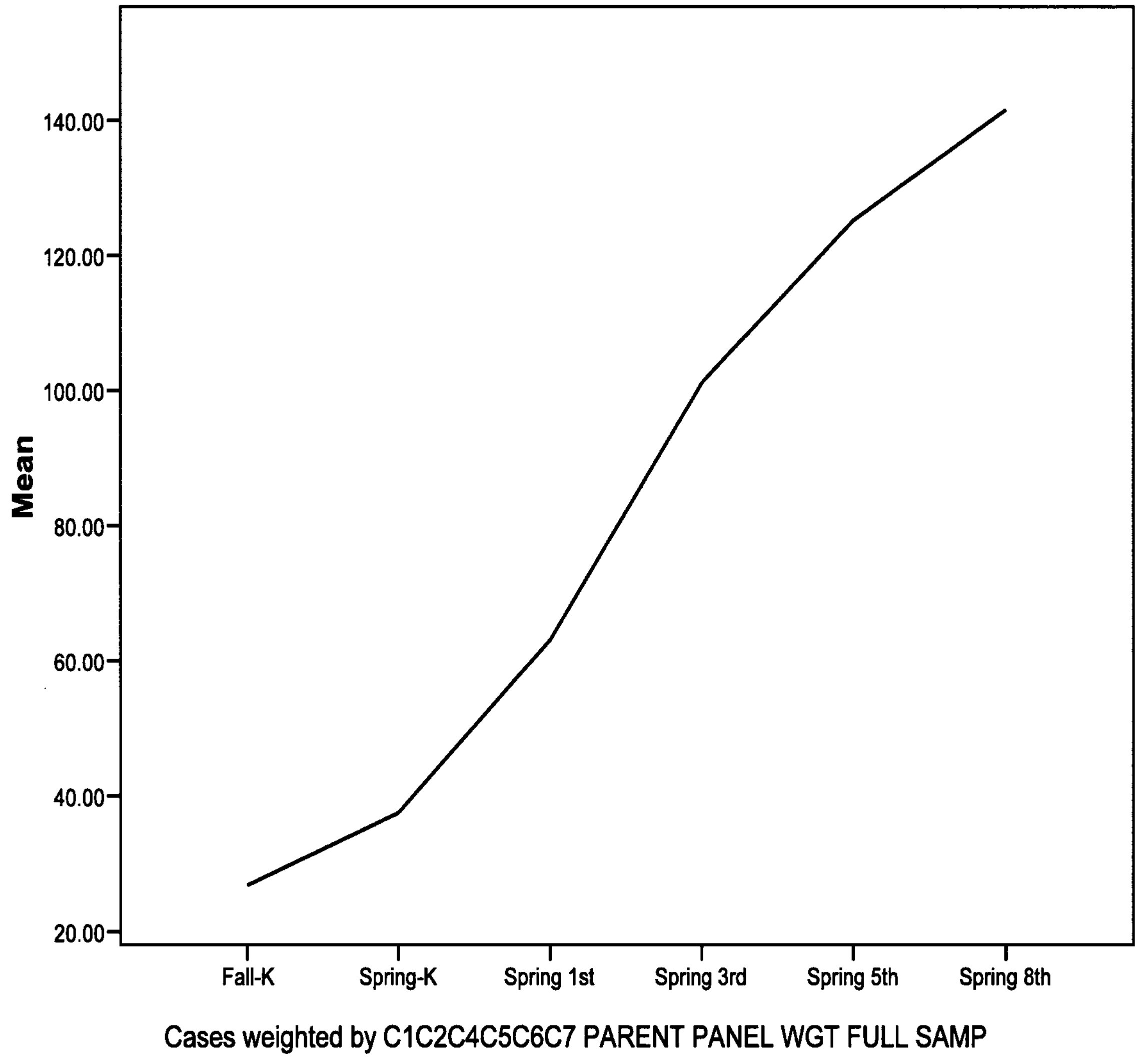

Figure 2. Line graph of math IRT scores from fall of kindergarten to spring of eighth grade.

Immigrant-nonimmigrant Achievement: Prior to Missing Data Analysis

Columns 1 and 3 of Table 9 provide results for the addition of immigrant generational status as a covariate at level 2 prior to the consideration of missing data. Both 1.75- and second-generation immigrants' initial scores at the fall of kindergarten were lower than those of nonimmigrants in math by 5.04 and 4.69 points, respectively, and by 5.46 and 2.41 points, respectively, in reading. Linear growth in reading scores is 2.4 points lower for second-generation immigrants compared with nonimmigrants, but not significantly different between 1.75-generation immigrants and nonimmigrants. Linear growth for 1.75-generation immigrants' math scores is 1.49 points greater than that of nonimmigrants, but not significantly different between second-generation immigrants and nonimmigrants. Additionally, the acceleration of second-generation reading scores is .23 points less negative (i.e., -1.8) compared with nonimmigrants. No acceleration terms for math achievement are significant for immigrants. At spring of eighth grade, 1.75-immigrant and nonimmigrant performances in math and reading do not significantly differ, but second-generation immigrants significantly underperform relatively to nonimmigrants by 2.9 points in math and by 5.57 points in reading.[24] For math, generational status variables explained an additional 5%, .04%, and 0%, respectively, of variance in the intercept, slope and acceleration between individuals in comparison with the initial quadratic math growth model that included no covariates at level 2. For reading generational status variables explained an additional .1%, 2%, and 2%, respectively, of variance in the intercept, slope and acceleration between individuals

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[24]Performance differences at eighth grade were determined by re-centering the growth curve model at eighth grade.

in comparison with the initial quadratic math (reading) growth model that included no covariates at level 2.

The next section suggests that math results appear to be robust to missing data. However, reading results are more problematic. As discussed in Chapter 5, results presented in column 4 of Table 9 (discussed in the next section) may provide a more accurate estimate of results than the one reported here, depending on perspectives about assessment.

Table 9

Results for Growth in Math and Reading Outcomes by Immigrant Generation

Variable	Math coefficient *(SE)*	Math: dummy for missing data coefficient *(SE)*	Reading coefficient *(SE)*	Reading: 0 for missing data coefficient *(SE)*
For Intercept				
Intercept, β_{00}	26.38* (.21)	26.38* (.21)	33.88* (.25)	33.76* (.26)
Gen 1.75, β_{01}	-5.04* (1.15)	-4.93* (1.15)	-5.46* (1.34)	-18.00* (2.23)
Gen 2, β_{02}	-4.69* (.43)	-4.61* (.43)	-2.41* (.68)	-12.33* (.90)
Gen 3FB, β_{03}	.67 (1.73)	.76 (1.72)	.17(1.72)	-.29 (1.82)
Gen missing, β_{04}	-3.01(1.56)	-2.9 (1.54)	-.31(2.42)	-2.51 (3.24)
Gen3	-	-	-	-
Dummy	n/a	-4.73** (1.64)	n/a	n/a
For linear growth slope				
Intercept, β_{10}	26.17* (.18)	26.17* (.18)	33.04* (.22)	33.09*(.22)
Gen 1.75, β_{11}	1.49*** (.74)	1.49*** (.73)	-.74(1.02)	3.16** (1.05)
Gen 2, β_{12}	-.35(.38)	-.34 (.39)	-2.4* (.46)	.89*** (.43)
Gen 3FB, β_{13}	-.12 (1.93)	-.12 (1.93)	-.08(1.99)	.17 (2.05)
Gen miss., β_{14}	1.18 (1.44)	1.17 (1.44)	1.5(2.32)	.95 (2.47)
Gen 3	-	-	-	-
Dummy	n/a	.83 (1.66)	n/a	n/a

Table 9 (Continued)

Results for Growth in Math and Reading Outcomes by Immigrant Generation

Variable	Math coefficient *(SE)*	Math missing data coefficient *(SE)*	Reading coefficient *(SE)*	Reading: 0 for missing data coefficient *(SE)*
For acceleration				
Intercept, β_{20}	-1.5 * (.02)	-1.5 * (.02)	-2.03* (0.2)	-2.03*(.02)
Gen 1.75, β_{21}	-0.07 (.08)	-0.07 (.08)	0.16 (.11)	-.13 (.11)
Gen 2, β_{22}	0.07 (0.04)	0.06 (0.04)	.23* (.05)	-.02 (.05)
Gen 3FB , β_{23}	-0.01 (.17)	-0.02 (.17)	.02 (.16)	-.01 (.17)
Gen missing, β_{24}	-0.04 (.15)	-0.04 (.15)	-.24 (.26)	-.14 (.28)
Gen 3	-	-	-	
Dummy	n/a	.01 (.17)	n/a	n/a
σ^2	56.18	56.17	107.62	120.34
τ_{00}	61.52*	61.50*	92.38*	140.93*
τ_{11}	45.17*	45.17*	58.10*	54.52*
τ_{22}	.39*	.39*	.52*	.49*
Reliability, π_0	.668	.668	.596	.686
Reliability, π_1	.751	.751	.659	.635
Reliability, π_2	.658	.658	.567	.535

Table 9 (Continued)

Results for Growth in Math and Reading Outcomes by Immigrant Generation

Notes. The dummy variable in column 2 controls for participants with missing data due to language minority status. In column 4, missing values for children not assessed in reading due to lack of English proficiency are replaced with zero. The reference group for generational comparison is generation 3 (i.e., nonimmigrant). $^{*}p \leq .001$; $^{**}p < .01$; $^{***}p < .05$.

Supplemental analysis: Data Potentially not Missing at Random (MNAR) Due to Language Minority Status

This subsection reviews the three supplemental analyses related to MNAR data described more fully in chapter 3. First descriptive statistics for those of language minority status were evaluated for the full sample and for the sample categorized by immigrant generation (Table 10). This evaluation provided evidence about whether the data were in accordance with the second half of Raudenbush and Bryk (2002) statement that growth curve "results will be robust to nonignorable missingness [at level 1] to the extent that (a) all of the data are efficiently used and (b) the fraction of missing data is small" (p. 200).[25] The second analysis included dummy, control variables to assess the significance of missing data (i.e., passage of the English OLDS for reading assessment data and non-Spanish language minority status for math assessment data). The third analysis replicated the primary analyses for a subsample that excludes participants with data missing due to their language minority statuses.

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[25]Full maximum likelihood estimation was used to produce efficient estimates in satisfaction of the first part of Raudenbush and Bryk (2002) statement.

Table 10

Percentages of Math and Reading Assessment Data Missing for Certain Language Minority Students by Relevant Data Collection Waves

ECLS-K data collection wave/sample	Not assessed in math due to non-Spanish language minority status (weighted sample)	% Not assessed in reading due to OLS failure (weighted sample)
	Fall kindergarten	
% of full sample	0.6	7.3
% of gen-1.75 immigrants	3.9	57.8
% of gen.-2 immigrants	3.2	38.1
% of gen.-3 immigrants	0	.4
% of gen-3 foreign-born	3.0	3.0
% of missing-gen immigrants	2.5	9.7
	Spring kindergarten	
% full sample	0.3	4.6
% of gen. 1-75 immigrants	.8	36.3
% of gen. 2 immigrants	1.6	23.9
% of gen. 3 immigrant	0	.3
% of gen. 3 foreign-born	0	3.0
% of missing-gen immigrants	0	5.4

Table 10 (Continued)

Percentages of Math and Reading Assessment Data Missing for Certain Language Minority Students by Relevant Data Collection Waves

ECLS-K data collection wave/sample	Not assessed in math due to non-Spanish language minority status (weighted sample)	% Not assessed in reading due to OLS failure (weighted sample)
	Spring of first grade	
% of full sample	0.1	2.1
% of gen-1.75 immigrants	.2	12.6
% of gen.-2 immigrants	.3	10.8
% of gen.-3 immigrant	0	.2
% of gen.-3 foreign-born	0	3.0
% of missing-gen immigrants	0	5.4
	Spring of third, fifth, and eighth grades	
% full sample	0	0

Note. The percentage of students not assessed in math was determined by the sub-classification of ECLS-K variables C1ASMTST to C7ASMTST (i.e., child assessment status) that denotes *language minority (not Spanish)—not assessed.* The percentage of students not assessed in reading was determined via the ECLS-K variable CPSOLDS.

Evaluation of potentially NMAR data related to math outcomes. Table 10 indicates that the fraction of potentially NMAR data related to math outcomes was relatively small. The percentage of missing data is .6% for the full sample and never exceeded 3.9% of 1.75-generation immigrants or 3.2% of second-generation immigrants. Additionally, by third grade, no math outcomes were missing due to language minority status for any participant regardless of immigrant status. The inclusion of a dummy variable coded to 1 for all participants who had missing math outcomes due to language minority status yielded results that were identical to results previously reported about the immigrant paradox. However, the initial score at fall of kindergarten for participants who had missing data due to language minority status was estimated to be 4.73 points lower than those of nonimmigrant's (p = .004) (Table 9). Henceforth, all main analyses of math achievement controls for missing data due to language minority status. Finally, the replication of results on a subsample that excluded participants with missing data due to language minority status produced results that were identical to those found for the full sample.

Evaluation of potentially NMAR data related to reading outcomes. Table 10 indicates that although the percentage of missing reading outcomes did not exceed 7.3% for the full sample, it was relatively high for 1.75- and second-generation immigrants. More specifically, in fall (spring) of kindergarten, 57.8% (36.3%) of 1.75-generation immigrants had data missing due to language minority status and 38.1% (23.9%) of second-generation immigrants have data missing due to language minority status. Just as with math outcomes, no participants have missing reading outcomes due to language minority status by spring of third grade.

This high degree of missing data rendered the proposed methods of assessing missing data invalid.[26] Dummy variable analysis essentially controlled for the lack of initial English proficiency among immigrants (i.e., 58% of all 1.75-generation immigrants and 38% of second-generation immigrants but only .4% of nonimmigrants were represented by a dummy variable indicative of language minority status). Additionally, results for the subsample that was always English proficient would not be expected to replicate those of the full sample because English language proficiency has been widely documented as a factor that distinguishes between immigrant and nonimmigrant achievement.

As an alternative to the missing data analysis initially proposed, it should be reconsidered whether reading scores were actually missing for those of language minority status. In fact, participants of language minority status were determined not to have even basic English language proficiency. Hence, from the perspective that the reading assessment evaluated reading achievement in the *English* language, these students who had no English language proficiency would have had scores of approximately zero on the reading achievement test. Consequently, reading scores for those who had missing data due to lack of English proficiency were recoded from missing to zero (Table 9 column 4).

Analyses indicate that initial differences between immigrant and non-immigrant performance at fall of kindergarten were identical in terms of direction and statistical

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[26]Results for a reading growth model with a dummy variable for missing data related to participants of language minority status did produce a significant finding for the dummy variable regarding the intercept, linear growth and acceleration of growth (coefficients = -10.30, -4.86, and .39, respectively, $p < .001$). Additionally, prior findings of significance by immigrant generation were eliminated, as was the case for the model where all participants with missing data due to English language proficiency were excluded from analysis.

significance (Table 9 column 3 cf. column 4). However, replacing missing values with zero for missing data due to lack of basic English proficiency creates much steeper initial underperformance for 1.75-immigrants compared with nonimmigrants and for second-immigrants compared with nonimmigrants (i.e., -18-points and by -12-points, respectively). Furthermore, differences in linear growth rates are positive (i.e., 3.16- and .89-points, for 1.75-immigrants and second-generation immigrants, respectively). Additionally, column 4 of Table 9 reports no differences in the acceleration of growth between nonimmigrants and immigrants. Further analysis indicated that at spring of eighth grade there no significances differences between 1.75-generation and nonimmigrant performance, but second-generation immigrants continued to underperform relative to nonimmigrants by a projected 6.21-points.[27] The addition of immigrant generation to the analysis explained 15%, .33%, and .28% of the variance in growth in the intercept, linear growth, and acceleration of growth compared to the initial growth model where readings scores were assigned a value of zero for participants with missing data due to failure of the OLDS.

Finally, a reading growth curve model was estimated for achievement outcomes from third grade to eighth grade because this time period contains no missing data due to lack of English proficiency. Given only three points of observation, it was not possible to estimate a random term at the acceleration level. Results indicate that both 1.75- and second-generation students were initially behind nonimmigrants in terms of reading achievement by 7.59- and 8.88-points, respectively. However, rates of linear growth and acceleration did not differ for 1.75- or second-generation immigrants compared to

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[27]Performance differences at eighth grade were determined by re-centering the growth curve model at eighth grade.

nonimmigrants. Additionally, when the analysis was recentered so that time zero was eighth grade, second-generation immigrants underperformed relative to first-generation immigrants by 5.89 points in the eighth grade, but 1.75-generatio immigrants did not. This analysis explained 2% and .70% of the variance in reading achievement at the intercept and linear growth levels, respectively, over the basic growth model (i.e., the model prior to the introduction of generational status).

Research Question 2: Do Immigrants' Nations of Origin within Race Explain the Variability Typically Attributed to Race Alone Regarding Differences in Immigrants and Nonimmigrants' Math and Reading Achievement for Students followed from Kindergarten through Eighth Grade?

Like research question 1, research question 2 has been evaluated through a three-part process. First, a 3-level growth curve was developed where level 1 represents time, level 2 tests person specific measures, and level 3 assesses the geographic unit of interest: nationality. Second, covariates were added to the 3-level model to assess the explanatory power of race compared with nationality. Finally, supplementary analyses were conducted regarding the effect of missing data and country-specific findings.

Development of the 3-level Model

The iterative procedure for developing growth curves for research question 2 was identical to the procedure relied upon for research question 1: ANOVA models were tested for the additional presence of linear, quadratic, and higher-order (i.e., cubic) growth through an evaluation of deviance statistics, reliabilities, number of iteration to convergence, and pseudo R^2's. The results of each iterative model, calculated via full maximum likelihood estimation, have not been provided to avoid unnecessary duplication of results already provided for research question 1. Just as was the case with the first research question, the best descriptors of growth were quadratic growth models (columns 1 and 3 of Table 11).

Some differences in the growth models for research question 2 compared to research question 1 should be highlighted:

1. Only the second-generation sample has been included in the analysis.[28]

2. The sample for the second research question was not weighted with ECLS-K sample weights.[29]

The following model for both math and reading was the end result of growth modeling process:[30]

Level 1 (Time): $Score_{tij} = \pi_{0ij} + \pi_{1ij}Time_{tij} + \pi_{2ij}Time^2_{tij} + e_{tij}$, where $e_{tij} \sim N(0, \sigma^2)$.

Level 2 (Person): $\pi_{0ij} = \beta_{00j} + r_{0ij}$, where $r_{0ij} \sim N(0, \tau_{\pi 00})$.

$\pi_{1ij} = \beta_{10j} + r_{1ij}$, where $r_{1ij} \sim N(0, \tau_{\pi 11})$.

$\pi_{2ij} = \beta_{20j} + r_{2ij}$, where $r_{1ij} \sim N(0, \tau_{\pi 22})$.

Level 3 (Nationality): $\beta_{00j} = \gamma_{000} + u_{00j}$, where $u_{00j} \sim N(0, \tau_{\beta 00})$.

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[28]The analysis excluded 1.75-generation immigrants for two reasons. First, the ECLS-K database did not provide sufficient information about these immigrants' countries of birth so that analysis cannot be controlled for potential differences in mothers' and children's countries of birth. Second, although mothers of 1.75-generation were probably born in a sufficient number of countries for 3-level growth curve analysis (N = 39), only three of these countries represent more than three participants—Mexico (N = 54), Philippines (N = 14), and India (N = 6). Such sample sizes precluded testing the robustness of results to number of participants per country.

[29]The main reason for the lack of weighting is that *HLM 6.08 (2009)* does not allow individual-level weighting at level 3.

[30]Pseudo R^2's for the math (95%) and reading (91%) growth model represented improvements over the ANOVA model. These pseudo R^2's have been calculated as $R^2 = 1 - (\tau_{00\text{comparions model}} + \sigma^2_{\text{comparison model}}) / (\tau_{00\text{ANOVA\_MODEL}} + \sigma^2_{\text{ANOVA\_MODEL}})$.

$$\beta_{10j} = \gamma_{100} + u_{10j}, \text{ where } u_{10j} \sim N(0, \tau_{\beta 11}).$$

$$\beta_{20j} = \gamma_{200} + u_{20j}, \text{ where } u_{20j} \sim N(0, \tau_{\beta 22}).$$

In this model π_{0ij}, π_{1ij}, and π_{2ij} represent participants' mean initial score at fall of kindergarten, linear growth in achievement, and the acceleration in growth in achievement, respectively. As presented in Table 11, π_{0ij}, π_{1ij}, and π_{2ij} are estimated to be 26.28, 27.83, and -1.6, respectively, for math, and 36.21, 33.45, and 2.02, respectively, for reading ($p < .001$). Reliabilities for these estimates range from .59 to .69 for math and from .39 to .56 for reading. Level 2 provides estimates of variability in achievement due to individual-level differences, and Level 3 provides estimates of variability in achievement associated with nationality. For the initial model prior to the introduction of race covariates, nationality explains 32%, 14%, and 16% of initial scores, linear growth, and acceleration, respectively, for math, and 25%, 13%, and 11%, respectively, for reading.[31]

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[31]This ratio was calculated as level-3 variances' proportionate share of the combined total of level 2 and level 3 variances at the initial, linear, and quadratic levels (Raudenbush & Bryk, 2002).

Table 11

Growth in Math and Reading Outcomes by Nationality and Race

Variable	Math: growth only coefficient *(SE)*	Math: growth + race coefficient *(SE)*	Reading: growth only coefficient *(SE)*	Reading: growth + race coefficient *(SE)*	Reading: missing values coefficient *(SE)*	Reading: 3^{rd} to 8^{th} grade coefficient *(SE)*
For Intercept						
Intercept, β_{00}	26.28^{*} (.71)	27.96^{*} (.85)	36.21^{*} (1.02)	36.01^{*} (1.14)	35.36^{*} (1.27)	139.04^{*} (2.20)
Black, β_{01}	n/a	-3.79^{***}(1.63)	n/a	-.91 (1.95)	-.059 (2.03)	-19.77^{*} (4.70)
Hispanic, RS., β_{02}	n/a	-5.04^{**} (1.76)	n/a	-4.70^{***}(1.95)	-10.83^{*} (2.73)	-11.11^{*} (3.11)
Hispanic, RNS, β_{03}	n/a	-5.97^{*} (1.37)	n/a	-4.11^{**}(1.47)	-10.00^{*} (2.18)	-18.61^{*}(3.07)
Asian, β_{04}	n/a	1.88 (1.39)	n/a	6.08^{***} (2.4)	1.60 (3.10)	-2.60 (3.11)
HOPI, β_{05}	n/a	-5.89^{*} (1.40)	n/a	-5.00^{**} (1.86)	-7.50^{*} (2.41)	-10.46^{**} (5.08)
Mixed, β_{06}	n/a	1.45 (1.67)	n/a	2.89 (2.82)	2.79 (2.80)	4.46 (4.91)
White	–	–	–	–	–	–
Dummy, β_{07}	-11.64^{*} (1.08)	-12.07^{*}(1.36)	n/a	n/a	n/a	n/a

Table 11 (Continued)

Growth in Math and Reading Outcomes by Nationality and Race

Variable	Math: growth only coefficient *(SE)*	Math: growth + race coefficient *(SE)*	Reading: growth only coefficient *(SE)*	Reading: growth + race coefficient *(SE)*	Reading: missing values coefficient *(SE)*	Reading: 3rd to 8th grade coefficient *(SE)*
For linear growth slope						
Intercept, β_{10}	27.83^{*} (.42)	29.06^{*} (.66)	33.45^{*} (.45)	35.37^{*} (.73)	35.64^{*} (.71)	$-.64^{*}$ (.17)
Black, β_{11}	n/a	-3.37^{*} (.92)	n/a	-6.49^{*} (1.55)	-6.92^{*} (1.58)	-.35 (.40)
Hispanic, RS., β_{12}	n/a	-2.18^{***} (.90)	n/a	-1.37 (.89)	.78 (.82)	-.41 (.23)
Hispanic, RNS, β_{13}	n/a	-3.41^{*} (1.01)	n/a	-4.11^{*} (.98)	-1.89^{***} (.85)	$-.62^{**}$ (.21)
Asian, β_{14}	n/a	-.76 (.98)	n/a	-2.97^{**} (.99)	-1.06 (.90)	.05 (.23)
HOPI, β_{15}	n/a	-2.20^{**} (.75)	n/a	-1.33 (1.48)	-.41 (1.15)	$-.76^{*}$ (.23)
Mixed, β_{16}	n/a	1.6 (1.34)	n/a	.87 (1.32)	.93 (1.30)	-.27 (.40)
White	n/a	–	–	–	–	–
Dummy, β_{17}	.20 (.78)	.36 (.86)	n/a	n/a	n/a	n/a

Table 11 (Continued)

Growth in Math and Reading Outcomes by Nationality and Race

Variable	Math: growth only coefficient *(SE)*	Math: growth + race coefficient *(SE)*	Reading: growth only coefficient *(SE)*	Reading: growth + race coefficient *(SE)*	Reading: missing values coefficient *(SE)*	Reading: 3^{rd} to 8^{th} grade coefficient *(SE)*
For acceleration						
Intercept, β_{20}	-1.6^{*} (.04)	-1.73^{*} (.07)	-2.02^{*} (0.04)	-2.17^{*} (.07)	-2.19^{*} (.07)	11.60^{*} (.90)
Black, β_{21}	n/a	$.27^{**}$ (.10)	n/a	$.52^{**}$ (.16)	$-.56^{*}$ (.17)	1.91 (2.18)
Hispanic, RS., β_{22}	n/a	$.20^{***}$ (.09)	n/a	.07 (.09)	-.10 (.08)	1.88 (1.01)
Hispanic, RNS, β_{23}	n/a	$.27^{**}$ (.10)	n/a	$.35^{*}$ (.09)	$.17^{**}$ (.08)	3.95^{*} (.99)
Asian, β_{24}	n/a	.10 (.10)	n/a	$.26^{**}$ (.09)	.09 (.09)	.48 (1.03)
HOPI, β_{25}	n/a	$.26^{**}$ (.08)	n/a	.09 (.13)	.03 (.11)	4.11^{*} (1.38)
Mixed, β_{26}	n/a	-.13 (.14)	n/a	-.10 (.14)	-.11 (.14)	1.12 (2.39)

Table 11 (Continued)

Growth in Math and Reading Outcomes by Nationality and Race

Variable	Math: growth only coefficient (SE)	Math: growth + race coefficient (SE)	Reading: growth only coefficient (SE)	Reading: growth + race coefficient (SE)	Reading: missing values coefficient (SE)	Reading: 3^{rd} to 8^{th} grade coefficient (SE)
White	–	–	–	–	–	–
Dummy, β_{27}	.06 (.07)	.02 (.07)	n/a	n/a	n/a	n/a
σ^2	56.85	56.84	114.38	114.29	169.46	105.34
$\tau_{\pi 00}$	50.43*	48.55*	133.64*	130.41*	254.23*	467.34*
$\tau_{\pi 11}$	36.80*	35.94*	36.03*	34.49*	24.95*	.26*
$\tau_{\pi 22}$	.32*	.31*	.33*	.31*	.21*	n/a
$\tau_{\beta 00}$	24.33*	14.85*	44.51*	28.0*	47.70*	63.75
$\tau_{\beta 11}$	6.08*	4.60*	5.44*	2.8*	1.00	n/a
$\tau_{\beta 22}$	.06*	.05*	0.04*	.02**	.01	n/a

Table 11 (Continued)

Growth in Math and Reading Outcomes by Nationality and Race

Variable	Math: growth only coefficient (*SE*)	Math: growth + race coefficient (*SE*)	Reading: growth only coefficient (*SE*)	Reading: growth + race coefficient (*SE*)	Reading: missing values coefficient (*SE*)	Reading: 3^{rd} to 8^{th} grade coefficient (*SE*)
Reliability, π_0	.598	.589	.562	.557	.730	.874
Reliability, π_1	.691	.686	.465	.456	.358	.45
Reliability, π_2	.595	.589	.388	.379	.256	n/a
Reliability, β_{00}	.493	.403	.437	.351	.351	.341
Reliability, β_{10}	.326	.293	.267	.179	.085	n/a
Reliability, β_{20}	.309	.293	.197	.134	.048	n/a

Notes. The reference group for racial comparison is (second-generation) non-Hispanic white. RS = race specified, RNS = race not specified, HOPI = Native Hawaiian or other Pacific Islander. Dummy controls for missing data due to language minority status. $^{*}p \leq .001$; $^{**}p <. 01$; $^{***}p < .05$.

Explanatory Power of Nationality Versus Race

Race provided 4%, 2%, and 3% additional explanatory power in the variability of the intercept, growth, and acceleration of achievement outcomes between individuals in math, and 2%, 4%, and 6% in reading over nationality alone (Table 11 columns 2 and 4). Additionally, due to the overlap between race and nationality in some countries, the addition of race provided further explanatory power at level 3. More specifically, the introduction of race as a covariate explained 39%, 24%, and 17% of the variance in the intercept, growth and acceleration of math and 37%, 49%, and 50% of reading achievement, which was formerly attributed to nationality. However, nationality continued to explain 23%, 11%, and 14% of the variability in initial scores, linear growth, and acceleration for math and 18%, 8%, and 6% for reading achievement after the introduction of race covariates.

Four (i.e., black, Hispanic race specified, Hispanic race not specified, and Native Hawaiian or other Pacific Islander) out of six of the second-immigrant races examined (i.e., black, Hispanic race specified, Hispanic race not specified, Asian, Native Hawaiian or other Pacific Islander, and mixed) significantly underperformed relative to second-generation whites in terms of initial math test scores at fall of kindergarten. This result was slightly different for initial reading scores in that black immigrants did not score statistically different from white immigrants, and Asian immigrants significantly outscored white immigrants by 6-points. The same races that underperformed in terms of initial math scores also underperformed in terms of linear growth in math scores. However, the acceleration of these races' math achievement significantly exceeded that of white immigrants. Linear growth rates in reading were significant and negative for black (i.e., -6.49), Hispanic race not specified (i.e., -4.11), and Asian (i.e., -2.97) children, but the acceleration of growth in reading achievement for these races exceeded that of second-generation whites. Although math results reported in this section appear to be robust to missing data, certain results regarding reading may not be. Information reported in the subsection on missing data and discussion in Chapter 5 should be considered before drawing final conclusions about specific reading results.

As noted in chapter 3, some nationalities in the ECLS-K contained very few participants. However, HLM estimation can occur reliably as long as the number of groups at level 3 (i.e., number of nations) is relatively large even when the number of participants per group is small (Barnett, Marshall, Raudenbush, & Brennan, 1993). To assess the stability of HLM variances estimates, the growth models were reestimated based on a subsample that required at least 10 participants per nation. This restriction resulted in 20 nationalities being represented at level-3 and consisted of 78 percent of the participants in the original sample. The portion of achievement explained by nationality for this subsample was analogous to that of the full sample for both reading and math achievement.

Supplemental Analysis

Supplemental analyses for research question 2 included two components. The first component was the same examination of potentially MNAR data for participants of minority language status as conducted for research question 1. The second component was an examination of nation-specific results.

Potentially MNAR data for participants of language minority status. Previously reported results for math outcomes (Table 11 columns 1 and 2) were controlled for missing data due to language minority status through dummy variable analysis as described in research question 1. Initial scores for children with missing data due to language minority status were projected to be 12-points below mean initial scores of second-generation white immigrants ($p < .001$) (Table 11). However, all other results for both (a) the full sample without dummy-variable controls for missing data and (b) the subsample that excluded participants of minority language status were analogous to reported results.

As described more fully in results related to research question 1, results reported for reading outcomes were assessed for robustness by replacing missing data due to failure of the basic English language proficiency assessment with zero (Table 11 column 5). Signs and significance of covariates tended to be the same as for the original model (in Table 11 column 4) except (a) Asian reading achievement is not found to be significantly different from non-Hispanic white children's at any level of the model and (b) the acceleration rate for black participants is found to be negative, instead of positive as in the original model. Additionally variability explained by nationality for this model was somewhat lower than that reported in the original model at 16%, 4% and 5% for initial scores, linear growth, and acceleration in reading achievement, respectively.

Finally, the analysis for reading was replicated based on the time period with no missing data due to lack of basic English proficiency, the period from third grade to eighth grade (Table 11 column 6). Just as for the first research question, it was not possible to estimate a random term for the level of acceleration because only three observations were available per participant. Additionally, modeling a random term at level 3 corresponding to linear growth was inappropriate due to the lack of significance of the random term. Consequently, the explanatory power of nationality could only be estimated at the intercept level as 12% after the addition of covariates for race. Specific results of significance regarding race differ from the analyses of reading. However, these results relate to a different time period and, therefore, would not necessarily be expected to correspond with analyses during the time period from fall of kindergarten to spring of eighth grade.

Country specific analysis. Country specific results were evaluated graphically (Figures 3 and 4) based on the 10 nations with the greatest number of participants in the sample by mothers' countries of birth (N = 371 for Mexico to N = 15 for the United Kingdom). A total of 663 participants were represented by this subsample (i.e., 65 percent of the original sample). Figures 3 and 4 reveal a wide range in scores by mother's nationality for reading and math. More specifically, for math, in fall of kindergarten scores ranged from 20 for children whose mothers were born in Mexico to 38 for children whose mothers were born in China compared to a sample mean of 24. By spring of eighth grade, math scores ranged from 127 for children whose mothers were born in Dominican Republic to 160 for children whose mothers were born in Vietnam compared to a sample mean of 142. For reading, in fall of kindergarten scores ranged from 31 for children whose mothers were born in Mexico to 54 for children whose mothers were born in India compared to a sample mean of 37. By spring of eighth grade, reading scores ranged from 150 for children whose mothers were born in Dominican Republic to 193 for children whose mothers were born in China compared to a sample mean of 168.

In general, children whose mothers were born in nations that were predominately Hispanic scored less than the sample mean, whereas children whose mothers were born in nations that were predominately Asian scored above the sample mean. Children with mothers' born in Laos were an exception: They tended to score below the sample mean in fall of kindergarten and around the sample mean by eighth grade. Additionally, children whose mothers were born in El Salvador tended to score above the sample mean in reading and just at the sample mean in math by eighth grade.

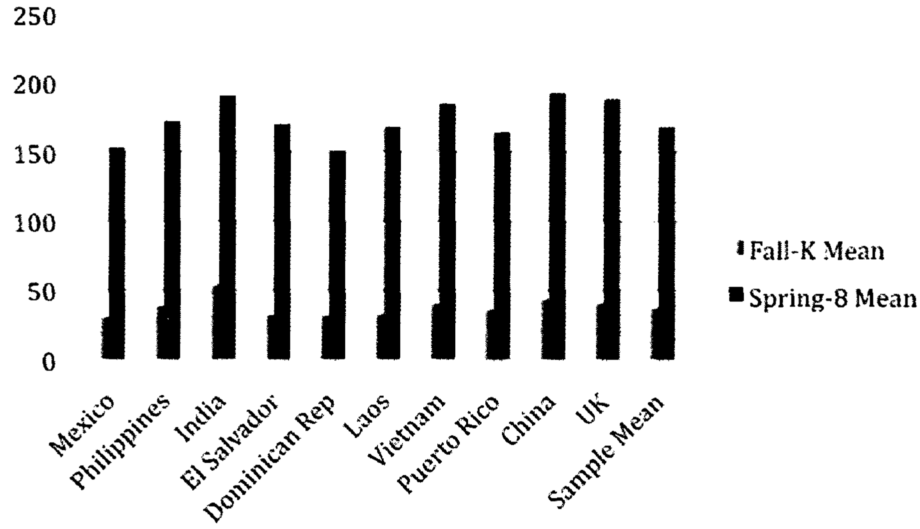

Figure 3. Fall kindergarten and spring eighth grade mean reading scores for the 10 most highly represented countries of second-generation immigrants (by mothers' countries of birth) compared to the (unweighted) sample mean for all second-generation immigrants combined.

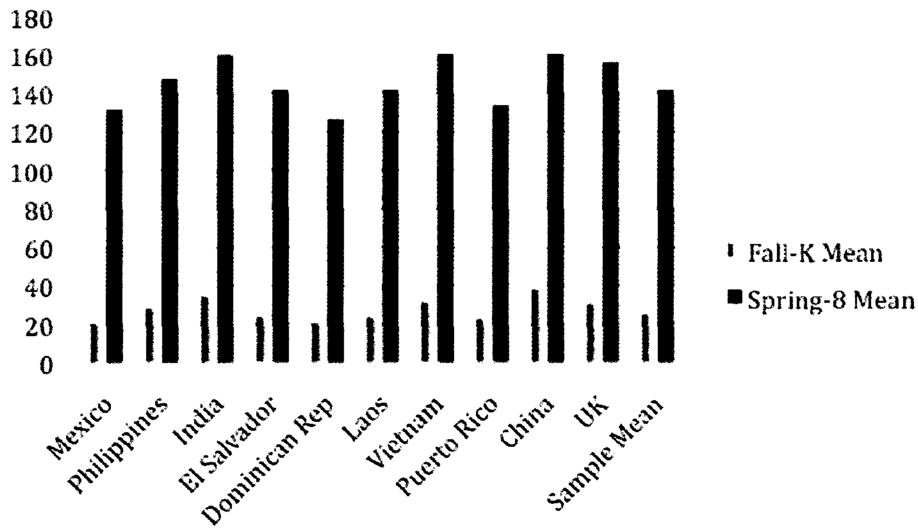

Figure 4. Fall kindergarten and spring eighth grade mean math scores for the 10 most highly represented countries of second-generation immigrants (by mother's countries of birth) compared to the (unweighted) sample mean for all second-generation immigrants combined.

Finally, two nations were explored further through 2-level growth curve analysis: Mexico and Philippines. These nations were selected for further analysis because they had sufficient sample sizes for HLM analysis as well as appeared to have sufficient diversity in race for further analysis. India, for example, was excluded from 2-level analysis even though it had 46 participants because 90 percent of children whose mothers were born in India were Asian. Results of this analysis for children whose mothers were born in Mexico ($N = 371$, 1% = white, 37% = Hispanic race specified, 62% = Hispanic race not specified) indicated that children identified as Hispanic race-specified outperformed children identified as Hispanic race not specified in terms of initial math scores at fall of kindergarten and in terms of linear growth in math scores, by 8- and 1.5-points, respectively ($p < .05$). However, children identified as Hispanic race specified had a significantly lower acceleration in math scores of -.16-points ($p < .05$) in comparison with children whose mothers had identified them as Hispanic race not specified. These results did not hold for reading scores, where results did not differ according to whether children were Hispanic race specified or unspecified.[32]

More racial diversity existed for the subsample of the children whose mothers were born in the Philippines ($N = 86$, 7% = white, 7% = Hispanic race specified, 6% = Hispanic race not specified, 45% = Asian, 30% other Pacific islander, and 5% = mixed race). However, analysis detected differences in academic achievement only for initial achievement. Children who were Hispanic race specified, Hispanic race not specified, and Asians outperformed other Pacific islanders by 16-, 6- and 8-points, respectively, (p

[32]Additionally, non-Hispanic white children scored higher than children designated as Hispanic race not specified in math at the initial and linear growth levels, and in reading at the linear growth and acceleration levels. However, only 1% of the children in the Mexican subsample were non-Hispanic white.

$\leq .01$) in math at fall of kindergarten. Only Asian children outperformed other Pacific islanders in reading at fall of kindergarten (coefficient = 11, $p = .003$).

Research Question 3: Does Expanding the Definition of SES to Include Educational Selectivity Provide Additional Explanatory Power in Analyzing Immigrant Versus Nonimmigrant Reading And Math Achievement Outcomes among Students Followed From Kindergarten Through Eighth Grade?

Research question 3 consists of four main analyses and two types of supplementary analyses. The main analyses involves evaluating the explanatory power of educational selectivity and other components of SES for (a) the full sample, (b) the subsample of 1.75-generation immigrants, (c) the subsample of second-generation immigrants prior to the consideration of nationality, and (d) the subsample of second-generation immigrants inclusive of nationality. Each analysis consists of growth curve modeling with independent variables being introduced hierarchically in the following order: (1) immigrant generation and race, (2) SES, (3) educational selectivity (and mother's age at immigration), (4) school-level SES, (5) English language proficiency, (6) urban status and (7) gender. Analyses were conducted on the two-level models created for research question 1, prior to the evaluation of nationality, whereas, the inclusion of nationality was evaluated via the 3-level growth model developed in research question 2. Results of these analyses should be evaluated with supplemental analyses on missing data as well as with the supplemental country-specific analyses.

Main Analyses

Full sample. Table 12 presents the results for growth in math achievement for the full sample of immigrants and nonimmigrants. Educational selectivity itself was not a significant covariate for the full sample inclusive of nonimmigrants.[33] However, the association between educational selectivity and math outcomes at the intercept level for 1.75-generation immigrants compared to the rest of the sample was significant so that a one-unit increase in educational selectivity for 1.75-generation immigrants was associated with about a 2.30-point increase in initial math outcomes. Furthermore, educational selectivity appears to moderate SES at the intercept level as indicated by the significant interaction term between SES and educational selectivity so that a one-unit increase in educational selectivity was expected to increase the impact of SES by about .70-units throughout the model. This moderator effect was about 1.40-points different for 1.75-immigrants relative to the rest of this sample.[34]

Additionally, the introduction of educational selectivity eliminated the significance of the gap between second-generation student's math achievement compared to that of nonimmigrants at the intercept level as well as the significance of the achievement gap between 1.75-generation and nonimmigrants at the linear growth level and acceleration levels.[35] The introduction of factors associated with educational

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[33]In evaluating this lack of significance, it should be noted that 83% of the sample has a value of zero for educational selectivity because only 1.75- and second-generation immigrants have a value for educational selectivity. Furthermore, these zero values cause singularities in the analysis when the full range of interactions between educational selectivity (ES) and SES and immigrant status are considered (i.e., ES*SES*gen 1.75. ES*SES*gen 2, ES*SES*gen3, ES*SES*genFB, and ES*SES*genmissing). Therefore, these interactions can be modeled only for 1.75- and second-generation immigrants.
[34]The negative sign on this moderator effect is not necessarily readily obvious and is explained in the section on analyses of the 1.75- and second-generation subsamples.
[35]The correlations between educational selectivity and SES for 1.75- and second-generation immigrants' educational selectivity are .57 and .58, respectively, so that introduction of ES as a covariate is unlikely to cause multicollinearity in the data, which might distort the significance levels on other independent variables.

Table 12

Math Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient (*SE*)	+ SES coefficient (*SE*)	+ ES coefficient (*SE*)	+ School SES coefficient (*SE*)	+ ELP coefficient (*SE*)	+ Urban status coefficient (*SE*)	+ Gender coefficient (*SE*)
For Intercept							
Intercept, β_{00}	28.04* (.26)	26.90* (.24)	26.94* (.24)	27.66* (.30)	27.63* (.30)	28.37* (.55)	28.61* (.56)
Gen1.75, β_{01}	-2.71*** (1.32)	-2.13 (1.34)	-3.90 (2.23)	-3. 80 (2.27)	-3.12 (2.38)	-3.12 (2.37)	-3.34(2.36)
Gen 2, β_{02}	-2.86* (.55)	-2.24*(.50)	-.73 (1.09)	-.56 (1.08)	-.14 (1.11)	-.22 (1.11)	-.28(1.12)
Gen 3FB, β_{03}	-.13 (1.75)	-2.03 (1.77)	-1.87 (1.77)	-1.95 (1.78)	-1.85 (1.77)	-1.81 (1.77)	-1.84 (1.76)
Genmiss, β_{04}	-2.58 (1.37)	-.19 (1.47)	-.36 (1.44)	-.34 (1.33)	-.23 (1.28)	-.29 (1.31)	-.21 (1.34)
Dummy, β_{05}	-9.20* (2.03)	-8.24* (1.93)	-7.55* (1.91)	-7.35* (1.96)	-6.52* (1.96)	-6.58* (1.96)	-6.53* (1.97)
CPSOLDS, β_{06}	n/a	n/a	n/a	n/a	-.37*(.10)	-.37* (.10)	-.37* (.10)
Sch_SES, β_{07}	n/a	n/a	n/a	-.03** (.01)	-.02** (.01)	-.02* (.01)	-.02** (.01)
Urban, β_{08}	n/a	n/a	n/a	n/a	n/a	-.36 (.22)	-.36 (.22)
SES, β_{09}	n/a	3.92* (.28)	3.72* (.30)	3.50* (.31)	3.44* (.31)	3.40* (.31)	3.38* (.31)

Table 12 (continued)

Math Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
Momage, β_{010}	n/a	n/a	-.07(.04)	-.06 (.04)	-.05 (.04)	-.05 (.04)	-.05 (.04)
ES, β_{011}	n/a	n/a	-.29 (.36)	-.32 (.35)	-.45 (.36)	-.44(.36)	-.42 (.36)
Hispanic, RS, β_{012}	-4.17* (.57)	-2.47* (.55)	-2.34* (.55)	-2.15* (.55)	-1.90* (.56)	-2.01* (.56)	-2.03* (.56)
Hispanic, RNS, β_{013}	-5.9* (.57)	-3.18* (.56)	-2.97* (.56)	-2.57* (.58)	-2.22* (.58)	-2.35* (.58)	-2.36* (.58)
Asian, β_{014}	2.15 (1.34)	1.46 (1.18)	1.04 (1.20)	1.09 (1.20)	1.02 (1.19)	.98 (1.18)	.88 (1.18)
Black, β_{015}	-5.72* (.49)	-2.99* (.48)	-3.14* (.48)	-2.55* (.53)	-2.63*(.54)	-2.76*(.54)	-2.76* (.54)
HOPI, β_{016}	-1.34 (1.86)	-.20 (1.85)	-.42 (1.94)	-.44 (1.91)	-.55 (1.92)	-.35 (1.91)	-.43(1.89)
Indian, β_{017}	-5.66*(.81)	-2.67**(.92)	-2.81** (.91)	-2.48** (.91)	-2.52**(.90)	-2.37* (.90)	-2.39**(.91)
Mixed, β_{018}	-.75 (1.15)	-.84 (1.11)	-1.09 (1.06)	-.96 (1.04)	-.94(1.04)	-1.1 (1.04)	-1.09(1.05)
White	–	–	–	–	–	–	–
S*Gen1.75, β_{019}	n/a	n/a	2.29**(.85)	2.28** (.87)	2.25** (.89)	2.29** (.89)	2.28** (.89)

Table 12 (continued)

Math Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient (*SE*)	+ SES coefficient (*SE*)	+ ES coefficient (*SE*)	+ School SES coefficient (*SE*)	+ ELP coefficient (*SE*)	+ Urban status coefficient (*SE*)	+ Gender coefficient (*SE*)
Male, β_{020}	n/a	n/a	n/a	n/a	n/a	n/a	-.46 (.33)
SES*ES, β_{021}	n/a	n/a	$.71^{**}$ (.23)	$.69^{**}$ (.23)	$.67^{**}$ (.23)	$.68^{**}$ (.23)	$.68^{**}$(.23)
SES*ES*Gen1.75, β_{022}	n/a	n/a	-1.43^{*} (.41)	-1.42^{*} (.42)	-1.40^{**} (.43)	-1.42^{*} (.43)	-1.41^{*} (.43)
For linear growth slope							
Intercept, β_{10}	27.54^{*} (.20)	26.76^{*} (.20)	26.78^{*} (.21)	27.41^{*} (.26)	27.37^{*} (.26)	28.82^{*} (.50)	27.81^{*} (.51)
Gen1.75, β_{11}	2.50^{**} (.86)	2.90^{*} (.20)	.94 (1.48)	1.03 (1.46)	1.61 (1.45)	1.4 (1.47)	1.38 (1.45)
Gen 2, β_{12}	.02 (.53)	.41 (.51)	-1.36 (.98)	-1.22 (.98)	-.82 (1.01)	-1.0 (1.0)	-.83 (.98)
Gen 3FB, β_{13}	-.98 (1.89)	-2.31 (1.87)	-2.22 (1.88)	-2.29 (1.88)	-2.19 (1.87)	-2.12 (1.91)	-1.93 (1.97)
Genmiss, β_{14}	1.02 (1.28)	2.66 (1.64)	2.67 (1.63)	2.68 (1.53)	2.77 (1.50)	2.68 (1.56)	2.39 (1.48)
Dummy, β_{15}	-1.05 (1.88)	-.31 (1.81)	-.55 (1.82)	-.41 (1.81)	.44 (1.76)	.32 (1.77)	.24 (1.80)

Table 12 (continued)

Math Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
CPSOLDS, β_{16}	n/a	n/a	n/a	n/a	$-.35^{**}$ (.11)	$-.37^{*}$ (.11)	$-.38^{*}$ (.11)
Sch_SES, β_{17}	n/a	n/a	n/a	$-.02^{**}$ (.01)	$-.02^{**}$ (.01)	$-.02^{*}$ (.01)	$-.02^{*}$ (.01)
Urban, β_{18}	n/a	n/a	n/a	n/a	n/a	$-.71^{*}$ (.20)	$-.72^{*}$ (.20)
SES, β_{19}	n/a	2.68^{*}(.21)	2.66^{*}(.22)	2.45^{*} (.23)	2.41^{*} (.23)	2.33^{*} (.23)	2.39^{*} (.23)
Momage, β_{110}	n/a	n/a	$.07^{**}$(.03)	$.08^{**}$ (.03)	$.09^{**}$ (.04)	$.09^{**}$ (.03)	$.09^{**}$ (.03)
ES, β_{111}	n/a	n/a	.27 (.32)	.24 (.32)	.11 (.33)	.13 (.32)	.054(.32)
Hispanic, RS, β_{112}	-1.71^{*} (.54)	-.53(.53)	-.56 (.53)	-.39 (.54)	-.15 (.55)	-.35 (.55)	-.29 (.56)
Hispanic, RNS, β_{113}	-2.64^{*} (.55)	-.77 (.56)	-.78 (.55)	-.44 (.57)	-.09 (.57)	-.36 (.58)	-.32 (.57)
Asian, β_{114}	1.06 (.90)	.64 (.82)	.19 (.89)	.24 (.88)	.17 (.89)	.10 (.89)	.45 (.87)
Black, β_{115}	-5.62^{*} (.47)	-3.75^{*} (.47)	-3.77^{*} (.48)	-3.26^{*} (.51)	-3.34^{*} (.51)	-3.60^{*} (.52)	-3.59^{*} (.52)
HOPI, β_{116}	-3.14^{*} (.92)	-2.33^{**} (.83)	-2.46^{**}(.82)	-2.47^{**}(.84)	-2.58^{**}(.83)	-2.23^{**}(.83)	-1.95^{***}(.83)

Table 12 (continued)

Math Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
Indian, β_{117}	-4.77^{*} (.95)	-2.63^{**}(.88)	-2.65^{**}(.88)	-2.37^{**}(.87)	-2.42^{**}(.87)	-2.06^{***}(.86)	-1.96^{***}(.84)
Mixed, β_{118}	-.08 (.78)	-.141 (.82)	-.15 (.82)	-.06 (.82)	-.04 (.82)	-.29 (.83)	-.24(.80)
White	–	–	–	–	–	–	–
ES*Gen1.75,β_{119}	n/a	n/a	-.28 (.56)	-.30 (.55)	-.33 (.55)	-.25 (.55)	-.18 (.55)
Male, β_{120}	n/a	n/a	n/a	n/a	n/a	n/a	1.99^{*} (.28)
SES*ES, β_{121}	n/a	n/a	-.03 (.19)	-.05 (.19)	-.07(.19)	-.06 (.19)	-.07 (.18)
SES*ES*Gen1.75, β_{122}	n/a	n/a	.06 (.28)	.07 (.28)	.08 (.28)	.06 (.29)	.004 (.28)
For acceleration							
For intercept, β_{20}	-1.61^{*} (.02)	-1.55^{*} (.02)	-1.55^{*} (.02)	-1.60^{*} (.03)	-1.60^{*} (.03)	-1.75^{*} (.05)	-1.64^{*} (.05)
Gen1.75, β_{21}	$-.17^{**}$ (.08)	$-.21^{**}$ (.08)	-.06 (.15)	-.07 (.15)	-.11 (.14)	-.09 (.15)	-.09 (.14)

Table 12 (continued)

Math Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
Gen 2, β_{22}	.02 (.05)	-.013 (.05)	.13 (.09)	.12 (.10)	.08 (.10)	.10 (.10)	.08 (.09)
Gen 3FB, β_{23}	.05 (.16)	.16 (.17)	.15 (.17)	.15 (.17)	.16 (.17)	.14 (.17)	.12 (.18)
Genmiss, β_{24}	-.03 (.14)	-.17 (.16)	-.16 (.16)	-.16 (.15)	-.17 (.15)	-.16 (.16)	-.13 (.15)
Dummy, β_{25}	.17 (.20)	.11 (.19)	.11 (.19)	.10 (.19)	.04 (.19)	.05 (.19)	.06 (.19)
CPSOLDS, β_{26}	n/a	n/a	n/a	n/a	$.03^{**}$(.01)	$.03^{**}$(.01)	$.03^{**}$(.01)
Sch_SES, β_{27}	n/a	n/a	n/a	$.002^{**}$ (.001)	$.002^{**}$ (.001)	$.002^{**}$ (.001)	$.002^{**}$ (.001)
Urban, β_{28}	n/a	n/a	n/a	n/a	n/a	$.07^{*}$ (.02)	$.07^{*}$ (.02)
SES, β_{29}	n/a	$-.22^{*}$ (.02)	$-.22^{*}$ (.02)	$-.19^{*}$ (.02)	$-.19^{*}$ (.02)	$-.19^{*}$ (.02)	$-.19^{*}$ (.02)
Momage, β_{210}	n/a	n/a	-.01 (.003)	$-.01^{***}$ (.003)	$-.01^{**}$ (.003)	$-.01^{**}$ (.003)	$-.01^{**}$ (.003)
ES, β_{211}	n/a	n/a	-.01 (.03)	-.004 (.030)	.004 (.03)	.002 (.03)	.01(.03)

Table 12 (continued)

Math Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
Hispanic, RS, β_{212}	$.16^{**}$(.05)	.06 (.05)	.06 (.05)	.05 (.05)	.03 (.06)	.05 (.06)	.04 (.06)
Hispanic, RNS, β_{213}	$.24^{*}$ (.05)	.08 (.06)	.08 (.06)	.06 (.06)	.03 (.06)	.06 (.06)	.05 (.06)
Asian, β_{214}	-.07 (.08)	-.04 (.07)	.005 (.08)	.001 (.08)	.01 (.08)	.01 (.08)	-.02 (.08)
Black, β_{215}	$.46^{*}$ (.05)	$.31^{*}$ (.05)	$.31^{*}$ (.05)	$.27^{*}$ (.05)	$.27^{*}$ (.05)	$.30^{*}$ (.05)	$.30^{*}$ (.05)
HOPI, β_{216}	$.33^{*}$ (.09)	$.26^{**}$ (.09)	$.26^{**}$ (.08)	$.26^{**}$ (.09)	$.27^{**}$ (.09)	$.24^{**}$ (.09)	$.21^{*}$ (.08)
Indian, β_{217}	$.44^{*}$ (.09)	$.26^{**}$ (.09)	$.26^{**}$ (.09)	$.24^{**}$ (.09)	$.24^{**}$ (.09)	$.21^{**}$ (.08)	$.19^{**}$ (.08)
Mixed, β_{218}	-.006 (.08)	-.003 (.08)	.001 (.08)	-.01 (.08)	.01 (.08)	.02 (.08)	.01 (.08)
White	–	–	–	–	–	–	–
SES*Gen1.75, β_{219}	n/a	n/a	.03 (.06)	.03 (.06)	.03 (.06)	.03 (.06)	.02 (.06)
Male, β_{220}	n/a	n/a	n/a	n/a	n/a	n/a	$-.21^{*}$ (.03)
SES*ES, β_{221}	n/a	n/a	-.01 (.02)	-.01 (.02)	.01 (.02)	-.01 (.02)	-.01 (.02)

Table 12 (continued)

Math Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
ES*ES*Gen1.75, β_{222}	n/a	n/a	.004 (.03)	.004 (.03)	.003 (.03)	.005 (.03)	.01 (.03)
σ^2	56.20	56.20	56.19	56.19	56.19	56.19	56.19
τ_{00}	54.65*	46.39*	46.02*	45.69*	45.53*	45.46*	45.44*
τ_{11}	40.49*	36.59*	36.52*	36.26*	36.11*	35.87*	34.89*
τ_{22}	.36*	.33*	.33*	.33*	.33*	.32*	.31*
Reliability, π_0	.642	.603	.602	.600	.599	.599	.599
Reliability, π_1	.731	.711	.711	.710	.709	.707	.702
Reliability, π_2	.640	.623	.622	.621	.620	.619	.611

Notes. The reference groups for (a) immigrant generation = nonimmigrant (i.e., generation 3), (b) race = non-Hispanic white, and (c) gender = female. All generational interactions with educational selectivity are generation 1.75 compared to all other generations, where the educational selectivity is zero except for 1.75-immigrants and second-generation immigrants.

Table 12 (continued)

Math Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

ES = educational selectivity, ELP = English language proficiency, FB = foreign born, CPSOLD = round of passage of English proficiency exam, Sch_SES = school level SES, Momage = age mother immigrated to U.S., RS = race specified, RNS = race not specified, HOPI = Native Hawaiian or other Pacific Islander. Dummy = control for imputing of missing values due to language minority status. $^{*}p \leq .001$; $^{**}p \leq . 01$; $^{***}p < .05$.

selectivity produced only slight decreases in level-2 variances (i.e., .8% at the intercept level, .2% at the linear growth level, and no change in variance at the acceleration level).

Individual-level SES continued to provide significant explanatory power throughout the model. More specifically, a one-unit increase in SES was associated with at least 3-point and 2-point improvements in math outcomes at the intercept and linear growth levels, respectively. By contrast, a one-unit increase in SES was associated with about a .20-point decrease in the acceleration of the growth in math scores. Additionally, SES accounted for 15%, 10% and 8% variance at the initial, linear growth and acceleration levels, respectively, compared to the model with race and immigrant generation alone. Finally, the introduction of SES as a covariate eliminated the gap between 1.75-generation immigrants and nonimmigrants at the intercept level so that together SES and educational selectivity accounted for all gaps in achievement between immigrants and nonimmigrants.

The other measure of SES--school-level SES--was significant at all levels throughout the model but was also of very small magnitude. The relationship between basic English language proficiency and math outcomes[36] remained significant at all levels throughout the model, as did the control variables for (a) urban status, (b) gender and (c) mother's age at time of immigration at the linear growth and acceleration of growth levels. Additionally, the model did not account for the significance of all associations between race and math outcomes. Rather, outcomes remained significant at at least some

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[36]The negative sign on the measure of basic English proficiency at the intercept and linear growth levels indicates that earlier passage of the OLDS was associated with higher math outcomes. The positive sign at the acceleration level indicates that the rate change of linear growth was lower for participants who passed the OLDS at earlier time points compared those who passed the OLDS in later rounds.

level in the full model for children who were Hispanic race specified, Hispanic race not specified, black, Hawaiian or other Pacific Islander as well as American Indian or Native Alaskan. However, this analysis on the full sample does not adequately address the issue of whether educational selectivity combined with SES accounts for differences in immigrant performance potentially attributed to race because 82% of participants in the full sample are nonimmigrants. Instead, the models that examine math performance for subsamples of immigrants by generation are more adequate for evaluating the explanatory power of SES and educational selectivity regarding immigrant racial gaps.

Table 13 provides results for growth in reading achievement. Several differences between the analyses of growth in reading outcomes and math outcomes are present. First, no differences in the direct association between educational selectivity and reading outcomes by immigrant generation were uncovered. Additionally, educational selectivity moderated SES not only at the intercept level, but also at the linear growth level. Also, SES eliminated all gaps in achievement for second-generation immigrants at the initial, linear growth and acceleration levels, whereas basic English language eliminated the significance of the remaining immigrant achievements gaps present at the intercept level.

Furthermore, the control variable for gender was significant at the intercept level indicating that male participants tended to underperform in reading relative to female participants at fall of kindergarten by about 2.40-points and the linear growth rate of males compared to female participants was -1.31-points with a positive difference in acceleration of .10-points compared to females. Similarly, unlike results for the math

Table 13

Reading Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
For Intercept							
Intercept, β_{00}	35.15*(.31)	33.69*(.28)	33.79*(.27)	34.56*(.37)	34.45*(.37)	35.84* (.69)	37.07* (.72)
Gen1.75, β_{01}	-4.61** (1.47)	-4.03** (1.43)	-8.21** (3.34)	-8.09* (3.40)	-6.39 (3.69)	-6.58 (3.68)	-6.47 (3.60)
Gen 2, β_{02}	-1.73*** (.86)	-1.03 (.75)	-1.92 (1.73)	-1.74 (1.73)	-.87 (1.74)	-1.00 (1.74)	-1.17 (1.76)
Gen 3FB, β_{03}	-1.35*** (1.60)	-3.81*** (1.68)	-3.35** (1.69)	-3.44** (1.71)	-3.07 (1.69)	-3.00 (1.67)	-3.27 (1.75)
Genmiss, β_{04}	-.22 (2.60)	3.06 (2.36)	2.77 (2.31)	2.78 (2.21)	2.97 (2.22)	2.86 (2.22)	3.18 (2.21)
CPSOLDS, β_{05}	n/a	n/a	n/a	n/a	-1.64* (.36)	-1.67* (.35)	-1.66* (.36)
Sch_SES, β_{06}	n/a	n/a	n/a	-.03** (.01)	-.02** (.01)	-.02** (.01)	-.02** (.01)
Urban, β_{07}	n/a	n/a	n/a	n/a	n/a	-.67***(.29)	-.65***(.29)
SES, β_{08}	n/a	5.05* (.38)	4.64* (.40)	4.38* (.41)	4.31* (.41)	4.22* (.42)	4.17* (.42)

Table 13 (continued)

Reading Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient (*SE*)	+ SES coefficient (*SE*)	+ ES coefficient (*SE*)	+ School SES coefficient (*SE*)	+ ELP coefficient (*SE*)	+ Urban status coefficient (*SE*)	+ Gender coefficient (*SE*)
Momage, β_{09}	n/a	n/a	-.02 (.07)	-.01 (.07)	.04 (.07)	.04 (.07)	.04 (.07)
ES, β_{010}	n/a	n/a	.40(.64)	.36(.64)	.20(.63)	.21(.63)	.30 (.64)
Hispanic, RS, β_{011}	-4.23* (.87)	-2.13** (.79)	-2.00** (.79)	-1.81** (.79)	-1.20 (.80)	-1.38 (.81)	-1.49 (.81)
Hispanic, RNS,β_{012}	-5.30*(.81)	-1.83**(.77)	-1.46 (.77)	-1.04 (.78)	-.21 (.79)	-.46 (.79)	-.49 (.78)
Asian, β_{013}	6.07*(1.55)	5.39*(1.38)	3.97**(1.49)	4.04**(1.48)	4.25**(1.47)	4.19**(1.45)	3.78**(1.48)
Black, β_{014}	-4.07* (.60)	-.55 (.58)	-.87 (.57)	-.25 (.63)	-.44 (.63)	-.69 (.63)	-.69 (.63)
HOPI, β_{015}	-.61 (2.09)	.97 (2.06)	-.30 (2.16)	-.28 (2.11)	-.01 (2.08)	.35 (2.08)	.15 (2.05)
Indian, β_{016}	-4.60* (1.32)	-.68 (1.36)	-.97 (1.33)	-.63 (1.33)	-.74 (1.33)	-.45 (1.32)	-.51 (1.29)
Mixed, β_{017}	-.19 (1.70)	-.29 (1.64)	-.77 (1.55)	-.63 (1.54)	-.49 (1.54)	-.75 (1.55)	-.78 (1.55)
White	–	–	–	–	–	–	–
ES*Gen1.75,β_{018}	n/a	n/a	1.98 (1.43)	1.97 (1.45)	1.76 (1.52)	1.83 (1.51)	1.73 (1.47)

Table 13 (continued)

Reading Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
Male, β_{019}	n/a	n/a	n/a	n/a	n/a	n/a	-2.40^{*} (.42)
SES*ES, β_{020}	n/a	n/a	1.09^{**} (.37)	1.06^{**} (.37)	$.93^{**}$ (.36)	$.95^{**}$ (.36)	$.97^{**}$ (.36)
SES*ES*Gen1.75, β_{021}	n/a	n/a	-1.18 (.68)	-1.18 (.68)	-1.11 (.69)	-1.13 (.69)	-1.06 (.68)
For linear growth slope							
Intercept, β_{10}	34.44^{*}(.26)	33.48^{*}(.27)	33.46^{*}(.27)	34.51^{*}(.33)	34.44^{*}(.33)	35.92^{*}(.61)	36.59^{*}(.61)
Gen1.75, β_{11}	.81 (1.19)	1.42 (1.16)	-.84 (2.04)	-.68 (2.00)	.24 (1.99)	.01 (2.00)	.03 (2.02)
Gen 2, β_{12}	-1.43^{*}(.58)	-.89 (.58)	-1.35 (1.06)	-1.14 (1.1)	-.49 (1.1)	-.66 (1.1)	-.73 (1.1)
Gen 3FB, β_{13}	-.86 (2.02)	-2.49 (2.00)	-2.59 (2.00)	-2.71 (1.99)	-2.51 (2.01)	-2.43 (2.04)	-2.58 (1.98)
Genmiss, β_{14}	1.47 (2.31)	3.58 (2.19)	3.70 (2.19)	3.70 (1.98)	3.79 (1.98)	3.71 (2.12)	3.89 (2.15)

Table 13 (continued)

Reading Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
CPSOLDS, β_{15}	n/a	n/a	n/a	n/a	$-.35^{*}$ (.18)	$-.38^{*}$ (.18)	$-.38^{*}$ (.18)
Sch_SES, β_{16}	n/a	n/a	n/a	$-.04^{*}$ (.01)	$-.03^{*}$ (.01)	$-.03^{*}$ (.01)	$-.04^{*}$ (.01)
Urban, β_{17}	n/a	n/a	n/a	n/a	n/a	$-.73^{**}$ (.26)	$-.71^{**}$ (.25)
SES, β_{18}	n/a	3.34^{*} (.25)	3.47^{*} (.28)	3.11^{*} (.28)	3.04^{*} (.28)	2.96^{*} (.28)	2.93^{*} (.28)
Momage, β_{19}	n/a	n/a	.04 (.04)	.05 (.04)	.07 (.04)	.07 (.04)	.07 (.04)
ES, β_{110}	n/a	n/a	-.01 (.33)	-.05 (.33)	-.26 (.33)	-.24 (.33)	-.19 (.33)
Hispanic, RS, β_{111}	-1.22(.69)	.29 (.68)	.25 (.68)	.53 (.68)	.92 (.69)	.72 (.71)	.69 (.69)
Hispanic, RNS,β_{112}	-3.99^{*} (.62)	-1.65^{*} (.65)	-1.77^{*} (.65)	-1.21 (.67)	-.63 (.67)	-.90 (.68)	-.95 (.67)
Asian, β_{113}	-.16 (.81)	-.63 (.76)	-.50 (.79)	-.40 (.79)	-.46 (.78)	-.54 (.78)	-.75 (.77)
Black, β_{114}	-5.57^{*} (.59)	-3.24^{*} (.59)	-3.18^{*} (.60)	-2.32^{*} (.64)	-2.46^{*} (.65)	-2.74^{*} (.65)	-2.75^{*} (.65)
HOPI, β_{115}	-1.0 (1.54)	-.02 (1.53)	-.02 (1.56)	-.03 (1.53)	.17 (1.53)	.17 (1.49)	.04 (1.41)

Table 13 (continued)

Reading Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient (*SE*)	+ SES coefficient (*SE*)	+ ES coefficient (*SE*)	+ School SES coefficient (*SE*)	+ ELP coefficient (*SE*)	+ Urban status coefficient (*SE*)	+ Gender coefficient (*SE*)
Indian, β_{116}	-7.1* (1.21)	-4.53* (1.11)	-4.46* (1.12)	-4.00* (1.11)	-4.08* (1.11)	-3.70* (1.10)	-3.75* (1.10)
Mixed, β_{117}	0.98 (.97)	0.91 (1.00)	1.10 (1.00)	1.23 (1.00)	1.28 (1.01)	1.00 (1.01)	1.00 (1.03)
White	–	–	–	–	–	–	–
ES*Gen1.75,β_{118}	n/a	n/a	.75 (.76)	.72 (.74)	.64 (.74)	.72 (.74)	.67 (.76)
Male, β_{119}	n/a	n/a	n/a	n/a	n/a	n/a	-1.31*(.35)
SES*ES, β_{120}	n/a	n/a	-.44** (.20)	-.48** (.20)	-.52** (.20)	-.51** (.20)	-.51** (.20)
SES*ES*Gen1.75, β_{121}	n/a	n/a	.26 (.37)	.28 (.36)	.33 (.36)	.30 (.36)	.35 (.37)
For acceleration							
For intercept, β_{20}	-2.12* (.03)	-2.04* (.03)	-2.04* (.03)	-2.11* (.04)	-2.11* (.04)	-2.28* (.07)	-2.34* (.07)
Gen1.75, β_{21}	-.04 (.12)	-.02 (.12)	.16 (.22)	.15 (.21)	.07 (.21)	.10 (.21)	.09 (.21)

Table 13 (continued)

Reading Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
Gen 2, β_{22}	$.16^{**}$ (.06)	.11 (.06)	.13 (.11)	.12 (.11)	.06 (.11)	.08 (.11)	.08 (.11)
Gen 3FB, β_{23}	.07(.17)	.21 (.17)	.22 (.17)	.23 (.17)	.21 (.17)	.20 (.17)	.21 (.17)
Genmiss, β_{24}	-.24 (.26)	-.42 (.23)	-.43 (.23)	-.43 (.22)	-.43 (.22)	-.42 (.24)	-.43 (.24)
CPSOLDS, β_{25}	n/a	n/a	n/a	n/a	.03 (.02)	$.03^{***}$ (.02)	$.03^{***}$ (.02)
Sch_SES, β_{26}	n/a	n/a	n/a	$.002^{**}$ (.001)	$.002^{**}$ (.001)	$.002^{**}$ (.001)	$.002^{**}$ (.001)
Urban, β_{27}	n/a	n/a	n/a	n/a	n/a	$.09^{**}$ (.03)	$.08^{**}$ (.03)
SES, β_{28}	n/a	$-.28^{*}$ (.03)	$-.29^{*}$ (.03)	$-.26^{*}$ (.03)	$-.26^{*}$ (.03)	$-.25^{*}$ (.03)	$-.25^{*}$ (.03)
Momage, β_{29}	n/a	n/a	-.003(.004)	-.004(.004)	-.01(.004)	-.01(.004)	-.01(.004)
ES, β_{210}	n/a	n/a	.02 (.03)	.02 (.03)	.04 (.03)	.03 (.03)	.03 (.03)

Table 13 (continued)

Reading Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
Hispanic, RS, β_{211}	-.07 (.07)	-.05 (.07)	-.05 (.07)	-.07 (.07)	-.11 (.07)	-.08 (.07)	-.08 (.07)
Hispanic, RNS, β_{212}	.31* (.06)	.12 (.07)	.12 (.07)	.09 (.07)	.04 (.07)	.07 (.07)	.08 (.07)
Asian, β_{213}	-.002 (.08)	.04 (.08)	.02 (.08)	.01 (.08)	.01 (.08)	.02 (.08)	.04 (.08)
Black, β_{214}	.37* (.06)	.18** (.07)	.17 ** (.07)	.11 (.07)	.12 (.07)	.16** (.07)	.16** (.07)
HOPI, β_{215}	-.05 (.14)	-.03 (.14)	-.05 (.14)	-.05 (.14)	-.03 (.14)	-.08 (.14)	-.06 (.13)
Indian, β_{216}	.65* (.12)	.43* (.12)	.42* (.12)	.39* (.12)	.40* (.12)	.36** (.11)	.36** (.11)
Mixed, β_{217}	-.12 (.10)	-.11 (.10)	-.13 (.11)	-.14 (.11)	-.14 (.11)	-.11 (.11)	-.11 (.11)
White	–	–	–	–	–	–	–
ES*Gen1.75, β_{218}	n/a	n/a	-.07 (.09)	-.06 (.08)	-.06 (.08)	-.07 (.08)	-.06 (.09)
Male, β_{219}	n/a	n/a	n/a	n/a	n/a	n/a	.10** (.04)
SES*ES, β_{220}	n/a	n/a	.03 (.02)	.03 (.02)	.04 (.02)	.04 (.02)	.04 (.02)

Table 13 (continued)

Reading Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Variable	Gen & race coefficient *(SE)*	+ SES coefficient *(SE)*	+ ES coefficient *(SE)*	+ School SES coefficient *(SE)*	+ ELP coefficient *(SE)*	+ Urban status coefficient *(SE)*	+ Gender coefficient *(SE)*
SES*ES*Gen1.75, β_{221}	n/a	n/a	-.04 (.04)	-.04 (.04)	-.04 (.04)	-.04 (.04)	-.04 (.04)
σ^2	107.54	107.54	107.53	107.56	107.53	107.52	107.52
τ_{00}	86.15*	72.60*	71.83*	71.47*	70.93*	70.70*	69.25*
τ_{11}	52.77*	46.68*	46.47*	45.70*	45.11*	44.89*	44.47*
τ_{22}	.50*	.45*	.45*	.45*	.45*	.44*	.44*
Reliability, π_0	.580	.540	.537	.536	.534	.533	.528
Reliability, π_1	.638	.612	.611	.607	.604	.603	.601
Reliability, π_2	.556	.535	.534	.532	.530	.528	.527

Notes. The reference groups for (a) immigrant generation = nonimmigrant (i.e., generation 3), (b) race = non-Hispanic white, and (c) gender = female. All generational interactions with educational selectivity are generation 1.75 compared to all other generations, where the educational selectivity is zero except for 1.75-immigrants and second-generation immigrants.

Table 13 (continued)

Reading Achievement Controlled for Immigrant Generation, Race, Components of SES, English Language Proficiency (ELP) and other Covariates

ES = educational selectivity, ELP = English language proficiency, FB = foreign born, CPSOLD = round of passage of English proficiency exam (from fall kindergarten to spring third grade), Sch_SES = school level SES (estimated by free lunch percent), Momage = age mother immigrated to U.S., RS = race specified, RNS = race not specified, HOPI = Native Hawaiian or other Pacific Islander. $^{*}p \leq .001$; $^{**}p \leq .01$; $^{***}p < .05$.

growth model, the control variable for urban status was significant at the intercept level. By contrast, mother's age at immigration was not significant at the acceleration level.

Finally, the analysis of reading outcomes appeared to account for racial gaps somewhat more adequately than did the math growth model. Only Asian children's initial scores differed significantly (and positively) compared to those of non-Hispanic white children's. Additionally, only (a) black and (b) American Indian or Native Alaskan children had significant differences in reading outcomes compared to those of non-Hispanic whites at the linear growth and acceleration levels. However, the subsequent analyses--which examined immigrant performance separate from nonimmigrant performance--continue to be the model that examines the explanatory power of SES and educational selectivity in accounting for immigrant-racial-achievement gaps.

1.75-generation subsample. Educational selectivity had significant direct associations with math outcomes of 2.06-points, -1.31-points, and .13-points at the intercept, linear, and acceleration levels, respectively, for the 1.75-generation subsample (Table 14). Additionally, educational selectivity moderated SES by -.83 at the intercept level. SES itself had significant values of 4.62, 3.40, and -.34, at the intercept, linear growth and acceleration levels, respectively.

Interpreting the sign of the interaction between SES and educational selectivity requires further information. About 67% of 1.75-generation immigrants had a negative SES, so that SES tends to be associated with decreased, not increased math outcomes for most of the sample. Educational selectivity is defined so that it always has a positive value for 1.75-generation immigrants. Consequently, the product of educational selectivity and SES is also negative for 67% of the 1.75-generation sample. Hence, the negative sign on the moderator typically works to decrease the negative effect of SES on math outcomes, so that the negative effect of SES prior to the consideration of educational selectivity is overstated. However, for 1.75-immigrants with positive SES's, the negative moderator effect implies that the positive effect of SES is overstated.

Additionally, adding both SES and educational selectivity to all levels of the model eliminated significant results regarding race. Initial levels and growth in math outcomes was not dependent either on the round of passage of the basic English proficiency screener or on school level SES. It was positively (negatively) associated with mother's age at immigration at the linear growth (acceleration) level.

In the reading growth curve models for 1.75-generation immigrants, educational selectivity had a significant effect only as a moderator (coefficient = -.85) at the linear growth level (Table 14). Again, for the typical participant in the sample, this negative moderator effect works to improve the impact of SES, which is negative for about 67% of 1.75-generation participants. SES itself had significant associations with reading scores at the intercept and linear growth levels (coefficients = 5.18 and 7.29, respectively). Just as in the math growth model, the introduction of SES and educational selectivity as covariates together eliminated racial achievement gaps among 1.75-generation immigrants. Also, similar to results for the math growth curve results, neither the round of passing the OLDS nor school-level SES significantly predicted reading achievement in the 1.75-generation subsample. Unlike results for the math growth model, being male was associated with 8.72-points lower initial reading achievement among the 1.75-generation subsample and the control for urban status was significant at the intercept level.

Table 14

Growth in Reading and Math Achievement by Immigrant Generation Controlled for Race, Components of SES, English Language Proficiency (ELP) and other Covariates

	1.75-Generation		2nd-Generation			
Variable	Math coefficient *(SE)*	Reading coefficient *(SE)*	Math coefficient *(SE)*	Math + nationality coefficient *(SE)*	Reading coefficient *(SE)*	Reading + nationality coefficient *(SE)*
For Intercept						
Intercept, β_{00}	22.19^{*} (3.54)	18.70^{*} (5.44)	28.83^{*}(1.80)	30.22^{*} (1.41)	36.44^{*}(2.87)	37.71^{*} (1.83)
Dummy, β_{01}	-2.78 (4.06)	n/a	-7.62^{*} (2.04)	-8.45^{*} (1.56)	n/a	n/a
CPSOLDS, β_{02}	.50 (.34)	.86 (.83)	-.49 (.10)	$-.55^{*}$ (.07)	-1.94^{*} (.44)	-1.99^{*} (.38)
Sch_SES, β_{03}	-.03 (.04)	.06 (.05)	$-.02^{***}$ (.01)	$-.03^{**}$ (.01)	-.03 (.02)	$-.02^{*}$ (.02)
Urban, β_{04}	.09 (1.49)	4.73^{***} (2.04)	-1.16 (.70)	-1.38^{*} (.42)	$-.17^{***}$(.84)	-1.85^{***} (.76)
SES, β_{05}	4.62^{*} (1.99)	5.18^{***}(1.98)	2.76^{*} (.82)	3.06^{**}(1.12)	3.45^{***} (1.39)	3.90^{***} (1.77)
Momage, β_{06}	-.17(.09)	.05(.12)	-.05 (.04)	-.03 (.03)	.05 (.07)	.03 (.06)
ES, β_{06}	2.06^{***} (.87)	1.91 (1.16)	-.57 (.39)	-.55(.24)	.004(.64)	-.40 (.41)

Table 14 (continued)

Growth in Reading and Math Achievement by Immigrant Generation Controlled for Race, Components of SES, English Language Proficiency (ELP) and other Covariates

	1.75-Generation		2nd-Generation			
Variable	Math coefficient *(SE)*	Reading coefficient *(SE)*	Math coefficient *(SE)*	Math + nationality coefficient *(SE)*	Reading coefficient *(SE)*	Reading + nationality coefficient *(SE)*
Hispanic, RS, β_{08}	3.50 (5.07)	-3.10 (4.66)	-1.71 (.13)	-1.55 (1.37)	-2.08 (1.90)	.12 (1.48)
Hispanic, RNS, β_{09}	1.88 (4.17)	-.45(4.01)	-1.68 (1.18)	-2.10^{***} (.99)	-.34 (1.87)	.98 (1.07)
Asian, β_{010}	1.89 (4.05)	-1.78 (4.56)	2.78 (1.90)	3.38^{**} (1.29)	6.35^{***} (2.11)	8.14^{*} (1.97)
Black, β_{011}	6.15 (5.52)	1.85 (5.16)	-2.30 (1.72)	-2.33 (1.53)	2.00 (2.66)	.77 (1.67)
HOPI, β_{012}	3.18 (5.81)	2.89 (6.47)	-.43 (1.75)	-1.39 (1.21)	2.99 (3.96)	.87 (1.83)
Mixed, β_{013}	n/a	n/a	4.77 (2.70)	.94 (1.54)	5.91 (6.94)	2.08 (3.18)
White	—	—	—	—	—	—
Male, β_{014}	-2.15 (1.68)	-8.72^{*} (2.44)	-.07 (.64)	.17 (.50)	-.21 (1.06)	-.92 (1.0)
SES*ES, β_{015}	$-.83^{***}$ (.36)	.27 (.76)	$.82^{**}$(.26)	.50 (.25)	1.01^{***} (.51)	.85 (.54)

Table 14 (continued)

Growth in Reading and Math Achievement by Immigrant Generation Controlled for Race, Components of SES, English Language Proficiency (ELP) and other Covariates

	1.75-Generation		2nd-Generation			
Variable	Math coefficient (*SE*)	Reading coefficient (*SE*)	Math coefficient (*SE*)	Math + nationality coefficient (*SE*)	Reading coefficient (*SE*)	Reading + nationality coefficient (*SE*)
For linear growth slope						
Intercept, β_{10}	29.56^{*}(3.27)	39.97^{*} (4.77)	25.75^{*} (1.87)	28.24^{*}(.97)	33.5^{***}(1.95)	36.76^{*} (1.0)
Dummy, β_{11}	-10.92^{**} (3.93)	n/a	3.25^{***} (1.62)	2.25^{**} (.82)	n/a	n/a
CPSOLDS, β_{12}	-.50 (.30)	-.02 (.52)	$-.45^{*}$ (.13)	$-.53^{*}$(.05)	$-.51^{***}$(.21)	$-.58^{*}$ (.17)
Sch_SES, β_{13}	-.01 (.30)	-0.2 (.04)	-.002 (.01)	.01 (.01)	-.003 (.012)	-.01 (.01)
Urban, β_{14}	.001 (1.21)	-1.86 (1.41)	-.70 (.59)	$-.84^{***}$ (.41)	.10 (.73)	-.84 (.53)
SES, β_{15}	3.40^{*} (1.47)	7.29^{*}(1.93)	1.12 (.80)	1.95^{***} (.90)	1.58 (.83)	2.17^{**} (.80)
Momage, β_{16}	$.13^{***}$ (.06)	-.04 (.12)	.07 (.04)	.06 (.04)	.05 (.04)	.06 (.04)

Table 14 (continued)

Growth in Reading and Math Achievement by Immigrant Generation Controlled for Race, Components of SES, English Language Proficiency (ELP) and other Covariates

	1.75-Generation		2nd-Generation			
	Math	Reading	Math	Math + nationality	Reading	Reading + nationality
Variable	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)
ES, β_{17}	-1.31*** (.60)	.07 (.95)	.02 (.33)	-.39 (.26)	-.19 (.33)	-.35 (.20)
Hispanic, RS, β_{18}	-.86(2.89)	-2.65 (3.49)	.33 (1.47)	-.89 (.81)	2.83 (1.59)	.42 (.94)
Hispanic, RNS, β_{19}	-.94(2.85)	-1.45 (3.35)	-.30 (1.37)	-1.86 (.98)	-.93 (1.31)	-2.26** (.96)
Asian, β_{110}	3.63 (2.33)	.91 (2.83)	.49 (1.48)	-.15 (.89)	-.02 (1.22)	-2.07** (.83)
Black, β_{111}	1.42 (2.66)	3.03 (4.13)	-.95 (1.79)	-3.25* (.88)	-2.59 (1.89)	-6.19* (1.55)
HOPI, β_{112}	1.63 (3.66)	-.32 (4.31)	.88 (1.47)	.15 (1.05)	1.98 (1.99)	.80 (1.34)
Mixed, β_{113}	n/a	n/a	2.85 (1.64)	1.56 (1.17)	3.38 (2.5)	.86 (1.28)
White	–	–	–	–	–	–

Table 14 (continued)

Growth in Reading and Math Achievement by Immigrant Generation Controlled for Race, Components of SES, English Language Proficiency (ELP) and other Covariates

	1.75 Generation		2nd Generation			
	Math	Reading	Math	Math + nationality	Reading	Reading + nationality
Variable	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)
Male, β_{114}	-.20 (1.41)	-1.03 (1.76)	1.75** (.67)	1.69* (.41)	-2.91*(.74)	-1.82* (.44)
SES*ES, β_{115}	-.04 (.30)	-.85*** (.42)	.38 (.23)	.11 (.19)	.03 (.25)	-.05 (.24)
For acceleration						
Intercept, β_{20}	-1.82*(.31)	-2.40* (.51)	-1.47* (.17)	-1.68* (.10)	-2.07* (.19)	-2.38* (.11)
Dummy, β_{21}	1.41** (.47)	n/a	-.24 (.15)	-.14 (.08)	n/a	n/a
CPSOLDS, β_{22}	.05 (.03)	-.02 (.06)	.04*** (.01)	.04* (.01)	.05*** (.02)	.06* (.02)
Sch_SES, β_{23}	-.000 (.003)	-.002 (.004)	-.000 (.001)	-.001 (.001)	-.000 (.001)	-.000 (.001)

Table 14 (continued)

Growth in Reading and Math Achievement by Immigrant Generation Controlled for Race, Components of SES, English Language Proficiency (ELP) and other Covariates

	1.75-Generation		2nd-Generation			
Variable	Math coefficient *(SE)*	Reading coefficient *(SE)*	Math coefficient *(SE)*	Math + nationality coefficient *(SE)*	Reading coefficient *(SE)*	Reading + nationality coefficient *(SE)*
Urban, β_{24}	.01 (.12)	.11 (.14)	.09 (.06)	.09*** (.04)	.02 (.07)	.11 (.06)
SES, β_{25}	-.34** (.15)	-.81 (.21)	-.08 (.07)	-.17 (.11)	-.07 (.08)	-.14 (.09)
Momage, β_{26}	-.01** (.01)	-.000(.01)	-.01 (.004)	-.01 (.003)	-.004(.004)	-.004 (.003)
ES, β_{27}	.13*** (.06)	-.01 (.11)	.01 (.03)	.04 (.03)	.03 (.03)	.05 (.03)
Hispanic, RS, β_{28}	.14(.30)	.43 (.33)	.03 (.14)	.13 (.09)	-.27 (.16)	-.05 (.10)
Hispanic, RNS, β_{29}	.20 (.28)	.27 (.34)	.05 (.13)	.17 (.11)	.14 (.14)	.23*** (.09)
Asian, β_{210}	-.24 (.22)	.20 (.32)	-.03 (.13)	.05 (.09)	-.000 (.13)	.189*** (.08)
Black, β_{211}	.04 (.28)	.03(.41)	.09 (.16)	.27**(.10)	.17 (.19)	.53** (.17)

Table 14 (continued)

Growth in Reading and Math Achievement by Immigrant Generation Controlled for Race, Components of SES, English Language Proficiency (ELP) and other Covariates

	1.75-Generation		2nd-Generation			
	Math	Reading	Math	Math + nationality	Reading	Reading + nationality
Variable	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)
HOPI, β_{212}	-.22 (.42)	.09 (.45)	-.06 (.15)	.02 (.12)	-.20 (.20)	-.09 (.13)
Mixed, β_{213}	n/a	n/a	-.27 (.17)	-.12 (.12)	-.43 (.25)	-.09 (.14)
White	–	–	–	–	–	–
Male, β_{214}	.08 (.15)	.21 (.20)	$-.18^{**}$ (.06)	$-.17^{*}$(.04)	$.27^{*}$ (.07)	$.17^{*}$ (.04)
SES*ES, β_{215}	.000(.03)	.07 (.05)	$-.05^{***}$ (.02)	-.02 (.02)	-.02 (.03)	-.02 (.03)
σ^2	56.54	94.32	58.98	56.86	112.44	114.25
τ_{00} or $\tau_{\pi 00}$	25.21^{*}	31.74^{*}	29.01^{*}	38.38^{*}	79.78^{*}	105.76^{*}

Table 14 (continued)

Growth in Reading and Math Achievement by Immigrant Generation Controlled for Race, Components of SES, English Language Proficiency (ELP) and other Covariates

	1.75-Generation		2nd-Generation			
	Math	Reading	Math	Math + nationality	Reading	Reading + nationality
Variable	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)	coefficient (*SE*)
τ_{11} or $\tau_{\pi 11}$	22.20*	29.47*	38.12*	32.49*	30.56*	28.05*
τ_{22} or $\tau_{\pi 22}$	.20*	.32*	.30*	.28*	.28*	.26*
$\tau_{\beta 00}$	n/a	n/a	n/a	5.15*	n/a	8.86
$\tau_{\beta 11}$	n/a	n/a	n/a	2.13	n/a	.21
$\tau_{\beta 22}$	n/a	n/a	n/a	.03**	n/a	.002
Reliability, π_0	.428	.256	.459	.533	.465	.514
Reliability, π_1	.576	.417	.694	.666	.441	.410
Reliability, π_2	.476	.388	.578	.566	.368	.340

Table 14 (continued)

Growth in Reading and Math Achievement by Immigrant Generation Controlled for Race, Components of SES, English Language Proficiency (ELP) and other Covariates

Notes. The reference groups for (a) race = non-Hispanic white for the corresponding immigrant generation, and (b) gender = female. Dummy = control for imputing of missing math values due to language minority status. ES = educational selectivity, ELP = English language proficiency, CPSOLD = round of passage of English proficiency exam, Sch_SES = school level SES, Momage = age mother immigrated to U.S., RS = race specified, RNS = race not specified, HOPI = Native Hawaiian or other Pacific Islander. $^{*}p \leq .001$; $^{**}p \leq .01$; $^{***}p < .05$. Column 4: Reliabilities of β_{00}, β_{10}, and β_{20} are .247, .184, and .221, respectively. Column 6: Reliabilities of β_{00}, β_{10}, and β_{20} are .199, .027, and .028, respectively.

Second-generation subsample prior to consideration of nationality. Results for math and reading achievement were similar at the intercept level for the subsample of second-generation immigrants regarding educational selectivity (Table 14). Educational selectivity moderated SES at the linear growth level (coefficient = .82 for math and 1.01 for reading). In the second-generation sample, SES and--hence, the product of SES and educational selectivity--was negative for about 60 percent of the sample. Consequently, for 60 percent of the participants the interaction between SES and educational selectivity implied that SES's downward association with math and reading outcomes at the intercept level is understated. For the other 40 percent, the interaction term increased the positive impact of SES. For math outcomes, the interaction between SES and educational selectivity is -.05 at the acceleration level, implying that the interaction increases (decreases) the rate of change in linear growth for participants with negative (positive) SES. SES itself was a significant determinant of both reading and math achievement at the intercept level (coefficients = 2.76 and 3.45, respectively), but not at the linear growth or acceleration of growth levels in either model.

Earlier passage of the OLDS was associated with greater reading achievement at the intercept and linear growth levels, but only with greater math performance at the linear growth level. However, earlier OLDS passage was associated with declining rates of linear growth in each model. Males experience different performance levels in both math and reading in terms of linear growth (acceleration) rates, but the effect was positive (negative) for math (coefficient = 1.75 (-.18)) and negative for reading (coefficient = -2.91 (.27)). Finally, race was eliminated as an explanatory factor in each model with the exception of the initial performance of Asians in reading being 6.35-points higher than that of second-generation non-Hispanic white immigrants.

Second-generation sample inconclusive of nationality. The covariates considered previously in 2-level growth curve models were added to the 3-level growth curve model created in research question 2 to allow for evaluation of the additional potential effect of nationality (Table 14). As previously discussed with regard to research question 2, the 3-level model could not be weighted. Therefore, results--particularly regarding race--cannot be compared directly across models. However, it can be noted that the interaction between educational selectivity and SES was not significant in the 3-level models indicating that educational selectivity may no longer have had explanatory power when a participant's mother's nation of birth was known. However, this analysis produced the fairly low reliabilities for the additional level of modeling (i.e., for the math model reliabilities for β_{00}, β_{10}, and β_{20} were .25, .18, and .22, respectively; for the reading model reliabilities for β_{00}, β_{10}, and β_{20} were .20, .03, and .03, respectively).

Supplemental Analysis

Missing data due to language minority status. Reported results for math achievement were controlled for missing values due to participants' language minority status via dummy variables. For analysis on the full sample, control dummy variables were significant at the intercept level; for the analysis on the 1.75-generation subsample, they were significant at the linear growth and acceleration levels; for analysis on the second-generation subsample, they were significant at the intercept and linear growth levels. However, all other results were comparable for models evaluated with or without the dummy variables.

Additionally, the effect of missing math data on results was evaluated by replicating analyses on a subsample that excluded participants with missing data due to language minority status. Some differences in results related to math outcomes were uncovered. For 1.75-generation subsample, educational selectivity was no longer significant at the linear slope level. For the second-generation subsample prior to the consideration of nationality, being Asian became significant at the intercept level and the interaction between SES and educational selectivity lost its significance at the acceleration level. Results for the subsample with excluded participants are not nationally representative, and, therefore, would not necessarily be expected come to the same conclusions was the analysis on the full sample.

For reading, reported results were reevaluated by replacing missing values due to language minority status with zero values (Tables 15 and 16). Most results were relatively comparable across methods of treating missing data for the full sample and the subsample. In particular, the analysis of the full sample continued to account for all differences in immigrant and nonimmigrant achievement. However, some results related to educational selectivity differed. For the full sample interactions between SES and educational selectivity continued be significant at the intercept and linear growth levels (coefficients = .75 and -.46, respectively). Thus, educational selectivity moderated SES in terms of differences *between* immigrant and nonimmigrant achievement.[37] However, results did not indicate that these interactions significantly accounted for differences in achievement *within* in any immigrant groups (Table 16).

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[37]Subsequent analysis indicated that the interaction between SES and immigrant generation did not differ between 1.75-immigrants and second-generation immigrants in account for achievement gaps between immigrants and nonimmigrants.

Table 15

Growth in Reading Achievement for the Full Sample Assuming Zero Values for Language Minority Students' Missing Data

Variable	Intercept coefficient *(SE)*	Linear growth coefficient *(SE)*	Acceleration coefficient *(SE)*
Intercept	37.02* (.72)	36.54* (.61)	-2.33* (.07)
Gen1.75	-4.05 (2.79)	1.46 (1.59)	-.05 (.17)
Gen 2	-1.70 (1.56)	-.49 (1.08)	.05 (.11)
Gen 3FB	-2.80 (1.83)	-2.38 (2.01)	.18 (.17)
Genmiss	3.61 (2.26)	3.10 (2.32)	-.35 (.26)
CPSOLDS	-5.03* (.13)	.12 (.14)	.03 (.01)
Sch_SES	-.03* (.01)	-.03* (.01)	.002** (.001)
Urban	-.54 (.29)	-.77** (.25)	.09* (.03)
SES	4.22* (.41)	2.89* (.28)	-.24* (.03)
Momage	-.01 (.06)	.13* (.04)	-.01** (.004)
ES	.71 (.57)	-.21 (.32)	.03 (.03)
Hispanic, RS	-1.96*** (.81)	1.18 (.68)	-.14 (.07)
Hispanic, RNS	-.97 (.81)	-.44 (.67)	.02 (.07)
Asian	4.21** (1.37)	-.83 (.78)	.04 (.08)
Black	-.24 (.66)	-3.03*(.64)	.18** (.07)
HOPI	.51 (2.01)	-.24 (1.42)	-.03 (.13)
Indian	-.45 (1.30)	-3.85* (1.09)	.37** (.11)

Table 15 (Continued)

Growth in Reading Achievement for the Full Sample Assuming Zero Values for Language Minority Students' Missing Data

Variable	Intercept coefficient *(SE)*	Linear growth coefficient *(SE)*	Acceleration coefficient *(SE)*
Mixed	-.26 (1.60)	.83 (1.04)	-.10 (.11)
Male, β_{020}	-2.34^{*} (.42)	-1.29^{*} (.35)	$.10^{**}$ (.04)
SES*ES, β_{021}	$.74^{***}$ (.32)	$-.46^{***}$(.18)	.03 (.02)
Variance	$\sigma^2 = 120.43$	$\tau_{11} = 43.23^{*}$	$\tau_{22} = .42^{*}$
	$\tau_{00} = 66.02^{*}$		
Reliability	.506	.581	.498

Notes. The reference groups for (a) immigrant generation = nonimmigrant (i.e., generation 3), (b) race = non-Hispanic white, and (c) gender = female. ES = educational selectivity, FB = foreign born, CPSOLD = round of passage of English proficiency exam, Sch_SES = school level SES, Momage = age mother immigrated to U.S., RS = race specified, RNS = race not specified, HOPI = Native Hawaiian or other Pacific Islander. $^{*}p \leq .001$; $^{**}p \leq .01$; $^{***}p < .05$.

Table 16

Growth in Reading Achievement for the 1.75- and Second-generation Subsamples Assuming Zero Values for Language Minority Students' Missing Data

	1.75-gen.	2nd-gen	
Variable	Reading coefficient *(SE)*	Reading coefficient *(SE)*	Reading + nationality coefficient *(SE)*
For Intercept			
Intercept, β_{00}	19.80* (5.51)	36.63* (2.76)	38.55* (1.94)
CPSOLDS, β_{02}	-3.99* (.38)	-5.05* (.14)	-5.05* (.30)
Sch_SES, β_{03}	.003 (.03)	-.04** (.02)	-.04** (.01)
Urban, β_{04}	5.98** (1.91)	-1.02 (.81)	-1.46*** (.70)
SES, β_{05}	2.20 (1.89)	3.99**(1.3)	3.93*** (1.56)
Momage, β_{06}	-.10 (.11)	-.002 (.07)	-.01 (.07)
ES, β_{06}	2.46*** (1.21)	.07 (.63)	-.31 (.43)
Hispanic, RS, β_{08}	-9.32 (5.19)	-3.47 (1.93)	-.25 (1.33)
Hispanic, RNS, β_{09}	-5.50 (5.30)	-2.02 (1.91)	.64 (1.14)
Asian, β_{010}	-2.30 (5.85)	5.45*** (2.41)	6.56** (2.17)
Black, β_{011}	4.89 (7.14)	2.94 (2.89)	1.99 (1.88)
HOPI, β_{012}	-5.97 (8.08)	2.72 (3.85)	.38 (1.73)
Mixed, β_{013}	n/a	6.60 (7.34)	1.96 (3.10)
White	-	-	-
Male, β_{014}	-1.49 (2.08)	-.99 (.95)	-1.45 (.94)
SES*ES, β_{015}	.11 (.81)	.86 (.48)	.94 (.51)

Table 16 (continued)

Growth in Reading Achievement for the 1.75- and Second-generation Subsamples Assuming Zero Values for Language Minority Students' Missing Data

	1.75-gen.	2nd-gen	
Variable	Reading coefficient *(SE)*	Reading coefficient *(SE)*	Reading + nationality coefficient *(SE)*
For linear growth slope			
Intercept, β_{10}	40.72*(4.88)	33.29* (1.96)	36.47* (1.14)
CPSOLDS, β_{12}	.56 (.47)	-.09 (.14)	-.13 (.11)
Sch_SES, β_{13}	.03 (.05)	.01 (.01)	-.01 (.01)
Urban, β_{14}	-2.37 (1.60)	-.25 (.73)	-1.15 (.62)
SES, β_{15}	7.86* (2.09)	1.12 (.82)	1.81*** (.90)
Momage, β_{16}	-.002 (.11)	.10***(.04)	.09** (.03)
ES, β_{17}	-.25 (1.09)	.22 (.34)	-.29 (.22)
Hispanic, RS, β_{18}	1.46 (4.18)	3.89***(1.56)	1.01 (.87)
Hispanic, RNS, β_{19}	1.15 (3.76)	.30 (1.32)	-1.67*** (.84)
Asian, β_{110}	1.70 (3.17)	.66 (1.26)	-1.14 (.86)
Black, β_{111}	.93 (4.38)	-3.46 (1.89)	-7.28* (1.58)
HOPI, β_{112}	2.80 (5.51)	1.70 (2.01)	1.06 (1.22)
Mixed, β_{113}	n/a	3.04 (2.59)	.77 (1.29)
White	_	_	_
Male, β_{114}	-3.08 (1.92)	-2.43* (.74)	-1.43* (.44)
SES*ES, β_{115}	-.69 (.46)	.12 (.25)	-.07 (.27)

Table 16 (continued)

Growth in Reading Achievement for the 1.75- and Second-generation Subsamples Assuming Zero Values for Language Minority Students' Missing Data

	1.75-gen.	2^{nd}-gen	
Variable	Reading coefficient *(SE)*	Reading coefficient *(SE)*	Reading + nationality coefficient *(SE)*
Intercept, β_{20}	-2.49* (.53)	-2.04* (.19)	-2.35* (.12)
CPSOLDS, β_{22}	-.01 (.05)	.05** (.02)	.05* (.01)
Sch_SES, β_{23}	-.01 (.01)	-.002 (.001)	-.002 (.001)
Urban, β_{24}	.15 (.16)	.05 (.08)	.14*** (.07)
SES, β_{25}	-.84*(.22)	-.02 (.08)	-.10 (.10)
Momage, β_{26}	-.002 (.01)	-.01***(.01)	-.01** (.003)
ES, β_{27}	.01 (.12)	.03 (.03)	.04 (.03)
Hispanic, RS, β_{28}	.02 (.41)	-.39*** (.16)	-.12 (.09)
Hispanic, RNS, β_{29}	.01 (.38)	.01 (.14)	.16 (.08)
Asian, β_{210}	.11 (.35)	-.07 (.13)	.09 (.08)
Black, β_{211}	.28 (.45)	.27 (.18)	.65* (.18)
HOPI, β_{212}	-.15 (.53)	-.16 (.20)	-.13 (.12)
Mixed, β_{213}	n/a	-.41 (.25)	-.08 (.14)
White	-	-	-
Male, β_{214}	.36 (.21)	.23** (.08)	.13* (.04)
SES*ES, β_{215}	.06 (.05)	-.03 (.03)	-.02 (.03)

Table 16 (continued)

Growth in Reading Achievement for the 1.75- and Second-generation Subsamples Assuming Zero Values for Language Minority Students' Missing Data

	1.75-gen.	2nd-gen	
Variable	Reading coefficient *(SE)*	Reading coefficient *(SE)*	Reading + nationality coefficient *(SE)*
σ^2	190.87	178.85	169.52
τ_{00} or $\tau_{\pi 00}$	13.76	56.77*	84.50*
τ_{11} or $\tau_{\pi 11}$	30.75*	23.34*	22.85*
τ_{22} or $\tau_{\pi 22}$	.23*	.17*	.18*
$\tau_{\beta 00}$	n/a	n/a	13.96*
$\tau_{\beta 11}$	n/a	n/a	.22
$\tau_{\beta 22}$	n/a	n/a	.000
Reliability, π_0	.116	.369	.474
Reliability, π_1	.374	.336	.339
Reliability, π_2	.245	.216	.228

Notes. The reference groups for (a) race = non-Hispanic white for the corresponding immigrant generation, and (b) gender = female. ES = educational selectivity, ELP = English language proficiency, CPSOLD = round of passage of English proficiency exam, Sch_SES = school level SES, Momage = age mother immigrated to U.S., RS = race specified, RNS = race not specified, HOPI = Native Hawaiian or other Pacific Islander. $^{*}p \leq .001$; $^{**}p \leq .01$; $^{***}p < .05$. Column 3: Reliabilities of β_{00}, β_{10}, and β_{20} are .261, .027, .006, respectively.

Additionally, for the 1.75-generation subsample (Table 16), educational selectivity itself predicted kindergarteners' initial reading scores (coefficient = 2.46) although SES was not a significant predictor at the intercept level. Furthermore, at the intercept level, passage of the OLDS was significantly associated with initial reading scores. Finally, being male was no longer significant at the intercept level for 1.75-generation immigrants' fall of kindergarten reading scores. However, the reliability in estimating the intercept was relevantly low at .12.

Finally, reading growth curves were reevaluated for the full sample and for each subsample over the time period during which no data were missing due to language minority status (i.e., from third grade to eighth grade.) Results for the full sample indicated that although the model explained the 1.75-generation-nonimmigrant achievement gap, the gap between second-generation immigrants and nonimmigrants remained unexplained at the linear growth and the acceleration levels by .67- and -3.27-points, respectively. The interaction between SES and educational selectivity was not significant at any level. The significance of race was accounted for except for children who were (a) Hispanic race not specified and black at the initial level with scores being 5- and 8-points lower than non-Hispanic white children's and (b) Hispanic race not specified at the acceleration level with rates being 1.72-points higher than those of non-Hispanic white children. Reliabilities were .89 at the intercept level, and .49 at the linear slope level.[38]

For the 1.75-generation subsample, the interaction between educational selectivity was -2.70 with SES itself being significant and having a relatively high magnitude of 26-

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[38]Because only three data points were observed per participant, a random term could not be estimated for any of the grade 3 through grade 8 growth models.

points at third grade. Being male compared to being female was also associated with lower reading scores estimated at 10-points at the intercept level. Additionally, the linear growth rate for children who were Hispanic race not specified was significant (i.e., 1.90 greater than that of non-Hispanic whites). Reliabilities were .87 at the intercept and .56 at the linear slope level.

For the second-generation subsample prior to the introduction of nationality (i.e., the 2-level model), the interaction between educational selectivity and SES was not significant at any level. However, the model did explain the significance of race except for for children of mixed race at the linear growth and acceleration levels; their related rates of achievement exceeded non-Hispanic white growth by 1.26- and 5.16 points, respectively. Reliabilities for the intercept and linear growth level were .84 and .44, respectively.

By contrast, the interaction between educational selectivity and SES was significant (i.e., coefficient = -.13) at the linear growth level for second-generation inclusive of nationality (i.e., the 3-level model). Furthermore, the variance of the intercept at level-3 was insignificant suggesting that after the introduction of covariates, no significant variability due to nationality remained in the model. Reliabilities for estimation of the intercept and linear growth term were .84 and .46, respectively. For the estimate of the reliability at the intercept at level 3 the reliability was .10.[39]

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[39]A random term was not estimated at the linear growth level at level 3 because the variance term was not significant for this level based on the analysis of the basic growth curve model (i.e., the growth model prior to the introduction of covariates at level 2). Additionally, the reliability of the linear growth term in the basic model was estimated to be 0.

Country Specific Analysis

Patterns in achievement by nation of origin. The pattern of mean reading and math outcomes for fall of kindergarten and spring of eighth grade for second-generation immigrants[40] was assessed in terms of the mean product of educational selectivity and SES (i.e. the mean moderator effect) for the 10 most highly represented countries in terms of mothers' nations of birth (Table 17).[41] When a given country's mean moderator effect was below that of the sample mean, both mean math and reading scores for that country tended to be below or near the sample mean. For example, Mexico, Dominican Republic, Puerto Rico, and Laos had mean moderator effects below the mean moderator effect for the entire sample and also had mean math and reading scores at fall of kindergarten and at spring of eighth grade that were beneath or just at the sample mean.

By contrast, the Philippines, United Kingdom, India and China had mean moderator effects that exceeded the mean moderator effect of the entire sample. Correspondingly, mean math and reading scores for these countries exceeded mean scores for the sample of second-generation immigrants in both time periods examined. Vietnam was an exception to this heuristic where reading and math scores exceeded those of the sample for all time periods, but the mean moderator effect was below that of the sample mean. Additionally, El Salvador's mean reading score at spring of eighth grade exceeded that of the sample despite the fact that El Salvador had a lower mean moderator effect than that of the sample.

[40]These patterns were not assessed for 1.75-generation immigrants because typically each country represented only to 1 to 3 ECLS-K participants.
[41]These 10 countries contained 663 participants or 65% of the sample of second-generation immigrants.

Table 17

*Second-generation Participant's Mean Math Scores, Mean Reading Scores, Mean Socioeconomic Status (SES), Mean Educational Selectivity (ES), and Mean ES*SES for the 10 Most Highly Represented Countries by Mothers' Nation of Birth*

Country	Mean score fall-K	Mean score spring-8	Mean SES	Mean ES	Mean ES *SES
			Math		
2nd gen. sample *N* = 1,020	24.93	141.53	-.121	1.890	.520
Mexico *N* = 371	19.89	131.58	-.7108	1.1469	-.5598
Dominican Rep *N* = 27	20.28	126.7	-.6596	1.1759	-.6097
Puerto Rico *N* = 18	22.14	133.93	-.1550	.8981	-.0075
Laos *N* = 26	23.13	141.76	-.6154	2.1154	-.8973
El Salvador *N* = 34	23.53	141.79	-.2876	1.3676	.1237
Philippines *N* = 86	27.93	147.41	.1947	4.1512	1.4152

Table 17 (continued)

*Second-generation Participant's Mean Math Scores, Mean Reading Scores, Mean Socioeconomic Status (SES), Mean Educational Selectivity (ES), and Mean ES*SES for the 10 Most Highly Represented Countries by Mothers' Nation of Birth*

Country	Mean score fall-K	Mean score spring-8	Mean SES	Mean ES	Mean ES *SES
United Kingdom *N* = 15	30.23	156.06	.7647	1.5667	1.5962
Vietnam *N* = 23	31.51	160.32	.0957	1.8478	.4346
India *N* = 46	34.79	159.79	1.0126	5.1304	5.8622
China *N* = 17	37.96	160.12	.9935	2.7353	3.0529
			Reading		
2nd gen. sample *N* = 1,020	37.22	167.92	-.121	1.890	.520
Mexico *N* = 371	30.58	152.84	-.7108	1.1469	-.5598
Dominican Rep *N* = 27	31.48	150.27	-.6596	1.1759	-.6097

Table 17 (continued)

*Second-generation Participant's Mean Math Scores, Mean Reading Scores, Mean Socioeconomic Status (SES), Mean Educational Selectivity (ES), and Mean ES*SES for the 10 Most Highly Represented Countries by Mothers' Nation of Birth*

Country	Mean score fall-K	Mean score spring-8	Mean SES	Mean ES	Mean ES *SES
El Salvador					
N = 34	32.3	170.25	-.2876	1.3676	.1237
Laos					
N = 26	32.6	168.19	-.6154	2.1154	-.8973
Puerto Rico					
N = 18	36.24	164.05	-.1550	.8981	-.0075
Philippines					
N = 86	38.51	171.67	.1947	4.1512	1.4152
Vietnam					
N = 23	40.03	187.9	.0957	1.8478	.4346
United					
Kingdom	40.78	188.01	.7647	1.5667	1.5962
N = 15					
China					
N = 17	43.80	192.73	.9935	2.7353	3.0529
India					
N = 46	53.84	190.31	1.0126	5.1304	5.8622

Table 17 (continued)

*Second-generation Participant's Mean Math Scores, Mean Reading Scores, Mean Socioeconomic Status (SES), Mean Educational Selectivity (ES), and Mean ES*SES for the 10 Most Highly Represented Countries by Mothers' Nation of Birth*

Notes. Analysis not weighted. The mean of ES * SES is not necessarily the same as the mean of SES * mean of ES.

Country specific growth curve analysis. The only country with a sample of 1.75–generation ($N = 54$) and second-generation ($N = 371$) participants sufficient for country-specific growth curve analysis was Mexico. Based on the same two-level growth curves tested for the entire sample, educational selectivity--taken as a whole or by immigrant generation—was not associated with reading or math outcomes directly or as a moderator. Earlier passage of the OLDS predicted initial math scores and growth in math scores at the linear growth levels, but earlier passage of the OLDS was also associated with decreasing rates of growth in math outcomes at the acceleration level. Earlier passage of the OLDS also significantly predicted initial reading scores, but did not have a bearing on growth in reading scores. Being male was associated with about a 4-point lower linear growth rate in reading scores, and being Hispanic race specified as opposed to being Hispanic race unspecified was associated with about 4-points higher reading scores, but a lower acceleration of growth in those scores of .4-points.

Research Question 4: Which (if any) Parenting Characteristics are Associated with Educational Selectivity?

Research question 4 has been addressed in three steps. The first step consisted of factor analysis performed on the ECLS-K parenting variables discussed in Chapter 3 and listed in Appendix A. The second step was regression analysis, which evaluated the association between educational selectivity and parenting. Supplemental analysis at the country level comprised the third step.

Factor Analysis

The scree plot (Figure 5) produced by factor extraction suggested that six factors were likely to be associated with the ECLS-K parenting variables under analysis.

Subsequently, Varixmax rotation extracted the six factors listed in Table 18. Only loadings greater than .45 were interpreted (Tabachnick & Fidell, 2007). Other values have been replaced with zeros in Table 18.

These factors appeared to represent parental warmth (α =. 73), parental involvement (α = .66), and four choices of early childhood education--relative care (α = .97), nonrelative care (α = .97), Head Start (α = .97), and center care (α =.94). These factors were in alignment with a priori expectations, except that parental involvement included only forms of home involvement with no factor representing school involvement. Together the six factors explained 38% of the variability in the parenting variables—with parental warmth explaining 5%, parental involvement explaining 7%, relative care explaining 5%, nonrelative care explaining 7%, Head Start explaining 7%, and center care explaining 7%.

Table 18 indicates that 31 of the 67 variables analyzed have been retained in the creation of factors. The remaining 36 variables are accounted for as follows: (1) Six were eliminated during the data screening phase as being ambiguous, (2) two (i.e., number of hours of TV viewing on weekdays and the weekend) were eliminated because SPSS identified them as being continuous variables that were too far out of range for analysis with the associated interval data, (3) the remaining 28 variables had loadings of less than .45 on all six factors. An example of an ambiguous variable eliminated was the case where parents were asked the age at which their child began a particular form of child care. In the ECLS-K dataset, responses to these questions were coded -1 if the child did not participate in that particular type of care at all. Recoding this response to a useable continuous variable such as zero would have indicated that the child started that particular form of care at birth rather than never participating in that form of care.

Table 18

Rotated Parenting Factors Produced by Varimax Rotation

Item	Center care pre-K	Involve-ment	Non-Relative care pre-K	Head Start pre-K	Warmth	Relative care pre-K
How often you read to child?	0	.508	0	0	0	0
How often tell stories?	0	.551	0	0	0	0
How often sing songs?	0	.475	0	0	0	0
How often teach nature?	0	.529	0	0	0	0
How often build things?	0	.477	0	0	0	0
How often do sports?	0	.470	0	0	0	0
Rel. care yr before k?	0	0	0	0	0	.968
Place of rel. care yr before k?	0	0	0	0	0	.945
# months rel. care yr before k?	0	0	0	0	0	.956
Non-rel care year before k?	0	0	.982	0	0	0
# nrel care arrangements yr before k?	0	0	.923	0	0	0

Table 18 (continued)

Rotated Parenting Factors Produced by Varimax Rotation

Item	Center care pre-K	Involve-ment	Non-Relative care pre-K	Head Start pre-K	Warmth	Relative care pre-K
Place of nrel care yr before k?	0	0	.957	0	0	0
# months of nrel care yr before k?	0	0	.959	0	0	0
Was child ever in HS?	0	0	0	.930	0	0
HS year before k?	0	0	0	.957	0	0
HS full or part-day?	0	0	0	.912	0	0
# of hrs/wk in HS	0	0	0	.884	0	0
Ever had regular center care?	.732	0	0	0	0	0
Ctr care year before k?	.943	0	0	0	0	0
# ctr care arrange yr before k?	.909	0	0	0	0	0
# hrs/wk ctr care yr before k?	.803	0	0	0	0	0
# mths ctr care yr before k?	.936	0	0	0	0	0
Too busy to play (reverse coded)	0	0	0	0	.476	0

Table 18 (continued)

Rotated Parenting Factors Produced by Varimax Rotation

Item	Center care pre-K	Involve-ment	Non-Relative care pre-K	Head Start pre-K	Warmth	Relative care pre-K
Hard to be warm (reverse coded)	0	0	0	0	.467	0
Being parent harder than expected (reverse coded)	0	0	0	0	.594	0
Child does things bother me (reverse coded)	0	0	0	0	.590	0
Sacrifice to meet child's need (reverse coded)	0	0	0	0	.620	0
Feel trapped as parent (reverse coded)	0	0	0	0	.701	0
Often feel angry with child (reverse coded)	0	0	0	0	.562	0
Child harder to care for (reverse coded)	0	0	0	0	.576	0
More work than pleasure (reverse coded)	0	0	0	0	.529	0

Table 18 (continued)

Rotated Parenting Factors Produced by Varimax Rotation

Notes. Only loadings greater than .45 have been interpreted. Other values have been replaced with zeros.

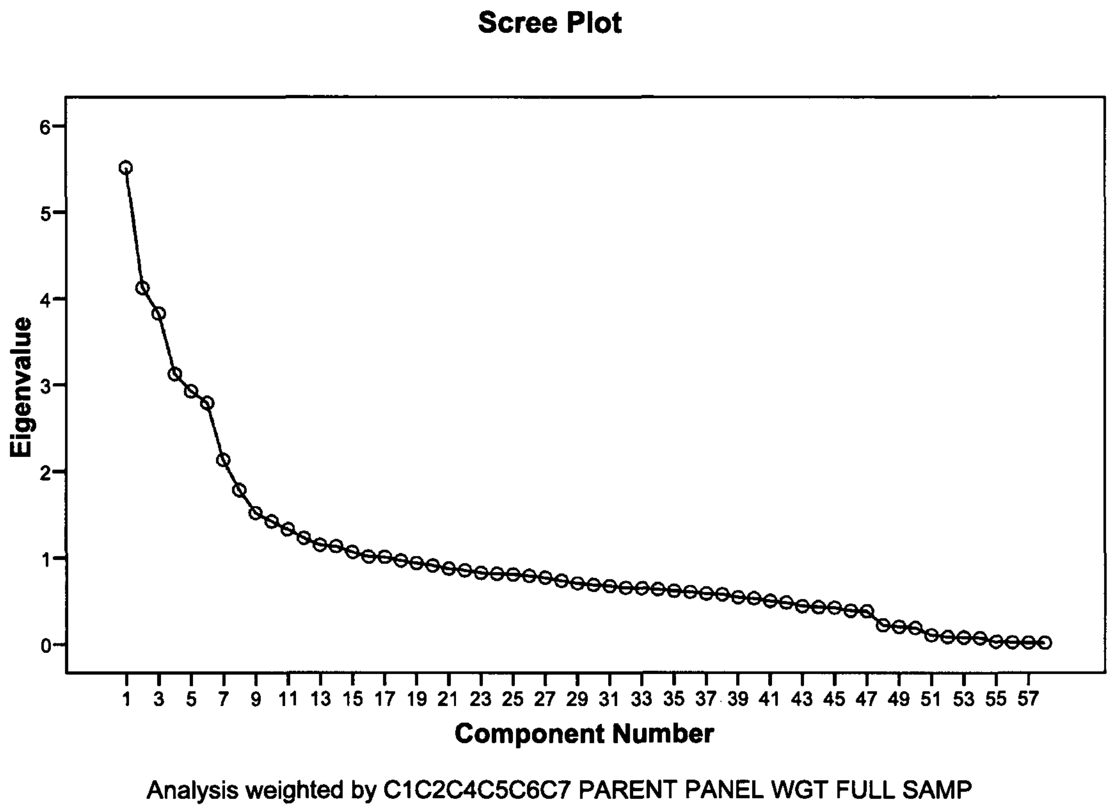

Figure 5. Scree plot of ECLS-K parenting variables produced by principal components analysis.

Regression Analysis

Six scales were created for the combined sample of 1.75- and second-generation participant's based on the mean values of the items related to each of the six factors.[42] These scales served as the main independent variables in regression analysis,[43] where the dependent variable was mother's educational selectivity. Table 19 (column 1) presents results for the full model ($R^2 = .31$), which also includes covariates for child's gender, mother's age at immigration, child's English proficiency, child's race, and child's generational status. In separate analysis not shown interactions between child's immigrant generation and parental factors for the full sample were found to be insignificant so that interactions between generational status and parenting variables were not included in the final analysis.

The parenting factors that were significantly associated with educational selectivity were center-based care and parental home involvement. More specifically, one-unit increases in parental involvement and center care were associated with .05- and .25-unit increases, respectively, in mother's educational selectivity.[44] Educational selectivity was also greater for mothers of Asian, Native Hawaiian and other Pacific Islander, and mixed-race children by 1.5, 1.6, and 1.3 points, respectively, compared to mother of non-Hispanic white children. Additionally, greater educational selectivity was associated with earlier passage of the OLDS as indicated by the negative coefficient on this variable. Furthermore, the control variable for the child being male was significant.

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[42]Because the metrics on the items related to the four childcare scales were not identical, these scales were standardized by creating z-scores.
[43]Regression analysis was conducted in *Am Statistical Software Beta Version 0.06.03* (2005) so that standard errors and significance levels were corrected for the ECLS-K sample design.
[44]The value of educational selectivity for the sample ranges from .25 to 7.

Country Specific Supplemental Analysis

The only country with combined sample sizes of 1.75- and second-generation regression analysis sufficient for country specific regression was Mexico (*N* = 425 participants; 371 = second generation and 54 = 1.75-generation) (Tabachnick & Fidell, 2007). Both parental involvement for both 1.75- and second-generation immigrants and center care for 1.75-generation immigrants were significant and positive predictors of educational selectivity.[45] Mothers who designated their children as being Hispanic race specified or white[46] tended to have higher educational selectivity than those who indicated that their children were Hispanic but not of a specific race. Finally, child's gender was not significantly related to educational selectivity in the sample of Mexican-born mothers.

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[45]Supplemental analysis indicated that for the subsample of participants with mothers' born in Mexico, the only significant interaction between generational status and parenting variables was center-based care.

[46]The percentages of children designated by Mexican-born mothers as Hispanic race specified, Hispanic race not specified, and white were 37.4%, 61.4%, and 1.2%, respectively.

Table 19

Regression of Educational Selectivity on Parenting Variables and Other Covariates

Variable	Full sample of 1.75 and 2nd immigrants Coefficient (SE)	Sample of 1.75 and 2nd immigrants (mother's born in Mexico) Coefficient (SE)
Constant	.649** (.262)	1.089* (.216)
Parental involvement	.251* (.062)	.210* (.045)
Relative care	.020 (.049)	.011 (.032)
Nonrelative care	.077 (.039)	.054 (.034)
Head Start	-.018 (.014)	.008 (.011)
Center Care	.046* (.011)	.026 (.013)
Center Care * Generation 1	n/a	.075**(.029)
Parental warmth	.026 (.077)	-.055 (.051)
OLDS	-.066* (.011)	-.041* (.008)
Male	.188** (.075)	-.047 (.055)
Age mother came into U.S.	.006 (.006)	-.003 (.004)
Hispanic-RS	.118 (.140)	.201** (.066)
Hispanic-RNS	.031 (.135)	_
Asian	1.500* (.148)	n/a
Black	.337 (.254)	n/a
HOPI	1.599* (.322)	n/a
Mixed	1.246** (.388)	n/a
White	_	.717** (.281)

Table 19 (continued)

Regression of Educational Selectivity on Parenting Variables and Other Covariates

Variable	Full sample of 1.75 and 2nd immigrants Coefficient (SE)	Sample of 1.75 and 2nd immigrants (mother's born in Mexico) Coefficient (SE)
Generation 1	.271 (.153)	.148 (.115)
Generation 2	_	_

Notes. Corrected standard errors and significance levels were calculated in *Am Statistical Software Beta Version 0.06.03* (2005). Interactions between center care and generation not tested in column 1 because intermediate analysis showed that no interactions between generation and parenting variables were significant. Column 1: The reference group for racial comparison is non-Hispanic white. Column 2: The reference group for racial comparisons is Hispanic race not specified. Both columns: The reference group for generation 1 is generation 2. RS = race specified, RNS = race not specified, HOPI = Native Hawaiian or other Pacific Islander. R^2 squared column 1 = .308; column 2 = .184.

$^{*}p<.001$. $^{**}p<.05$.

Summary

Chapter 4 has provided descriptive statistics for this study in addition to summarizing the main analyses of each research question. It has also described supplemental analyses related to missing data and country-specific evaluations. Chapter 5 will provide a summary of results, limitations, discussion, implications for research and policy, and suggestions for further research.

CHAPTER V: CONCLUSION

Chapter 4 has summarized this study's results. Chapter 5 concludes this study with a summary of findings, limitations, discussion and implications for research and policy. Additionally, it provides suggestions for further research.

Summary of Findings

This study has four main findings, one related to each of the following research questions:

1. Is there evidence of the immigrant paradox in terms of math and reading achievement for students from kindergarten through eighth grade?
2. Do immigrants' nations of origin within race explain the variability typically attributed to race alone regarding differences in immigrants and nonimmigrants' math and reading achievement for students followed from kindergarten through eighth grade?
3. Does expanding the definition of SES to include educational selectivity provide additional explanatory power in analyzing immigrant versus nonimmigrant reading and math achievement outcomes among students followed from kindergarten through eighth grade?
4. Which (if any) parenting characteristics are associated with educational selectivity?

This study's first finding is that no results are consistent with the immigrant educational paradox (Rumbaut, 1997a, 1997b). More specifically, based on growth curve analysis of Early Childhood Longitudinal Study of 1998 Kindergarten Cohort (ECLS-K), immigrant students' achievement in reading and math from fall of kindergarten to spring of eighth grade did not appear to exceed that of nonimmigrants. Instead, immigrant students who have been in the United States since at least their preschool years had lower math and reading achievement than nonimmigrants when they began kindergarten. In both achievement areas, 1.75-generation students caught up to their nonimmigrant counterparts, but second-generation students did not. The specific pathway of growth for reading achievement was not independent of assumptions made about missing data, but the general conclusions were.

This study's second finding is that nationality may play a greater role in determining immigrant performance than does race. Based on analysis of second-generation immigrants, mother's nationality explained an estimated 11 to 23%[47] of the variability in math achievement in the presence of race. By contrast, when nationality was modeled, race explains only an additional estimated 2 to 4% additional variability in math outcomes. Additionally, race and nationality provided from 17 to 39% overlapping information about variability in growth in math achievement. Missing data for reading outcomes for immigrants of language minority status prevented specific estimates from being provided about the relationship between nationality and race. However, for all models tested, when nationality was modeled, nationality had greater explanatory power than race for reading outcomes as well.

The third finding of this study is that educational selectivity has explanatory power with regard to math outcomes in (a) accounting for gaps between immigrant and nonimmigrant achievement, (b) accounting for racial gaps in achievement among both 1.75- and second-generation immigrants, (c) accounting directly for achievement among 1.75-immigrants, and (d) moderating the explanatory power of SES among both 1.75- and second-generation immigrants. More specifically, educational selectivity accounts for

[47]The range of variability represents the estimated values at the intercept, growth, and acceleration level of growth curve modeling.

the significance of three out of four of the significant gaps between immigrant and nonimmigrant math achievement uncovered in hierarchical growth modeling—with SES having accounted for the significance of the fourth achievement gap. Additionally, supplementing SES with educational selectivity eliminated all findings of racial gaps between 1.75- and second-generation immigrants. Also, for the subsample of 1.75-generation immigrants, educational selectivity was directly and positively associated with improved math outcomes at the fall of kindergarten, but over time, the growth rate in math achievement was directly, but negatively related to educational selectivity--although the rate of change of that growth rate had a direct, positive relationship with educational selectivity.

Educational selectivity also moderated SES's association with growth in math achievement among both 1.75- and second-generation immigrants. However, the moderator's effect was found to be complex. For the 1.75-generation sample, educational selectivity moderated the impact of SES on scores at fall of kindergarten so that among immigrants with low (i.e., negative) SES, educational selectivity worked to buffer the downward effect of SES. By contrast, among 1.75-immigrants with higher (i.e., positive) SES, educational selectivity reduced the positive impact of SES (i.e., the sign of the moderator was negative). The reverse finding was identified among second-generation immigrants for achievement scores at fall of kindergarten (i.e., the sign of the moderator was positive), but the interaction between SES and educational selectivity was negative at the acceleration level among second-generation immigrants. Evidence was inconclusive about whether missing data impacted findings regarding growth in reading achievement.

The fourth finding of this study is that mother's educational selectivity is positively associated with both parental involvement and center-based early childhood education, but not with parental warmth, relative care, nonrelative care, or participation in Head Start—independent of whether children were 1.75- or second-generation immigrants. However, supplemental analysis of the subsample children whose mother's were born in Mexico, indicated that while parental involvement was significant for children of both generations, center-based care was significantly associated with mother's educational selectivity only among mothers of 1.75-generation immigrants.

Limitations

This study has several limitations. First, as discussed more thoroughly in the next section, findings regarding reading achievement are limited by missing data among students' of language minority status. A second limitation of this study is that it is directly applicable only to immigrants who have arrived in the U.S at least by preschool. Third, many ECLS-K measures—particularly those related to SES, parenting, child's race, mother's educational attainment, and mother's nationality—were based on self-reported data rather than on third party observations. Self-reported measures are likely to contain a degree of greater subjectivity and greater variability for the same observation.

Fourth, the measure of educational selectivity was an estimate. In particular, it was based on the nearest 5-year interval of data available. Fifth, this study's design was highly dependent on how well ECLS-K sample weights compensate for attrition. Remaining sample participants are weighted to make up for attrition--which may be more uniquely determined among immigrants due to unobserved factors related to emigration (Rumbaut, 1997a, 1997b). At eighth grade, only about 32% (6,861 out of 21,409) of initial participants remained in the study. Sixth, fathers' immigration statuses and countries of origin could not be assessed with ECLS-K data. Seventh, results related to research question 2 (i.e., the explanatory power of race versus nationality) could not be weighted so that findings are not nationally representative. Finally, as is the case with all nonexperimental studies, findings are indicative of correlations not of causation.

Discussion

This section first provides a discussion of the alignment of findings with prior literature, and then a further discussion of results related to reading and educational selectivity. The first finding is consistent with prior studies on the ECLS-K (Glick & Hohmann-Marriott, 2007; Palacios, Guttmannova & Chase-Lansdale, 2008) in terms of the failure to detect the immigrant paradox prior to the introduction of control variables. This study differs from all known other studies in the literature, however, because it traces the trajectory of immigrant achievement over a 9-year period beginning in early childhood. Additionally, unlike Palacios et. al (2007), which excludes ECLS-K participants who did not pass the basic English language proficiency exam in fall of kindergarten from growth curve analysis, this study finds that immigrant children have reading scores that are below those of nonimmigrants at third grade—instead of finding no significant differences in achievement before the introduction of covariates.

The second finding is consistent with literature in that prior studies have indicated that immigrant educational outcomes vary by nationality (Glick & Hohmann-Marriott, 2007). However, this study is the first known study that attempts to quantify that variability. Additionally, the third finding regarding educational selectivity for growth in math achievement is consistent with Feliciano (2005a, 2005b), which found that educational selectivity has significance in terms of accounting for immigrants' educational attainment as well as accounting for racial gaps among immigrants. However, this study is the first known study that examines the impact of educational selectivity on achievement as well as the first known study that relies on hierarchical modeling to estimate educational selectivity at the individual level, rather than estimating aggregate educational selectivity at the country-level. The fourth finding corroborates parental involvement (Kao, 2004; Keith & Litchtman, 1994; Glick & White, 2004; Pong et al., 2005; Rosenbaum & Rochford, 2008) and center-based care (Magnuson, Lahaie & Waldfogel, 2006) as key constructs related to immigrant education. Together findings for research questions 3 and 4 complement the only other known study (i.e., Qin, 2006) that appears to provide insight on educational selectivity over time, which indicates that the parent-child relationship among parents of high educational selectivity is complex and may have variable educational benefits over time.

Additional interpretation may provide greater insights into (a) the possible dependence of reading outcomes on data potentially missing not at random and (b) findings regarding educational selectivity. Reading outcomes have been assessed in three ways—(1) without correction to the sample for missing data due to language minority status, (2) by replacing missing values due to language minority status with zero, and (3) by reestimating reading growth curve models during the time period with no missing data (i.e., spring of third grade, spring of fifth grade, and spring of eighth grade). Estimation without a correction for missing data assumes that the initial growth and rates of increase of that growth can be correctly inferred from the nonmissing data through hierarchical linear model's approach of weighting the group and grand means based on the reliability of information in the nonmissing data (Raudenbush & Bryk, 2002). This approach may be likened to measuring reading achievement as a construct, rather than measuring the ability to read a particular language. It is possible that non-assessed participants, on average, are learning the construct of reading through their native language at the same rate as the assessed participants, so that the uncorrected approach may be very informative.

Alternatively, replacing missing values due to language minority status with zero assumes that the intent of the assessment is to measure the ability to read English. Because students failed basic reading proficiency screeners, it seems likely that a reasonable assumption would be that non-assessed participants have reading scores approximately equal to zero. Models based on this assumption provide the best available estimate if the ability to read English is the focal point of interest. Finally, although the time period from third grade to eighth grade contains a limited number of observations, it provides a degree of a check if estimates during this time frame are consistent with the findings during the period from fall of kindergarten through spring of eighth grade. However, even consistency does not assure that all estimates over the longer time period are correct. Additionally, the shorter timeframe does not fulfill the purpose of the study, which is to assess the pattern of reading achievement among immigrants beginning in early childhood. Studying the early childhood years may be particularly ideal because intervention over this time period is often posited to be highly beneficial (Shonkoff & Phillips, 2000).

For the first research question, all three of these methods of modeling reading achievement produced consistent results: Immigrant children started out behind nonimmigrant children at fall of kindergarten, but 1.75-generation children caught up and second-generation immigrants did not. For the second-research question, findings were consistent that nationality tended to provide greater explanatory power than race. However, relying on three different assumptions of reading growth prevented any one set of point estimates from being offered as a generalized conclusion.

Findings for the third research question, however, yielded more of a conundrum. The uncorrected analysis indicated that educational selectivity acted as a moderator prior to the inclusion of nationality. The corrected analysis did not—except for in terms of explaining variability between immigrants and nonimmigrants—and the results from the growth period from grades 3 to grade 8 contained no significant interactions prior to the consideration of nationality, except for for the sample of 1.75-generation immigrants at third grade. Additionally, replacing missing assessment values with zero indicated that educational selectivity had a positive, direct association with reading outcomes and 1.75-generation immigrants. That effect could not be corroborated with any of the other testing and the reliability related to that testing was low. Consequently, it appears unwarranted to suggest that this study provides conclusive results regarding whether educational selectivity moderates SES in terms of growth in reading achievement or whether educational selectivity has a direct effect on reading outcomes. What can be said is that models for reading achievement that contained educational selectivity had explanatory power in terms of accounting for gaps in racial achievement among immigrants and in terms of accounting for gaps between nonimmigrants and immigrants.

A general question remains as to why educational selectivity appears both to bolster and reduce math achievement. Possibly educational selectivity's interaction with

SES simply works as an adjustment to SES for immigrant status (i.e., it is merely a correction, not a "good" or a "bad thing.") Why, then, would the 1.75-generation's SES need to be adjusted in a different direction than does the second-generation sample? Neither the mean value of SES, occupational prestige, mothers' educational levels nor educational selectivity itself differ significantly across immigrant generation. However, one component of SES does differ significantly ($p = .03$) across 1.75- and second-generation immigrants: Family household income is about $9,000 lower for 1.75-generation immigrants compared with second-generation immigrant (M = $32,178 versus $41,078, respectively). Hence, due to lower household income, the majority of 1.75-generation participants may require an upward adjustment to SES, whereas, the majority of second-generation immigrants may require a downward adjustment.

Another possible explanation is that an unobserved trait such as immigrant optimism (Kao & Tienda, 1995) among parents of 1.75-generation immigrants may cause them to more highly leverage their educational selectivity, so that it may be necessary to adjust the negative effect of SES upward for approximately 70% of 1.75-generation immigrants, but downward for 60% of the second-generation subsample. Additionally, the finding that the sign of direct effect of educational selectivity on education among 1.75-generation immigrants changes over time may be due to changing relationships within the family as the child grows up (Qin, 2006).

Other than Qin (2006), no studies were uncovered that attempt to ascertain what goes on in households over time where parents have high and low educational selectivity, making it more difficult to interpret the results of the present study. However, because educational selectivity does not appear to have consistently positive associations with improved educational outcomes, encouraging parents with low educational selectivity to adopt the traits of parents with high educational selectivity cannot be recommended. This study would be remiss in not pointing out that other studies have found positive associations between parental involvement and immigrant educational outcomes (Kao, 2004; Keith & Litchtman, 1994; Glick & White, 2004; Pong et al., 2005; Rosenbaum & Rochford, 2008).

The literature is less clear about center-based care. Crosnoe (2007) determined that for children of Mexican descent--by far the largest component of the ECLS-K--higher math achievement was associated with parental rather than attending center-based care. By contrast, Magnuson et al (2006) concluded that immigrants typically experience the same improvements in school readiness from center-based care as nonimmigrants in terms of math and reading scores. However, no study appears to have examined whether the long-term benefits of center-based care differ between immigrants and nonimmigrants. Recent studies have found that, in general, the academic benefits of center-based care appear to fade by third grade with the possible exception of improved vocabulary (as long as center-based care was of high quality) and that nonclinical behavioral problems tend to persist (Belsky, et al., 2007; Magnuson, Ruhm, & Waldfogel, 2007a, 2007b). Hence, it is not clear what suggestion should be made concerning center-based care for immigrants.

Implications for Policy and Research

This study offers four implications for policy and research. First, it presents policymakers and researchers with an opportunity to reconsider whether "labeling" learners is more beneficial than detrimental, even when a descriptor has statistical significance. Although this study identified statistically significant gaps in immigrant and nonimmigrant achievement, these gaps explain very little of the variability in math outcomes (i.e., 0 to 5% at any level). The same can be said of all models on reading scores, except for regarding the initial variability explained by the model that assigns a value of zero to language minority students' missing values. Even the addition race and SES leave a minimum of 70% of the variance of achievement in reading and math scores unexplained in all models explored. Greater emphasis on this finding may be beneficial in evaluating education policy that has focused so heavily on achievement gaps via The No Child Left Behind Act. Not only might such policy work to obscure the public's ability to discern the "big" picture in educational achievement, but also it might overly focus educational resources on achievement gaps rather than working to understand the other 70% of variability in achievement.

Second, a common pattern noted in the literature is to report comparisons of immigrant and nonimmigrant educational performance after introducing control variables through multivariate analysis (Chiswick & DebBurman, 2004; Glick &White, 2004; Palacios, et. al. 2008; Perreira et al., 2006). A better research protocol may be to report these comparisons prior to the introduction of control variables. Doing so would provide greater clarity about how immigrants perform relative to nonimmigrants and also about the factors that contributed to under- or over-performance.

Third, findings of this study question the protocol of excluding immigrant children from reading (and other) achievement exams. Controlling existing achievement scores for lack of English proficiency likely would be a better route than addressing missing data issues when large portions of achievement scores are missing for a subsample of interest. Furthermore, testing all students for basic English proficiency rather than only specifically identified students might be a less error-prone technique. Fourth, researchers should consider providing more detail about missing data, particularly including more information about missing data for a subgroup of immigrants, rather than just providing information about missing data for the sample of nonimmigrants and immigrants as a whole.

Suggestions for Further Research

Findings of this study suggest at least five areas where additional research may be productive. First, it would ideal to re-evaluate growth in reading outcomes on a sample inclusive of earlier learners without the present missing data restrictions, particularly to better gauge the association between educational selectivity and reading outcomes. Second, it may be productive to evaluate the trajectory of students through high school to evaluate whether an immigrant paradox emerges after eighth grade. Third, this study found that mother's educational selectivity has both positive and negative associations with achievement outcomes. However, it is not clearly known why having high educational selectivity would be associated with less favorable achievement outcomes. Performing rigorous qualitative studies of educational selectivity might facilitate a better understanding of parent-children relationships related to educational selectivity. Fourth, several findings in the supplemental analysis indicated that achievement outcomes differ among children whose mother's designated them as Hispanic race specified as opposed to Hispanic race not specified. Further investigation as to why this finding occurred may be warranted. Fifth, evaluating whether the long-term benefits of preschool differ for immigrants as opposed to nonimmigrants may provide useful information.

Summary

Chapter 5 has summarized the findings for each research question as well as provided the main limitations of this study and supplemental discussion. Additionally, implications for research and policy have been discussed. Finally, suggestions for further research have been offered.

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Appendix A

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data wave	Question	Response range
	Parental warmth	
Spring-K	My child and I often have warm, close times together.	1 = completely true to 4 = not at all true
Spring-K	Most of the time I feel that my child likes me and wants to be near me.	1 = completely true to 4 = not at all true
Spring-K	I am usually too busy to joke and play around with my child.	Original scale: 1 = completely true to 4 = not at all true (reverse coded)
Spring-K	Even when I'm in a bad mood, I show my child a lot of love.	1 = completely true to 4 = not at all true
Spring-K	By the end of a long day, I find it hard to be warm and loving toward my child.	1 = completely true to 4 = not at all true (reverse coded)
Spring-K	I express affection by hugging, kissing and holding my child.	1 = completely true to 4 = not at all true
Spring-K	Being a parent is harder than I thought it would be.	Original scale: 1 = completely true to 4 = not at all true (reverse coded)
Spring-K	My child does things that really bother me.	Original scale: 1 = completely true to 4 = not at all true (reverse coded)

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
Spring-K	I find myself giving up more of my life to meet my child's needs than I ever expected.	Original scale: 1 = completely true to 4 = not at all true (reverse coded)
Spring-K	I feel trapped by my responsibilities as a parent.	Original scale: 1 = completely true to 4 = not at all true (reverse coded)
Spring-K	I often feel angry with my child.	Original scale: 1 = completely true to 4 = not at all true (reverse coded)
Spring-K	My child seems harder to care for than most.	Original scale: 1 = completely true to 4 = not at all true (reverse coded)
Spring-K	I find taking care of a young child more work than pleasure.	Original scale: 1 = completely true to 4 = not at all true (reverse coded)
	Parental home involvement	
Fall-K	In a typical week, how often do you or a family member read books to the child?	0 = not at all to 3 = everyday

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
Fall-K	In a typical week, how often do you or a family member tell the child stories?	0 = not at all to 3 = everyday
Fall-K	In a typical week, how often do you or a family member sing songs with the child?	0 = not at all to 3 = everyday
Fall-K	In a typical week, how often do you or a family member help the child do arts and craft?	0 = not at all to 3 = everyday
Fall-K	In a typical week, how often do you or a family member involve the child in household chores, like cooking, cleaning, setting the table, or caring for pets?	0 = not at all to 3 = everyday
Fall-K	In a typical week, how often do you or a family member play games or puzzles with the child?	0 = not at all to 3 = everyday
Fall-K	In a typical week, how often do you or a family member talk about nature or do science projects with the child?	0 = not at all to 3 = everyday
Fall-K	In a typical week, how often do you or a	0 = not at all to 3 =

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
	family member build something or play with construction toys with the child?	everyday
Fall-K	In a typical week, how often do you or a family member play sports or exercise together?	0 = not at all to 3 = everyday
Spring-K	How many days in a typical week does your family eat the evening meal together?	0 to 7
Spring-K	In the past month has anyone in your family visited a library with the child?	0 = yes; 1 = no
Spring-K	In the past month has anyone in your family gone to a play, concert, or other live show with the child?	0 = yes; 1 = no
Spring-K	In the past month has anyone in your family visited an art gallery, museum or historical site with the child?	0 = yes; 1 = no
Spring-K	In the past month has anyone in your family visited a zoo, aquarium, or petting farm with the child?	0 = yes; 1 = no

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
Spring-K	How often does someone in your family talk with the child about your family's religious beliefs or traditions?	0 = never to 4 = several times a week or more
Spring-K	How often does someone in your family participate in special cultural events or traditions connected with your racial or ethnic background?	0 = never to 4 = several times a week or more
Spring-K	How often does someone in your family talk with the child about his/her ethnic or racial heritage?	0 = never to 4 = several times a week or more
Spring-K	In the past month has anyone in your family attended an athletic or sporting event in which the child is not a player with the child?	0 = yes; 1 = no
Spring-K	How many hours a day does the child usually watch TV or videos on school days?	0 to 15
Spring-K	How many hours does the child usually watch TV or videos on Saturday and Sunday	0 to 30

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
	combined?	
Spring-K	Are there family rules for which television programs the child can watch?	0 = yes; 1 = no
Spring-K	Are there family rules about how many hours the child may watch television?	0 = yes; 1 = no
Spring-K	Are there family rules about how early or late the child may watch television?	0 = yes; 1 = no
	Parental school involvement	
Spring-K	How many times has (have) parent(s) (or other adults in household) attended open house or a back to school night [since the beginning of the school year]?	0 to 22
Spring-K	How many times has (have) parent(s) (or other adults in the household) attended a meeting of a PTA, PTO, or a Parent-Teacher Student Organization [since the beginning of the school year]?	0 to 40
Spring-K	How many times has (have) parent(s) (or	0 to 50

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
	other adults in the household) gone to a meeting of a parent advisory group or policy council [since the beginning of the school year]?	
Spring-K	How many times has (have) parent(s) (or other adults in the household) gone to regularly scheduled parent-teacher conference with the child's teacher or meeting with the child's teacher [since the beginning of the school year]?	0 to 50
Spring-K	How many times has (have) parent(s) (or other adults in the household) attended a school or class event [since the beginning of the school year]?	0 to 60
Spring-K	How many times has (have) parent(s) (or other adults in the household) acted as a volunteer at the school or served on a committee [since the beginning of the	0 to 99

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
	school year]?	
Spring-K	How many times has (have) parent(s) (or other adults in the household) participated in fundraising for the child's school [since the beginning of the school year]?	0 to 99
	Choice of early childhood education	
Fall-K	Has the child ever received care from a relative on a regular basis?	0 = yes; 1 = no
Fall-K	How old was the child in months when he/she first received care from any relative on a regular basis?	0 to 18 months
Fall-K	Did child receive care from a relative on a regular basis the year before he/she started kindergarten?	0 = yes; 1 = no
Fall-K	How many different regular care arrangements did you have with relatives for care in the year before he/she started kindergarten?	0 to 4

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
Fall-K	Was the care [by the relative who] provided [the most care] in your home or in another home?	Own home, other home, both
Fall-K	How many hours each week did the child receive care from his/her relative the year before he/she started kindergarten?	0 to 70
Fall-K	How long did the child receive care from his/her relative the year before he/she started kindergarten?	0 to nine-twelve months
Fall-K	Has the child ever received care in a private home from a nonrelative on a regular basis?	0 = yes; 1 = no
Fall-K	How old was the child in months when he/she first received regular care in a private home from any nonrelative?	0 to 24 months
Fall-K	Did child receive care from a nonrelative on a regular basis the year before he/she started kindergarten?	0 = yes; 1 = no
Fall-K	How many different regular care	0 to 4

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
	arrangements did the child have with a nonrelative for care in the year before he/she started kindergarten?	
Fall-K	Was the care [by the nonrelative who] provided [the most care] in your home or in another home?	Own home, other home, both
Fall-K	How many hours each week did the child receive care from a nonrelative the year before he/she started kindergarten?	0 to 70
Fall-K	For how long did the child receive care from the nonrelative the year before he/she started kindergarten?	0 to nine-twelve months
Fall-K	Has the child ever attended Head Start?	0 = yes; 1 = no
Fall-K	Did the child attend Head Start the year before he/she started kindergarten?	0 = yes; 1 = no
Fall-K	Did he or she go [go to Head Start] for a full-day or a part-day?	0 = part day; 1 = full day
Fall-K	How many hours per day did child go to the	0 to 50

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
	Head Start program?	
Fall-K	Has the child ever attended a day care center, nursery school, preschool, prekindergarten, or before or after school program at a school or in a center on a regular basis?	0 = yes; 1 = no
Fall-K	How old was the child in months when he/she first attended a day care center, nursery school, preschool, prekindergarten, or before or after school program at a school or in a center on a regular basis?	0 to 22 months
Fall-K	Did child attend a day care center, nursery school, preschool, prekindergarten, or before or after school program at a school or in a center on a regular basis the year before he/she started kindergarten?	0 = yes; 1 = no
Fall-K	How many different regular care arrangements did you have with a	0 to 4

Appendix A (continued)

Parenting Measures Assessed in Factor Analysis (Research Question 4)

Data collection wave	Question	Response range
	nonrelative for care in the year before he/she started kindergarten?	
Fall-K	How many hours each week did the child go to the [center] program the year before he/she started kindergarten?	0 to 66
Fall-K	For how long did the child receive care at that [center] program the year before he/she started kindergarten?	0 to nine-twelve months

APPENDIX B

DISCUSSION OF ASSUMPTIONS

Hierarchical Linear Modeling (HLM)

The assumptions of HLM can be summarized as follows (Raudenbush & Bryk, 2002):

1. HLM residuals are normally, independently, and identically distributed within each level of analysis as well as are independent across levels of analysis.
2. Predictors are independent of residuals within and across each level of analysis.

These assumptions were assessed graphically mainly through scatterplots as well as through calculations of correlations and diagnostic testing available in *HLM 6.08 (2009)* for evaluating homoscedasticity of variance at level 1. Additionally as a precaution, robust standard errors were reported to correct for non-normality in the analysis.

Each assumption appeared to be reasonably satisfied with two exceptions. As would be expected given the nature of achievement testing, the variances of residuals related to achievement testing were not homogenous over time. Additionally, autocorrelation is likely at level 1, which again would be expected given the longitudinal nature of the data set. Violations of assumptions concerning independence and identical distribution of residuals have the potential to influence the consistency of estimates of standard errors as well as the accuracy of point estimates and findings related to hypothesis testing (Raudenbush & Bryk, 2002). *HLM 6.08 (2009)* does not allow for the correction of autocorrelation in unbalanced datasets (Mathilda du Toit [SSI, Inc.], personal communication, November 12, 2009).

Additionally, correction for heterosedasticity in simplified models resulted in models that represented worse overall fits of the data than uncorrected models.

Factor Analysis

The assumptions of factor analysis can be summarized as follows (Green & Salkind, 2005):

1. The construct being measured has a linear relationship with measured items.
2. Items follow a multivariate normal distribution.

The linearity and normality of items were assessed graphically. Given the discrete rather than continuous nature of the data, both linearity and normality assumptions were violated, particularly in cases where items had binary response scales. However, the parenting factors identified through factor analysis were consistent with those identified by other means in the extant literature (Chiswick & DebBurbman, 2006; Crosnoe, 2007; Kao, 2004; Keith & Litchtman, 1994; Glick & White, 2004; Magnuson, Lahaie & Waldfogel, 2006; Rosenbaum & Rochford, 2008; Qin, 2006).

Regression Analysis

The assumptions for nonexperimental multiple regression analysis can be summarized as follows (Tabachnick & Fidell, 2007):

1. Residuals are normally, independently, and identically distributed.
2. All relevant covariates (a) are included in the analysis, (b) have a linear relationship with the dependent variable, and (c) have been measured without error.

These assumptions have been assessed graphically and appear to be reasonably satisfied with two exceptions. No empirical analysis can assure that all covariates have been considered, or that all covariates are measured without error. However, this study is based on a large random sample with nearly 19,000 variables. Additionally, there are no indications that systematic measurement errors occurred during data collection.

VITA

KATHRYN A. SIMMS, Ph.D., CPA
Department of Teaching and Learning
Old Dominion University

EDUCATION

Candidate for Ph.D. in Education, Concentration in Early Childhood Education
Old Dominion University, GPA 4.0
Awarded AERA dissertation grant, December 2009-2010

Ph.D. in Finance, The University of Georgia, June 1996, GPA 4.0

M. T. A. (Master's in Tax Accounting), The University of Alabama, December 1988

B. S. in Accounting, The University of Alabama, December 1987, Summa cum laude

ACADEMIC RESEARCH AND TEACHING EXPERIENCE

Assistant Finance Professor June 1996 to May 1999
Old Dominion University

Other:

Research Assistant and Graduate Student August 2005-Present
Old Dominion University

Instructor, Research Assistant, Teaching Assistant September 1992 to June 1996
The University of Georgia

OTHER PROFESSIONAL EXPERIENCE

COO/CFO April 2001 to August 2005
Tidewater Eye Centers, PC
Portsmouth, Chesapeake, & Virginia Beach, VA

SENIOR ACCOUNTANT/SENIOR TAX ACCOUNTANT

Cavanaugh, Nelson and Company Various
Frederick B. Hill and Company
Peat Marwick & Main
Halvorson & Fischer, PC
Intergraph, Corporation

CERTIFICATION

CPA (Georgia) since 1991