STRATHCLYDE
DISCUSSION PAPERS IN ECONOMICS

THE SKILL DEVELOPMENT OF CHILDREN OF IMMIGRANTS

BY

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NO 20-05

DEPARTMENT OF ECONOMICS
UNIVERSITY OF STRATHCLYDE GLASGOW

The Skill Development of Children of Immigrants*

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May 23, 2020

Abstract

In this paper, we study the evolution of cognitive and noncognitive skills gaps for children of immigrants between kindergarten and 5th grade using two cohorts of elementary school students. We find some evidence that children of immigrants begin school with lower math scores than children of natives, but this gap disappears in later elementary school. For noncognitive skills, children of immigrants and children of natives score similarly in early elementary school, but a positive gap opens up in 2nd grade. We find that the growth in noncognitive skills is driven by disadvantaged immigrant students. We discuss potential explanations for the observed patterns of skill development as well as the implications of our results for the labor market prospects of children of immigrants.

JEL codes I21, J13, J15

*We would like to thank participants from the following seminars and conferences for helpful comments: Elon University; UNC Greensboro; 2018 South Carolina Applied Micro Day; 2018 Western Economic Association International Conference; 2018 Southern Economic Association Meetings; IV Oxford Workshop on Immigration, Health, and Wellbeing; and 2019 Society of the Economics of the Household Meetings.

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1 Introduction

According to the American Community Survey (ACS), one in twenty children living in the United States is foreign born, and one in four has a foreign-born parent (Ruggles et al., 2015). Given that children of immigrants will make up a substantial fraction of the future workforce, it is critical to understand whether they leave school with the skills to succeed. Labor market success is not guaranteed for these children since many experience socioeconomic disadvantages. About half of children of immigrants live in a low-income family (Zong and Batalova, 2017), and they are more likely than children of natives to have no parent with a high school degree (Crosnoe and López Turley, 2011). Still, immigrants in the U.S. are quite diverse, with varying racial and ethnic backgrounds, time spent in the U.S., and language proficiency. For example, 37% of children with a foreign-born parent are Mexican origin, and the rest hail from other countries (Ruggles et al., 2015). It is important to take this heterogeneity into account since immigrants of different backgrounds might have different experiences in school.

In this paper, we study the evolution of cognitive and noncognitive skills[1] for children of immigrants. We use two longitudinal surveys of elementary school students that are representative of the kindergarten cohorts of 1998-99 and 2010-11. Prior literature has extensively explored immigrant-native differences in adult outcomes, such as wages and educational attainment, but less is known about differences in cognitive skills at school entry. The primary contribution of this paper, however, is to document gaps in noncognitive skills between children from native and immigrant families. Noncognitive skills have recently attracted more attention from social scientists for their role in determining later life outcomes. To our knowledge, this paper is the first to study differences in noncognitive skills between children of immigrants and children of natives.[2] We also explore potential mechanisms by

[1] Noncognitive skills are sometimes called socioemotional skills or soft skills.

[2] More precisely, we are the first to examine these gaps using a summary measure of noncognitive skills. Figlio and Özek (forthcoming) document gaps in disciplinary incidents, which indirectly measure noncognitive skills.

leveraging information collected from parents and schools, which is a unique feature of our survey data relative to the administrative data used in some prior work.

We begin by documenting skill gaps between children of natives and children of immigrants across grades. At school entry, children of immigrants have lower scores on math tests by about 0.1 standard deviations. The gap is sometimes statistically significant depending on the set of controls and the cohort under consideration. Between 2nd and 5th grade, we estimate immigrant-native math score gaps that are generally smaller in magnitude and rarely statistically significant. In our specification with the full set of controls, the 95% confidence intervals for the difference in 5th grade math scores are $(-0.07, 0.16)$ for the 1998-99 cohort and $(-0.08, 0.09)$ for the 2010-11 cohort. Thus, we can rule out large and moderate-sized math gaps at the end of elementary school.

For our measure of noncognitive skills, we find that children of immigrants begin school with no gap, but by 5th grade, children of immigrants perform significantly better. In the 1998-99 cohort, children of immigrants score 0.31 standard deviations higher on the noncognitive measure; in the 2010-11 cohort, they score 0.23 standard deviations higher. Moreover, we find that our results are driven by students that are relatively disadvantaged (low-SES, late-arriving parent, non-English speaking household). Our results are consistent with the idea that noncognitive skill production is higher in low-skill immigrant families than in low-skill native families. Indeed, Bütikofer and Peri (2017) find that migrants, and particularly low-skill migrants, are positively selected on adaptability, though not sociability.

We next turn to potential explanations for these patterns. Our survey data include extensive sets of questions for parents and schools, and we test for differences between children of immigrants and children of natives across three sets of characteristics: parental investments; teacher characteristics;[3] and endowment and early life characteristics. By our measures, immigrant parents invest in their children at lower levels than native parents, but they maintain

[3]Our full set of controls includes school fixed effects, and so we do not test for differences in school and neighborhood characteristics since the model already accounts for any differences in these traits.

higher expectations for their children's educational attainment.[4] Children of immigrants are assigned to teachers with less experience on average, and they are more likely to have a teacher with a non-standard teaching certification (such as a temporary or provisional certification). In terms of early life characteristics, we find that children of immigrants spend less time in non-relative care in early life compared to children of natives. Despite these differences in inputs, our results for cognitive and noncognitive skill gaps remain unchanged when we include them in regressions. In particular, our measures of parental investments have little to no explanatory power, though we note that simultaneity bias may be present if parents respond to better outcomes with less investment. Other possible explanations concern the design of U.S.-based surveys and immigrant children's familiarity with two cultures.

Overall, the outlook for children of immigrants, particularly those from disadvantaged families, is positive. At the end of elementary school, children of immigrants have cognitive skills on par with children of natives with the same ethnic background and household characteristics and attending the same schools. If this pattern holds through the rest of their schooling, they will enter the labor market with the same cognitive skills as children with native parents. If the positive gap in noncognitive skills is maintained, or even grows, children of immigrants will enter the labor market with an advantage in this dimension. Given prior work, we might have expected a positive gap in cognitive skills to open up in the grades we observe.[5] However, noncognitive skills have been shown to positively influence wages and educational attainment (Cunha, Heckman, and Schennach, 2010) as well as cognitive skills (Cunha and Heckman, 2008), and so we still view our findings as consistent with other work on immigrant children. In light of recent evidence showing that returns to noncognitive skills are increasing (Deming, 2017; Edin et al., 2017), children of immigrants should be particularly well positioned in the labor market.

[4]This statement is based on unconditional means, but we show in the supplementary appendix that this statement also holds when we condition on our full set of controls.

[5]See Clotfelter, Ladd, and Vigdor (2012); Hull (2017); and Figlio and Özek (forthcoming) for examples of papers that document positive immigrant-native test score gaps in late elementary school and/or middle school. We do in fact see evidence of a positive gap in later grades in supplementary specifications that pool all grades.

Life outcomes for today's immigrant children are especially important to understand, not only because they will make up a large share of our future workforce, but also because of calls for immigration policy reform in the U.S. For the most part, our paper does not speak directly to this debate—like many studies, we do not have the ability to identify whether immigrant students, or their parents, are undocumented.[6] Still, the evidence presented here runs counter to claims that students from immigrant families have a negative impact on students from native families. If anything, there is potential for positive spillover effects on children of natives. With better noncognitive skills, children of immigrants likely cause fewer classroom disruptions.[7] Moreover, exposure to immigrant peers could foster the growth of noncognitive skills in children of natives.

In the next section, we give an overview of the related literature. We describe the data and present descriptive statistics in Section 3. In Section 4, we document the evolution of skills gaps for children of immigrants, and we follow this with a discussion of our results in Section 5. Section 6 concludes.

2 Related literature

This paper builds on three literatures: the educational outcomes of children of immigrants, the evolution of test score gaps as children age, and the importance of noncognitive skills.

We begin by reviewing some terminology related to children of immigrants. We define our population of interest as children of immigrants, or children who have a foreign-born parent. This group includes some first-generation immigrants (children who are themselves foreign born) but mostly second-generation immigrants (children who are born in the U.S. to a foreign-born parent). The division between the first and second generation can be blurry. Compared to first-generation immigrants who arrive as adults, those who arrive as children

[6]According to the Pew Research Center, 4.6% of K–12 students had an unauthorized parent in 2000. The vast majority of these were U.S.-born children and thus U.S. citizens from birth.

[7]Previous research has shown that disruptive students have a negative impact on the achievement of their peers. See Carrell and Hoekstra (2010) for example.

often appear more similar to second-generation immigrants. Accordingly, these early-arriving immigrants are often called the "1.5 generation" to emphasize that their experiences are somewhere between those of the first and second generation.[8] The respondents in our sample were first surveyed at around age 5, so any first-generation immigrants arrived at very young ages. Thus, for our purposes, children of immigrants include members of the 1.5 and second generations, but our results are mainly driven by second-generation immigrants since most of the children in our sample are native born.

Much of the work on the educational outcomes of children of immigrants has focused on educational attainment. With ethnicity among the controls, Chiswick and DebBurman (2004) find that second-generation immigrants attain higher levels of education than first-generation immigrants and native-born individuals. Among first-generation immigrants, early-arriving immigrants acquire more years of education (Gonzalez, 2003). Card (2005) studies the wage gap between immigrants and natives and finds that on average children of immigrants earn higher wages than natives. This gap can mostly be attributed to higher levels of education among children of immigrants.

Another key measure of educational success are test scores, which contain information about the skills students obtain in school. Several papers have studied the impact of generational status and/or age at arrival on test scores. Conclusions vary by the age of the students, the cohort under consideration, the set of controls, and whether the data is nationally representative.[9] An emerging pattern is that children of immigrants tend to outperform children of natives when race/ethnicity and family socioeconomic status are among the controls. Early-arriving immigrant children also tend to score higher than late arrivers. A more recent set of papers investigates the evolution of test scores among immigrant students; these are discussed below.

A subset of the literature on the test score gap focuses on the evolution of minority-

[8]The use of the term "1.5 generation" is often attributed to Rumbaut (2004).

[9]See, for example, Kao and Tienda (1995); Portes and MacLeod (1996); Glick and White (2003); Schwartz and Stiefel (2006); Stiefel, Schwartz, and Conger (2010).

white differences as students age (Phillips, Crouse, and Ralph, 1998; Fryer and Levitt, 2004, 2006; Clotfelter, Ladd, and Vigdor, 2009). These papers document when gaps open up to the sizes observed in early adulthood, which can provide suggestive evidence on whether schools contribute to the growth of achievement gaps. In the case of immigrant children, previous work has established that the 1.5 and second generations achieve at higher levels than natives and late-arriving immigrants, with the appropriate caveats for control variables. Less established is the age at which these gaps open up. Using North Carolina administrative data, Hull (2017) analyzes the Hispanic-white test score gap by immigrant generation in grades 3 to 8. She finds that the test scores of second-generation Hispanic students are statistically no different from socioeconomically similar white students in late elementary school. In middle school, they begin to outperform observably similar whites. A similar story holds for early-arriving first-generation Hispanic immigrants on math tests, but catch-up takes a few years longer.[10] Figlio and Özek (forthcoming) reach similar conclusions to Hull (2017) using Florida administrative data. Reardon and Galindo (2009) use data from the earlier ECLS-K cohort to study Hispanic-white test score gaps. Including no controls, they find that first- and second-generation immigrants begin school with very low achievement levels but make substantial gains in kindergarten and 1st grade. Another related paper using the same data is Glick and Hohmann-Marriott (2007). They focus on 3rd grade math score as an outcome and study immigrant children's trajectory by controlling for kindergarten math score. With a wider set of grades, our paper will provide more a complete picture of the evolution of immigrant children's development through elementary school.

Finally, a growing literature has demonstrated the importance of noncognitive skills for a variety of life outcomes. Sometimes called socioemotional skills or "soft skills," noncognitive skills encompass a variety of attitudes, behaviors, and strategies that are related to success but not captured by traditional cognitive measures (e.g., test scores). They can include mo-

[10]Clotfelter, Ladd, and Vigdor (2012) use the same North Carolina education data and find that Hispanic students who enter North Carolina public schools by 3rd grade close achievement gaps with socioeconomically similar whites in 6th grade. Since their data does not include information of immigrant generation, they can only speculate that this result is driven by immigrant students.

tivation, perseverance, self-control, and social and communication skills. Heckman, Stixrud, and Urzua (2006) link noncognitive skills to schooling decisions, wages, and a variety of risky behaviors, such as teenage pregnancy, tobacco and marijuana use, and participation in illegal activities. Recent evidence from Deming (2017) and Edin et al. (2017) indicates that the labor market returns to noncognitive skills are higher now than in the past. Cognitive and noncognitive skills are related, and noncognitive skills promote the formation of cognitive skills (Cunha and Heckman, 2008). A potential explanation of the immigrant advantage in other outcomes could be differences in noncognitive skills.

Despite the widespread recognition that noncognitive skills are important, researchers are only beginning to study heterogeneity in noncognitive skills and how it may contribute to inequality in other outcomes. Bertrand and Pan (2013) study the evolution of the noncognitive skills gap between girls and boys using the earlier ECLS-K cohort; Elder and Zhou (forthcoming) do the same for the black-white gap in noncognitive skills. Cornwell, Mustard, and Van Parys (2013) trace how gender gaps in noncognitive skills contribute to gender gaps in teacher-assigned grades. To our knowledge, no previous study on immigrant children has featured any noncognitive measures as a major part of the analysis, with the exception of Figlio and Özek (forthcoming). They find that Hispanic children of immigrants have fewer disciplinary incidents than Hispanic children of natives in middle school grades, and similarly for Asians. In contrast, we use an composite measure based on multiple socioemotional scales that more fully captures the various dimensions of noncognitive skills.

3 Data

This study uses longitudinal data from two cohorts of the Early Childhood Longitudinal Study: the Kindergarten Class of 1998-99 and the Kindergarten Class of 2010-11. We refer to the former as the 1998-99 cohort and the latter as the 2010-11 cohort. Each cohort is comprised of a nationally representative sample of children attending kindergarten in the

respective school year. These data are well-suited for our study because the survey follows cohorts of students from kindergarten to 5th grade. The sampling design is school-based, allowing us to control for the unobserved school environment, and parents and teachers were also surveyed to provide more detailed information on the children. In each wave of the survey, students were administered cognitive assessments, and in most waves, teachers provided subjective reports of students' noncognitive skills.

By analyzing two cohorts, we are able to generate more evidence in support of our conclusions. In addition, results from two cohorts can give us a sense of whether experiences for immigrant children are changing over time. With a 12-year spacing between cohorts, we expect these students to encounter some differences in institutional environments. First, the No Child Left Behind (NCLB) law required that schools report test scores for certain subgroups, such as racial minorities and English language learners. Teachers and school administrators may have focused more attention on immigrant students due to accountability pressure. Second, the share of students with an immigrant background increased between the two cohorts, and the increase was spread unevenly throughout the U.S. As a consequence, some schools may have placed a greater emphasis on serving immigrant students. There were no comprehensive immigration reforms between the two cohorts, but in the aftermath of 9/11, some conditions were less favorable to immigrants. Immigration enforcement became stricter with tighter border security and immigration raids; there was also an increase in anti-immigrant sentiment (Golash-Boza, 2012). We might also expect some differences in the labor market conditions for the parents: Children in the 1998-99 cohort were in 2nd grade at the beginning of the 2001 recession; students in the 2010-11 cohort were in early childhood during the Great Recession in the late 2000s.

Our analysis of the 1998-99 cohort takes outcomes from the waves in the springs of kindergarten, 1st grade, 3rd grade, and 5th grade.[11] The ECLS-K also collected information

[11]We exclude fall kindergarten since a number of immigrant students become proficient in oral English between fall kindergarten and spring kindergarten. As we discuss below, a student must be proficient in oral English or oral Spanish to take the math assessment. In addition, the teacher reports on students' skills are better informed at the end of the school year. The fall 1st grade round only included a 30%

in the springs of 2nd grade and 4th grade for the 2010-11 cohort, and we include these waves in our analysis of that cohort. Note that some students may not be in the same grade as most of the cohort if they were held back or skipped a grade; these students were still surveyed and are included in our sample. Since we focus on the evolution of cognitive and noncognitive skills gaps, we only include students with a valid math score and valid teacher responses to the noncognitive skills questions in each wave.[12] We also drop students if we cannot determine whether a parent is foreign born. These restrictions leave us with analytic samples of over 6,000 students from each cohort. Unless otherwise noted, we use the appropriate longitudinal weights for analyses that include parent interview data and focus on the waves included in our study.[13]

There may be concern that children of immigrants would be more likely to attrit from the sample.[14] A fraction of students were flagged to be followed for data collection if they moved or transferred schools; the probability of being flagged was higher for children whose home language was not English.[15] In addition to this anticipated attrition, there was also sample attrition due to survey nonresponse. In each cohort, about 20,000 children were included in the initial student sample from fall kindergarten, but a lower number participated in all of the survey waves that we study. The longitudinal weights were designed to account for moving as well as survey nonresponse.

Still, we examine whether children of immigrants were more likely to be dropped from

random subsample and did not include teacher questionnaires. A spring 8th grade round is available for the 1998-99 cohort but not the 2010-11 cohort, and in any case, it did not include teacher reports on students' noncognitive skills.

[12] Clotfelter, Ladd, and Vigdor (2012) and Hull (2017) document the importance of restricting the sample to students observed in all grades when studying immigrant children. Immigrant students who enter the sample late or leave the sample early have lower test scores on average, and including them can obscure the progress of continuously enrolled immigrant students.

[13] For the 1998-99 cohort, we use the sample weight C2_6FC0, and for the 2010-11 cohort, we use W9C29P_2T290.

[14] One reason for this concern is that immigrant families may more mobile. However, a simple analysis of data from the 2000 ACS runs counter to this claim. Children with a foreign-born mother and children with a native-born mother are equally likely to live in the same house as one year ago ($p = 0.36$) (Ruggles et al., 2015).

[15] For the 1998-99 cohort, the total targeted fractions for follow-up were 0.5 for spring 1st and 3rd grade and 0.42 for 5th grade. In general, children had 0.5 probability of being followed for the 2010-11 cohort; language minority students were followed with certainty.

our analytic sample in Section A of the supplementary appendix. We take the sample of children in the spring kindergarten wave and define a dummy variable that equals one if the child was not included in our analytic sample.[16] We then regress this non-inclusion indicator on a dummy for child of immigrant and the control variables defined below. We conduct this analysis using the cross-sectional weights for spring kindergarten;[17] results are similar if we do not use weights. We find that children of immigrants in the 1998-99 (2010-11) cohort who are present in the spring of kindergarten are on average 12 (6) percentage points less likely to be included in our analytic sample. These differences shrink after we control for the baseline and household controls described below. The results indicate that some of the attrition of children of immigrants is explained by greater attrition by nonwhite children. When we add school fixed effects, we find that children of immigrants are no more likely than children of natives to be dropped from our analytic sample; this is true for both cohorts. Thus, our preferred set of controls explains the differential attrition among children of immigrants.

The direct cognitive assessments were designed to be age-appropriate and were scored using Item Response Theory (IRT). We focus on math test scores for our measure of cognitive skill instead of reading scores. For the 1998-99 cohort, children had to be proficient in oral English to take the reading assessment, so some children of immigrants are missing reading scores, particularly in earlier grades.[18] For both cohorts, students who were proficient in oral English were given the math assessment in English, and students who were proficient in oral Spanish but not oral English were given the math assessment in Spanish. Otherwise, a math assessment was not given. We standardize the math scores to be mean zero, standard deviation one, within each cohort and wave.[19]

The noncognitive measure is derived from the Social Rating Scale (SRS) questionnaire administered to each child's teacher. The teachers were asked to assess children on a frequency

[16]By necessity, we also drop all children for whom we do not have a valid measure of mother foreign born.

[17]For the 1998-99 cohort, this weight is C2CPTW0, which is the appropriate cross-sectional weight for analyses using the spring kindergarten direct assessment and parent interview data. The weight is W12P0 for the 2011 cohort.

[18]The ECLS-K offered a short reading assessment in Spanish for the 2010-11 cohort.

[19]Survey weights are used in the standardizations.

scale of 1–4 on items pertaining to the following five areas: Approaches to Learning, Self-control, Interpersonal Skills, Externalizing Problem Behaviors,[20] and Internalizing Problem Behaviors.[21] The score in each area is the mean rating for items in that area. The Social Rating Scale has several desirable properties and has been used widely. Specifically, the scales have high test-retest reliability, high internal consistency, and moderate interrater reliability, and they strongly correlate with other measures of behavioral problems (Elliott et al., 1988). In a comparative analysis, the SRS questionnaire was found to be the most comprehensive instrument for social skills assessment (Demaray et al., 1995). Measures derived from the Social Rating Scale in the ECLS-K have been used by Bertrand and Pan (2013), Cornwell, Mustard, and Van Parys (2013), and Elder and Zhou (forthcoming).

Since the correlations among scores are generally high, we conduct a principal component analysis (PCA) by cohort and wave.[22] We then estimate component scores and standardize them to create a single measure of noncognitive skill for each grade. The loading factors for the principal component analysis are shown in Appendix Table A1. In each wave, only the first component has an eigenvalue above one, which suggests that one component is sufficient to summarize the various measures of noncognitive skill. The loading factors for the single component are similar across waves and cohorts. For all cases, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is above 0.8, indicating that it is appropriate to apply a PCA.[23]

We classify a student as a child of an immigrant based on the country of birth of the mother. We focus on mothers because father's country of birth is missing completely for the 1998-99 cohort.[24] If a child's mother was born outside of the U.S., where Puerto Rico

[20]Externalizing behaviors include "acting out" behaviors. Children receive higher scores on this measure if they more often argue, fight, get angry, act impulsively, and disturb others.

[21]Children receive higher scores on this measure if they more often appear anxious, lonely, and sad, and if they appear to have low self-esteem.

[22]Note that we use all available observations in the noncognitive principal component analysis even though we employ the sample restrictions listed above in our later analyses. Repeating the PCA using our analytic sample yields loading factors that are indistinguishable from the ones we ultimately use.

[23]Below, we use individual area scores as outcomes to check whether our results are driven by any particular skills area.

[24]In the supplementary appendix, we show that the main results for the 2010-11 cohort are not sensitive

and other U.S. territories are considered outside the U.S.,[25] then that child is considered a child of an immigrant for the purposes of this study. Our main measure of disadvantage comes from the socioeconomic composite index, which is created by the National Center for Education Statistics (NCES) and provided with the ECLS-K data. The SES composite is constructed from parental education, parental occupation status, and household income. We consider a child's family to be low-SES if the SES composite is in the bottom two quintiles for at least half of the survey waves we consider.[26] We also explore heterogeneity in our results by ethnicity, mother's age at arrival, and whether English is the primary language spoken at home.

In our baseline specification, we include child ethnicity/race, gender, and age at the fall kindergarten survey. We also consider a model that adds a parsimonious set of household characteristics. These characteristics are the SES composite,[27] mother's age at first birth, an indicator for single-parent household, and the household size. All household characteristics except mother's age at first birth vary over time. We include missing indicators and set the missing value to the mean for continuous variables and to zero for categorical variables.

3.1 Descriptive statistics

We display descriptive statistics for the 1998-99 cohort in Table 1 and for the 2010-11 cohort in Table 2. Per standardization the math scores and noncognitive scores are mean 0, standard deviation 1, in the full sample. In the spring of kindergarten, children of immigrants in the 1998-99 (2010-11) cohort score 0.35 (0.29) standard deviations below children of natives

to defining child of immigrant as having a foreign born father or mother.

[25]We only observe 18 children with a mother born in Puerto Rico in the 1998-99 cohort, so this classification decision should not drive our results.

[26]Another possibility is to use parent's educational attainment alone to measure disadvantage. We did not pursue this definition since many immigrant parents completed their education in their country of birth and educational systems differ across countries.

[27]The SES composite is generally preferred by researchers using the ECLS-K because it is often available even when one of the components is missing. By using the SES composite, we also hope to avoid the methodological problems with the parental education control that have been documented by Luthra and Soehl (2015). The foremost concern is that immigrant parents were educated in many different countries with different education systems; we discuss this issue further in the next section. Still, we recognize that some of the same issues may be present with the SES composite.

on the math assessment. This gap shrinks to -0.16 (-0.14) standard deviations at the end of 3rd grade and then to -0.04 (-0.12) standard deviations at the end of 5th grade. The narrowing of the raw math gap is consistent with Hull (2017), though she focuses on Hispanic immigrants. In contrast, children of immigrants begin school with noncognitive skills that are slightly better than children of natives, but as they progress through school, they gain a more substantial advantage. In kindergarten and 1st grade, the noncognitive skills gaps hover between 0.02 and 0.12 standard deviations. Those gaps grow through elementary school such that children of immigrants outperform children of natives by 0.25 (0.22) standard deviations in 3rd grade and by 0.29 (0.21) standard deviations in 5th grade in the 1998-99 (2010-11) cohort. The mean test scores provide initial evidence that immigrant families produce gains in their children's cognitive and noncognitive skills.

Tables 1 and 2 also shows mean demographic and household characteristics, which are similar across the two cohorts. In the 1998-99 cohort, 12% of our sample is comprised of children of immigrants while it is 20% in the 2010-11 cohort; a higher fraction was expected in the later cohort due to national trends in this time period. Children of immigrants are more likely than children of natives to be Hispanic (about 60% compared to about 10%) or Asian (about 15% compared to 1%). Using our definition, two thirds of immigrant households are low-SES in contrast to less than half of native households. They also live in larger households on average. However, children of immigrants are not disadvantaged in all respects: They are less likely to come from a single-parent household, and they are more likely to live with their biological mother. Perhaps surprisingly, there is little difference in the average age at first birth between immigrant mothers and native mothers. For characteristics that might vary over time, we report means from kindergarten and 5th grade only, for the sake of space. For the characteristics that show a time trend, the trend moves in the same direction for children of immigrants and children of natives within the same cohort.

Since socioeconomic status is an important dimension of heterogeneity in later analyses, we report descriptive statistics for children of low-SES natives and children of low-SES im-

migrants in the last two columns of Table 1. Among low-SES children, the math scores for children of natives and children of immigrants trend in different directions. The mean math score for low-SES native children in the 1998-99 (2010-11) cohort is -0.27 (-0.30) standard deviations in kindergarten but decreases to -0.37 (-0.36) standard deviations in 5th grade. In contrast, low-SES immigrant children in the 1998-99 (2010-11) cohort have a mean math score of -0.62 (-0.50) standard deviations in kindergarten, but they score similarly to low-SES native children in 5th grade with a mean math score of -0.31 (-0.36) standard deviations. For noncognitive skills, the pattern of worsening scores for low-SES natives and improving scores for low-SES immigrants holds. In kindergarten, children of low-SES natives in the 1998-99 (2010-11) cohort score -0.19 (-0.15) standard deviations on our noncognitive index; in 5th grade, they score -0.28 (-0.24) standard deviations. Children of low-SES immigrants perform quite well on our measure of noncognitive skills: Their mean score in kindergarten is -0.04 (0.03) standard deviations in the 1998-99 (2010-11) cohort, but in 5th grade, they score 0.28 (0.13) standard deviations above the mean for all students.

There are also some differences in the demographic and household characteristics of low-SES native and low-SES immigrant children. Even conditional on fitting our definition of low-SES, children of immigrants have lower scores on the socioeconomic composite. Over half of low-SES native children are white and 20% are black, while about three quarters of low-SES immigrant children are Hispanic. Low-SES families in general are more likely to have a single parent, and the mothers were younger at first birth on average.

4 Estimates of immigrant-native skills gaps

To test for differences between children of immigrants and children of natives, we estimate models of the form:

$$y_{igc} = \alpha_{gc} immigrant_i + X_{igc}\theta_{gc} + \varepsilon_{igc}, \tag{1}$$

where i indexes the child; g indexes survey wave, or grade; and c indexes cohort. The model parameters are allowed to vary by grade and cohort since we estimate separate regressions for each grade and each cohort. The dependent variable y_{igc} is either a measure of cognitive skill or noncognitive skill. The parameter of interest α_{gc} measures the average difference between children of immigrants and children of natives in grade g and cohort c conditional on the controls in X_{igc}. We consider three successive sets of control variables. The first, or baseline, set includes race/ethnicity, gender, and age. The second set adds in the following household characteristics: the SES composite, number of household members, an indicator for single parent, mother's age at first birth, and an indicator for whether the biological mother is in the home. We use this parsimonious set as a starting point since Fryer and Levitt (2004), among others, demonstrate that test score gaps are not substantially different with an exhaustive set. Our final set of controls adds school fixed effects.

Figure 1 plots estimates of immigrant-native skills gaps by grade and cohort. Each panel shows results for a different outcome and specification; error bars give 95% confidence intervals. In Panel A, we see that children of immigrants in both cohorts have math scores 0.10 standard deviations below children of natives in the spring of kindergarten after controlling for race/ethnicity, gender, and age. Through the rest of elementary school, the difference is statistically insignificant. Still, the 95% confidence intervals are wide enough that they sometimes fail to rule out differences that might be of practical importance. For example, the 95% confidence interval for the test score gap in 3rd grade for the 1998-99 cohort is $(-0.13, 0.22)$.

With the addition of more controls in Panels B and C, we find that the estimated math score gaps generally shrink in magnitude, but the overall picture does not change. There is still some evidence of a statistically significant math gap between children of immigrants and children of natives at the beginning of elementary school. However, we find little evidence of a statistically significant difference in grades 2–5. In 5th grade, the 95% confidence interval for the immigrant-native math gap is $(-0.07, 0.16)$ for the 1998-99 cohort and $(-0.08, 0.09)$

for the 2010-11 cohort when we include our full set of controls. As a point of contrast, the black-white math gap in 5th grade is -0.54 (-0.59) standard deviations for the 1998-99 (2010-11) cohort. While we cannot completely rule out immigrant-native gaps that would be of concern, the evidence points to a small math gap that is relatively constant across elementary school. From past work, we might have expected to see a positive test score gap open up in elementary school.[28] A small, positive math gap is still possible, but we are able to rule out large and moderate-sized differences in cognitive skills between children of immigrants and children of natives.

The bottom three panels of Figure 1 plot estimates for noncognitive skills gaps. With only our baseline controls, we find that the noncognitive skills of children of immigrants and children of natives are statistically no different in kindergarten. In 3rd grade, children of immigrants in the 1998-99 (2010-11) cohort have 0.17 (0.20) standard deviations higher noncognitive skills compared children of natives. For the 1998-99 cohort, this gap grows to 0.31 standard deviations in 5th grade, but it remains relatively constant for the 2010-11 cohort. With the addition of household characteristics in Panel E and then school fixed effects in Panel F, the estimates by grade and cohort are quite similar. With our full set of controls, children of immigrants outscore children of natives by 0.31 (0.23) standard deviations on our noncognitive measure in 5th grade for the 1998-99 (2010-11) cohort.

To explore whether the growth in noncognitive skills for children of immigrants is driven by certain components of our index, we estimate models where we use the (standardized) area score as the outcome. These results are presented in Appendix Figure A1. Note that for externalizing and internalizing problem behaviors, lower scores correspond to better behaviors. For the 1998-99 cohort, we find that the general pattern of insignificant differences in early grades and significant differences in later grades holds across area scores. For the 2010-11 cohort, the pattern is not as consistent.

[28]Recall that our population of interest includes second-generation and very early-arriving first-generation immigrants. Hull (2017) finds that second-generation Hispanic immigrants begin to outscore whites in 4th grade, and similarly for early-arriving first-generation immigrants in 6th grade.

Our noncognitive results are in line with Figlio and Özek (forthcoming), who find that early-arriving first-generation and second-generation students have fewer disciplinary incidents in 8th grade. It is difficult to provide a practical interpretation of our noncognitive skills estimates. The literature on noncognitive skills gaps is small, and the existing literature on noncognitive skills uses various measures, which can make comparisons problematic. That being said, results from Heckman, Stixrud, and Urzua (2006) suggest that the wage return to noncognitive skill is about one quarter of the wage return to cognitive skill; however, results from Edin et al. (2017) using more recent data suggest that return to cognitive and noncognitve skill are about the same. At a minimum, we can say that cognitive skills do not tell the whole story of an immigrant advantage among early-arriving and second-generation immigrants. Given the current evidence on the importance of noncognitive skill development during early life, children of immigrants may be especially well positioned to succeed after elementary school.

4.1 Heterogeneity

We next explore whether immigrant-native skill gaps vary by key family characteristics.[29] We generally find that children of immigrants from disadvantaged backgrounds drive any catch up in math scores as well as the growth in noncognitive skills.

Specifically, we test whether the evolution of skills gaps depends on family socioeconomic status, ethnicity, mother's age at arrival to the U.S., and whether English is the primary language spoken at home. For example, to test whether test score gaps vary by socioeconomic status, we estimate the following model by grade:

$$y_{igc} = \beta_{gc1} highSESimm_i + \beta_{gc2} lowSESimm_i + \beta_{gc3} lowSESnative_i + X_{igc}\lambda_{gc} + \nu_{igc}, \quad (2)$$

[29] We have also used conditional quantile regression to further study heterogeneity; these results are reported in the supplementary appendix. We find evidence that the patterns in our main results appear across the conditional distribution of skills, with perhaps a larger role for students at the lower end of the distribution.

where $highSESimm_i$ equals 1 if child i is a child of an immigrant and considered high SES, $lowSESimm_i$ equals 1 if child i is a child of an immigrant and considered low SES, and $lowSESnative_i$ equals 1 if child i is a child of a native and considered low SES. The omitted group in the above model is children of high-SES natives. Recall that we define low-SES as appearing in the bottom two quintiles of the SES composite in at least half of the survey waves we study; all other children are considered high SES. Our null hypotheses of interest are: (i) children of high-SES immigrants are no different from children of high-SES natives, i.e., $\beta_{gc1} = 0$, and (ii) children of low-SES immigrants are no different from children of low-SES natives, i.e., $\beta_{gc2} = \beta_{gc3}$. For the rest of the paper, all models include baseline demographic characteristics, household characteristics, and school fixed effects.

Figure 2 presents math gap results by selected family characteristics. Panels A and B show immigrant-native math gaps for low-SES and high-SES families, respectively. The results indicate that the improvement in math scores among children of immigrants is driven by children from low-SES immigrant families.[30] In kindergarten, children of low-SES immigrants in the 1998-99 (2010-11) cohort score 0.09 (0.13) standard deviations below children of low-SES natives, but by the end of 5th grade, the gap is statistically insignificant and practically small. In contrast, there is no clear pattern in immigrant-native math gaps among high-SES families. Panels C and D similarly plot gaps for Hispanic and Asian children, two ethnic groups of interest. We compare Hispanic children of immigrants to Hispanic children of natives, and similarly for Asian children. The confidence intervals for the estimates are quite wide, and so we cannot draw conclusions about whether children of particular ethnicities drive the main results for math.

Panel E of Figure 2 plots math gaps between immigrant children with a late-arriving mother and native children. We define an immigrant mother as late-arriving if she arrived in the U.S. after age 12. This age is considered a critical age for language proficiency, and prior research has shown that children with parents who arrived before age 12 have better

[30] In the supplementary appendix, we split the sample by SES quartile to more finely measure family disadvantage. This analysis suggests that the bottom quartiles drive our main result for math.

outcomes (Bleakley and Chin, 2008). In Panel F, we plot math gaps between immigrant children with an early-arriving mother and native children. For the 2010-11 cohort, children with a late-arriving mother appear to drive the negative math gap in kindergarten, but otherwise, we find no evidence of heterogeneity along this dimension. Finally, we explore heterogeneity by the primary language spoken at home in Panels G and H. Like the previous two panels, the comparison group is children of natives. We find evidence that children whose primary language at home is not English are responsible for the negative math gap in kindergarten.[31] Recall that students could take the math test in Spanish if they were not proficient in oral English but proficient in oral Spanish.[32] Still, there may have been some students who barely qualified to take the math test in English and consequently scored lower than they might have otherwise.[33]

Figure 3 replicates Figure 2 with the noncognitive measure as the outcome. In our main results, we found that the noncognitive skills of children of immigrants surpass those of children of natives by 2nd grade. Figure 3 sheds light on whether this pattern is driven by a specific group of immigrants. In Panel A, we compare children of low-SES immigrants to children of low-SES natives and find that they have similar scores in kindergarten and 1st grade. In the 1998-99 cohort, children of low-SES immigrants score 0.15 standard deviations higher than children of low-SES natives in 3rd grade and then 0.50 standard deviations higher in 5th grade. In the 2010-11 cohort, they score 0.22 standard deviations higher in 3rd grade but only 0.25 standard deviations higher in 5th grade. Among high-SES families, we do see evidence of growth in noncognitive scores in 2010-11 cohort, but this trend is not present in the 1998-99 cohort.[34] The middle two panels of Figure 3 show the evolution of

[31] Aparicio Fenoll (2018) finds that English proficiency has no effect on math test scores, so we might expect that this catch-up is due to cultural factors rather than language itself. However, Aparicio Fenoll (2018) defines English proficiency by the language spoken in the country of origin while our measure is whether English is the primary language spoken at home.

[32] If they were proficient in neither, they did not take the assessment. ECLS-K psychometric reports provide more information about the instrument used to evaluate children's language fluency.

[33] In light of the findings in Akresh and Akresh (2011), we expect that this bias to be small.

[34] In the supplementary appendix, we show results when we split the sample by SES quartile. The lowest two quartiles appear to play the largest role in the growth of noncognitive skills among children of immigrants relative to children of natives.

immigrant-native noncognitive gaps for children of Hispanic and Asian ethnicity. For the most part, these estimated differences are imprecise enough that we cannot say whether a specific ethnic group drives the overall noncognitive results. An exception is the 5th grade gap among Hispanics in the 1998-99 cohort, where Hispanic children of immigrants outscore Hispanic children of natives by 0.43 standard deviations.

We next look for heterogeneity in the growth of noncognitive gaps by mother's age at arrival to the U.S., and we find that children of late-arriving mothers drive the growth in noncognitive scores. After scoring similarly to children of natives in kindergarten, children of late-arriving mothers in the 1998-99 (2010-11) cohort outperform children of natives by 0.14 (0.15) standard deviations in 3rd grade and by 0.39 (0.22) standard deviations in 5th grade. In contrast, children of early-arriving mothers generally have similar noncognitive skills to children of natives throughout elementary school. Last, we test for differences in noncognitive skills gaps by the primary language spoken at home. Consistent with our other results, we find evidence that immigrant children from non-English speaking households experience greater growth in their noncognitive skills. In 5th grade, they score 0.48 (0.30) standard deviations higher than children of natives in the 1998-99 (2010-11) cohort. However, children of immigrants that do speak English at home also contribute to the growth in noncognitive skills for both cohorts; they score about 0.15 standard deviations higher than children of natives in 5th grade.

The growth in noncognitive skills among disadvantaged immigrant children is perhaps surprising. One possible explanation for this trend has to do with our classification of children as low- or high-SES. The SES composite provided in the ECLS-K data is calculated from reports of parents' education, income, and occupation. We prefer the SES composite as a measure of socioeconomic status because it captures multiple dimensions of socioeconomic status. However, with respect to the education component, the comparison may not be valid. Education systems differ across countries, and so it may not be valid to compare a high school graduate from the U.S. with a high school graduate from a less developed country.

Specifically, dropping out of high school in the U.S. indicates a low level of noncognitive skills,[35] whereas dropping out of high school in other countries does not carry the same information. In this light, the low-SES native parents are negatively selected on noncognitive skills relative to low-SES immigrant parents. Assuming parents pass noncognitive skills on to their children, our result may be driven by this negative selection. To mitigate this concern, we have explored using occupational prestige scores as an alternative measure of SES, and these results mimic those with the SES composite. We also note that the pattern of growth was present for other disadvantaged groups. Thus, we conclude that the SES composite is a useful measure of SES for our analysis.

4.2 Robustness to scaling

Bond and Lang (2013), among others, raise the concern that since test scores contain only ordinal information, measured test score gaps may be a statistical artifact of the choice of scale. To check whether our results for math scores are sensitive to scaling decisions, we re-estimate our model using a normalization of test scores proposed by Penney (2017). Penney's metric is invariant to monotonic transformations and has interval properties under weak assumptions. It involves estimating the ordinary least squares variant of an unconditional quantile regression at the median and then normalizing the coefficients by dividing them by the standard error of the regression. We report results for this robustness check in Table 3. Because we estimate the unconditional quantile regression without weights, we first document that ordinary least squares (OLS) estimates are similar with and without sampling weights. The last column of Table 3 reports estimates of the math score gap between children of immigrants and children of natives using the method in Penney (2017). The pattern of coefficients across grades holds, so we conclude that our math score results are not an artifact of scaling.

[35]Research on the value of the GED in the U.S. illustrates this stylized fact (Heckman, Humphries, and Mader, 2011).

4.3 Robustness to unobserved time-invariant factors

Thus far, we have explored gaps in skills by estimating regressions separately by grade. In a pooled model, we can study how immigrant-native skills gaps change across grades by comparing coefficients from the same regression. Furthermore, a specification that includes child fixed effects controls for factors that do not vary across grades. In this model, we can no longer ascertain whether children of immigrants start school behind children of natives because the main effect for immigrant child is not identified. However, we can assess whether immigrant-native skills gaps change across grades. We expect the conclusions from the child fixed effect specifications to be similar as long as the set of controls in our main specification adequately captures child-specific heterogeneity.

We report results for pooled models with and without child fixed effects in Table 4. The pooled results without child fixed effects reveal patterns somewhat similar to our main results. Children of immigrants in the 1998-99 cohort score similarly to children of natives at the start of school; in the 2010-11 cohort, there is a negative gap. In later elementary school, children of immigrants in both cohorts score about 0.15 standard deviations higher in math. This evidence of a positive gap is consistent with previous studies using administrative data, though these pooled results are different from our own main results in this respect. For noncognitive skills, we estimate a pattern that is quite similar to our main results. Finally, when we include child fixed effects, we find no evidence of sensitivity to controlling for time-invariant factors for either math or noncognitive skills, relative to the pooled results without child fixed effects. These results suggest that our control set has sufficiently accounted for fixed unobservables that may explain the gaps.

5 What drives the growth in noncognitive skills among children of immigrants?

In this section, we turn from documenting the size of skills gaps to investigating the mechanisms behind them. Any credible explanation for the pattern of noncognitive results must be consistent with both the intercept and the slope (i.e., no difference in kindergarten but a positive difference in later elementary school), and it must also be consistent with modest growth, if any, in cognitive skills. For example, teachers might have different rating scales in mind when evaluating the noncognitive skills of children of immigrants and children of natives. However, this would only explain the increase in the immigrant-native difference if it was true for 2nd through 5th grade teachers but not kindergarten and 1st grade teachers. A leading potential explanation is that immigrant parents foster greater improvement in noncognitive skills relative to native parents, which could result from different attitudes or parenting behaviors. It is also possible that children with immigrant parents are treated differently within school or that different endowments lead to different skill trajectories.

Inputs to the educational production function can be divided into three areas: home inputs, school/neighborhood inputs, and endowment. The ECLS-K includes detailed questionnaires for parents, teachers, and school administrators, and in this section, we use this information to test for differences in inputs between children of natives and children of immigrants.

In Tables 5 and 6, we test for differences in parenting behaviors and attitudes between immigrant and native parents. To this end, we construct several summary measures of parental investments, which we describe in detail in the supplementary appendix. The characteristics reported in Tables 5 and 6 were measured in kindergarten; results are similar if we use a later grade. By several measures, immigrant parents display significantly lower levels of investment compared to native parents. Specifically, immigrant parents report being less involved at school, enrolling their children in fewer organized activities, and interacting less

with their children at home. At the same time, immigrant parents report higher expectations for their children's educational attainment. We find mixed evidence across the two cohorts on whether there are significant differences in warmth/emotional support, discipline style, and parent mental health.[36] In the supplementary appendix, we show that this pattern of differences is also present when we condition on our full set of controls. When we restrict our comparison to children of low-SES immigrants and children of low-SES natives, we also find significant disparities in education-related investments. Overall, the evidence on parental investments suggests that children of immigrants might develop lower levels of skills relative to natives, which runs counter to our findings.

We also test for differences in teacher characteristics in Tables 5 and 6.[37] Recall that our main specification includes school fixed effects, so we have already controlled for differences in school-level characteristics. The school fixed effects also capture some differences between neighborhoods. Still, children of immigrants may be treated differently within schools; specifically, they may be more or less likely to be assigned to teachers with certain characteristics. In Table 5, we see that children of immigrants are less likely to be assigned a white teacher and more likely to have a Hispanic teacher.[38] Children of immigrants also have teachers with less experience. This difference persists in a simple model with school fixed effects (results not reported), indicating that students are assigned teachers with less experience conditional on school. The disparity is concerning given evidence that novice teachers are less effective (Clotfelter, Ladd, and Vigdor, 2006; Wiswall, 2013). We find no significant differences in teacher's educational attainment for the 1998-99 cohort, but children of immigrants in the 2010-11 cohort are more likely to have a teacher with a graduate degree. Across the co-

[36]Higher values indicate worse mental health.

[37]Teacher characteristics were collected for each grade, but we only report kindergarten and 5th grade for the sake of space. For 5th graders, we use characteristics of the reading teacher, because these are available for all children. Information on math teachers is reported but only for half the children and on science teachers for the remaining half.

[38]The public-access version of the ECLS-K for the 1998-99 cohort does not report whether a teacher is Hispanic in later grades, and teacher Hispanic ethnicity is not reported in any grade for the 2010-11 cohort. In unreported analyses, we find that children of immigrants in the 1998-99 cohort attend schools that have higher proportions of Hispanic and Asian teachers on average.

horts, children of immigrants are more likely to have a teacher with a nonstandard teacher certification (such as a temporary or provisional certification). Again, these descriptive differences are concerning since there is some evidence that teachers with regular licenses have a positive effect on achievement (Clotfelter, Ladd, and Vigdor, 2007). Overall, we find some evidence that children of immigrants have teachers with lower qualifications. However, it is still possible that these students are matched with teachers who are well suited to teach children from immigrant families, which could outweigh lower qualifications. For example, Hispanic and Asian teachers may be more attuned to the needs of children from immigrant families.

Last, we examine differences in endowment and early life characteristics between children of immigrants and children of natives. Birth weight and rates of premature birth are similar between these two groups. Immigrant mothers are more likely to participate in WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children), which is consistent with their lower scores on the SES composite. Immigrant parents report that their children spend fewer hours in the care of non-relatives. This difference indicates that immigrant parents rely less on informal care by neighbors and/or formal childcare, like daycare and preschool. There is no significant difference in the amount of time spent in the care of relatives.

To explore whether these inputs might explain the growth in noncognitive skills among children of immigrants, we add each set of inputs as controls to our specification that already includes baseline characteristics, household characteristics, and school fixed effects.[39] These results are in Figure 4. The patterns remain the same—indeed, the coefficients are almost identical. Moreover, the parental investment variables largely do not seem to have much explanatory power in their own right. In Figure 5, we similarly report skills gaps between children of low-SES immigrants and children of low-SES natives after controlling for each

[39]Specifically, we add parental investments measured at kindergarten and teacher characteristics measured in the same grade as the skill. Note that the controls are the same across the two cohorts, except that we can only control teacher race/ethnicity for the 1998-99 cohort.

potential set of mechanisms. Again, the results are virtually identical. Although we observe some differences in inputs between children of natives and children of immigrants, they do not help explain the pattern of skills beyond a more parsimonious set of controls.

The lack of explanatory power in the parental investment variables is perhaps surprising. One possibility is that simultaneity bias exists in the model with these variables. Bias could arise if parents respond to poor outcomes or behavior with greater investments, and vice versa.[40] Under this "response model," OLS estimates for the parental investment variables would be biased towards zero. In our analysis, we find that the coefficients on the parental investment variables are mostly insignificant and that the addition of these variables has virtually no effect on other coefficients of interest. Testing whether the response model holds is beyond the scope of this paper; however, several studies have found evidence that after dealing with the endogeneity in parental involvement, the magnitude of its effect on child outcomes increases substantially.[41] Therefore, we cannot definitively conclude from our estimates that parental investments do not explain any of the skill development among children of immigrants. Still, we note that the descriptive differences suggest that, if anything, we would expect the children of immigrants to be disadvantaged in terms of investments, except for parental expectations.

Another interpretation of these results is that the measures provided in the ECLS-K cannot capture the relevant differences between immigrant and native parents. As a U.S.-based survey, the questions may not have been well designed to pick up on ways that foreign-born mothers foster growth in skills. Crosnoe and López Turley (2011) explain, "[i]mmigrants' parenting behaviors, although appropriate to their home culture, do not always align with what is demanded and rewarded by American schools" (p. 142). A budding literature investigates how immigrant traits influence educational outcomes. For example, Figlio et al. (2019) show that children from countries that emphasize delayed gratification have fewer

[40] See Becker and Tomes (1976) for the first description of the "response model" versus "enhancement model."

[41] See Cabus and Ariës (2016), Norris and van Hasselt (2019), Kalb and van Ours (2014), and Price (2008).

absences and disciplinary incidents, and they make larger test score gains over time. In a similar vein, Mendez and Zamarro (2018) find that immigrant parents transmit country-specific noncognitive skills to their offspring and that these in turn influence educational attainment and labor market outcomes. In addition, Bütikofer and Peri (2017) find that immigrants are positively selected on adaptability and hypothesize that this selection could contribute to observed differences between immigrants and native in other outcomes. To our knowledge, there were no questions in the parent survey of the ECLS-K that address adaptability. Furthermore, Burgess and Heller-Sahlgren (2018) find that children of immigrants have more positive attitudes toward school than children of natives and hypothesize that the positive attitudes are transmitted from immigrant parents. There were also no questions on the ECLS-K parent survey that directly asked about attitudes. On a broader level, some differences among parents may be inherently difficult to capture in surveys. As a point of comparison, the black-white test score gap changes little when researchers control for a wider set of background characteristics (Phillips et al., 1998; Fryer and Levitt, 2004).

A further possibility is that unobserved school-level factors are responsible for the growth in noncognitive skills among children of immigrants. Students from immigrant and native families begin school with similar social skills ratings from teachers, and the gap emerges after they have attended school for several years. This timing in particular suggests a role for the school. For example, principals may assign children of immigrants to teachers that are better at fostering noncognitive skills, and this advantage builds over time.

Finally, immigrant students' experience with two cultures might stimulate growth in socioemotional skills. These children may develop a better understanding of different communication styles in others and may in turn become better at expressing themselves. Struggling to learn a new language for school may foster patience and persistence. They may also have a greater appreciation for diversity, which would help them get along with a wider variety of their classmates.

6 Conclusion

In this paper, we document skills gaps between children of immigrants and children of natives in elementary school. We find some evidence of a small, negative math score gap in early elementary school, but that gap closes in later elementary school. Our estimates are precise enough to rule out large and moderate-sized math gaps between immigrant and native children.

For noncognitive skills, there is no statistical difference in early grades, but children of immigrants finish elementary school with statistically higher noncognitive skills compared to children of natives. Upon further analysis, we find that the growth in noncognitive skills is driven by disadvantaged immigrant students. Controlling for potential mechanisms that we observe in our data set does not alter these patterns.

Cognitive and noncognitive skills are key to labor market success, and the outlook for children of immigrants, specifically those from disadvantaged families, is positive. Their higher noncognitive skills at the end of elementary school may help them build cognitive skills, but even if this is not the case, we expect the noncognitive skills alone to give them a boost in their eventual educational attainment and wages. Heckman, Stixrud, and Urzua (2006) find that the wage returns to a one standard deviation increase in noncognitive skill among males in the NLSY79 is 5.1%. Using more recent Swedish data, Edin et al. (2017) find the return to be 9.8%; they also show that this return has increased over time.[42] If children of immigrants maintain their noncognitive advantage from 5th grade, we would expect their wages to be 1.2% to 3.0% higher on average.[43] Thus, our results indicate that children of immigrants should be well positioned to succeed in the labor market.

[42]Both of these returns are from models without educational attainment, which is the appropriate choice in our case because we do not observe attainment for children in our sample.

[43]Card (2005) finds that second-generation immigrant males in the 1995-2002 March Current Population Survey earn 3.6% higher wages than natives not controlling for education or ethnicity. When both of these controls are added, the return drops to 2.3%.

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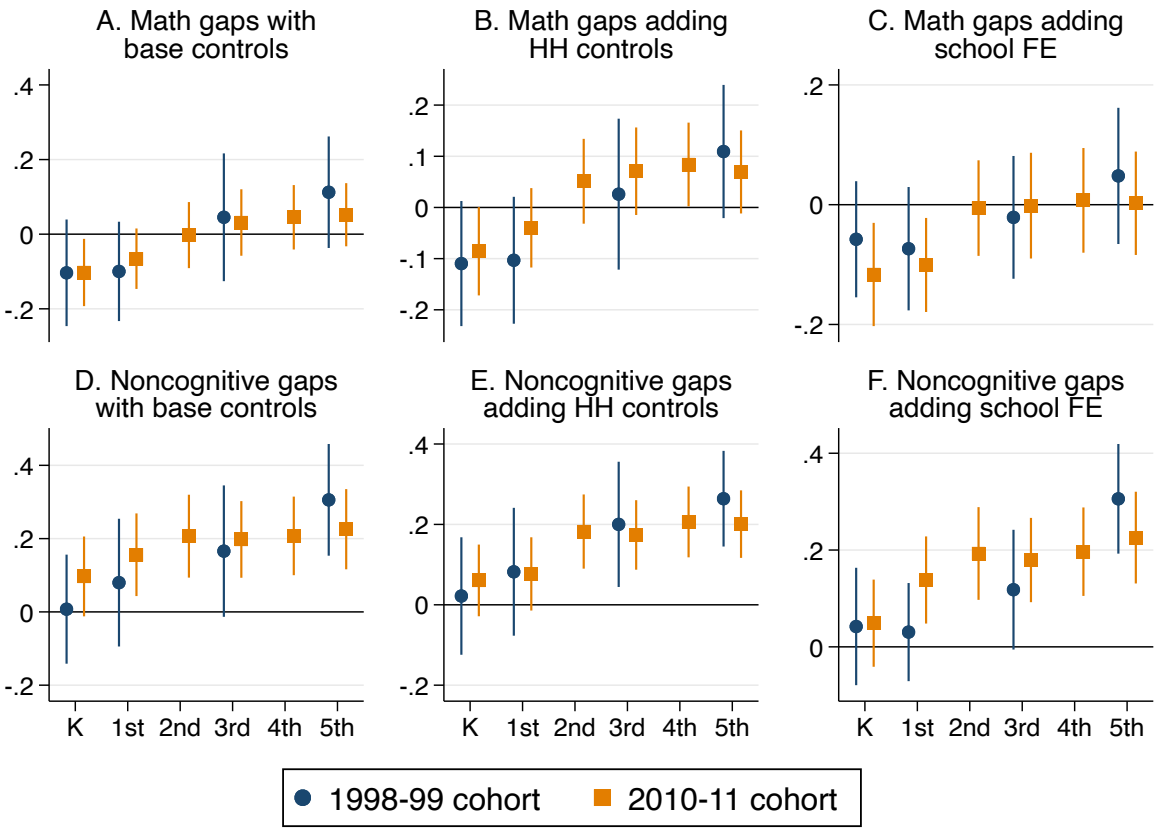
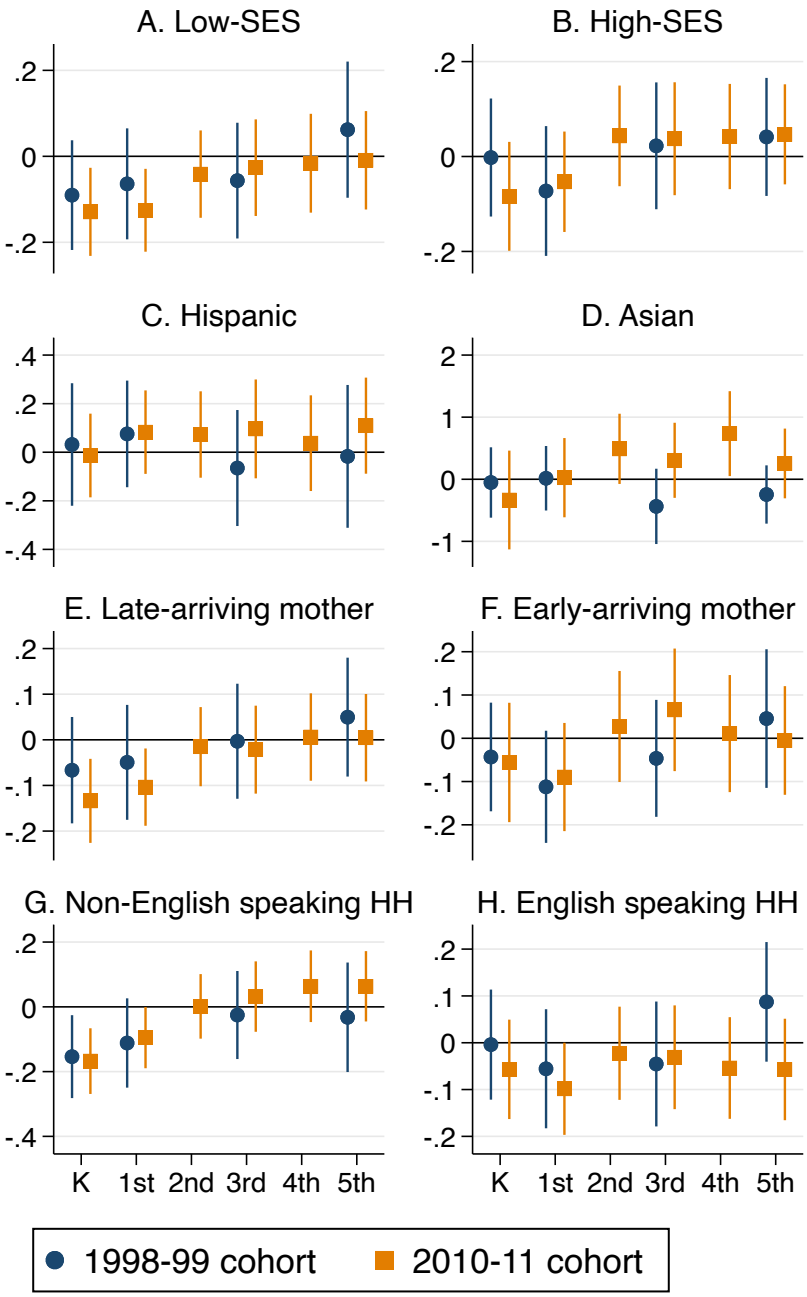
Figure 1: Immigrant-native skills gaps by grade



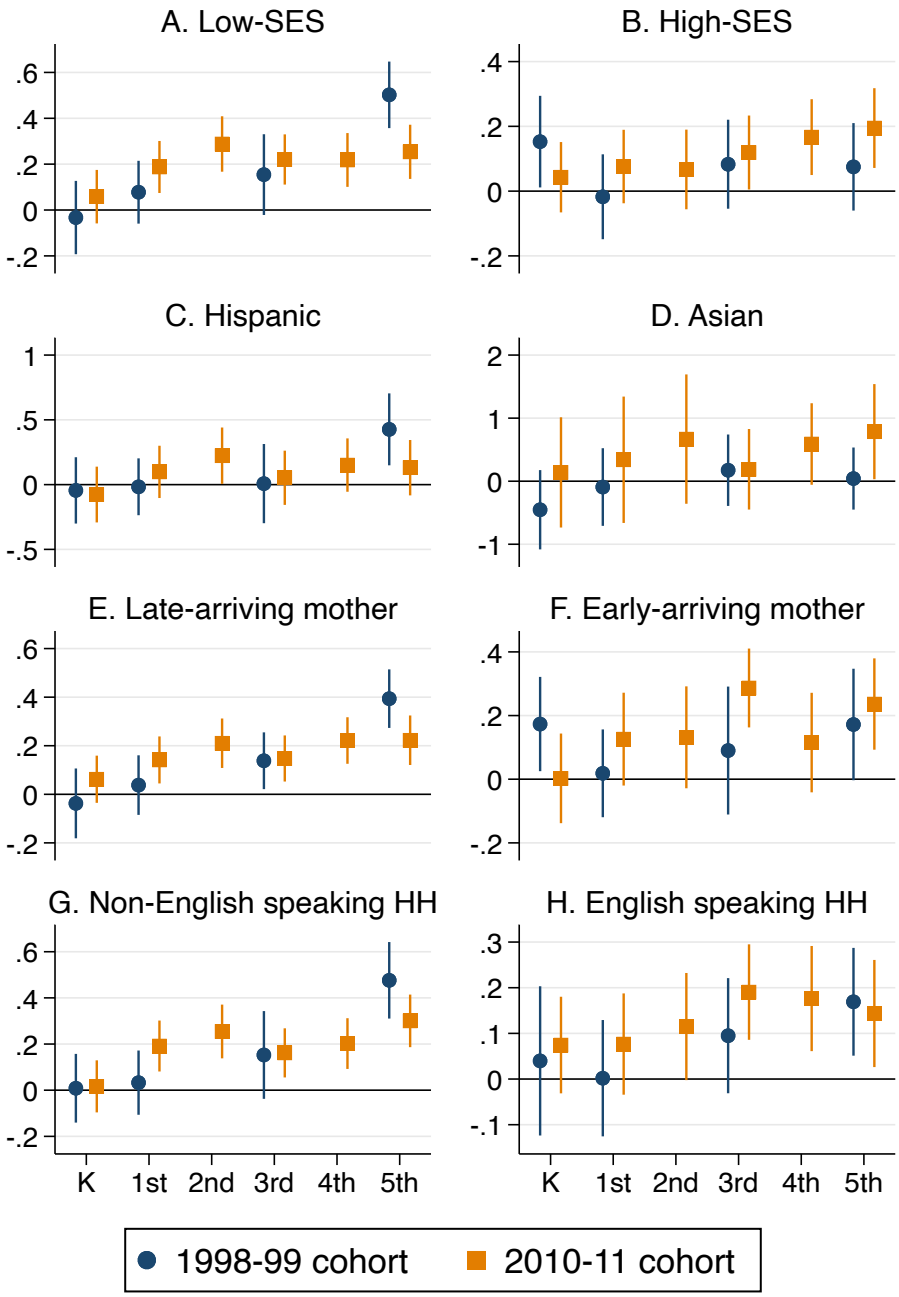
Notes: Each panel plots the average gap between children of immigrants and children of natives by grade conditional a different set of controls. Bars give 95% confidence intervals. Base controls are ethnicity, gender and age. Household controls are the SES composite, number of household members, an indicator for single parent, mother's age at first birth, and an indicator for whether the biological mother is in the home.

Figure 2: Heterogeneity in immigrant-native math score gaps by grade



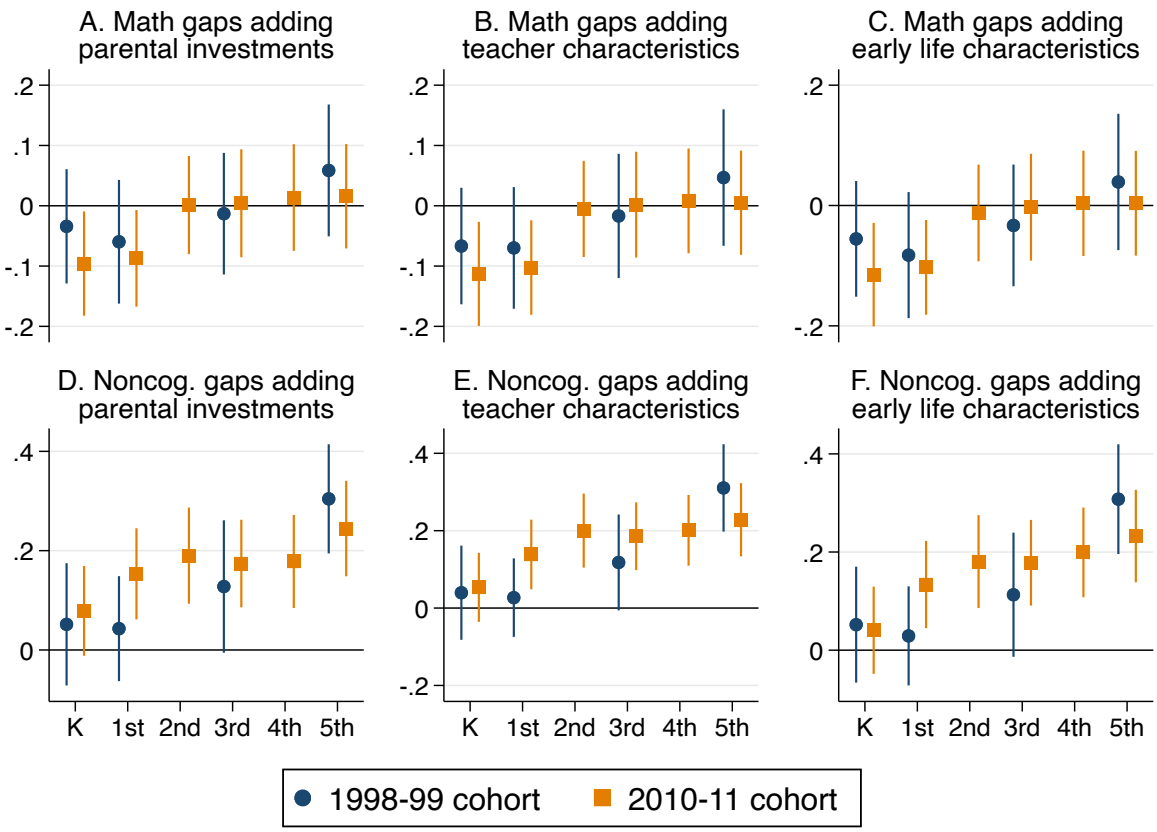
Notes: Each panel plots the average gap between children of immigrants and children of natives by grade for a given family characteristic. Error bars give 95% confidence intervals. All regressions include base controls, household characteristics, and school fixed effects.

Figure 3: Heterogeneity in immigrant-native noncognitive score gaps by grade



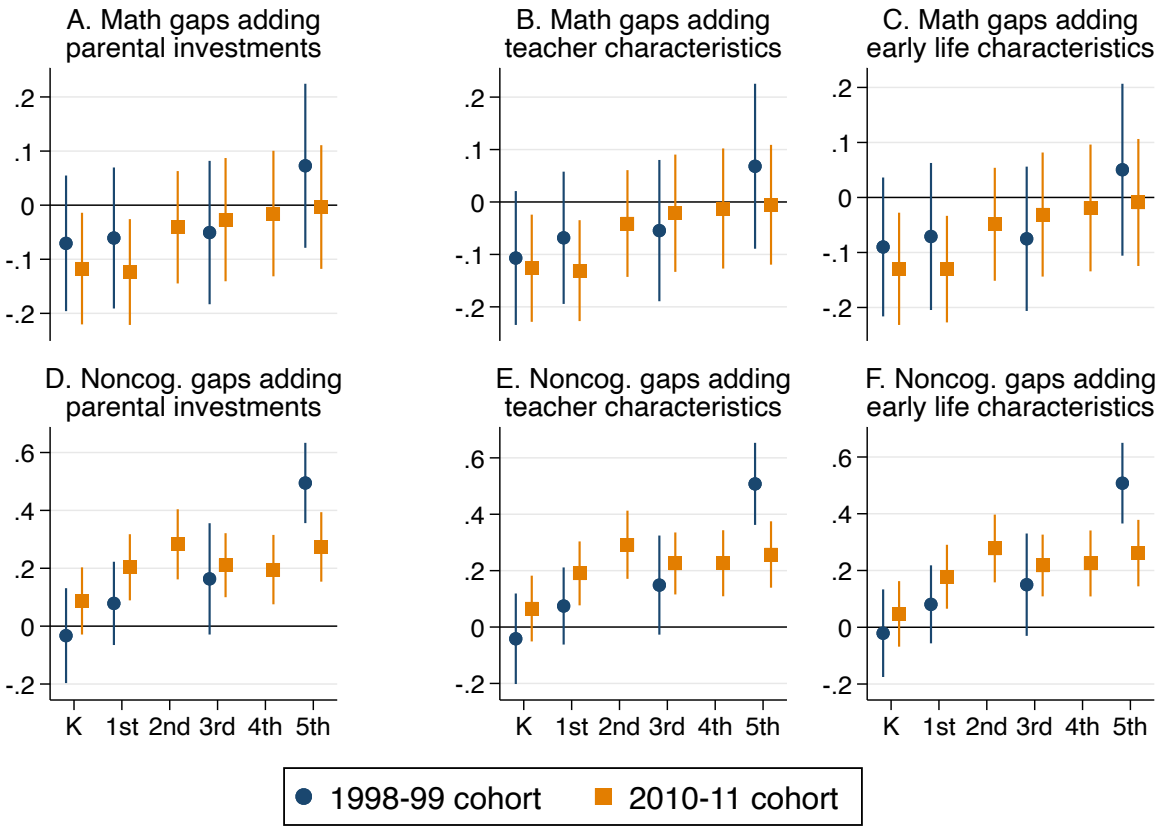
Notes: Each panel plots the average gap between children of immigrants and children of natives by grade for a given family characteristic. Error bars give 95% confidence intervals. All regressions include base controls, household characteristics, and school fixed effects.

Figure 4: Immigrant-native skills gaps by grade, controlling for mechanisms



Notes: Each panel plots the average gap between children of immigrants and children of natives by grade adding a different set of potential mechanisms. Error bars give 95% confidence intervals. Besides the sets of controls listed, all regressions include base controls, household characteristics, and school fixed effects.

Figure 5: Immigrant-native skills gaps among low-SES students by grade, controlling for mechanisms



Notes: Each panel plots the average gap between low-SES children of immigrants and low-SES children of natives by grade adding a different set of potential mechanisms. Error bars give 95% confidence intervals. Besides the sets of controls listed, all regressions include base controls, household characteristics, and school fixed effects.

Table 1: Descriptive statistics, 1998-99 cohort

	Full sample	Children of natives	Children of immigrants	Children of low-SES natives	Children of low-SES immigrants
Math scores					
Kindergarten	0 (1)	0.043 (0.984)	-0.303* (1.059)	-0.267 (0.878)	-0.615* (0.846)
1st grade	0 (1)	0.036 (0.997)	-0.253* (0.975)	-0.290 (0.910)	-0.484* (0.839)
3rd grade	0 (1)	0.020 (0.990)	-0.142* (1.057)	-0.326 (0.945)	-0.460 (0.914)
5th grade	0 (1)	0.005 (0.991)	-0.039 (1.057)	-0.366 (1.006)	-0.311 (1.005)
Noncognitive scores					
Kindergarten	0 (1)	-0.002 (0.995)	0.017 (1.031)	-0.186 (1.069)	-0.041 (1.000)
1st grade	0 (1)	-0.012 (1.000)	0.084 (0.988)	-0.220 (1.024)	0.080* (0.984)
3rd grade	0 (1)	-0.031 (0.996)	0.216* (0.992)	-0.253 (1.012)	0.189* (0.975)
5th grade	0 (1)	-0.036 (0.999)	0.255* (0.960)	-0.278 (1.038)	0.283* (0.911)
Child of immigrant	0.124	0	1	0	1
Low SES	0.489	0.466	0.654*	1	1
White	0.656	0.726	0.163*	0.623	0.073*
Black	0.127	0.134	0.084*	0.203	0.049*
Hispanic	0.153	0.091	0.595*	0.105	0.780*
Asian	0.019	0.005	0.113*	0.003	0.074*
Other ethnicity	0.044	0.044	0.045	0.067	0.025*
Female	0.499	0.495	0.522	0.499	0.568
Age (mos), kindergarten	74.8	74.9	74.2*	75.2	74.2*
SES composite, kindergarten	0.088	0.124	-0.167*	-0.421	-0.632*
SES composite, 5th grade	0.051	0.084	-0.188*	-0.486	-0.656*
Household members, kindergarten	4.44	4.41	4.69*	4.43	4.86*
Household members, 5th grade	4.47	4.42	4.76*	4.43	4.87*
Single parent, kindergarten	0.188	0.192	0.159	0.295	0.174*
Single parent, 5th grade	0.143	0.148	0.110*	0.221	0.153*
Mom age at first birth	24.5	24.5	24.1	22.2	23.1*
No bio mom in home, kindergarten	0.072	0.075	0.051*	0.108	0.056*
No bio mom in home, 5th grade	0.118	0.120	0.105	0.158	0.098*
Unweighted N	6,567	5,648	919	2,436	517

Notes: Standard deviations in parentheses. * signifies that the mean is statistically different from the mean in the column to the left at the 5% level.

Table 2: Descriptive statistics, 2010-11 cohort

	Full sample	Children of natives	Children of immigrants	Children of low-SES natives	Children of low-SES immigrants
Math scores					
Kindergarten	0 (1)	0.059 (0.981)	-0.233* (1.038)	-0.296 (0.880)	-0.498* (0.932)
1st grade	0 (1)	0.060 (0.991)	-0.235* (0.998)	-0.294 (0.916)	-0.513* (0.867)
2nd grade	0 (1)	0.038 (0.983)	-0.150* (1.050)	-0.332 (0.947)	-0.440* (0.962)
3rd grade	0 (1)	0.029 (0.983)	-0.114* (1.058)	-0.341 (0.986)	-0.375 (1.009)
4th grade	0 (1)	0.026 (0.990)	-0.100* (1.031)	-0.355 (1.036)	-0.366 (1.000)
5th grade	0 (1)	0.024 (0.990)	-0.095* (1.033)	-0.361 (1.052)	-0.364 (1.028)
Noncognitive scores					
Kindergarten	0 (1)	-0.014 (1.005)	0.056* (0.970)	-0.145 (1.018)	0.026* (0.992)
1st grade	0 (1)	-0.025 (1.005)	0.097* (0.966)	-0.200 (1.017)	0.039* (0.989)
2nd grade	0 (1)	-0.038 (1.002)	0.150* (0.971)	-0.228 (1.028)	0.120* (0.992)
3rd grade	0 (1)	-0.045 (1.011)	0.175* (0.924)	-0.220 (1.034)	0.133* (0.939)
4th grade	0 (1)	-0.040 (1.005)	0.156* (0.955)	-0.243 (1.014)	0.111* (0.998)
5th grade	0 (1)	-0.043 (1.010)	0.169* (0.932)	-0.235 (1.017)	0.134* (0.971)
Child of immigrant	0.204	0.000	1	0	1
Low SES	0.479	0.431	0.667*	1	1
White	0.543	0.651	0.118*	0.521	0.051*
Black	0.128	0.145	0.060*	0.210	0.055*
Hispanic	0.231	0.136	0.602*	0.195	0.771*
Asian	0.040	0.009	0.164*	0.005	0.099*
Other ethnicity	0.059	0.059	0.056	0.069	0.023*
Female	0.502	0.497	0.523	0.507	0.534
Age (mos), kindergarten	73.8	74.0	73.0*	74.0	73.1*
SES composite, kindergarten	-0.053	0.022	-0.344*	-0.582	-0.799*
SES composite, 5th grade	-0.058	0.019	-0.366*	-0.606	-0.833*
Household members, kindergarten	4.57	4.48	4.90*	4.50	5.08*
Household members, 5th grade	4.60	4.51	4.93*	4.51	5.10*
Single parent, kindergarten	0.200	0.219	0.126*	0.353	0.144*
Single parent, 5th grade	0.222	0.242	0.142*	0.390	0.160*
Mom age at first birth	24.5	24.5	24.5	21.6	22.3*
No bio mom in home, kindergarten	0.057	0.072	0.000*	0.095	0.000*
No bio mom in home, 5th grade	0.079	0.097	0.010*	0.145	0.008*
Unweighted N	6,089	4,742	1,347	1,767	822

Notes: Standard deviations in parentheses. * signifies that the mean is statistically different from the mean in the column to the left at the 5% level.

Table 3: Immigrant-native gaps in math scores using the Penney normalization approach

	OLS, weighted	OLS, unweighted	Penney normalization
Panel A. 1998-99 Cohort			
Kindergarten	-0.06	-0.03	-0.05
	(0.05)	(0.05)	(0.07)
1st grade	-0.07	-0.06	-0.07
	(0.05)	(0.05)	(0.06)
3rd grade	-0.02	0.03	-0.03
	(0.05)	(0.05)	(0.07)
5th grade	0.05	0.06	0.07
	(0.06)	(0.05)	(0.06)
Panel B. 2010-11 Cohort			
Kindergarten	-0.12***	-0.10***	-0.19***
	(0.04)	(0.04)	(0.06)
1st grade	-0.10**	-0.08*	-0.18**
	(0.04)	(0.04)	(0.07)
2nd grade	-0.01	-0.03	0.05
	(0.04)	(0.04)	(0.08)
3rd grade	-0.00	0.02	-0.00
	(0.05)	(0.04)	(0.07)
4th grade	0.01	0.02	0.01
	(0.04)	(0.04)	(0.07)
5th grade	0.00	0.01	-0.07
	(0.04)	(0.04)	(0.07)

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Each cell contains an estimate of the child of immigrant indicator from a separate regression. All regressions include base controls, household characteristics, and school fixed effects. The Penney normalization takes the form $\hat{\alpha}/s$, where s is the standard error of an unconditional quantile regression at the median.

Table 4: Immigrant-native skills gaps, pooled and fixed effects models

	Math score		Noncognitive score	
	(1)	(2)	(3)	(4)
Panel A. 1998-99 cohort				
Child of immigrant	-0.08		0.02	
	(0.05)		(0.06)	
Child of immigrant × 1st grade	-0.05	-0.04	0.04	0.04
	(0.06)	(0.06)	(0.07)	(0.07)
Child of immigrant × 3rd grade	0.09	0.12**	0.13*	0.11
	(0.06)	(0.06)	(0.07)	(0.07)
Child of immigrant × 5th grade	0.15**	0.12**	0.23***	0.19**
	(0.06)	(0.06)	(0.08)	(0.07)
Panel B. 2010-11 cohort				
Child of immigrant	-0.14***		0.07	
	(0.05)		(0.05)	
Child of immigrant × 1st grade	0.03	0.06*	0.03	0.04
	(0.03)	(0.03)	(0.05)	(0.04)
Child of immigrant × 2nd grade	0.13***	0.14***	0.12**	0.13***
	(0.04)	(0.03)	(0.05)	(0.05)
Child of immigrant × 3rd grade	0.14***	0.17***	0.13***	0.13***
	(0.04)	(0.04)	(0.05)	(0.05)
Child of immigrant × 4th grade	0.17***	0.19***	0.18***	0.17***
	(0.04)	(0.04)	(0.05)	(0.05)
Child of immigrant × 5th grade	0.16***	0.20***	0.17***	0.16***
	(0.04)	(0.04)	(0.05)	(0.05)
Child FE	No	Yes	No	Yes

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are in parentheses and clustered at the child level. All regressions include base controls, household characteristics, and school fixed effects. The coefficients on all control variables are allowed to vary by grade.

Table 5: Descriptive statistics for mechanisms, 1998-99 cohort

	Full sample	Children of natives	Children of immigrants	Children of low-SES natives	Children of low-SES immigrants
Parental investments					
School involvement	0	0.060	-0.427*	-0.316	-0.684*
Organized activities	0	0.064	-0.455*	-0.270	-0.690*
In-home interactions	0	0.041	-0.304*	-0.094	-0.593*
Warmth/emotional support	0	-0.008	0.057	-0.004	0.083
Mental health	0	-0.002	0.016	0.238	0.116
Harsh discipline (0/1)	0.256	0.269	0.168*	0.329	0.176*
Expectations for education	0	-0.076	0.513*	-0.205	0.521*
Teacher characteristics					
White, kindergarten	0.929	0.933	0.895*	0.914	0.894
White, 5th grade	0.899	0.908	0.832*	0.879	0.835
Hispanic, kindergarten	0.049	0.031	0.177*	0.037	0.235*
Experience, kindergarten	14.3	14.4	13.4	14.1	13.7
Experience, 5th grade	14.5	14.8	12.9*	14.0	12.1*
BA or less, kindergarten	0.650	0.645	0.686	0.663	0.739*
BA or less, 5th grade	0.552	0.551	0.559	0.589	0.589
Graduate degree, kindergarten	0.350	0.355	0.314	0.337	0.261*
Graduate degree, 5th grade	0.448	0.449	0.441	0.411	0.411
Regular or higher certification, kindergarten	0.884	0.893	0.820*	0.893	0.810*
Regular or higher certification, 5th grade	0.908	0.914	0.863*	0.906	0.879
Endowment and early life characteristics					
Birth weight (oz)	118.9	119.0	118.4	117.7	118.5
Premature birth	0.165	0.164	0.168	0.150	0.165
Mother on WIC	0.352	0.338	0.455*	0.585	0.620
Hours/week of relative care	6.07	6.15	5.47	8.82	5.68*
Hours/week of non-relative care	4.96	5.32	2.32*	4.11	1.98*

Notes: * signifies that the mean is statistically different from the mean in the column to the left at the 5% level. See the supplementary appendix for descriptions of the parental investment variables.

Table 6: Descriptive statistics for mechanisms, 2010-11 cohort

	Full sample	Children of natives	Children of immigrants	Children of low-SES natives	Children of low-SES immigrants
Parental investments					
School involvement	0	0.100	-0.388*	-0.236	-0.576*
Organized activities	0	0.083	-0.321*	-0.307	-0.582*
In-home interactions	0	0.081	-0.373*	0.034	-0.504*
Warmth/emotional support	0	0.043	-0.171*	0.054	-0.248*
Mental health	0	0.019	-0.076*	0.213	0.021*
Harsh discipline (0/1)	0.295	0.301	0.272	0.311	0.300
Expectations for education	0	-0.105	0.479*	-0.286	0.424*
Teacher characteristics					
Experience, kindergarten	14.3	14.5	13.6*	14.0	13.2
Experience, 5th grade	14.2	14.3	13.6*	13.5	13.3
Graduate degree, kindergarten	0.501	0.492	0.534*	0.488	0.507
Graduate degree, 5th grade	0.531	0.523	0.563*	0.475	0.536*
Regular or higher certification, kindergarten	0.902	0.915	0.852*	0.937	0.868*
Regular or higher certification, 5th grade	0.908	0.913	0.888*	0.912	0.884
Endowment and early life characteristics					
Birth weight (oz)	116.8	117.0	116.0	115.0	115.4
Premature birth	0.200	0.205	0.178	0.207	0.179
Mother on WIC	0.437	0.408	0.549*	0.699	0.713
Hours/week of relative care	6.11	6.13	6.01	8.05	6.06*
Hours/week of non-relative care	3.05	3.47	1.13*	2.71	0.90*

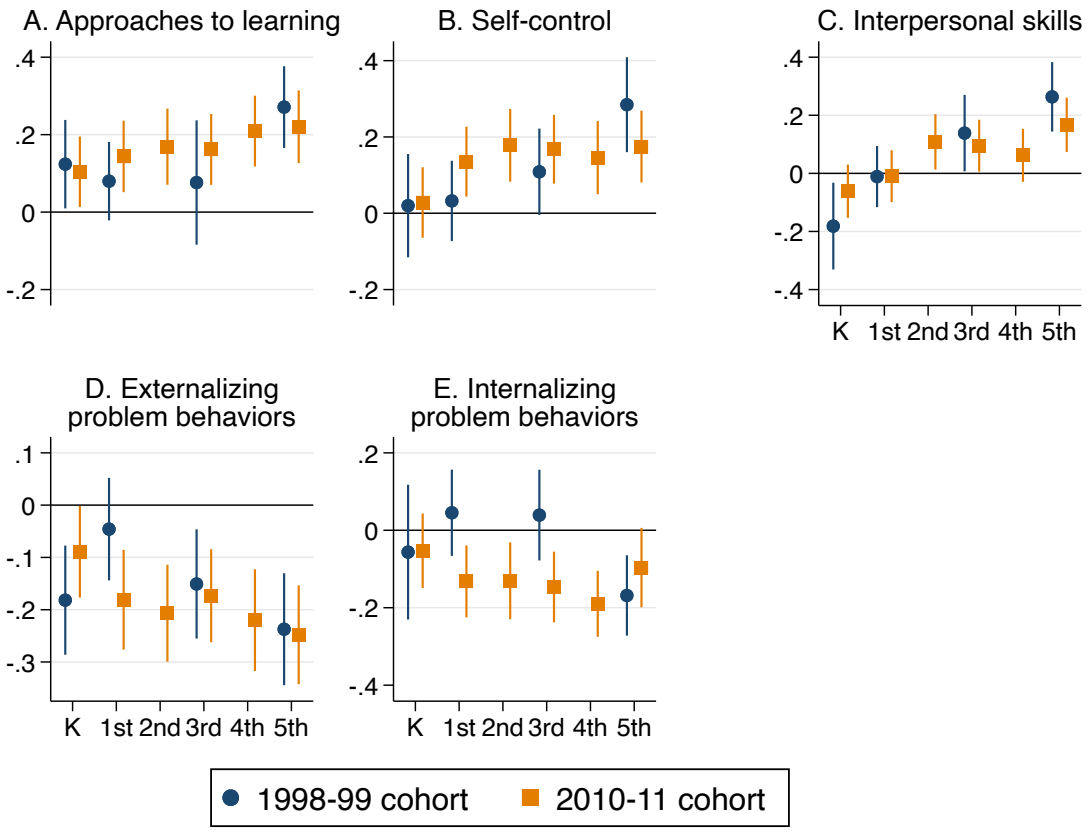
Notes: * signifies that the mean is statistically different from the mean in the column to the left at the 5% level. See the supplementary appendix for descriptions of the parental investment variables.

Appendix

Table A1: Loading factors for the principal component analysis of the Social Rating Scale areas

Grade:	K	1st	2nd	3rd	4th	5th
Panel A. 1998-99 cohort						
Approaches to Learning	0.46	0.46		0.47		0.47
Self-Control	0.50	0.50		0.49		0.50
Interpersonal Skills	0.50	0.50		0.49		0.49
Externalizing Problem Behaviors	-0.45	-0.45		-0.45		-0.45
Internalizing Problem Behaviors	-0.30	-0.30		-0.30		-0.30
N	18,755	14,595		11,382		10,317
Component Eigenvalue	3.24	3.23		3.33		3.32
Kaiser-Meyer-Olkin Measure	0.82	0.82		0.84		0.83
Panel B. 2010-11 cohort						
Approaches to Learning	0.47	0.47	0.47	0.47	0.48	0.48
Self-Control	0.50	0.50	0.50	0.50	0.50	0.50
Interpersonal Skills	0.49	0.49	0.49	0.48	0.49	0.49
Externalizing Problem Behaviors	-0.46	-0.45	-0.45	-0.45	-0.45	-0.45
Internalizing Problem Behaviors	-0.27	-0.28	-0.30	-0.30	-0.29	-0.29
N	15,515	12,938	12,268	11,546	10,651	10,002
Component Eigenvalue	3.31	3.29	3.35	3.33	3.33	3.33
Kaiser-Meyer-Olkin Measure	0.83	0.83	0.83	0.83	0.83	0.83

Figure A1: Immigrant-native noncognitive area skills gaps by grade



Notes: Each panel plots the average gap between children of immigrants and children of natives by grade for a different area of noncognitive skill. Error bars give 95% confidence intervals. All regressions include base controls, household characteristics, and school fixed effects.

Supplementary appendix

A Differential sample attrition

Here we explore whether immigrant children have a different likelihood of being dropped from our analytical sample relative to native children. We begin in column 1 with just the mean differences and then progressively add controls until column 4 which includes our full specification. While in both cohorts immigrant children are unconditionally slightly more likely to fall out of our sample, once we condition on school fixed effects (column 4) we find, in both cohorts, that they are no more likely to be omitted. Thus, observationally similar immigrant and native children in the data exhibit no differences in the propensity to be included in our analytical sample.

Table A1: Immigrant-native gaps in non-inclusion in the analytic sample

	(1)	(2)	(3)	(4)
Panel A. 1998-99 cohort				
Child of immigrant	0.12***	0.07***	0.07***	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Black		0.17***	0.11***	-0.04**
		(0.01)	(0.01)	(0.02)
Hispanic		0.12***	0.08***	-0.05***
		(0.01)	(0.01)	(0.01)
Asian		0.08***	0.07***	0.04*
		(0.02)	(0.02)	(0.02)
Other ethnicity		0.08***	0.04**	-0.03
		(0.02)	(0.02)	(0.02)
N	15,128	15,128	15,128	15,128
Panel B. 2010-11 cohort				
Child of immigrant	0.09***	0.02**	0.02*	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Black		0.19***	0.13***	0.00
		(0.01)	(0.01)	(0.02)
Hispanic		0.10***	0.04***	-0.03**
		(0.01)	(0.01)	(0.01)
Asian		0.13***	0.11***	0.01
		(0.02)	(0.02)	(0.02)
Other ethnicity		0.09***	0.06***	0.01
		(0.02)	(0.02)	(0.02)
N	16,040	16,040	16,040	16,040

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable equals one for students not in the analytic sample. The samples consist of students in the spring kindergarten wave with a valid measure for mother foreign born. Column 2 adds the base controls which are ethnicity, gender, and age. Column 3 adds household controls which are the SES composite, number of household members, an indicator for single parent, mother's age at first birth, and an indicator for whether the biological mother is in the home. Column 4 adds school fixed effects.

B Including fathers in the definition of immigrant

In the 1998-99 cohort, information on father's country of birth is unavailable, but the 2010-11 cohort survey does provide information on whether the father was born in the U.S. or not. For consistency, in our analysis, we match our definitions of children of immigrants across cohorts, meaning we use only information on whether the mother is foreign born. Below we check the extent that this may matter for our results in the 2010-11 cohort.

In our analytical sample for the 2010-11 cohort, there are 1347 children with a foreign-born mother. There are an additional 219 children with a U.S.-born mother and a foreign-born father. In Table B1, we report results where we redefine children of immigrants to include children with a foreign-born mother or father. We control for baseline characteristics, household characteristics, and school fixed effects.

For math scores, we find a pattern similar to our main results. Children of immigrants catch up to children of natives after 1st grade. For noncognitive scores, again we find a pattern consistent with our main results. Children of immigrants are on average similar to children of natives in kindergarten and a positive gap opens up in later elementary school. Thus, our results are not sensitive to classifying children with foreign-born fathers as children of immigrants.

Table B1: Immigrant-native skills gaps including fathers in the definition of immigrant, 2010-11 cohort

Grade:	K	1st	2nd	3rd	4th	5th
Panel A. Math score						
Child of immigrant (including father)	-0.08*	-0.10**	0.00	-0.02	0.01	0.01
	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
Panel B. Noncognitive score						
Child of immigrant (including father)	0.07	0.11**	0.16***	0.16***	0.20***	0.23***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
N	6,089	6,089	6,089	6,089	6,089	6,089

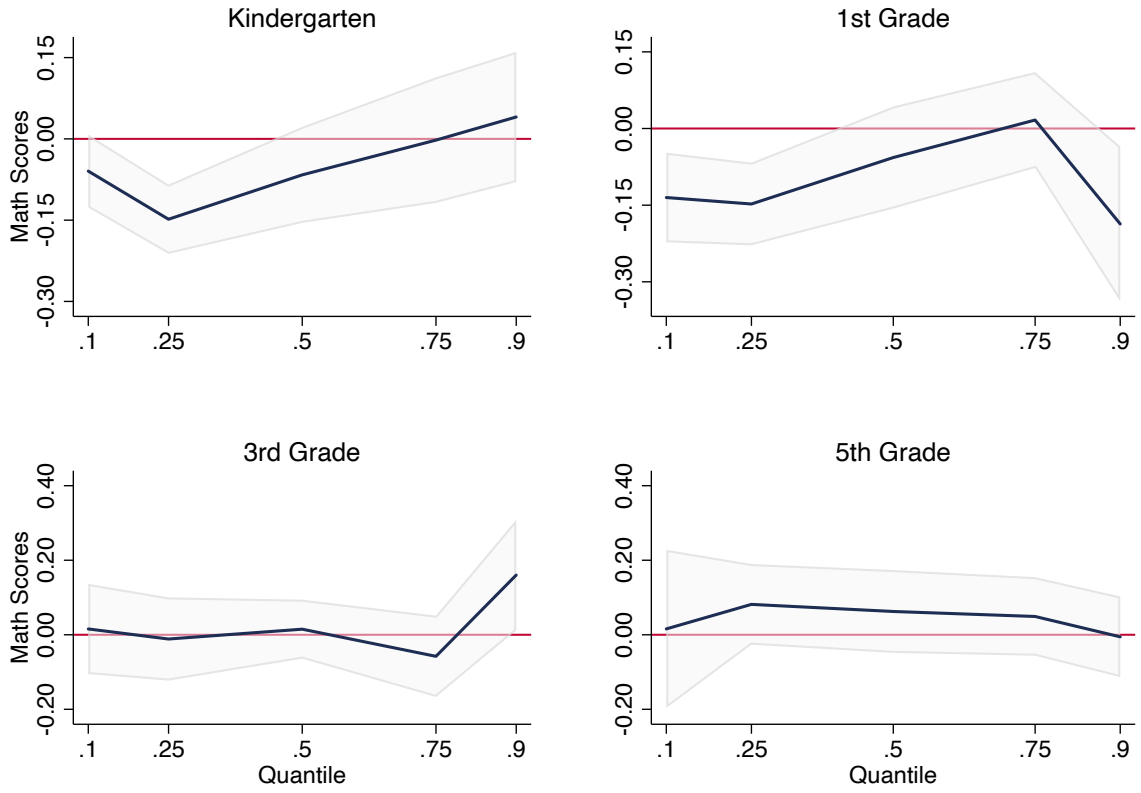
Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are in parentheses and survey weights are used throughout. All specifications include the full set of controls (defined in the paper) and school fixed effects.

C Conditional quantile regression analysis of immigrant-native skills gaps

Here we explore heterogeneity in the gaps over the conditional distribution of the dependent variable. We report results from conditional quantile regressions. For immigrant-native math gaps reported in Figures C1 (1998-99 cohort) and C2 (2010-11 cohort), we do not observe a clear pattern across cohorts. As before, there is some evidence that children of immigrants perform below native children at earlier grades. In the 1998-99 cohort, the evidence points to those on the lower end of the conditional distribution as the children who lag behind and then catch up, but in the 2010-11 cohort, this pattern is less clear. Overall, however, these results are consistent with our previous findings where we observe some catch-up in math scores.

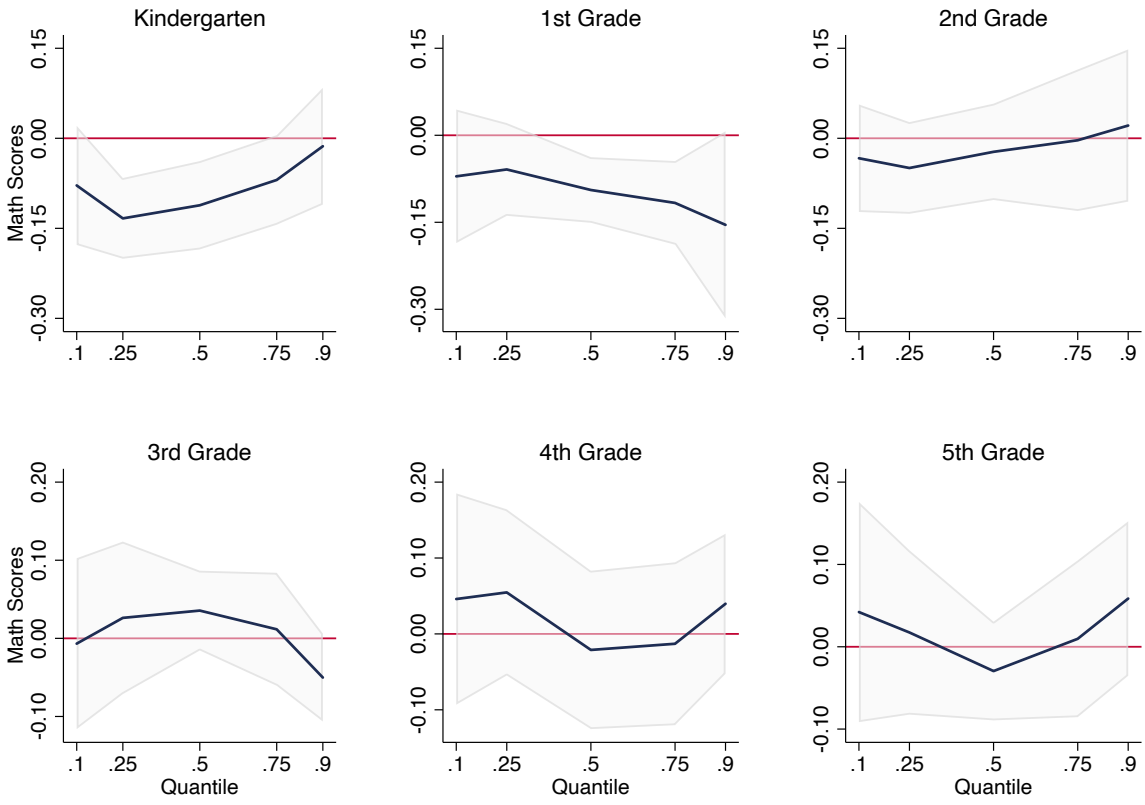
In Figures C3 and C4, we report the corresponding results for noncognitive skills. At kindergarten, we find no evidence of gaps across the conditional distribution in both cohorts. Post-kindergarten, we continue to find evidence for a positive gap for children of immigrants. The general pattern suggests that children of immigrants perform better in their noncognitive skills across much of the conditional distribution of skills. However, the gaps appear to be at their largest toward the lower end of the conditional distribution. This is consistent with our previous evidence that disadvantaged children drive the positive gaps.

Figure C1: Immigrant-native math score gaps across the conditional distribution, 1998-99 cohort



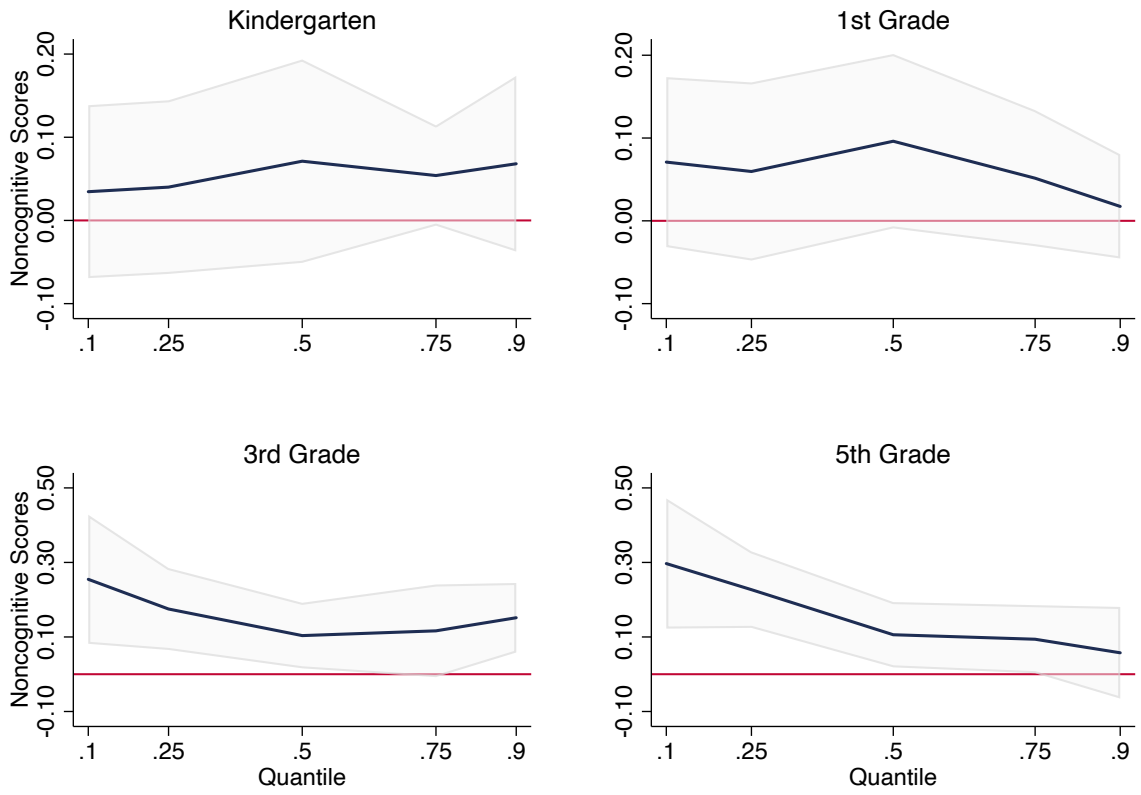
Notes: This figure is constructed by first conditioning on school-by-grade fixed effects and all controls and interactions with grade indicators in the pooled model from math scores and the immigrant child indicator. We then calculate the conditional quantile regressions on the residuals from the previous step at each grade level.

Figure C2: Immigrant-native math score gaps across the conditional distribution, 2010-11 cohort



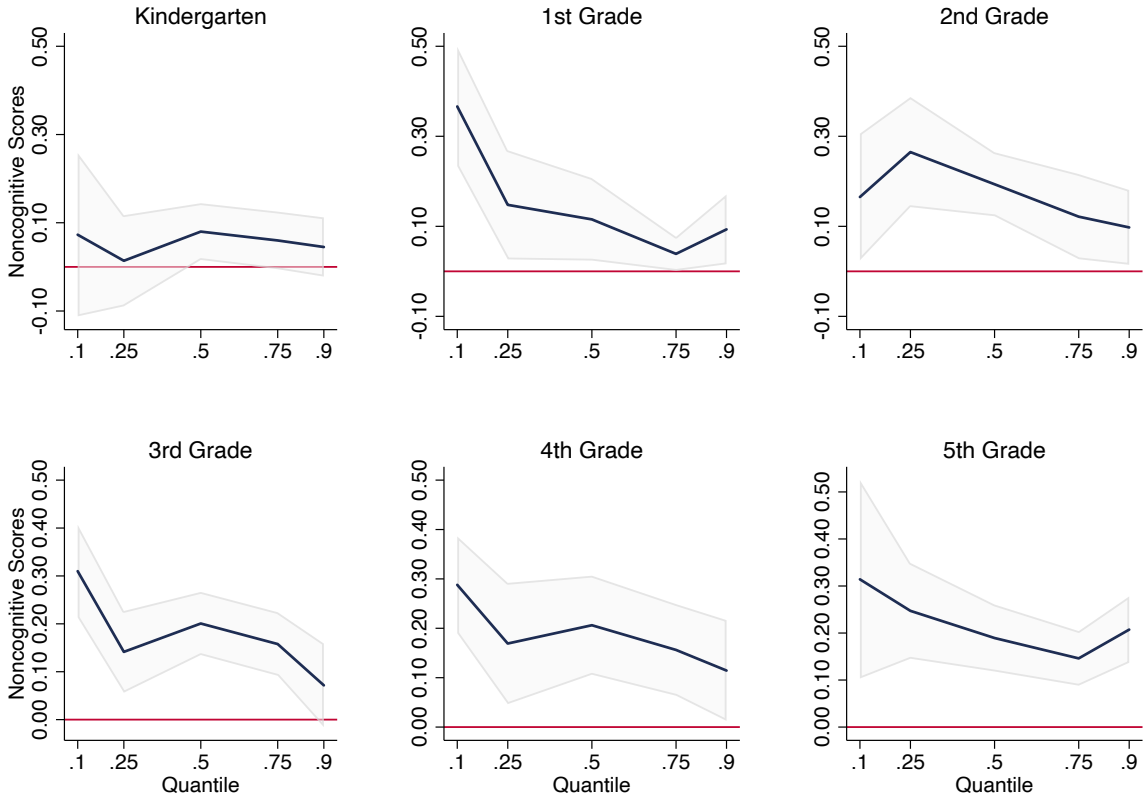
Notes: All notes reported for Figure C1 apply here.

Figure C3: Immigrant-native noncognitive score gaps across the conditional distribution, 1998-99 cohort



Notes: All notes reported for Figure C1 apply here.

Figure C4: Immigrant-native noncognitive score gaps across the conditional distribution, 2010-11 cohort



Notes: All notes reported for Figure C1 apply here.

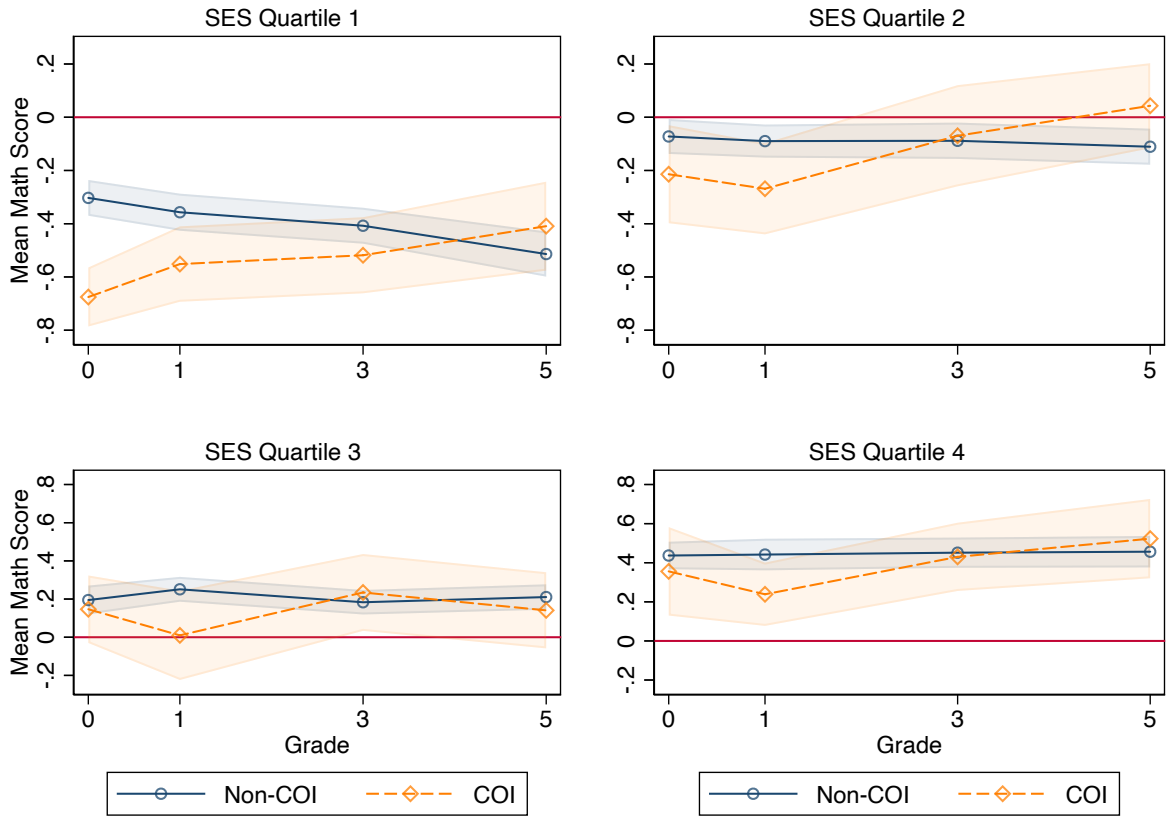
D Immigrant-native skills gaps by SES quartile

The ECLS-K composite SES measure is continuous. Here we expand on our heterogeneity analysis of skill gaps by low and high SES and examine whether these gaps vary over quartiles of SES. To do this, we use the pooled model specification, as in the text, omitting child fixed effects. We then take each child's household mean SES score over grade levels and construct quartile indicators. Finally, we add to the pooled specification an interaction between the immigrant child indicator, grade level indicators, and SES quartile indicators. For both cohorts and math and noncognitive scores, we use this specification to calculate the conditional mean skill scores for immigrant and native groups and report these outputs in the figures below.

For math scores, we see that for the 1998-99 cohort, it is the most disadvantaged children of immigrants (bottom quartile of SES) that drive a "catch-up" pattern to disadvantaged native children. We do not see this pattern for the 2010-11 cohort. Note that the bottom quartile of SES lags far behind more advantaged children regardless of immigrant status. Thus, that there is any further disadvantage for very low SES children of immigrants in math scores is concerning.

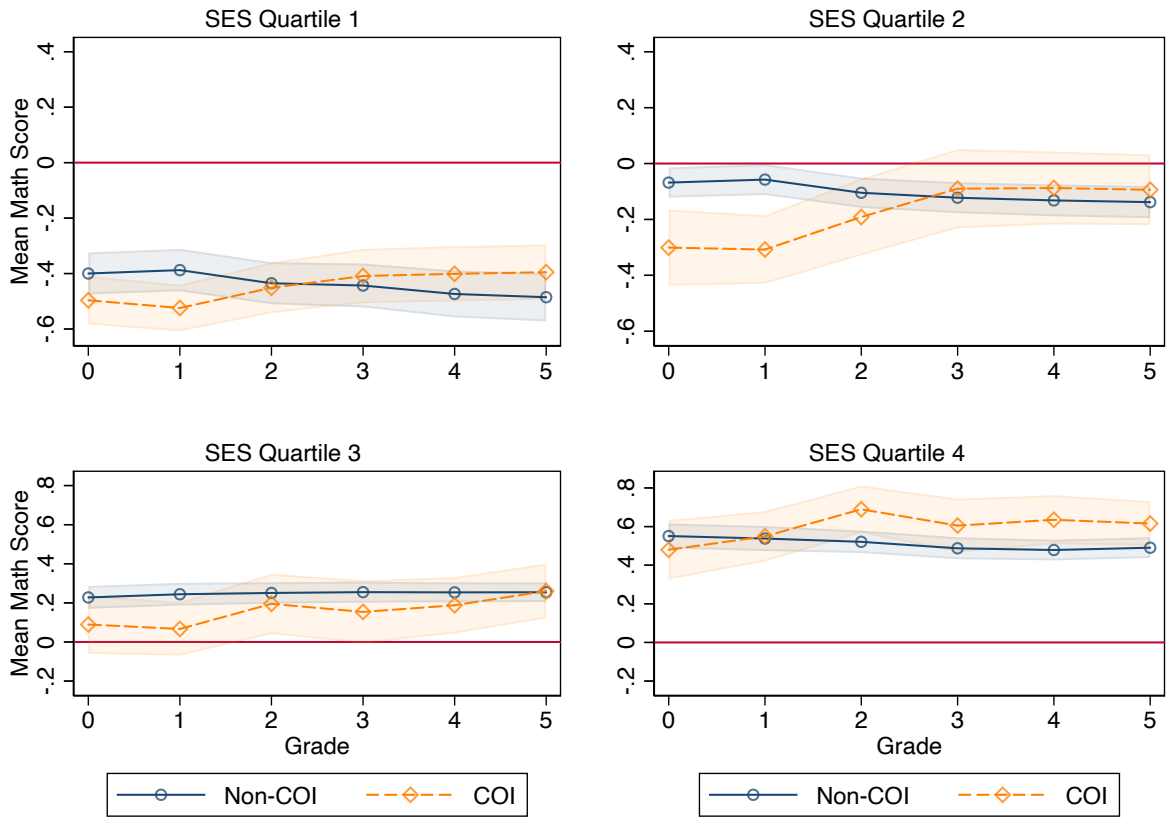
For noncognitive skills, we find a very similar pattern in both cohorts. Children of immigrants in the bottom two quartiles of SES drive positive gaps. Moreover, they tend to be on an upward trajectory, while the scores of similar native children remain relatively flat. These patterns are highly consistent with the evidence we present in the text. It is the disadvantaged children of immigrants who drive the positive gaps in noncognitive skills.

Figure D1: Conditional mean math scores for immigrant and native children by SES quartile, 1998-99 cohort



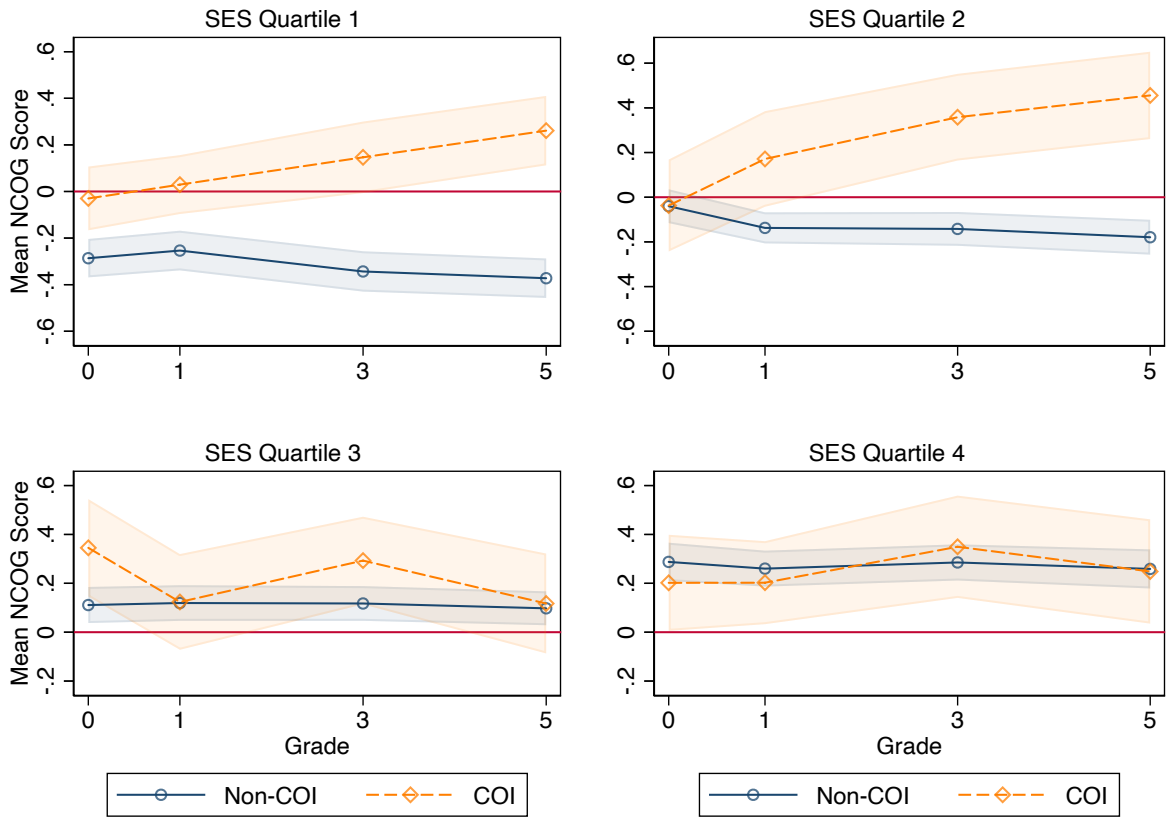
Notes: COI = child of immigrant, Non-COI = child of native. Mean scores are calculated based on pooled regressions with our full set of controls, including interactions between these and grade indicators, and school by grade fixed effects. We replace the continous SES measure with SES quartile indicators based on a child's mean SES score across grade levels and include a triple interaction between children of immigrants, grade indicators, and SES quartiles.

Figure D2: Conditional mean math scores for immigrant and native children by SES quartile, 2010-11 cohort



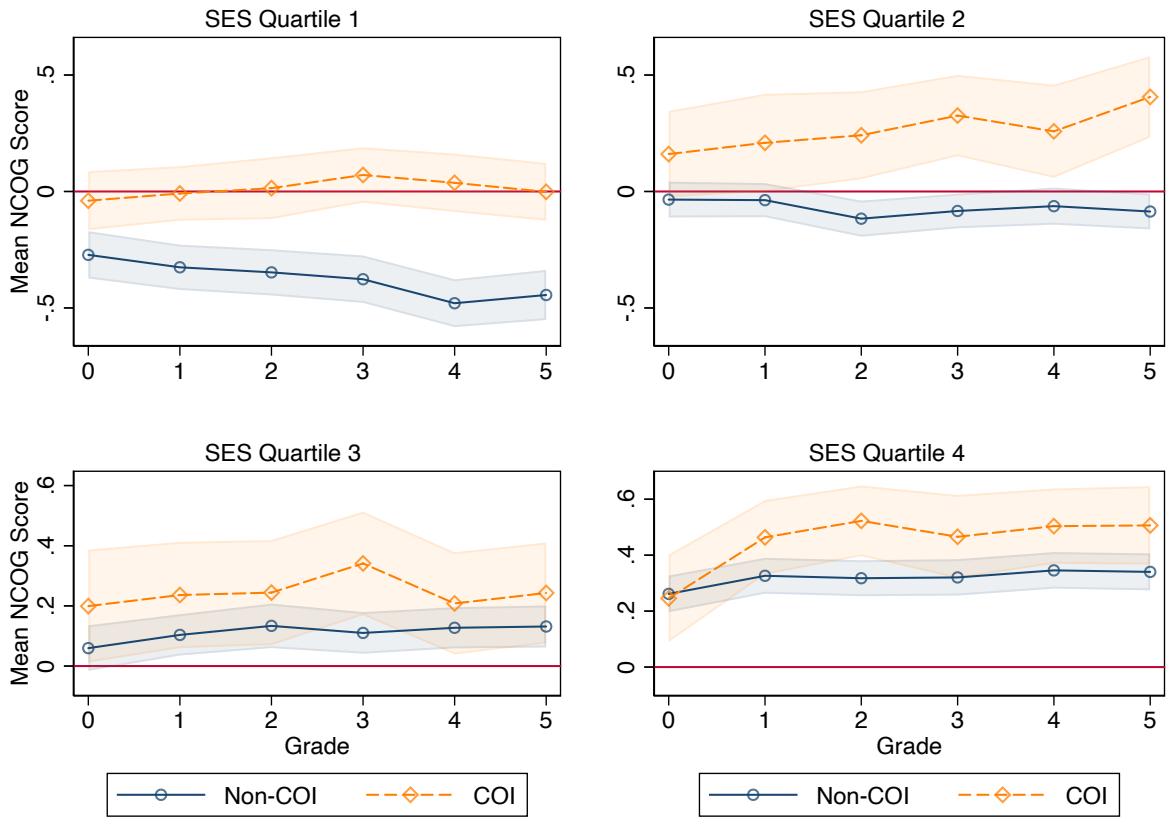
Notes: All notes from Figure D1 apply here.

Figure D3: Conditional mean noncognitive scores for immigrant and native children by SES quartile, 1998-99 cohort



Notes: All notes from Figure D1 apply here.

Figure D4: Conditional mean noncognitive scores for immigrant and native children by SES quartile, 2010-11 cohort



Notes: All notes from Figure D1 apply here.

E Parental investments

Table E1: Variable descriptions for parental investments

Kindergarten	School Involvement	Organized Activities	In-Home	Warmth	Harsh Discipline	Expectations
Scale Variables	parent or adult in HH	has child ever participated in	how often (per week)		No Scale, =1 if all true if child hits you	
	contacted school	dance lessons	read to child	warm, close time together	spank child	deg. expected of child
	attended open house	athletic events	tell stories	child likes me	hit child back	
	attended PTA meeting	organized clubs	sing songs	always show child love	make fun of child	
	attended parent-teacher conf.	music lessons	help do art	express affection	yell at child	
	attend school event	art lessons	child does chores			
	acted as school volunteer	organized performing	play games			
	participated in fundraising		teach nature			
			build things together			
			do sports together			
Answer Format	Yes/No	Yes/No	Frequency (1-4)	Likert (1-4)	Yes/No	0-3, less College to PhD
Scale Format	Sum	Sum	Sum	Sum	No scale	N/A
Standardized	Yes	Yes	Yes	Yes	No	No

Notes: Attended PTA meeting is attended open house for the 2010-11 cohort, otherwise all measures between cohorts match at kindergarten.

Table E2: Conditional parenting differences at kindergarten

	Sch. Inv.	Org. Act.	In-Home	Warmth	Par. Mental H.	Harsh Dis.	Edu. Expect.
Panel A. 1998-99 cohort							
Child of immigrant	-0.16**	-0.28***	-0.17**	0.02	0.05	-0.07*	0.37***
	(0.08)	(0.07)	(0.08)	(0.08)	(0.16)	(0.04)	(0.13)
Panel B. 2010-11 cohort							
Child of immigrant	-0.35***	-0.22***	-0.32***	-0.19***	-0.13**	-0.00	0.40***
	(0.05)	(0.05)	(0.06)	(0.05)	(0.06)	(0.02)	(0.05)

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are in parentheses and survey weights used throughout. Each column header is a dependent variable. We condition on the full set of controls as defined the main text of the paper.