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ABSTRACT

The Skill Development of Children of Immigrants*

In this paper, we study the evolution of cognitive and noncognitive skills gaps for children of immigrants between kindergarten and 5th grade. 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 3rd grade. We find that the growth in noncognitive skills is driven by disadvantaged (e.g., low-SES) 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 Classification: I21, J13, J15

Keywords: children of immigrants, cognitive and noncognitive skills, test score gap

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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 families (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. 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 for children of immigrants. We use a survey-based, longitudinal data set that is representative of the 1998-99 kindergarten cohort and follows children through 5th grade. 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 economists 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.[1] We also leverage information collected from parents and schools to explore potential mechanisms. Many prior studies employ school administrative data, and while these data are helpful for estimating gaps with precision, they leave the authors speculating as to the causes of observed gaps.

[1]More precisely, we are the first to examine these gaps using a summary measure of noncognitive skills. Özek and Figlio (2016) document gaps in disciplinary incidents, which indirectly measures noncognitive skills.

We begin by documenting skills gaps between children of natives and children of immigrants across grades. In models with basic demographic characteristics (including ethnicity) and household characteristics, we find that children of immigrants score about 0.15 standard deviations below children of natives on math tests in kindergarten and 1st grade. With the addition of school fixed effects, these gaps are smaller in magnitude and marginally significant. Across specifications, the math scores of children of immigrants are statistically no different than children of natives in 3rd and 5th grades. The 95% confidence interval for the difference in 5th grade math scores is $(-0.13, 0.11)$, which lets us rule out large and moderate-sized gaps. For our measure of noncognitive skills, we find that children of immigrants begin school with no gap, but in 5th grade, children of immigrants perform 0.27 standard deviations higher. Moreover, we find that this result is driven by students that are relatively disadvantaged (low-SES, Hispanic, 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 includes 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, school, and neighborhood characteristics; and endowment and early life characteristics. By our measures, immigrant parents invest in their children at lower levels than native parents, but they maintain higher expectations for their children's educational attainment. 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. Another possible explanation is that U.S.-based surveys are not well designed to capture differences in immigrant and native home environments.

Overall, the outlook for children of immigrants, particularly those from disadvantaged families, is positive. Children of immigrants have cognitive skills on par with children of natives of similar ethnic background and household characteristics at the end of elementary school. 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.[2] 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.

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 an immigrant student, or his parent, is undocumented.[3] Still, the evidence presented here runs counter to claims that students from immigrant families have a negative impact on students

[2]See Clotfelter, Ladd, and Vigdor (2012); Hull (2017); and Özek and Figlio (2016) for examples of papers that document positive immigrant-native test score gaps in late elementary school and/or middle school.

[3]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.

from native families. If anything, there is a potential for positive effects on children of natives. With better noncognitive skills, children of immigrants likely cause fewer classroom disruptions.[4] 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 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.[5] 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, because most of the children in our sample are native born.

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

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

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.[6] 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-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. Using North Carolina administrative data, Hull (2017) analyzes the Hispanic-white test score gap by immigrant generation in

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

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.[7] Özek and Figlio (2016) reach similar conclusions to Hull (2017) using Florida administrative data. Reardon and Galindo (2009) use the same data employed in this paper to study the 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.

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 motivation, 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 same data as this study; Elder and Zhou

[7]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.

(2017) 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 Özek and Figlio (2016). 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 data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K).[8] The ECLS-K is a nationally representative sample of children attending kindergarten in 1998-99. These data are well-suited for our study because the survey follows a cohort 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 all but two waves, teachers provided subjective reports of students' noncognitive skills.

Our analysis includes outcomes from the waves in the springs of kindergarten, 1st grade, 3rd grade, and 5th grade (waves 2, 4, 5, and 6).[9] 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

[8]Similar data from the cohort of students attending kindergarten in 2010-11 is also available, but only some waves have been released.

[9]We exclude fall kindergarten (wave 1) 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 (wave 3) only included a 30% random subsample and did not include teacher questionnaires. The spring 8th grade round (wave 7) did not include teacher reports on students' noncognitive skills.

of cognitive and noncognitive skill gaps, we only include students with a valid math score and valid teacher responses to the noncognitive skills questions in each wave. We also drop students if we cannot determine whether a parent is foreign born. These sample restrictions leave us with an analytic sample of 6,567 students of whom 919 have a foreign-born mother. We use the sample weight C2_6FP0, which is the appropriate longitudinal weight for analyses that include parent interview data and focus on waves 2, 4, 5, and 6.

There may be concern that children of immigrants would be more likely to attrit from the sample.[10] The ECLS-K flagged a fraction of students 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.[11] In addition to this planned attrition, there was also sample attrition due to survey nonresponse. Over 21,000 children were included in the initial student sample from fall kindergarten, but only 10,590 students participated in the four survey waves that we study. The longitudinal weights provided by the ECLS-K were designed to adjust estimates for the subsampling of movers and nonresponse.

Still, we examine whether children of immigrants were more likely to be dropped from our analytic sample in Appendix Table A.1. 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 our analytic sample.[12] We then regress this non-inclusion indicator on a dummy for child of immigrant and the control variables defined below. We conduct this analysis without weights and with the cross-sectional weights for spring kindergarten;[13] the weights do not affect our conclusion. We find that children of immigrants who are present in the spring of kindergarten are on average 12 percentage points less likely to be included in our analytic

[10] 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).

[11] The total targeted fractions for follow-up were 0.5 for spring 1st and 3rd grade and 0.42 for 5th grade.

[12] Note that we first have to drop all children for whom we do not have a valid measure of mother foreign born.

[13] This weight is C2CPTW0, which is the appropriate cross-sectional weight for analyses using the spring kindergarten direct assessment and parent interview data.

sample. This difference shrinks to 7 percentage points 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. Thus, our preferred set of controls explains the differential attrition among children of immigrants.

The direct cognitive assessments in the ECLS-K 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. 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. 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, no direct cognitive assessments were given. We normalize the math scores to be mean 0, standard deviation 1, within each wave.[14]

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 scale of 1–4 on items pertaining to the following five areas: Approaches to Learning, Self-Control, Interpersonal Skills, Externalizing Problem Behaviors, and Internalizing Problem Behaviors. 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,

[14]Survey weights are used in the normalizations.

Mustard, and Van Parys (2013), and Elder and Zhou (2017).

Since the correlations among scores are generally high, we conduct a principal component analysis (PCA) by wave.[15] We then estimate component scores and normalize 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 A.2. In each wave, only the first component has an eigenvalue above 1, 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. In each wave, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is above 0.8, indicating that it is appropriate to apply a PCA.[16]

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 for the majority of children. If a child's mother was born outside of the U.S., where Puerto Rico and other U.S. territories are considered outside the U.S., 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 supplied by the ECLS-K. 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 two of the four survey waves we consider.[17] 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 specifications, we include child ethnicity, gender, and age at time of the fall kindergarten survey. We also consider a model that adds a parsimonious set of household characteristics. These characteristics are the SES composite, mother's age at first birth, an

[15]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.

[16]Later, as check on the contribution from each scale we run our analysis on each individual scale.

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

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 our sample in Table 1. Per normalization the math scores and noncognitive scores are mean 0, standard deviation 1, in the full sample. In the spring of kindergarten, children of immigrants score 0.40 standard deviations below children of natives on the math assessment. This gap shrinks to -0.23 standard deviations at the end of 3rd grade and then to -0.11 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 will noncognitive skills that are similar to children of natives, but as they progress through school they gain an advantage. In kindergarten and 1st grade, the noncognitive skills gaps are close to zero, but children of immigrants outperform children of natives by 0.21 standard deviations in 3rd grade and by 0.26 standard deviations in 5th grade. The mean test scores provide initial evidence that immigrant families produce gains in their children's cognitive and noncognitive skills.

Table 1 also shows mean demographic and household characteristics. Children of immigrants are more likely to be Hispanic (59% vs. 9%) or Asian (12% vs. 1%). Using our definition, 68% of immigrant households are low-SES in contrast to 49% of native households. 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 traits that show a time trend, the trend moves in the same direction for children of immigrants and children of natives.

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 immigrants 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 is -0.23 standard deviations in kindergarten but decreases to -0.33 standard deviations in 5th grade. In contrast, low-SES immigrant children have a mean math score of -0.66 standard deviations in kindergarten, but they score similarly to low-SES native children in 5th grade with a mean math score of -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 score -0.17 standard deviations on our noncognitive index; in 5th grade, they score -0.27 standard deviations. Children of low-SES immigrants perform quite well on our measure of noncognitive skills: their mean score in kindergarten is -0.11 standard deviations, but in 5th grade, they score 0.23 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. Sixty-four percent of low-SES native children are white and 20% are black, while 76% 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:

$$y_{it} = \alpha_0 + \alpha_1 immigrant_i + X_{it}\alpha_2 + \varepsilon_{it}, \tag{1}$$

where i indexes the child and t indexes survey wave, or grade. We estimate models separately by grade, so implicitly the model parameters are allowed to vary by grade. The dependent variable y_{it} is either a measure of cognitive skill or noncognitive skill. The parameter of interest α_1 measures the average difference between children of immigrants and children of natives in a given grade. 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 gap results 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. Each panel shows results for a different outcome and set of controls; error bars give 95% confidence intervals. In Panel A, we see that children of immigrants have math scores 0.17 standard deviations below children of natives in the spring of kindergarten after controlling for race/ethnicity, gender, and age, and the gap is similar in first grade. In 3rd and 5th grades, the difference is statistically insignificant. Still, the 95% confidence intervals are wide enough that they fail to rule out differences that would be of practical importance. For example, the 95% confidence interval for the test score gap in 3rd grade is $(-0.19, 0.11)$. In Panel B, we add household characteristics and find a similar pattern.

With the full set of controls and school fixed effets in Panel C, the estimated math score gaps between children of natives and children of immigrants are statistically insignificant across grades. Also, the magnitudes are all less than one-tenth of a standard deviation. The addition of more controls also brings an increase in precision. In 5th grade, the 95% confidence interval for the immigrant-native math gap is $(-0.13, 0.11)$. As a point of contrast, the black-white math gap in 5th grade is -0.56 standard deviations. While we cannot completely rule out immigrant-native gaps that would be of concern, the evidence points to a relatively

small math gap that is constant across elementary school. From past work, we might have expected to see a positive test score gap open up in elementary school.[18] 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 and 1st grade. In 3rd grade, children of immigrants have 0.22 standard deviations higher noncognitive skills compared children of natives, and this gap grows to 0.26 standard deviations in 5th grade. With the addition of household characteristics in Panel E and then school fixed effects in Panel F, the estimates by grade are quite similar, but we make some gains in precision. Our 95% confidence intervals rule out immigrant-native differences in kindergarten and 1st grade that are larger than 0.16 standard deviations in magnitude. With our full set of controls, children of immigrants outscore children of natives by 0.27 standard deviations on our noncognitive measure in 5th grade.

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 (normalized) area score as the outcome. These results are presented in Appendix Figure A.1. Recall that for externalizing and internalizing problem behaviors, lower scores correspond to better behaviors. We find that children of immigrants have significantly better noncognitive skills in 5th grade across all five measures of noncognitive skill. In 3rd grade, they score significantly better in 4 out of 5 measures; they score better on the internalizing behavior measure, though the difference is not significant. Thus, we find support for our conclusion that immigrant children begin to surpass native children in their noncognitive skills in 3rd grade.[19]

[18] 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.

[19] Interestingly, children of immigrants score significantly better on Approaches to Learning and Externalizing Problem Behaviors but significantly worse on Interpersonal Skills in kindergarten.

Our noncognitive results are in line with Özek and Figlio (2016), 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 makes comparisons difficult. 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 the immigrant-native skill gaps vary by key family characteristics. Specifically, we test whether the evolution of skill 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:

$$y_{it} = \beta_0 + \beta_1 highSESimm_i + \beta_2 lowSESimm_i + \beta_3 lowSESnative_i + X_{it}\beta_4 + \nu_{it}. \qquad (2)$$

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 two of the four survey waves we study. We divide the sample into mutually exclusive groups instead of using interaction terms to facilitate comparisons across each group. Our null hypotheses of interest are: (i) high-SES immigrants are no different from high-SES natives, i.e., $\beta_1 = 0$, and (ii) low-SES immigrants are no different from low-SES natives, i.e., $\beta_2 = \beta_3$. 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. We find that the improvement in math scores among children of immigrants is driven by the children from low-SES immigrant families. In kindergarten, these students score 0.18 standard deviations below children of low-SES natives, but by the end of 5th grade, that gap shrinks to -0.03 standard deviations. In contrast, there is no clear pattern in the immigrant-native math gap among high-SES families. Panels C and D similarly plot gaps for Hispanic and Asian children, two ethnic groups of interest. Here, we see that Hispanic children of immigrants score 0.21 standard deviations below Hispanic children of natives in kindergarten. There is no clear improvement in math scores, however, and these students end 5th grade 0.18 standard deviations behind Hispanic children of natives. The confidence intervals for immigrant-native math score gaps for Asian families are quite wide, and so we cannot draw firm conclusions. However, the point estimates range between -0.15 and 0.03 standard deviations with no clear trend.

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 outcomes (Bleakley and Chin, 2008). In Panel F, we plot math gaps between immigrant children with an early-arriving mother and native children. We find no evidence of heterogeneity along this dimension, but we note that the confidence intervals are fairly wide. 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 all children of natives. We find that children whose primary language at home is not English drive the catch-up in math.[20] Recall that students could take the math test in Spanish if they were not proficient in oral English but proficient

[20]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.

in oral Spanish.[21] 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.[22]

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 beginning in 3rd 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. Children of low-SES immigrants, however, score 0.24 standard deviations higher than children of low-SES natives in 3rd grade and then 0.45 standard deviations higher in 5th grade. Among high-SES families, there are no significant immigrant-native differences in children's noncognitive scores across all grades. The middle two panels of Figure 3 show the evolution of immigrant-native noncognitive gaps by ethnicity. We find that Hispanic children of immigrants outscore Hispanic children of natives by 0.28 standard deviations in 3rd grade and 0.36 standard deviations in 5th grade while their scores are similar in other grades. Given that many Hispanic families are low-SES, the similarity in patterns is not surprising. For Asian children, the estimates are imprecise but suggest that Asian children of immigrants also help drive the growth in noncognitive skills among children of immigrants.

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 and 1st grade, children of late-arriving mothers outperform children of natives by 0.17 standard deviations in 3rd grade and by 0.38 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 that

[21] 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.

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

immigrant children from non-English speaking households experience greater growth in their noncognitive skills. In 5th grade, they score 0.45 standard deviations higher than children of natives. However, children of immigrants that do speak English at home also contribute to the growth in noncognitive skills. They score 0.14 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 by the ECLS-K 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 this trait. 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,[23] 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 Hispanic children of immigrants and children with a late-arriving mother, which are also disadvantaged groups. Thus, we conclude that the SES composite created by the ECLS-K is 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

[23]Research on the value of the GED in the U.S. illustrates this stylized fact (Heckman, Humphries, and Mader, 2010).

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 with the standard error of the regression. We report results for this robustness check in Table 2. Because we estimate the unconditional quantile regression without weights, we first document that ordinary least squares (OLS) estimates are very similar with and without sampling weights. The last column of Table 2 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 is quite similar, so we conclude that our math score results are not an artifact of scaling.

5 What Drives the Growth in Noncognitive Skills Among Children of Immigrants?

Any credible explanation for the pattern of results must be consistent with both the slope and the intercept (i.e., no difference in kindergarten but a positive difference in 5th grade), 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 growth in the immigrant-native difference if it was true for 3rd and 5th grade teachers but not kindergarten and 1st grade teachers. A leading potential explanation is that immigrant parents foster higher growth rates 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 four areas: home inputs, school inputs, 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 Table 3, we test for differences in parenting behaviors and attitudes for immigrant and native parents. To this end, we construct several summary measures of parental investments, which we describe in Appendix Table A.3. The characteristics reported in Table 3 were measured in kindergarten; results are similar if we use a later grade. In 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, interacting less with their children at home, and displaying less emotional warmth. On the other hand, immigrant parents are less likely to have a harsh discipline style, and immigrant parents report higher expectations for their children's educational attainment. We find no significant difference in our summary measure of parental mental health.[24] 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 suggest 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 Table 3.[25] Recall that our main specification includes school fixed effects, so we have already controlled for differences in school-level characteristics.[26] However, children of immigrants may be treated differently

[24]Higher values indicate worse mental health.

[25]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 the characteristics of the math teacher. In the 5th grade wave, the ECLS-K collected separated reports for a student's math teacher and reading teacher.

[26]We report summary statistics for school-level characteristics in Appendix Table A.4. These characteristics were measured in kindergarten.

within schools; specifically, they may be more or less likely to be assigned to teachers with certain characteristics. In Table 3, we see that children of immigrants are less likely to be assigned a white teacher and more likely to have a Hispanic teacher.[27] This difference is due in part to the schools that these students attend. Appendix Table A.4 shows that children of immigrants attend schools that have higher proportions of Hispanic and Asian teachers on average. Children of immigrants also have teachers with less experience and less tenure at their school. 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 teachers with more experience are more effective (Clotfelter, Ladd, and Vigdor, 2006; Wiswall, 2013). We find no significant differences in teacher's educational attainment, but 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 Clotfelter, Ladd, and Vigdor (2007) find that "other" teaching licenses have a negative effect on achievement. Overall, we find that children of immigrants on average 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 relatives and in the care of non-relatives. The former is unsurprising since the extended families of some immigrants stay in the country

[27]The public-access version of the ECLS-K does not report whether a teacher is Hispanic in grades 3 and 5.

of origin. The latter difference indicates that immigrant parents rely less on informal care by neighbors and/or formal childcare, like daycare and preschool. Together, this evidence appears to indicate that children of immigrants spend more time in the care of their parents compared to children of natives.

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 main specification.[28] 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 potential sets 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.[29] 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.[30] Therefore, we cannot conclude from our estimates that parental investments do not explain any of the skill development among children of

[28]Specifically, we add parental investments measured at kindergarten and teacher characteristics measured in the same grade as the skill.

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

[30]See Cabus and Ariës (2016), Norris and van Hasselt (2018), Kalb and van Ours (2014), and Price (2008).

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). For example, some foreign cultures place a high value on obedience and respect for authority. In a recent working paper, Figlio et al. (2016) show that children from countries that emphasize delayed gratification have fewer absences and disciplinary incidents, and they make larger test score gains over time. 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. 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.

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 kindergarten or 1st grade, but children of immigrants score 0.27 standard deviations higher on noncognitive skills in 5th grade 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.[31] If children of immigrants maintain their noncognitive advantage from 5th grade, we would expect their wages to be 1.4% to 2.6% higher on average.[32] In sum, our results speak to the potential of children of immigrants to contribute positively to society and go against claims that they have a negative impact on native children.

[31]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.

[32]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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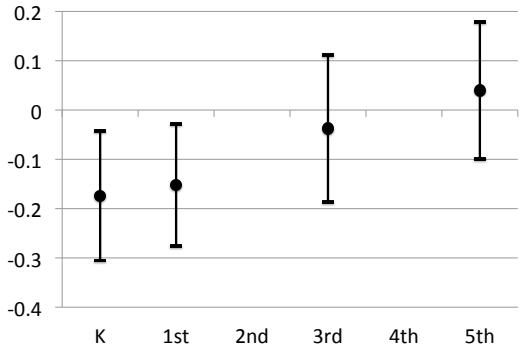
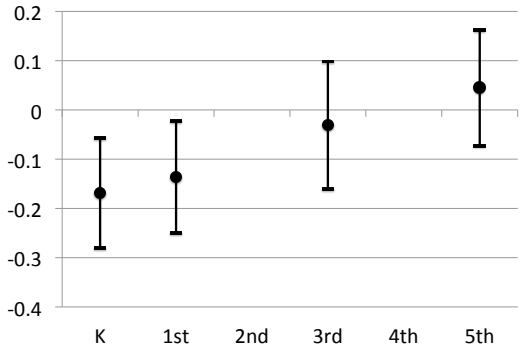
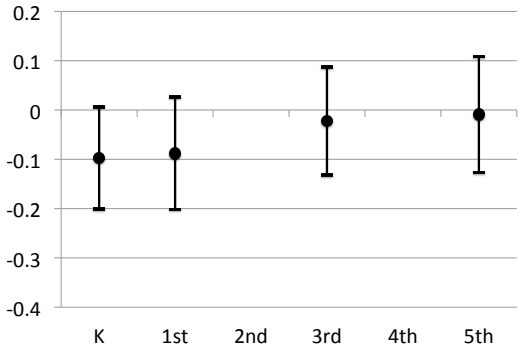
Figure 1: Immigrant-native skills gaps by grade



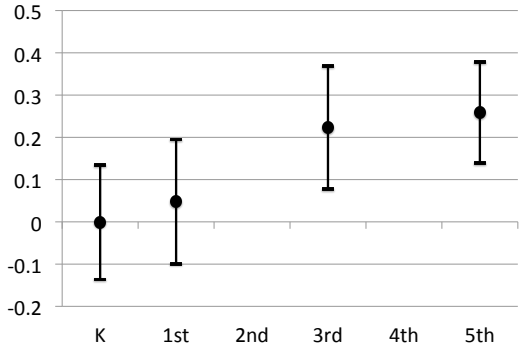
(A) Math gaps with base controls



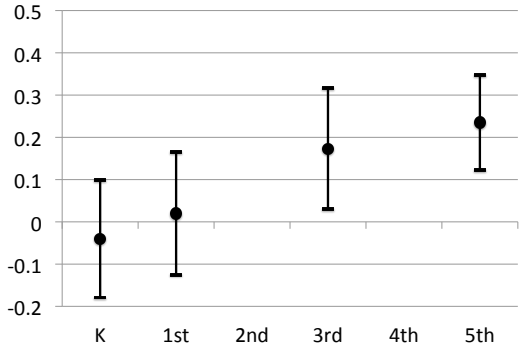
(B) Math gaps adding HH controls



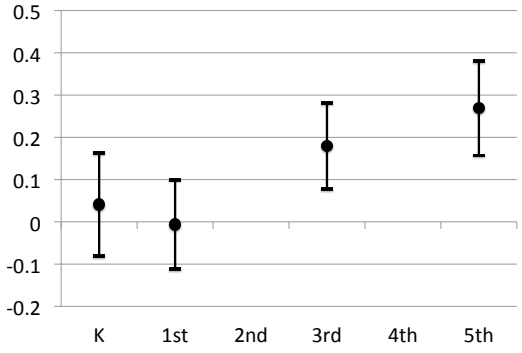
(C) Math gaps adding school FE



(D) Noncognitive gaps with base controls



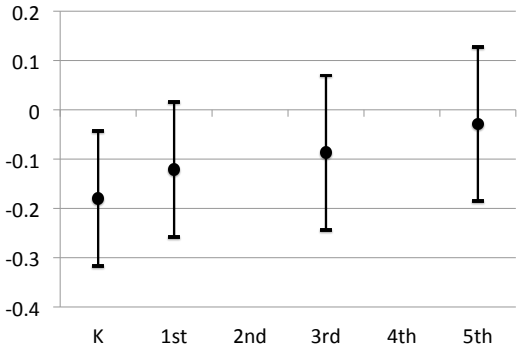
(E) Noncognitive gaps adding HH controls



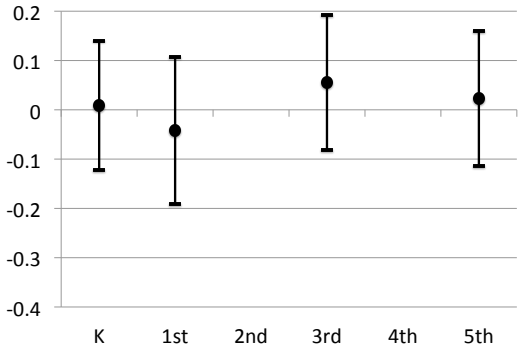
(F) Noncognitive gaps adding school FE

Notes: Each panel plots the average gap between children of immigrants and children of natives by grade for a different set of controls. Error 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.

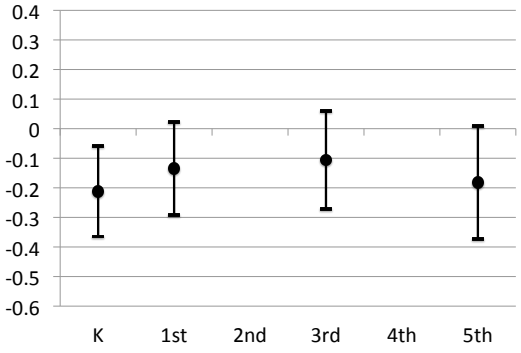
Figure 2: Heterogeneity in immigrant-native math score gaps by grade



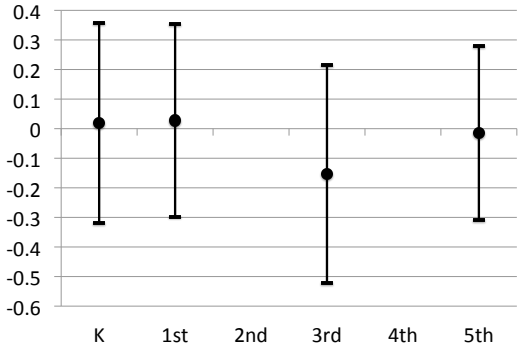
(A) Low-SES



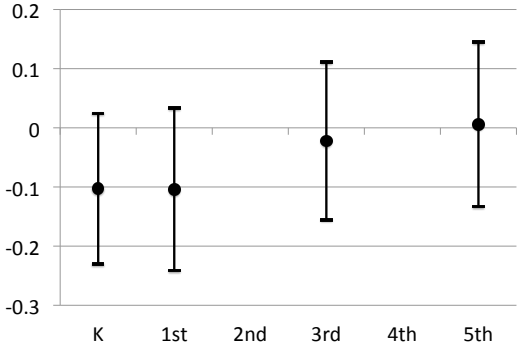
(B) High-SES



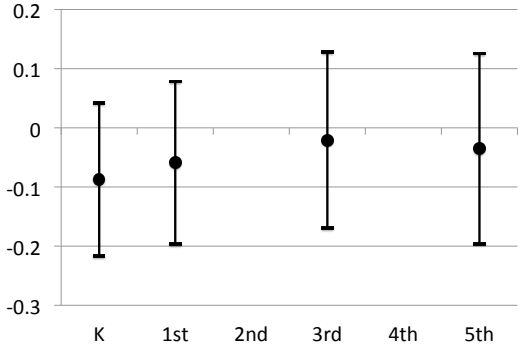
(C) Hispanic



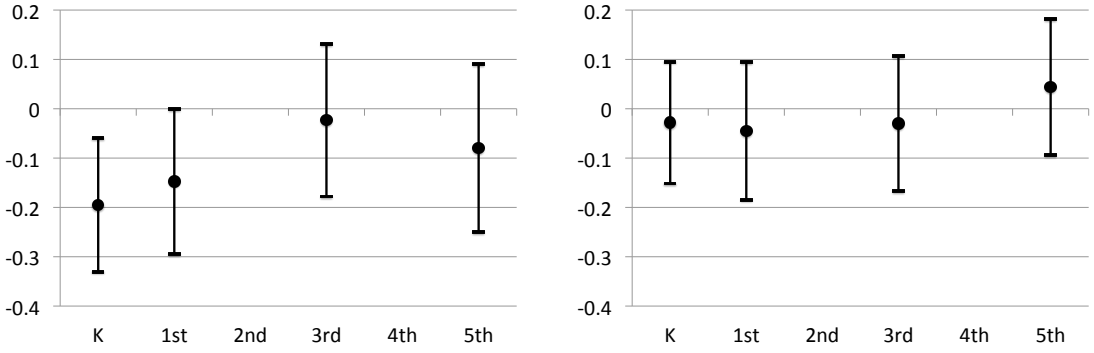
(D) Asian



(E) Late-arriving mother



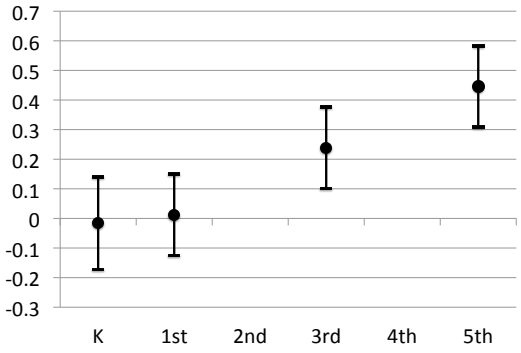
(F) Early-arriving mother



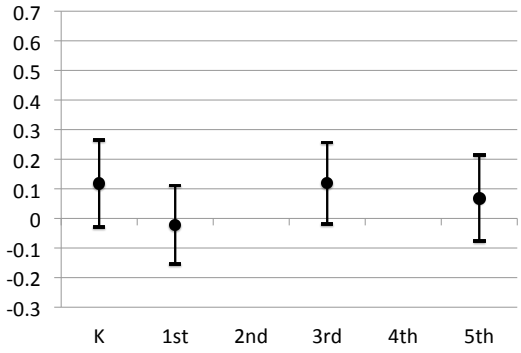
(G) Non-English speaking household (H) English speaking household

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.

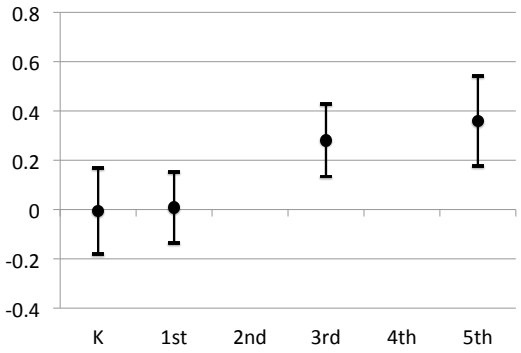
Figure 3: Heterogeneity in immigrant-native noncognitive score gaps by grade



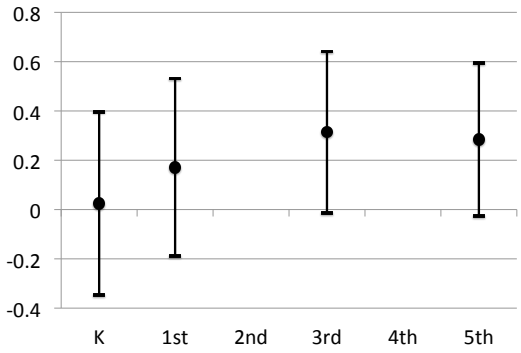
(A) Low-SES



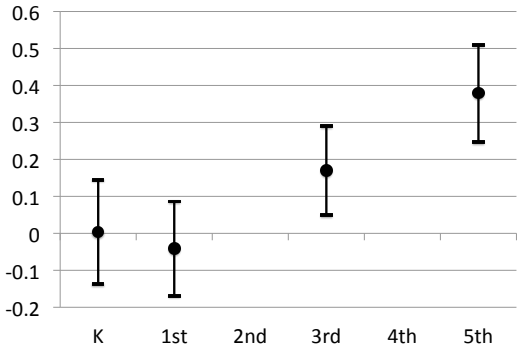
(B) High-SES



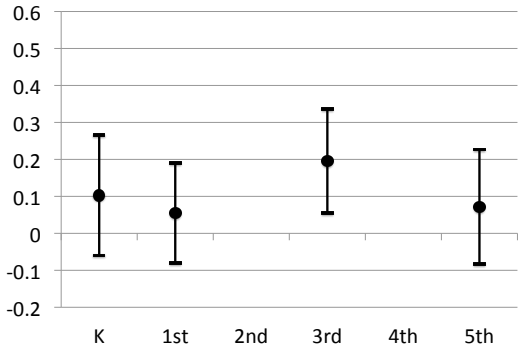
(C) Hispanic



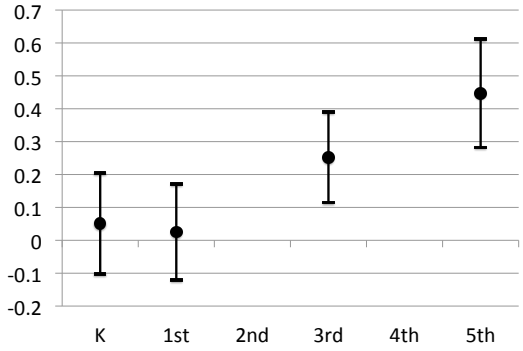
(D) Asian



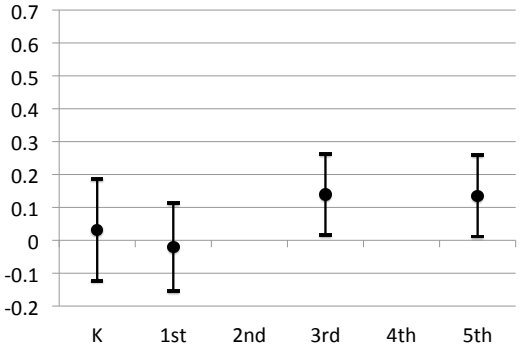
(E) Late-arriving mother



(F) Early-arriving mother



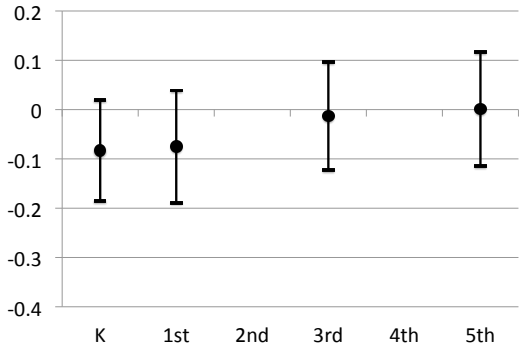
(G) Non-English speaking household



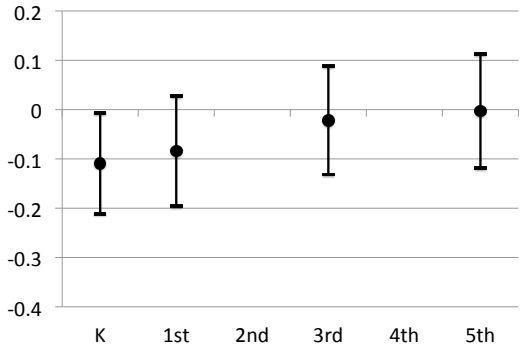
(H) English speaking household

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.

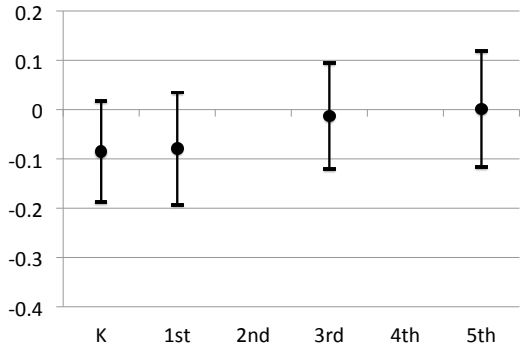
Figure 4: Immigrant-native skills gaps by grade, controlling for mechanisms



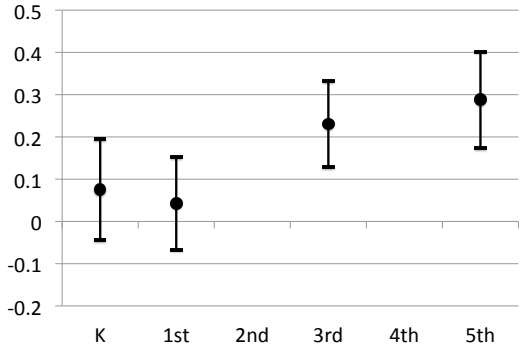
(A) Math gaps adding parent investments



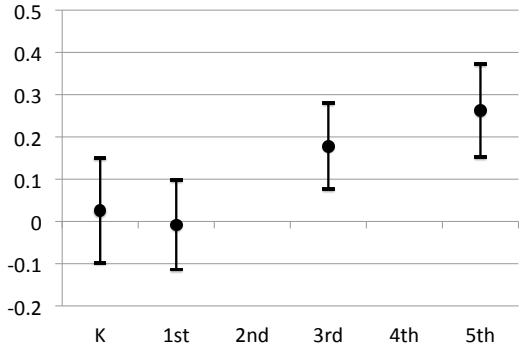
(B) Math gaps adding teacher char.



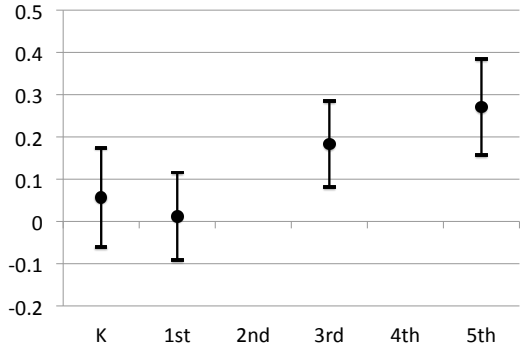
(C) Math gaps adding early life char.



(D) Noncog. gaps adding parent investments



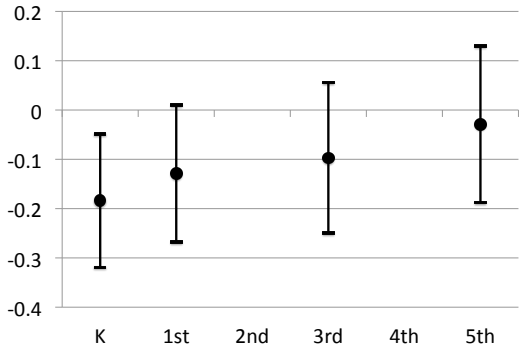
(E) Noncog. gaps adding teacher char.



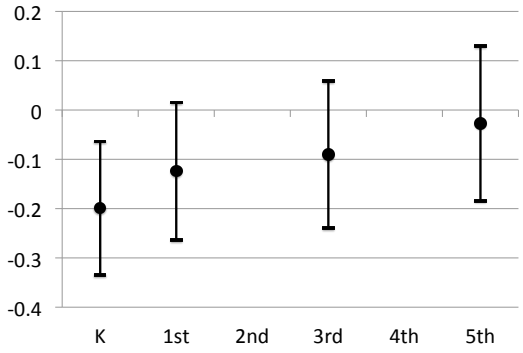
(F) Noncog. gaps adding early life char.

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.

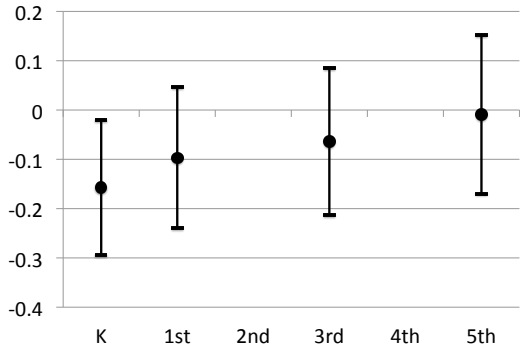
Figure 5: Immigrant-native skills gaps among low-SES by grade, controlling for mechanisms



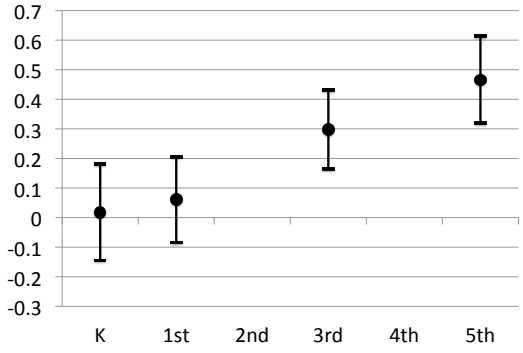
(A) Math gaps adding parent investments



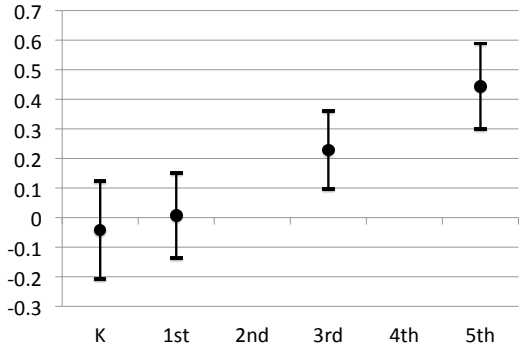
(B) Math gaps adding teacher char.



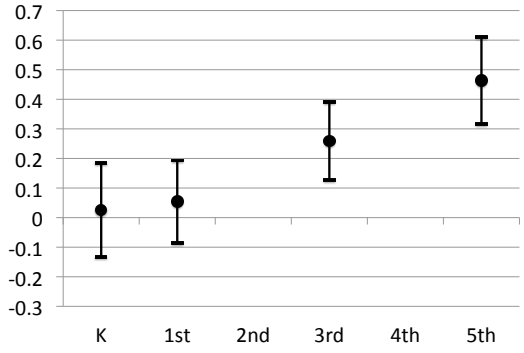
(C) Math gaps adding early life char.



(D) Noncog. gaps adding parent investments



(E) Noncog. gaps adding teacher char.



(F) Noncog. gaps adding early life char.

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

	Full sample	Children of natives	Children of immigrants	Children of low-SES natives	Children of low-SES immigrants
Math scores					
Kindergarten	0 (1)	0.053 (0.988)	-0.349* (1.009)	-0.228 (0.905)	-0.655* (0.798)
1st grade	0 (1)	0.046 (1.000)	-0.297* (0.946)	-0.251 (0.928)	-0.537* (0.808)
3rd grade	0 (1)	0.031 (0.995)	-0.203* (1.011)	-0.276 (0.967)	-0.491* (0.892)
5th grade	0 (1)	0.015 (0.994)	-0.099 (1.035)	-0.326 (1.018)	-0.360 (0.986)
Noncognitive scores					
Kindergarten	0 (1)	0.005 (1.001)	-0.034 (0.993)	-0.168 (1.083)	-0.111 (0.980)
1st grade	0 (1)	-0.006 (1.005)	0.037 (0.963)	-0.189 (1.050)	0.018* (0.965)
3rd grade	0 (1)	-0.028 (1.005)	0.186* (0.944)	-0.227 (1.035)	0.142* (0.935)
5th grade	0 (1)	-0.035 (1.010)	0.227* (0.898)	-0.266 (1.051)	0.232* (0.859)
Child of immigrant	0.133	0	1	0	1
Low SES	0.512	0.486	0.679*	1	1
White	0.659	0.737	0.150*	0.638	0.063*
Black	0.121	0.126	0.083	0.197	0.070*
Hispanic	0.157	0.091	0.590*	0.108	0.759*
Asian	0.023	0.007	0.123*	0.005	0.076*
Other	0.020	0.018	0.031	0.029	0.028
Multiracial	0.021	0.020	0.022	0.024	0.005*
Female	0.509	0.508	0.516	0.506	0.534
Age (mos), Kindergarten	74.8	74.9	74.2*	75.1	74.1*
SES composite, Kindergarten	0.067	0.110	-0.209*	-0.423	-0.653*
SES composite, 5th grade	0.009	0.049	-0.254*	-0.538	-0.717*
Household members, Kindergarten	4.44	4.39	4.77*	4.39	4.95*
Household members, 5th grade	4.44	4.39	4.79*	4.38	4.91*
Single parent, Kindergarten	0.198	0.205	0.154*	0.323	0.189*
Single parent, 5th grade	0.182	0.188	0.143*	0.280	0.192*
Mom age at first birth	24.5	24.6	24.2	22.4	23.1*
No bio mom in home, Kindergarten	0.048	0.052	0.019*	0.070	0.018*
No bio mom in home, 5th grade	0.066	0.072	0.030*	0.101	0.031*
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: Penney Normalization Approach for Math IRT Scores

	OLS, weighted	OLS, unweighted	Penney normalization
Kindergarten	-0.097*	-0.040	-0.059
	(0.053)	(0.045)	(0.072)
1st grade	-0.088	-0.069	-0.065
	(0.058)	(0.046)	(0.061)
3rd grade	-0.022	0.025	-0.053
	(0.056)	(0.047)	(0.069)
5th grade	-0.009	0.052	0.075
	(0.060)	(0.046)	(0.068)

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficient estimates are for the child of immigrant indicator. The full set of controls with school fixed effects are included. The Penney normalization takes $\hat{\beta}_{immigrant}/s$, where s is the standard error of an unconditional quantile regression at the median.

Table 3: Descriptive statistics for mechanisms

	Full sample	Children of natives	Children of immigrants	Children of low-SES natives	Children of low-SES immigrants
Parental investments					
School involvement	0	0.065	-0.431*	-0.285	-0.664*
Organized activities	0	0.070	-0.464*	-0.257	-0.706*
In-home interactions	0	0.052	-0.358*	-0.080	-0.586*
Warmth/emotional support	0	0.021	-0.138*	0.014	-0.138
Mental health	0	-0.005	0.035	0.204	0.133
Harsh discipline (0/1)	0.258	0.270	0.177*	0.327	0.180*
Expectations for education (1-6)	4.06	3.97	4.63*	3.72	4.62*
Teacher characteristics					
White, Kindergarten	0.932	0.937	0.890*	0.918	0.887
White, 5th grade	0.902	0.913	0.830*	0.882	0.840
Hispanic, Kindergarten	0.051	0.034	0.175*	0.041	0.233*
Experience, Kindergarten	14.3	14.5	13.5	14.2	13.8
Experience, 5th grade	14.5	14.8	12.9*	13.9	12.1*
Tenure, Kindergarten	9.5	9.7	7.7*	9.9	8.3
Tenure, 5th grade	8.4	8.6	7.4*	8.4	7.5
BA or less, Kindergarten	0.642	0.636	0.686	0.649	0.745*
BA or less, 5th grade	0.547	0.544	0.572	0.579	0.605
Graduate degree, Kindergarten	0.358	0.364	0.314	0.351	0.255*
Graduate degree, 5th grade	0.453	0.456	0.428	0.421	0.395
Highest certification, Kindergarten	0.635	0.643	0.573	0.630	0.555
Regular certification, Kindergarten	0.258	0.257	0.263	0.272	0.269
Regular certification, 5th grade	0.909	0.915	0.865*	0.913	0.887
Other certification, Kindergarten	0.107	0.099	0.164*	0.098	0.176*
Other certification, 5th grade	0.091	0.085	0.135*	0.087	0.113
Endowment and early life characteristics					
Birth weight (oz)	119.1	119.2	118.3	117.8	118.5
Premature birth	0.164	0.163	0.168	0.153	0.170
Mother on WIC	0.358	0.346	0.452*	0.595	0.622
Hours/week of relative care	6.08	6.17	5.41	8.92	5.61*
Hours/week of non-relative care	4.91	5.26	2.33*	4.02	1.91*

Note: * signifies that the mean is statistically different from the mean in the column to the left at the 5% level. See Appendix Table A.3 for descriptions of the parental investment variables.

Appendix

Table A.1: Immigrant-native gaps in non-inclusion in the analytic sample

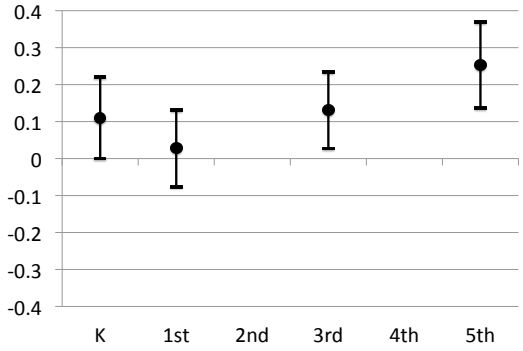
Model:	(1)	(2)	(3)	(4)
Panel A. Unweighted				
Child of immigrant	0.121***	0.0684***	0.0747***	-0.00468
	(0.0104)	(0.0134)	(0.0134)	(0.0137)
Black		0.173***	0.114***	-0.0353**
		(0.0124)	(0.0134)	(0.0168)
Hispanic		0.113***	0.0792***	-0.0552***
		(0.0130)	(0.0133)	(0.0147)
Asian		0.0824***	0.0740***	0.0397*
		(0.0211)	(0.0212)	(0.0217)
Other ethnicity		0.0746***	0.0333	-0.0470
		(0.0253)	(0.0256)	(0.0332)
Panel B. Spring kindergarten cross-sectional weights				
Child of immigrant	0.124***	0.0717***	0.0794***	-0.00957
	(0.0123)	(0.0156)	(0.0156)	(0.0157)
Black		0.181***	0.125***	-0.0311*
		(0.0137)	(0.0149)	(0.0189)
Hispanic		0.107***	0.0711***	-0.0622***
		(0.0150)	(0.0155)	(0.0167)
Asian		0.0988***	0.0977***	0.0414*
		(0.0248)	(0.0249)	(0.0247)
Other ethnicity		0.117***	0.0720**	-0.0271
		(0.0302)	(0.0303)	(0.0418)
Base controls	No	Yes	Yes	Yes
Household controls	No	No	Yes	Yes
School FE	No	No	No	Yes

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable equals one for students not in the analytic sample. The sample consists of students in the spring kindergarten wave with a valid measure for mother foreign born. Sample size is 15,128. 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.

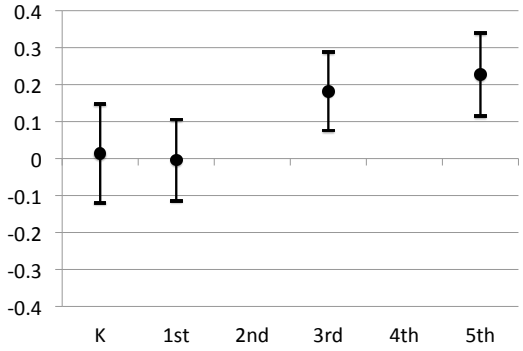
Table A.2: Loading factors for noncognitive PCA

Grade:	K	1st	3rd	5th
Approaches to Learning	0.460	0.457	0.469	0.472
Self-Control	0.502	0.500	0.493	0.496
Interpersonal Skills	0.495	0.497	0.493	0.490
Externalizing Problem Behaviors	-0.449	-0.455	-0.454	-0.450
Internalizing Problem Behaviors	-0.298	-0.295	-0.297	-0.297
Observations	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

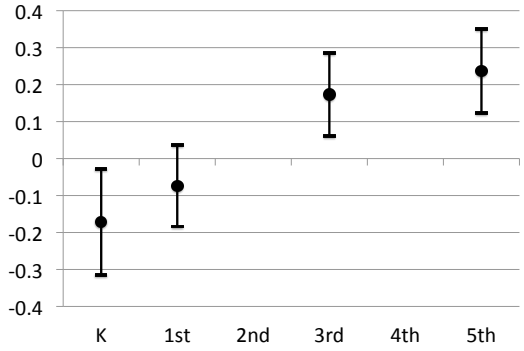
Figure A.1: Immigrant-native noncognitive area skills gaps by grade



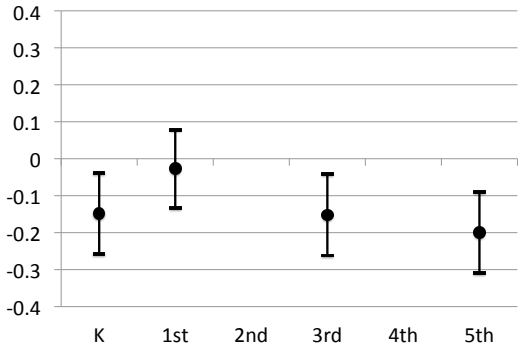
(A) Approaches to Learning



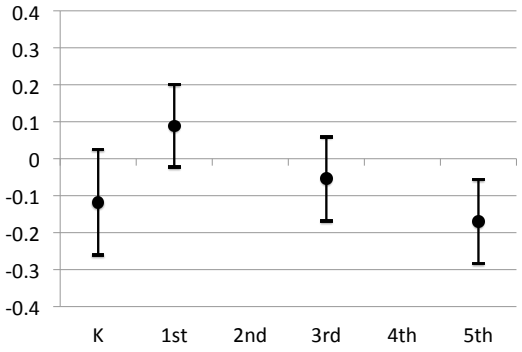
(B) Self-Control



(C) Interpersonal Skills



(D) Externalizing Problem Behaviors



(E) Internalizing Problem Behaviors

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.

Table A.3: Variable descriptions for parental investments

	School Involvement	Organized Act.	In-Home	Warmth	Harsh Dis.	Expectations
	parent or adult in h.h.	has child ever participated in	how often (per week)		No Scale, =1 if all true if child hits you	
Kindergarten						
Scale Variables						
	contacted school	dance lessons	read to child	warm, close time together	spank child	degree 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	child does things that bother me		
	acted as school volunteer	organized performing	play games	sacrifice to meet child's needs		
	participated in fundraising		teach nature	feel angry with child		
			build things together	child harder to care for than most		
			do sports together			
Answer Format	Yes/No	Yes/No	Frequency (1-4)	Likert (1-4)	Yes/No	1-6, less HS to PhD
Scale Format	Sum	Sum	Sum	Sum	No scale	NA
Normalized N(0,1)	Yes	Yes	Yes	Yes	No	No
Third Grade	Same set/format	Same set/format	Same-stories-songs	Same set/format	Same set/format	Same

Table A.4: Descriptive statistics for school and neighborhood characteristics

	Full sample	Children of natives	Children of immigrants	Children of low-SES natives	Children of low-SES immigrants
Traditional public school	0.775	0.769	0.817*	0.869	0.879
Magnet school	0.046	0.042	0.075*	0.039	0.103*
Religious school	0.148	0.155	0.099*	0.075	0.036*
Nonreligious private school	0.010	0.010	0.010	0.003	0.007
Urban school	0.145	0.130	0.247*	0.137	0.247*
Title I school	0.609	0.610	0.602	0.779	0.723
Staff shortage or reduction	0.111	0.111	0.109	0.125	0.135
% white teachers	88.5	89.6	79.5*	86.8	75.1*
% black teachers	4.2	4.1	4.9	5.9	5.0
% Hispanic teachers	2.4	1.7	8.2*	2.0	11.2*
% Asian teachers	0.4	0.3	1.1*	0.2	0.8*
Litter problem	0.274	0.267	0.324	0.354	0.389
Violent crime problem	0.108	0.095	0.201*	0.131	0.258*
Vacant property problem	0.179	0.175	0.212	0.259	0.268
Theft from children or teachers	0.062	0.061	0.068	0.093	0.093
Attacks/fights in school	0.370	0.371	0.364	0.448	0.393
Parenting program offered	0.672	0.654	0.807*	0.646	0.819*
Adult literacy program offered	0.169	0.154	0.283*	0.210	0.348*
Migrant program offered in school year	0.125	0.119	0.169*	0.169	0.212
Migrant program offered in summer	0.078	0.075	0.101	0.107	0.131

Note: * signifies that the mean is statistically different from the mean in the column to the left at the 5% level.