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Early Reading Achievement of Children in Immigrant Families: Is There an Immigrant Paradox?

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This article examines whether longitudinal reading trajectories vary by the generational status of immigrant children as they begin formal schooling through the 3rd grade. The results of the hierarchical linear model indicated that 1st and 2nd generation children (i.e., those born in a foreign country and those born in the United States to foreign-born parents, respectively) had higher achievement scores at the spring of kindergarten than did 3rd generation children. Yet, controlling for race/ethnicity and maternal education fully reduced the 1st generation advantage. In addition, 1st generation children grew in reading achievement at a faster rate than did 3rd generation children. Controlling for a host of proximal and distal factors that included demographic, race/ethnic, family, and school characteristics somewhat reduced the association between generational status and rate of growth. First and 2nd generation children continued to increase their reading scores at a faster rate than did 3rd generation children. It is likely that additional factors not measured in the Early Childhood Longitudinal Survey—Kindergarten cohort, such as selection, cultural, or motivational factors, would be useful in further explaining the immigrant advantage.

Keywords: immigrant children, early reading achievement, English language learners, hierarchical linear model

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One of the most significant challenges to educational policy and practice in the United States is the dramatic increase in the number of immigrant children. Of particular salience is the successful integration of immigrant children from very diverse backgrounds into the academic system—children whose parents have varying levels of education, socioeconomic status, English language proficiency, and reasons for migration. These children constituted nearly 20% of the U.S. school-age population in 2000 (Van Hook, Brown, & Kwenda, 2004; Van Hook & Fix, 2000). Within the last 5 years, the mean age at entry into the United States has decreased from 9.8 years to approximately 5 years, and 16% of all children under age 10 are born to immigrant parents in the United States. To date, most studies of school achievement among immigrant children have targeted adolescents, but research on younger children is burgeoning (Crosnoe, 2005; Glick & Hohmann-Marriott, 2007; Han, 2006; Leventhal, Xue, & Brooks-Gunn, 2006; Magnuson, Lahaie, & Waldfogel, 2006). This article examines the role of immigration, as indexed by generational status, in the reading achievement trajectories of children from kindergarten through the third grade, using a large, nationally representative data set: the Early Childhood Longitudinal Survey—Kindergarten cohort (ECLS–K). We examine whether children differ by generational status in the level and speed with which they acquire reading skills once they begin formal schooling. Furthermore, we examine the individual, familial, and school factors that contribute to the differences in the levels, rate of growth, and acceleration of reading achievement among children from immigrant and nonimmigrant families.

Immigrant Children and School Success

What is known about the school success of immigrant children? Several studies have documented the "immigrant paradox" hypothesis, which posits that first generation immigrants have better health and educational outcomes than individuals born in the United States, despite similarly disadvantaged circumstances (Fuligni, 1997; Hummer, Powers, Pullum, Gossman, & Frisbie, 2007; Kao, 1999; Kao & Tienda, 1995; Palloni & Morenoff, 2001; Portes, 1995; Portes & Rumbaut, 1990). Explanations for this immigrant advantage include selection bias, social and kinship networks (Palloni & Morenoff, 2001), cultural norms and values transported from the home country, the interplay between immigrants' characteristics and the context of reception within the

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United States (Portes, 1995), and the process of acculturation over time (Berry, 2007).

The immigrant paradox has been demonstrated primarily in physical health outcomes and to some extent in educational outcomes. The debate over whether the paradox exists at all has centered on the family's characteristics before and after migration. Immigrant children's academic success may be associated with their parents' positive characteristics that are also responsible for successful immigration to the United States. Hence, the parents' skills, motivation, and determination to overcome barriers to migration may also be the skills that foster immigrant children's favorable outcomes. One argument for why children in immigrant families may outperform their third generation counterparts in educational achievement is that their families are positively selected and can use the skills that existed prior to immigration to promote their children's academic performance (Card, 2005; Chiswick & DebBurman, 2004; Feliciano, 2001).

Problematic experiences of children and their families once they have arrived in the United States frame the other central focus of the debate over the immigrant paradox (García Coll & Magnuson, 1997; García Coll & Szalacha, 2004). Risk factors may overwhelm pre-existing strengths in immigrant families, leading to negative educational outcomes for children. Obstacles to immigrant children's successful school achievement may include low levels of family income and education, lack of familiarity with recommended parenting practices in the United States, poor English proficiency, and low levels of attendance in early education programs.

Questions of immigrant achievement are inextricably coupled with the complexities of race and ethnicity in the United States. Indeed, experiences with segregation and discrimination may contribute to poor outcomes of particular race/ethnic immigrant subgroups of color (García Coll & Garrido, 2000; Spencer, 2006; Spencer et al., 2006). An examination of immigrant reading performance must also be informed by the literature on ethnic and racial disparities in early achievement trajectories. For example, in a longitudinal study using the ECLS–K, Fryer and Levitt (2004) documented various race/ethnic achievement gaps among subgroups of children, controlling for foreign-born status. They found that Asians outperform all other race/ethnic groups in math and reading achievement, whereas the achievement of Black and Hispanic children lags behind that of White children at the start of kindergarten. Over time, the Black–White gap grows, and the Hispanic–White gap decreases (Fryer & Levitt, 2004). The early advantage experienced by Asian children also decreases, but they are not losing ground at the same rate as Black children (Fryer & Levitt, 2004). In studies of generational status by country of origin, Han (2006) and Glick and Hohmann-Marriott (2007) implemented a regression design using the ECLS–K and found that the immigrant paradox was evident among Asian children, but not among Mexican Americans by the start of first grade, although both groups grew at a faster rate than did third generation non-Hispanic White children. These results, however, should be interpreted with caution, because the sample sizes of the country of origin subgroups are relatively small.

Changes in the racial and ethnic composition of immigrants, a consequence of the Immigration Act (1965) and the Refugees Act (1980), have resulted in increased racial and ethnic discrimination toward immigrants (Portes & Zhou, 1993). Additionally, increases in immigrant child poverty are associated with declining returns from education, employment, and work experience, with the highest levels of risk experienced by children whose families have the lowest levels of education, work fewer hours, and have lived in the United States for shorter periods (Portes & Zhou, 1993; Zhou, 1997). The interplay among generational status, race/ethnicity, and socioeconomic factors comes together in a complex portrayal of immigrant life in the United States and requires a new study in which these coexisting factors can be carefully modeled. This article uses five waves of child outcome data in the ECLS–K for the simultaneous modeling of level and growth of individual trajectories, while incorporating key covariates that may help clarify potential differences in these pathways.

Research Questions

The following are the research questions addressed in this study: (a) Are there initial differences by generational status, such that first, second, and third generation children differ in their level of reading skills before they enter the first grade? (b) Are there differences among the various immigrant groups in the growth rates of reading skills between spring of kindergarten and the end of third grade? (c) If differences in the level and the rate of growth in reading achievement emerge, what may account for these differences?

Factors that may account for immigrant differences are informed by expanded models of ecological systems that are theorized to influence child development (Chase-Lansdale, Valdovinos D'Angelo, & Palacios, 2007; García Coll, Crnic, Lamberty, Wasik, & Vazquez, 1996). Child factors include English language proficiency, and race/ethnicity, and family factors include family socioeconomic status, structure, and parenting (Chase-Lansdale & Pittman, 2002). Extrafamilial factors include type and quality of childcare and early education experienced prior to school entry (Magnuson & Waldfogel, 2005; NICHD Early Child Care Research Network, 2005), whether children attend a private or public elementary school in an urban or rural setting, and the concentration of minority students within a school (Ainsworth, 2002; Crosnoe, 2005). The following sections discuss these potential mediating factors and their relationship with the school success of the young children from immigrant families.

Income, Education, Family Structure, and School Success

Family socioeconomic factors, including household income, maternal education, and family structure, are key indicators of economic and psychological resources and are often associated with children's academic outcomes (Foster, 2002; Votruba-Drzal, 2006; Yeung, Linver, & Brooks-Gunn, 2002). In addition, family socioeconomic factors partially explain race/ethnic disparities in academic achievement (Conger et al., 2002; G. Duncan & Brooks-Gunn, 1997; G. Duncan & Magnuson, 2005; Jencks & Phillips, 1998). Given immigrant children's increased likelihood of experiencing economic hardship during their early development (Van Hook et al., 2004; Van Hook & Fix, 2000) and the great variability in the level of education with which immigrant parents arrive in the United States (Feliciano, 2005), household socioeconomic factors may play an important role in explaining differences between generational groups. Immigrant children may face the ob-

stacles associated with poverty, although some parents will use their relatively high levels of education as a protective factor that enhances their children's education. For other immigrant parents, lower levels of education may serve as an additional risk factor for their children's achievement. Family structure adds another level of complexity, with higher rates of two-parent households among immigrant than nonimmigrant families (Hernandez, 2004), a context that is associated with healthy child development (Chase-Lansdale & Pittman, 2002; McLanahan & Sandefur, 1994). It is unclear whether controlling for these socioeconomic factors will reduce or augment a potential immigrant advantage in reading at the start of formal schooling or over time.

Parenting and Early Education Expectations for School Success

Parenting factors such as the mother–child relationship, the level of cognitive stimulation in the home, and parental beliefs regarding school readiness may also partially explain achievement differences between immigrant generational groups, as they have among other racial–ethnic groups (Brooks-Gunn & Markman, 2005; Lamb, Hwang, Ketterlinus, & Fracasso, 1999; Raikes et al., 2006). More specifically, racial–ethnic differences in the warmth and cohesion of the mother–child relationship account for part of the gap in school readiness (Brooks-Gunn & Markman, 2005). The gap may also be influenced by race/ethnic differences in children's access to learning material and a cognitively stimulating environment in the home (Administration for Children and Families, 2002; Bradley, Corwyn, Burchinal, Pipes McAdoo, & García Coll, 2001; Yarosz & Barnett, 2001), as well as by differences in maternal beliefs regarding the importance of school readiness (Brooks-Gunn & Markman, 2005).

Immigrant children may benefit academically if their parents demonstrate higher levels of warmth and cohesiveness. Yet, the positive effect of warmth may be mitigated by lower levels of cognitive stimulation in immigrant homes (e.g., reading and speaking to the child, or provision of educationally relevant material). Again, controlling for these parenting factors may serve to widen or reduce a potential advantage in the reading trajectories of immigrant children, when compared with their third generation counterparts.

Childcare and School Entry

Although 70% of kindergarteners attend preschool the year before kindergarten (National Center for Education Statistics, 1999), substantial gaps in attendance are evident by race, ethnicity, and immigrant status (Bainbridge, Meyers, Tanaka, & Waldfogel, 2005; Brandon, 2004; Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Matthews & Ewen, 2006; Waldfogel & Lahaie, 2007). These gaps are problematic because children of immigrants who do not attend preschool are less likely to pass tests of English oral language proficiency than peers who experience early childhood educational settings (Chiswick & DebBurman, 2006; Ishizawa, 2006; Magnuson et al., 2006; Rumberger & Tran, 2006). A pattern of low preschool attendance may set immigrant children on a path of early academic disadvantage that may be exacerbated by problematic school contexts (Crosnoe, 2005; Entwisle & Alexander, 1999). We hypothesize that controlling for these factors may increase a potential first or second generation advantage in reading trajectories over their third generation counterparts. However, because childcare and school contexts are the most distal factors considered, it is possible that the strength of their influence may be attenuated.

English Language Proficiency

Children's English language proficiency prior to or throughout the kindergarten year serves as a proxy for their oral skills before entering formal schooling in the first grade. Accounting for English proficiency is necessary because it is a potential barrier to the academic success of immigrant children (Hernandez, 2004) and may serve as a useful marker of acculturation. Studies of bilingualism and metacognition suggest that bilingual children are more adept at comparing languages and consequently strengthen their metalinguistic abilities (Hakuta, 1987; van Gelderen et al., 2004), utilizing both languages to improve reading comprehension (Proctor, August, Carlo, & Snow, 2006). Additionally, the timing of second language acquisition and English proficiency may be of critical importance to early developmental trajectories (Rumberger & Larson, 1998). Given that immigrant children are more likely to have lower levels of oral English language proficiency, we hypothesize that controlling for this factor will reduce any potential immigrant disadvantage in reading and, in the case of an immigrant advantage, may serve to widen the reading achievement gap between first, second, and third generation children.

Method

Participants and Procedures

The data for the present study draw on the ECLS–K, a nationally representative data set of children attending kindergarten in the fall of 1998 (National Center for Education Statistics, 2001). Information from children, parents, and teachers was collected at five time points (N = 17,401 at Time 1): fall and spring of kindergarten, fall and spring of first grade, and in the spring of third grade. In this article, we examine the reading achievement of immigrant children who are English proficient by the time they begin formal schooling (n = 16,395).

The design of the ECLS–K focused on reading assessment tests, but not all children took the tests. Children identified by teachers or school records as speaking a language other than English (i.e., language minority) were first given an English language proficiency assessment—the Oral Language Development Scale (OLDS; National Center for Education Statistics, 2001) to determine whether they were eligible to receive the reading assessment. In the fall of kindergarten, only those who were nonlanguage minority students (who never needed to take the OLDS) or those language minority students who passed the OLDS in the first attempt were given the full reading assessment (n = 15,874). A second group of language minority students (n = 521) failed the OLDS in the fall of kindergarten—and thus do not have fall reading scores—but passed the OLDS in the spring of kindergarten. Hence, this subset of students has valid reading achievement scores for the spring of kindergarten. This study includes nonlanguage minority students, as well as language minority students who passed the OLDS in one of the first two rounds (i.e., the fall

or spring of kindergarten). Students who did not pass the OLDS by the spring of kindergarten ($n = 851$), that is, those with very limited English proficiency, and those not assessed because of attrition ($n = 155$) were not included in our main analytic sample because they do not have reading achievement scores to model the transition from kindergarten through third grade. Nonetheless, this interesting and potentially biasing subset of children was included in robustness checks, as described in the data analysis plan and the results. In summary, out of the 17,401 children in the original data set, 16,395 children were eligible for this study and constitute our analytic sample.

The 1,006 participants not included in the main analyses differ from the analytic group in the following ways: They were more likely to identify their race/ethnicity as other, less likely to have a mother with more than a high school education, and less likely to live above the poverty line. Additionally, this group was likely to experience higher levels of parental warmth but lower levels of home cognitive stimulation. Finally, this group was more likely to be cared for at home, to live in an urban area, to attend public school, and to experience schools with more than 50% minority populations. All of these factors are controlled for in our analyses.

The ECLS–K collected extensive information on child and family background as well as teacher and school administrative information. Parental interviews were conducted via telephone by trained interviewers. These were conducted primarily in English but alternatives were available for parents who spoke a foreign language, including Spanish and Chinese. Teacher and administrative information was gathered via self-report surveys that required reporting on the focal child as well as on the classroom and school context.

Measures

Early reading achievement. Reading assessments for the ECLS–K contained items measuring basic skills such as print familiarity, letter recognition, beginning and ending sounds, rhyming sounds, and word recognition, as well as vocabulary and passage comprehension (National Center for Education Statistics, 2001). Some items were developed specifically for the ECLS–K, and other items in the survey were drawn from well-established reading assessment tools such as the Peabody Individual Achievement Test (PIAT), the Peabody Picture Vocabulary Test (PPVT), and the Woodcock–Johnson Battery (Revised). Reading achievement was assessed in a two-step process in which children were first given a common set of routing questions with varying levels of difficulty. The level of difficulty encountered in the second step was determined by the child's answers to questions in the first section. Consequently, children did not receive all of the same reading questions available but received a targeted set of questions that minimized the length of the assessment. Because children are compared on scores based on their answers to different questions, item response theory (IRT) scale scores were used in the present analysis. The IRT uses the "pattern of right, wrong, and omitted responses . . . and the difficulty, discriminating ability, and 'guessability' of each item to place each child on a continuous ability scale" (National Center for Education Statistics, 2001, pp. 3–2). Finally, IRT scoring allows for longitudinal measurement of achievement even if the assessment is not the same over time. Thus, the IRT scores represent estimates of the number of questions the child would have answered correctly had he or she been administered all of the 72 items in the full reading assessment. The IRT also accounts for omitted responses to administered items, level of difficulty, and guessing. The mean IRT scores for children in the analytic sample were 27.5 ($SD = 10.5$) in the fall of kindergarten and 108.8 ($SD = 19.61$) in the spring of third grade, which are similar to those published by the National Center for Education Statistics (2004) for the full survey sample.

Generational status. The generational status variable was created using the child's birth place (U.S. born or foreign born) and mother's country of origin. Foreign-born children of foreign-born mothers were classified as first generation children; U.S.-born children to foreign-born mothers were second generation children; and U.S.-born children to U.S.-born mothers were third generation and beyond. Although some studies incorporate additional familial immigrant information such as paternal or grandparental immigrant status, only 62% of participants in the ECLS–K reported father's country of origin, and of these only 5% differed from the maternal report. Moreover, it was not possible to breakdown the third generation into more nuanced generational categories because data on grandparents' country of origin were not available. Dummies for generational status were created with third generation as the reference group.

English language proficiency. The proficiency variable was developed using information about the time point at which the children became English language proficient (passing the OLDS) or whether they were deemed never to need the OLDS (0 = *never needed the OLDS*; 1 = *needed OLDS and passed by fall of kindergarten*; 2 = *needed OLDS and passed by spring of kindergarten*). The OLDS assessment measured children's listening comprehension, vocabulary, and ability to understand and produce language and was adapted from the PreLAS 2000, an instrument with Cronbach reliabilities ranging from .89 to .90 in a norming sample (S. E. Duncan & DeAvila, 1998).

Family income, education, and structure. Family income, measured by an income-to-needs poverty variable, is a powerful indicator of economic need and was developed using continuous family income during kindergarten and government poverty thresholds that consider the number of family members living in the household. The threshold is not just an estimate of income but an assessment of a family's need and level of poverty (Burtless & Smeeding, 2001). The final income–poverty variable transformed the continuous income-to-needs variable into a dichotomous dummy. Families scoring below 1 are living below the poverty line; those scoring at or above 1 are living at or above the poverty line.

Maternal education dummies were created using the highest level of schooling obtained by the spring of kindergarten parent survey, with high school or below as the omitted category (0 = *high school or below*; 1 = *vocational, some college or beyond*). The results for our study did not vary when a more detailed breakdown of maternal education was included in the analysis. Finally, family structure was constructed as a dichotomous variable for whether the child lived in a single parent (0) or two-parent family (1) during the kindergarten year.

Parenting and early education expectations. Parenting and early education expectations were measured through parental warmth, cognitive stimulation in the home, and parental beliefs regarding school readiness. The parental warmth composite was

developed as a mean score of responses to questions reported by mothers when their children were in kindergarten ($\alpha = .69$). This composite included 13 items such as "always show love to child" or "feel trapped as a parent," which were answered by mothers on a scale ranging from 1 (*completely true*) to 4 (*not at all true*).

In addition, a composite of cognitive stimulation in the home was developed using nine items measured in the spring of kindergarten such as "how often do you read to the child?" and "how often do you all sing songs?" ($\alpha = .71$). Parents responded on a scale ranging from 1 (*never*) to 4 (*everyday*). Finally, a six-item composite assessed parental beliefs regarding what children should know before they enter kindergarten. This measure includes items such as, "how important do you think it is that a child counts?" and "how important do you think it is that a child knows letters?" Mothers responded on a scale ranging from 1 (*essential*) to 5 (*not important*). The items were reverse coded prior to creation of the maternal beliefs on school readiness composite, which had an alpha of .77.

Childcare and school entry. Childcare is characterized by two variables: the number of hours spent in an early education or prekindergarten setting and the type of childcare in which the child spent the most hours per week during the year before kindergarten (0 = *parent care*; 1 = *nonparental relative care*; 2 = *Head Start care*; 3 = *center care, omitted category*). Finally, the four school variables included age at kindergarten entry, measured in months; type of school that the child attended (0 = *private*; 1 = *public*); the urbanicity of the school (0 = *urban*; 1 = *suburban*; 2 = *rural*); and the race/ethnic concentration of the school, classified as attending a school whose student body was over 50% minority (0 = *less than 50% minority*; 1 = *50% minority or greater*). Although a continuous race/ethnic concentration variable was available in the teacher survey of the ECLS–K, this variable contained a large amount of missing data (16%). In the present analysis we use the categorical race/ethnic concentration variable (< 1% missing), available in the administrative survey of the ECLS–K, because it had very little missing data.

Data Analysis Plan

To examine the early reading trajectories by generational status, we used hierarchical linear modeling (HLM) using the software program WHLM (Raudenbush, Bryk, & Congdon, 2004). Multilevel modeling of longitudinal data with repeated outcome measures was used to assess the initial differences by generational status in children's levels of reading achievement before the start of the first grade (i.e., in the spring of kindergarten) and the differences among the various immigrant groups in the rate of growth of reading achievement over time between spring of kindergarten and the spring of third grade. Subsequently, we included a host of potential explanatory factors and explored whether the differences in reading trajectories persist even after including these important covariates.

At Level 1 (Equation 1), the within-person model, we included time and time squared, describing the individual growth trajectories by capturing the level, the rate of change, and the acceleration of reading achievement over time,

$$\text{Read}_{it} = \pi_{0i} + \pi_{1i}\text{Time}_{it} + \varepsilon_{it} \quad (1A)$$

and

$$\text{Read}_{it} = \pi_{0i} + \pi_{1i}\text{Time}_{it} + \pi_{2i}\text{Time}_{it}^2 + \varepsilon_{it}, \quad (1B)$$

such that the time at the spring of kindergarten reading assessment was coded as 0, the fall of kindergarten was coded as the number of years prior to the spring of kindergarten (negative), and the times of subsequent assessments were coded as the number of years after the spring of kindergarten assessment. The intercept was centered at the spring of kindergarten because we were interested in the mean levels and variability in these levels of reading achievement before children entered formal schooling in first grade. At Level 1, π_{0i} represents mean level of reading achievement at the spring of kindergarten, π_{1i} represents a linear term that captures the rate of growth (slope) in reading achievement between the various time points in which reading achievement was measured, and π_{2i} is the rate of acceleration. The unconditional models test whether a linear or quadratic model is a better fit to the data and whether there is variability in the intercept, slope, and acceleration that may be explained using Level 2 covariates.

To capture between-person differences in reading achievement trajectories, we modeled child and family demographic and socioeconomic characteristics, along with parenting and school factors, at Level 2. The first conditional model includes generational status, the second also controls for English language proficiency, and Model 3 adds race as a covariate. The remaining variables were entered in separate conceptual blocks, first introducing proximal variables, such as family human capital, and then distal variables, such as childcare characteristics, in subsequent models, to examine how the inclusion of each block of variables would influence the association between immigrant generational status and reading trajectories (Chase-Lansdale et al., 2007). Thus, the final model at Level 2 builds on the preceding models and includes all controls:

$$\begin{aligned}\pi_{0i} = {} & \beta_{00} + \beta_{01}\text{Generation1}_i + \beta_{02}\text{Generation2}_i \\ & + \beta_{03}\text{Proficiency}_i + \beta_{04}\text{Race}_i + \beta_{05}\text{Gender}_i \\ & + \beta_{06}\text{Human Capital}_i + \beta_{07}\text{Parenting}_i + \beta_{08}\text{Childcare}_i \\ & + \beta_{09}\text{School}_i + \upsilon_{0i}. \quad (2A)\end{aligned}$$

$$\begin{aligned}\pi_{1i} = {} & \beta_{10} + \beta_{11}\text{Generation1}_i + \beta_{12}\text{Generation2}_i \\ & + \beta_{13}\text{Proficiency}_i + \beta_{14}\text{Race}_i + \beta_{15}\text{Gender}_i \\ & + \beta_{16}\text{Human Capital}_i + \beta_{17}\text{Parenting}_i + \beta_{18}\text{Childcare}_i \\ & + \beta_{19}\text{School}_i + \upsilon_{1i}. \quad (2B)\end{aligned}$$

$$\begin{aligned}\pi_{2i} = {} & \beta_{20} + \beta_{21}\text{Generation1}_i + \beta_{22}\text{Generation2}_i \\ & + \beta_{23}\text{Proficiency1}_i + \beta_{24}\text{Race}_i + \beta_{25}\text{Gender}_i \\ & + \beta_{26}\text{Human Capital}_i + \beta_{27}\text{Parenting}_i \\ & + \beta_{28}\text{Childcare}_i + \beta_{29}\text{School}_i + \upsilon_{2i}. \quad (2C)\end{aligned}$$

In order to provide statistical evidence of mediation, we tested the significance of the indirect effects of immigration status on reading achievement through each of the covariates in the final model (Baron & Kenny, 1986; MacKinnon, Warsi, & Dwyer, 1995). Specifically, we computed the indirect effects by multiplying the coefficient for the immigration status effect on the potential me-

diator by the coefficient specifying the mediator's effect on the outcome. Because both the initial variable (i.e., immigrant status) and the mediators were measured at Level 2, a single level specification of the coefficient indicating the relationship between the two variables was used in the computation of the multilevel estimate of the mediated effect (Krull & MacKinnon, 2001). The mediation effects were evaluated with the traditional Sobel (1982) test.

In order to reduce the false discovery error rate due to the many comparison tests, the *p* values associated with the presented test statistics were corrected for multiple tests using the Benjamini–Hochberg adjustment and an overall alpha level of .05 (Benjamini & Hochberg, 1995; Benjamini, Krieger, & Yekutieli, 2006).

Two approaches were used to address missing data in the analyses. Full information maximum likelihood with a robust maximum likelihood estimator was implemented to address potential bias due to missing data on the dependent variable. Maximum likelihood provides efficient estimates of parameters from incomplete data and allows for the retention of the full sample for all analyses (Schafer, 1997). In particular, full information maximum likelihood addresses missing data for the 521 participants who did not have a reading assessment in the fall of kindergarten, as well as missing data due to attrition over the five waves. In addition, to avoid listwise deletion of cases with missing information on our time-invariant covariates, primarily because of participant nonresponse, we used missing data dummy variables in our analyses (Allison, 2001). Missing data dummies were included for generational status (n = 1,773, 11%), family socioeconomic factors (n = 868, 5.3%), parenting variables (n = 3,147, 19.2%), childcare factors (n = 2,403, 14.7%), and schooling variables (n = 496, 3%).

Finally, to check the robustness of our findings to alternate model and missing data specifications, we conducted supplementary regression analyses within the ordinary least squares (OLS) framework that used the reading assessments at the spring of third grade as outcomes and that included the full list of covariates. These OLS models included the 1,006 cases that had been excluded from our HLM analyses as a result of the design of the ECLS–K. These results were analogous to those from the HLM models and are discussed in the results section.

Results

Descriptive Results

Reading scores over the five waves and background characteristics for the full sample and by generational status are presented in Tables 1 and 2, respectively. The first generation constitutes 1.5% of the sample (n = 251), and 11.6% of the sample were second generation (n = 1,907), which was comparable to census data available for children entering kindergarten in 2000 (Van Hook & Fix, 2000). Within the third generation (n = 12,464; 76%), participants were more likely to identify as White or Black (70.18% and 14.57%, respectively), whereas those in the first (38.24% and 26.69%, respectively) or second generation (40.22% and 26.74%, respectively) were more likely to identify as Hispanic or Asian.

Approximately 39% of the first generation and 52% of the second generation children never needed the OLDS language assessment, whereas 98% of third generation children never received the OLDS. Nearly one third of first and second generation children reached proficiency by the fall of kindergarten. The remaining 29% of the first generation and 17% of the second generation were proficient by the spring of kindergarten. Although all of the students included in this study have passed the English language proficiency test (OLDS) by the end of kindergarten, it is important to note that there was considerable variability in their proficiency scores.

Maternal education for the first generation was comparable to the third generation, with 58% and 60% of mothers obtaining more than a high school education, but only 51% of the mothers of second generation children obtained this level of education. Seventy-two percent of first generation children and 77% of the second generation were above the poverty line by the end of kindergarten, whereas more than 84% of third generation children were living in similar economic conditions.

Children of immigrants were more likely to live in a two-parent household (83% for first and second generation compared with 77% for the third generation). Also, first and second generation immigrants demonstrated higher levels of parental warmth. However, the home environment of third generation children was rated as being more cognitive stimulating than that of the first and second generation families. Additionally, first and second generation children spent fewer hours in kindergarten (18.58 and 22.88

Table 1
Descriptive Statistics for Reading Scores for the Total Sample and by Generational Status

Dependent variable: Reading	Total (N = 16,395)		1st generation (n = 251)		2nd generation (n = 1,907)		3rd generation (n = 12,464)		Missing generation (n = 1,773)		p
	M	SD	M	SD	M	SD	M	SD	M	SD	
Fall of kindergarten	27.55	10.06	29.05	12.13	28.30	12.73	27.79	9.80	24.81	8.06	$< .05^{a,b,c}$
Spring of kindergarten	38.87	13.37	28.82	15.60	39.81	15.37	39.20	13.13	35.44	11.82	$< .05^{a,b,c}$
Fall of first grade	45.64	16.96	49.05	20.99	47.83	20.00	45.87	16.59	40.82	14.36	$< .05^{a,b,c,d}$
Spring of first grade	68.44	20.61	69.81	21.50	69.44	20.82	69.16	20.54	62.24	19.63	$< .05^{a,b,c,d}$
Spring of third grade	108.87	19.62	110.17	19.64	107.71	18.47	109.96	19.48	100.64	20.44	$< .05^{a,b,c}$

[a] Significant difference between first and missing generations. [b] Significant difference between second and missing generations. [c] Significant difference between third and missing generations. [d] Significant difference between second and third generations.

Table 2
Descriptive Statistics for Covariates and Controls for the Total Sample and by Generational Status

Statistic	Total (N = 16,395)	1st generation (n = 251)	2nd generation (n = 1,907)	3rd generation (n = 12,464)	Missing generation (n = 1,773)	p
Child characteristics (% of total sample)						
White	59.34	20.32	17.72	70.18	33.39	$< .05^{a,b,c,d,e}$
Black	14.90	7.97	7.03	14.57	26.68	$< .05^{a,b,c,d,e}$
Hispanic	14.18	38.24	40.22	9.15	18.16	$< .05^{a,b,c,d,e}$
Asian	5.68	26.69	26.74	0.81	14.27	$< .05^{a,b,c,d,e}$
Other	5.90	6.77	8.29	5.30	7.50	$< .05^{b}$
Female	48.73	49.00	48.56	49.04	46.71	
Language proficiency (%)						
Never needed assessment	90.07	38.65	51.55	98.03	82.80	$< .05^{a,b,c,d,e,f}$
Proficient by fall of kindergarten	6.75	32.67	31.57	1.69	11.96	$< .05^{a,b,c,d,e}$
Proficient by spring of kindergarten	3.18	28.69	16.89	0.27	5.25	$< .05^{a,b,c,d,e,f}$
Socioeconomic factors (%)						
Maternal education above high school	55.05	58.17	50.60	59.59	28.14	$< .05^{b,c,d,e,f}$
Above poverty	81.78	72.20	76.98	84.11	67.85	$< .05^{a,b,d,e}$
Two-parent family	77.94	83.61	83.64	78.60	61.13	$< .05^{b,c,d,e}$
Parenting						
Warm parenting						
M	1.48	1.56	1.55	1.47	1.48	$< .05^{a,b,c,d}$
SD	0.33	0.40	0.39	0.32	0.35	
Home cognitive stimulation						
M	2.79	2.67	2.67	2.82	2.75	$< .05^{a,b,d,e}$
SD	0.48	0.52	0.52	0.47	0.52	
Maternal beliefs school readiness						
M	4.00	3.92	3.97	4.00	4.01	$< .05^{c,d}$
SD	0.50	0.45	0.47	0.51	0.47	
Hours in prekindergarten (per week)						
M	25.60	18.58	22.88	25.93	27.74	$< .05^{a,b,c,d,e,f}$
SD	21.53	18.65	21.34	21.37	23.30	
Age at kindergarten entry (in months)						
M	65.62	65	64.53	65.8	65.56	$< .05^{a,b,d}$
SD	4.24	4.55	4.20	4.22	4.23	
Childcare (%)						
Parental care	14.82	27.09	21.29	13.81	13.25	$< .05^{a,b,c,e,f}$
Nonparental, relative care	25.09	14.74	22.08	26.72	18.33	$< .05^{a,b,c}$
Headstart	7.56	9.96	8.39	7.18	8.97	$< .05^{d,e}$
Center care	37.93	31.47	35.4	40.81	21.32	$< .05^{b,d,e}$
School characteristics (%)						
Public school	77.76	86.18	79.02	76.27	85.86	$< .05^{a,d,e,f}$
Urban school	38.02	47.01	53.43	34.52	44.73	$< .05^{a,b,d,e}$
Suburban school	39.07	40.24	38.28	39.33	37.96	
Rural school	22.37	10.76	8.29	25.86	14.61	$< .05^{a,b,d,e}$
School is over 50% minority	30.78	53.69	55.47	23.74	50.51	$< .05^{a,b,d,e}$

[a] Significant difference between first and third generations. [b] Significant difference between second and third generations. [c] Significant difference between first and missing generations. [d] Significant difference between second and missing generations. [e] Significant difference between third and missing generations. [f] Significant difference between first and second generations

hours, respectively, compared with 25.93 hours for third generation) and were more likely to be in parental care than the third generation (27.09% and 21.09% for first and second generation, respectively, compared with 13.81%), whereas third generation children were most likely to participate in center care (40.81% compared with 31.47% and 35.40% for first and second generation, respectively). Once they entered formal schooling, first generation children were more likely to attend public schools and, along with the second generation, were more likely to attend schools in an urban setting with over 50% minority populations.

Growth Curve Analysis

Unconditional models. The unconditional model revealed significant mean intercept, linear slope, and acceleration components as well as significant variability in each of these components (see Table 3). In other words, children's reading scores by the spring of kindergarten were significantly above zero and grew at a positive rate, although gains in reading achievement slowed down over time. There was significant variability in the levels of children's reading skills at the end of kindergarten and in their rate of change over time: intercept, $\chi^2(16213, N = 16{,}214) = 95{,}224.81$, $p < .001$; linear slope, $\chi^2(16213, N = 16{,}214) = 33{,}704.69$, $p < .001$. The inclusion of a quadratic or acceleration term at Level 1 significantly improved the fit of the model, $\chi^2(4, N = 15{,}584) = 12{,}776.45$, $p < .001$. The variance component indicated that there was significant variability between students in the rate of acceleration, $\chi^2(15583, N = 15{,}584) = 29{,}123.48$, $p < .001$, further justifying the inclusion of a quadratic time variable at Level 1.

Table 3
Unconditional Growth Models for Reading Achievement From Kindergarten Through Third Grade

Fixed effects	Unconditional model	
	Linear	Square
Model for initial status		
Mean intercept	40.14***	40.41***
SE	0.10	0.10
Model for rate of change		
Mean slope	23.51***	27.47***
SE	0.04	0.10
Model for acceleration		
Mean acceleration		−1.53***
SE		0.03
Residual variance		
Level 2 intercept	139.32***	159.07***
SD	11.80	12.61
Slope	14.71***	84.35***
SD	3.84	9.18
Acceleration		9.04***
SD		3.01
Within individual	79.83	49.55
SD	8.93	7.04

*** $p < .001$, after controlling for multiple tests with the Bejamini–Hochburg adjustment.

Conditional Model 1: Generation. The first conditional specification modeled the generational differences in reading achievement but did not include any other predictors (see Table 4, Model 1). No significant immigrant generational differences emerged in reading achievement between students by the end of kindergarten (modeled as the intercept) or in their rate of growth. Inclusion of the generation variables helped explain 1.1% of the variance between students in the intercept, and 0.9% and 0.5% of the variance between students in slope and acceleration, respectively.

Conditional Model 2: English proficiency. Becoming English language proficient after entering kindergarten was associated with lower reading scores at the end of kindergarten but was not consistently associated with significant differences in growth or acceleration. Controlling for English language proficiency revealed a less biased association between immigrant status and initial reading achievement, particularly because immigrant children were less likely to be proficient at formal school entry. Once English language proficiency was added (see Table 4, Model 2), first generation children scored, on average, 2.31 points above their third generation counterparts at the end of kindergarten ($\beta = 2.31$, $p < .05$). This initial difference widened because of the faster reading growth rate experienced by first generation children ($\beta = 2.25$, $p < .01$). In other words, first generation students scored, on average, 4.46 points higher than third generation students by the end of the third grade (113.35 vs. 108.89, for first and third generation, respectively), over one fifth of a standard deviation advantage. In this model, second generation children were achieving very similarly to third generation children by the end of third grade (108.95 vs. 108.89, for second and third generation, respectively). Inclusion of the OLDS variables helped explain 2.0% of the variance between students in the intercept, and 1.1% and 0.5% of the variance between students in slope and acceleration, respectively.

Conditional Model 3: Race/ethnicity. The inclusion of race/ethnicity variables decreased the magnitude of the association between generational status and reading achievement, but the immigrant differences remained substantial and significant. At the end of kindergarten, first generation children scored 2 points higher ($\beta = 1.99$, $p < .05$) and increased their reading scores 2.18 points per year ($\beta = 2.18$, $p < .01$) faster than third generation children. At the end of third grade, first generation children scored approximately 6.02 points or one third of a standard deviation higher than third generation children.

Similarly, the inclusion of race/ethnicity decreased but did not eliminate the associations between the second generation and initial reading status ($\beta = 1.76$, $p < .001$), rate of change in reading over time ($\beta = 0.94$, $p < .05$), and acceleration ($\beta = -0.32$, $p < .05$). When considered together, second generation children scored 1.74 points higher than third generation children at the end of third grade, less than one tenth of a standard deviation advantage.

We also examined whether the first generation immigrant advantage was driven by any race/ethnic group (see Figure 1). The results indicate that Asians experienced a clear advantage at the end of kindergarten and were followed by White children. By the end of third grade, White and Asian children were performing at similarly high levels, whereas Latino and Black children were behind these two groups by approximately two fifths of a standard deviation and four fifths of a standard deviation, respectively.

The pattern of higher scores among first generation immigrant children was consistent across alternate model specifications and robustness checks. We were concerned that the first and second generation immigrant advantage over their third generation peers was due to a strong immigrant advantage within only one race/ethnic group. To test whether one race/ethnic group was responsible for the immigrant effect, we separately omitted each race/ethnic group from the analysis in four subsequent models (data not shown). For example, Asian children were removed from one set of models to ensure that the first generation advantage was not primarily due to the high level of achievement among first generation Asian immigrants. The immigrant advantage was similar in size and direction in each model, regardless of which race/ethnic group was removed from the sample. We did not run interactions between immigrant status and race/ethnicity because of model complexity and limitations related to sample size.

Additionally, sample size constraints did not allow for the exploration of immigrant differences by country of origin. However, we examined reading trajectories by generational status within race/ethnic groups (see Figure 1). Across all four race/ethnic groups, first generation children demonstrated higher scores than those in the third generation. The size of that advantage varied by race/ethnic group, with Black and Asian first generation children experiencing the largest advantage over the third generation children. Hispanic first generation children, however, experienced the smallest advantage over their third generation peers, even after controlling for whether the child's mother was born in Mexico—a group expected to have low reading scores (data not shown). Inclusion of race/ethnicity variables helped explain 7.0% of the variance between students in the intercept, and 5.9% and 2.4% of

the variance between students in slope and acceleration, respectively.

Full model: Gender, family socioeconomic status, parenting, childcare, and school characteristics. The individual covariates were entered in separate blocks to assess the influence of each context—family socioeconomic status, parenting, childcare, and school characteristics—on the association between immigrant status and reading achievement. The inclusion of each set of factors is warranted given the overall improvement in the model fit indexes (see Table 4 or the online supplemental materials, which include an expanded table with additional information). However, only the final model is discussed in detail.

In the final model, the coefficients for both maternal education and poverty indicated that children whose mothers had obtained more than a high school diploma or who lived above the poverty line experienced an early advantage and grew faster than children in families with lower levels of human capital. Notably, the inclusion of these socioeconomic factors significantly decreased the race/ethnic gap, particularly for Hispanic and Black children. Moreover, the first generation advantage at the end of kindergarten became nonsignificant.

The mediation tests indicate that race/ethnicity partially mediates the relationship between immigrant status for both first and second generation and children's reading scores at the end of kindergarten (see Table 4). Moreover, maternal education fully mediates the relationship between first generation and reading achievement at the end of kindergarten (zs = 4.75, $p < .004$) and partially mediates the relationship between first generational status to rate of growth (zs = 4.48, $p < .004$) and acceleration (zs = −3.93, $p < .004$). Socioeconomic factors, however, do not mediate the association between second generation status and children's reading achievement status. As Table 2 indicates, first generation children have a slight advantage over third generation children in maternal education, whereas second generation children are relatively disadvantaged when compared with third generation children on this measure of maternal education. Nonetheless, at the end of third grade, after controlling for socioeconomic factors, first generation children have approximately one quarter of a standard deviation advantage over third generation children (114.06 vs. 108.80 for first and third generation, respectively). Although main effects emerge in the subsequent models among the control variables and reading achievement, none of these factors—parenting, childcare, and school factors—significantly reduce the association between generational status and the reading achievement trajectories.

Children with missing socioeconomic factors had higher reading scores at the end of kindergarten and grew faster than children not missing these variables. The same pattern emerged with children missing childcare variables. However, children missing school variables scored lower at the end of kindergarten and had reading scores that grew at a slower rate than children not missing school variables.

In summary, across all models, the advantage in reading achievement of first generation children over third generation was consistently over one quarter of a standard deviation, whereas the second generation advantage was smaller and consistently under one tenth of a standard deviation. Although the race/ethnic differences described in Model 3 decreased, they remained significant at the end of kindergarten for all groups. Inclusion of the controls helped explain 20.0% of the variance between students in reading achievement at the end of kindergarten (intercept). Additionally, 12.5% and 5.6% of the variance between students in slope and acceleration, respectively, is explained in the full model.

Robustness checks. We estimated several OLS models to ensure that our results were not unduly biased by the initial exclusion of participants who did not pass the OLDS until after spring of kindergarten (n = 1,006). Only the reading achievement scores at the end of third grade were used as outcomes in these analyses and thus include the 1,006 children excluded from the HLM analyses. Seventy-five percent of the excluded children have reading scores by third grade. By the end of third grade the immigrant advantage is evident, such that first generation children and second generation children demonstrated a clear advantage ($\beta = 6.51$, $p < .001$; $\beta = 2.33$, $p < .001$, respectively) over their third generation counterparts. It is important to note that the third grade OLS analysis included all children who were tested at this time point and is not constrained by our initial selection criteria (which excluded children who were not proficient by the spring of kindergarten). Moreover, in the follow-up analyses, we respecified the HLM models by centering the intercept at third grade, still excluding the 1,006 cases; the results (intercept: $\beta = 7.16$, $p < .001$; slope: $\beta = 2.06$, $p < .01$) were very similar to the last OLS model that included the full sample. The similarity among the OLS estimates using the third grade outcome with all participants and the HLM analysis presented in the main results section, as well as the HLM analysis recentered at third grade (presented in this section), suggests that bias due to the initial exclusion of participants who had not passed the OLDS by the spring of kindergarten may be minimal. Overall, the finding of an immigrant advantage was robust to multiple specifications and checks.

Discussion

Using a large, longitudinal, nationally representative data set of young children from kindergarten through the third grade, this study examined immigrant differences in early reading achievement and extends the current knowledge base regarding factors that explain differences in young immigrant children's reading trajectories. The first generation advantage at the end of kindergarten was mediated by race/ethnicity and maternal education status. Yet, the advantage was still evident at the end of third grade, even with race, maternal education, and numerous other key child, family, and school factors controlled. None of these explained the first generation's advantage in the growth of reading scores over time. These findings provide additional support for an immigrant paradox. Yet, it remains unclear why immigrant children outperformed their second and third generation counterparts despite a higher likelihood of experiencing economic and social disadvantage.

In addition to the immigrant advantage, disparities in achievement by race/ethnicity were also evident. By third grade, White and Asian children were performing at similarly high levels, with Hispanic children attempting to catch up and Black children falling further behind the other race/ethnic groups. As demonstrated in other studies (Fryer & Levitt, 2004), socioeconomic factors significantly reduced but did not eliminate the race/ethnic gap in the present study. The ECLS–K does not contain other important explanatory factors, such as racism, discrimination, psychosocial stress, and patterns of race/ethnic socialization. Note that the

Table 4
Conditional Growth Models for Reading Achievement From Kindergarten Through Third Grade

Fixed effects	Gen status	English proficiency	Race	Gender	Socioeconomic factors	Parenting	Childcare	Schooling
				Model for initial status				
Mean intercept	40.41***	40.36***	40.37***	40.37***	40.36***	40.32***	40.31***	40.32***
SE	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09
1st generation	−0.18	2.31*	1.99*	2.02*	1.38	1.24	1.33	1.34
SE	0.97	0.97	0.91	0.91	0.88	0.88	0.87	0.87
Effect size	0.01	0.15	0.14	0.14	0.10	0.09	0.10	0.10
2nd generation	0.43	1.98***	1.77***	1.80***	1.71***	1.59***	1.55***	1.37***
SE	0.37	0.42	0.41	0.41	0.39	0.39	0.39	0.39
Effect size	0.03	0.12	0.11	0.11	0.11	0.10	0.10	0.09
Generation missing	−4.26***	−3.78***	−3.26***	−3.18***	−1.49***	−1.48***	−1.42***	−1.52***
SE	0.30	0.31	0.31	0.31	0.33	0.35	0.35	0.35
Effect size	0.36	0.31	0.27	0.26	0.12	0.11	0.10	0.11
Proficient by fall K		−1.05*	−1.39**	−1.41**	−0.96*	−1.09*	−0.96	−0.95
SE		0.48	0.50	0.50	0.47	0.47	0.47	0.46
Effect size		0.07	0.09	0.09	0.06	0.07	0.06	0.06
Proficient by spring K		−9.06***	−9.26***	−9.24***	−6.86***	−6.94***	−6.62***	−6.36[a,b]***
SE		0.57	0.58	0.58	0.56	0.56	0.55	0.55
Effect size		0.71	0.71	0.71	0.55	0.56	0.54	0.52
Black			−5.80***	−5.84***	−3.39***	−2.80***	−2.46***	−2.01[a,b]***
SE			0.27	0.27	0.27	0.28	0.29	0.33
Effect size			0.49	0.49	0.28	0.22	0.19	0.14
Hispanic			−4.07***	−4.06***	−2.48***	−2.40***	−2.08***	−1.85[a,b]***
SE			0.33	0.33	0.32	0.32	0.31	0.33
Effect size			0.28	0.29	0.18	0.18	0.15	0.13
Asian			5.01***	4.91***	4.98***	5.12***	5.32***	5.59[a,b]***
SE			0.60	0.59	0.57	0.57	0.57	0.57
Effect size			0.29	0.28	0.29	0.31	0.32	0.34
Other			−4.42***	−4.42***	−3.01***	−2.75***	−2.22***	−1.34[a,b]***
SE			0.46	0.45	0.43	0.43	0.43	0.44
Effect size			0.33	0.33	0.23	0.22	0.18	0.10
				Model for rate of change				
Mean slope	27.48***	27.60***	27.60***	27.60***	27.61***	27.70***	27.71***	27.70***
SE	0.10	0.10	0.10	0.10	0.09	0.10	0.10	0.10
1st generation	1.54	2.25**	2.18**	2.20**	1.90*	1.80*	1.83*	1.79*
SE	0.82	0.84	0.84	0.84	0.82	0.83	0.83	0.83
Effect size	0.12	0.17	0.17	0.17	0.15	0.14	0.14	0.14
2nd generation	0.65	1.08**	0.94*	0.96**	0.91*	0.84*	0.83*	0.78*
SE	0.30	0.35	0.36	0.36	0.35	0.35	0.36	0.35
Effect size	0.05	0.08	0.06	0.07	0.06	0.06	0.06	0.05
Generation missing	−2.46***	−2.33***	−1.85***	−1.80***	−0.88**	−1.27***	−1.18**	−1.20***
SE	0.31	0.32	0.32	0.32	0.34	0.37	0.37	0.37
Effect size	0.20	0.19	0.15	0.14	0.06	0.09	0.08	0.08
Proficient by fall K		0.34	−0.14	−0.15	0.11	−0.03	0.04	0.17
SE		0.41	0.43	0.43	0.42	0.42	0.42	0.42
Effect size		0.03	0.01	0.01	0.01	0.00	0.00	0.01
Proficient by spring K		0.51	0.08	0.10	1.47	1.17	1.24	1.53
SE		0.78	0.79	0.79	0.78	0.78	0.79	0.79
Effect size		0.03	0.00	0.01	0.08	0.07	0.07	0.09
Black			−4.67***	−4.70***	−3.20***	−2.68***	−2.46***	−1.83[a,b]***
SE			0.27	0.27	0.28	0.29	0.30	0.33
Effect size			0.39	0.40	0.26	0.21	0.19	0.12
Hispanic			−2.23***	−2.23***	−1.31***	−1.26***	−1.16***	−0.77[b]*
SE			0.32	0.32	0.32	0.32	0.32	0.34
Effect size			0.16	0.16	0.10	0.09	0.08	0.05
Asian			3.02***	2.94***	3.00***	2.88***	2.96***	3.28[a,b]***
SE			0.49	0.49	0.49	0.49	0.49	0.49
Effect size			0.21	0.20	0.21	0.20	0.21	0.23
Other			−2.91***	−2.91***	−2.05***	−1.89***	−1.68***	−0.92*
SE			0.42	0.42	0.42	0.42	0.42	0.43
Effect size			0.23	0.23	0.17	0.15	0.14	0.07

Table 4 (*continued*)

Fixed effects	Gen status	English proficiency	Race	Gender	Socioeconomic factors	Parenting	Childcare	Schooling
				Model for acceleration				
Mean acceleration	−1.55***	−1.59***	−1.59***	−1.59***	−1.60***	−1.63***	−1.63***	−1.63***
SE	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
1st generation	−0.34	−0.51	−0.28	−0.28	−0.20	−0.18	−0.17	−0.16
SE	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Effect size	0.08	0.11	0.06	0.06	0.04	0.04	0.04	.04
2nd generation	−0.46***	−0.57***	−0.32*	−0.32*	−0.31*	−0.29*	−0.29*	−0.27
SE	0.11	0.12	0.13	0.13	0.13	0.13	0.13	0.13
Effect size	0.11	0.11	0.06	0.06	0.06	0.06	0.06	0.05
Generation missing	0.31***	0.28*	0.38***	0.36***	0.23	0.38**	0.36**	0.36**
SE	0.11	0.11	0.11	0.11	0.12	0.13	0.13	0.13
Effect size	0.07	0.06	0.09	0.08	0.05	0.07	0.07	0.07
Proficient by fall K		−0.07	0.15	0.15	0.10	0.15	0.14	0.14
SE		0.14	0.15	0.15	0.15	0.15	0.15	0.15
Effect size		0.01	0.03	0.03	0.02	0.03	0.03	0.03
Proficient by spring K		−0.31	−0.11	−0.12	−0.39	−0.30	−0.32	−0.35
SE		0.26	0.26	0.26	0.26	0.26	0.26	0.26
Effect size		0.05	0.02	0.02	0.07	0.05	0.05	0.06
Black			0.47***	0.48***	0.17	0.05	0.03	−0.03
SE			0.09	0.09	0.10	0.10	0.11	0.12
Effect size			0.11	0.11	0.04	0.01	0.01	0.01
Hispanic			0.27*	0.26*	0.08	0.08	0.06	0.03[b]
SE			0.11	0.11	0.11	0.11	0.11	0.12
Effect size			0.05	0.05	0.02	0.02	0.01	0.01
Asian			−1.55***	−1.53***	−1.53***	−1.51***	−1.53***	−1.56[a,b]***
SE			0.17	0.17	0.17	0.17	0.17	0.18
Effect size			0.30	0.30	0.30	0.30	0.30	0.31
Other			0.19	0.19	0.01	−0.03	−0.08	−0.19
SE			0.14	0.14	0.14	0.14	0.14	0.15
Effect size			0.04	0.04	0.00	0.01	0.02	0.04
				Additional variables included in intercept, slope, and acceleration models				
Gender				Yes	Yes	Yes	Yes	Yes
Socioeconomic					Yes	Yes	Yes	Yes
Parenting						Yes	Yes	Yes
Childcare							Yes	Yes
School								Yes
Socioeconomic factors missing					Yes	Yes	Yes	Yes
Parenting missing						Yes	Yes	Yes
Childcare missing							Yes	Yes
School missing								Yes
				Residual variance				
Level 2 intercept	157.31***	155.93***	148.03***	146.70***	135.04***	133.61***	130.72***	128.62***
SD	12.54	12.48	12.16	12.11	11.62	11.56	11.43	11.34
Slope	83.54***	83.38***	79.39***	78.64***	74.86***	74.95***	74.48***	73.84***
SD	9.14 ***	9.13	8.91	8.87	8.65	8.66	8.63	8.59
Acceleration	8.99	8.99***	8.82***	8.78***	8.60***	8.61***	8.57***	8.53***
SD	3.00	3.99	2.97	2.96	2.93	2.93	2.93	2.92
Within individual	49.56	49.44	49.46	49.47	49.47	49.30	49.28	49.27
SD	7.04	7.03	7.03	7.03	7.03	7.02	7.02	7.02

Note. "Yes" indicates that an additional control variable or missing data dummy was included in the analysis. To see table with estimates for all mediating variables, please see the online supplemental materials. K = kindergarten.

[a] Factor is a significant mediator (Sobel test statistics significant after adjusting for multiple tests with the Bejamini–Hochburg adjustment) of the association between reading and first generation. [b] Factor is a significant mediator (Sobel test statistics significant after adjusting for multiple tests with the Bejamini–Hochburg adjustment) of the association between reading and second generation.

* $p < .05$, ** $p < .01$, and *** $p < .001$, after controlling for multiple tests with the Bejamini–Hochburg adjustment.

immigrant advantage was not driven by the substantial gaps in race and ethnicity, as controlling for this factor only slightly reduced the relationship between immigrant status and early reading trajectories. Moreover, the immigrant advantage was demonstrated within each race/ethnic group, but the race/ethnic disparities that were evident remain a serious concern. First generation White and Asian children had the highest absolute levels of achievement, whereas first generation Black and Hispanic children scored substantially lower. Additionally, Latino first generation children did not demonstrate as large an advantage as first generation Black,

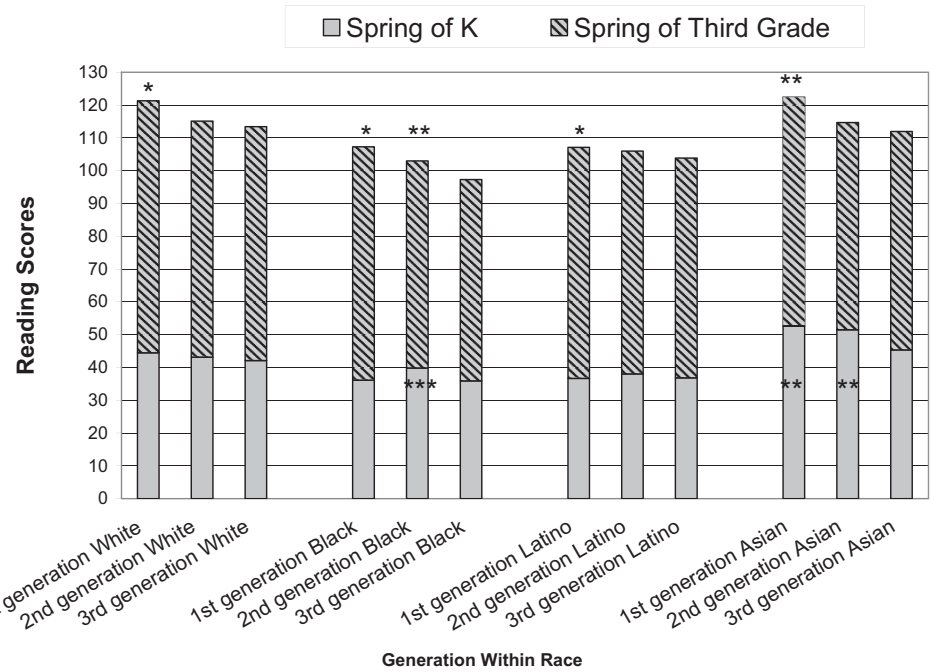

Figure 1. Generational differences in reading achievement within race/ethnic groups, controlling for immigrant status and English language proficiency. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$

Asian, and White children, when compared with their respective third generation counterparts. This smaller first generation Latino advantage was evident even after controlling for Mexican heritage, a group that typically has lower scores on reading achievement (e.g., Han, 2006).

The negative selection hypothesis may help explain why specific race/ethnic groups, especially subgroups of Black and Latino children, on average, perform below White and Asian children on measurements of cognitive achievement. If parents of immigrant children migrate because of high levels of inequality and lack of opportunity in the country of origin, the negative selection hypothesis suggests that immigrants are more likely to have lower levels of education and ability (Borjas, 1990). Hence, the parents in certain immigrant subgroups may not have the resources—in terms of economic or cultural capital—to help their children succeed academically once in the United States. Moreover, first generation Black and Latino children encounter many obstacles associated with minority status in the United States, including discrimination, racism, and spatial segregation, all of which are risk factors for educational achievement.

Besides race/ethnicity and maternal education, we also proposed that socioeconomic status, family structure, parenting, childcare, and school factors would explain the generational differences in children's reading achievement. As expected, the following characteristics predicted higher reading achievement trajectories for all children: living above poverty, mother's educational degree above high school, living in a two-parent family, mother's positive beliefs about school readiness, and children's attendance in center care programs and schools without high concentrations of minority students. It is interesting to note that home cognitive stimulation and warm parenting did not significantly relate to school achievement in this sample. This may be related to the relationship between maternal beliefs regarding school readiness and home cognitive stimulation. In fact, if the maternal beliefs variable is removed from the analysis, cognitive home stimulation positively predicts achievement. Yet, with the exception of maternal education, these factors did little to explain the immigrant advantage either at the end of kindergarten or, over time, through third grade.

It is possible that the significant advantage evidenced by the immigrant sample in our study is a function of our subsample selection. The ECLS–K survey structure required that only children who were English language proficient be administered the reading achievement assessments. Separate regression analyses reveal that an immigrant advantage persisted despite the inclusion of children with limited English proficiency and presumably lower reading achievement scores. This suggests that the immigrant differences found in our main analysis are not an artifact of sample selection (i.e., excluding the 851 participants who did not pass the English language proficiency test by the spring of kindergarten or the 155 participants not included because of attrition) but, rather, are robust differences in reading trajectories among immigrant children. Additionally, although all participants in the main analysis and the robustness checks were deemed minimally language proficient by the spring of third grade, there remains wide variability in the levels of proficiency achieved by these children.

The question remains, why do immigrant children experience an early and persistent reading advantage? Economic and sociological theories used to understand poverty and socioeconomic differentiation among immigrants may be useful in understanding our results (Feliciano, 2005; Palloni & Morenoff, 2001; Portes, 1995). Positive selection—or the brain drain hypothesis—posits that immigrants to the United States have specific advantages relative to nonimmigrants left

behind in the home country, which may account for immigrants' ability to migrate and to achieve success in the United States (Feliciano, 2005). If positive selection is the driving force of immigration to the Unites States, then it may explain why immigrant children overall perform equally to or better than children born in the United States. High skill levels, motivation, and ambition—the same factors that promoted successful immigration, including overcoming economic, bureaucratic, or distance obstacles—may account for differences among the children of immigrants and native-born children (Schultz, 1984).

Our results lend some degree of support to this idea, particularly because the mothers of first generation children report slightly higher levels of education than those of third generation children, a difference that mediated the relationship between generation status and reading achievement at the end of kindergarten. In fact, this advantage in maternal education may begin to illuminate why the immigrant paradox is evident among first generation children. Immigrant parents with higher levels of education may possess the necessary skills to help their children navigate early education, particularly the simple skills necessary to achieve at the end of kindergarten. However, an immigrant advantage in the growth of reading achievement over time was still evident even after controlling for maternal education.

Why would this be the case? First, this study did not model increases in parental education over time, and therefore we cannot fully account for the continued role of parental education beyond children's kindergarten experience. Second, there are clearly additional behaviors on the part of first generation parents beyond their own education that promote their children's faster rate of learning over time. The ECLS–K measures of cognitive stimulation at home and parental expectations for success did not explain this advantage. Thus, unmeasured characteristics may be operating. Immigrant parents, seeking a better life for their children, may demonstrate high levels of motivation, goal orientation, and forward thinking, all of which may contribute to their children's reading achievement growth through third grade. None of these characteristics are captured in the ECLS–K, and thus this explanation remains speculative. Yet, it is precisely the type of longitudinal analysis used in this article that allows for distinctions to be made between predictors of children's initial early levels of achievement as well as their rates of growth over time. These distinctions are essential for elucidating the multiple and discrete explanatory mechanisms underlying the different periods of children's developmental trajectories.

In addition to these selection forces, it is possible that the differences among immigrant groups are a function of acculturation—adaptation and adjustments that immigrants make in beliefs, behaviors, and values as a consequence of interactions with multiple groups in their new environments (Berry, 2007). Over time and through subsequent generations, experiences with discrimination, low-achieving schools, and poor employment opportunities, compounded by the potential loss of protective traditional cultural factors, may translate to lower levels of overall achievement (Ogbu, 1991; Rumbaut, 1997). These postmigratory experiences may potentially explain why third generation children generally performed at lower levels and why the racial–ethnic differences emerged even within the first generation of children. In addition to the child and family characteristics controlled for in our study, several nonfamilial factors may compound the risk of academic failure over the long term, including the chances of early student–teacher mismatches in school, the possibility of stereotype threat, detachment from school, the early misidentification of language-minority students as special needs, and the lack of support or know-how from immigrant parents (Schneider, Martinez, & Owens, 2006). These potential explanations should be pursued in new studies.

Longitudinal data sets such as the ECLS–K are useful in determining whether an immigrant paradox persists over time, particularly because of concerns over the high school dropout rates prevalent among Hispanic adolescents. However, this high rate of drop out may be driven by youth who immigrate in adolescence with a focus on working and earning money (Schneider et al., 2006) and may not be linked to the long-term academic trajectories of young immigrant children. Whether the first generation advantage that has been identified in the present study will continue as the children move into adolescence remains to be seen.

The variables that tap acculturation, how immigrants are changed by their context and how their context is changed by the presence of immigrants (Berry, 2007; García Coll & Magnuson, 1997; García Coll & Szalacha, 2004), are not available in large national data sets that focus on children. The design of future surveys with immigrant samples should include factors relevant to immigrant children and families (e.g., *cognitive stimulation*: role of storytelling by adults and language brokering by children, child and parent proficiency in native language; *social context*: extent of kinship networks, sense of familism, legal immigration status; *community context*: presence of coethnics, availability of native-language newspapers), as these may help us to further understand (a) the processes underlying the immigrant paradox and (b) how immigrant families differentially promote learning and achievement among their children (García Coll & Szalacha, 2004). Additionally, future data sets must pay careful consideration to the measurement of children's immigrant generational status, thereby including measures of the mother and father's generational status or country of origin. Moreover, the ideal design for a study of immigrant children's academic trajectories should include nesting of students within schools in order to directly model school effects and changes in schools over time. But the small sample size, especially of first generation students, precluded this approach in the present study.

In summary, this study investigated the immigrant paradox among young, kindergarten-age children with the purpose of understanding the factors that may explain differences in early reading abilities during the transition to formal schooling through third grade. The study provides support for the idea that first and second generation children experience an academic advantage over third generation counterparts during the early stages of children's academic trajectories. Given the rapid increase in immigrants from Asia and Latin America, research that provides insight on the achievement potential of immigrant children is important for the future stability and productivity of the United States.

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