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Immigrant English Proficiency, Children's Educational Performance, and Parental Involvement

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Abstract

Using the Children of Immigrants Longitudinal Study (CILS) and the New Immigrant Survey (NIS), this paper estimates the effect of immigrants' English proficiency on the educational performance of their children as well as measures of parental involvement in school. Together, the data allow us to examine children ranging from preschool to high school age. Given the confounding factors associated with English knowledge, we employ an instrumental variables two-stage least squares strategy that exploits parents' age at arrival and whether their country of origin is English speaking. For the younger cohort, which we access through the NIS sample, our results suggest that children of immigrant parents with higher English language ability score higher on reading assessments as well as some math-related assessments. For the older students, which we assess through the CILS sample, we see a positive effect on reading scores as a result of parental English proficiency. When examining parental involvement, we find that English proficiency results in a higher likelihood of being part of a parent-teacher organization as well as a higher probability of parent-teacher interaction. Our results are robust to various specifications and alternative instrumental variables.

Keywords Immigration · Education · English learners · English proficiency

JEL classification J15 · I24 · I20

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1 Introduction

Roughly one in seven individuals residing in the United States (U.S.) is foreign-born. An important aspect of immigrating is English speaking ability, particularly insofar as acquiring adequate proficiency of a host country's language greatly contributes to future labor market outcomes and earnings (Bleakley & Chin, 2004, Chiswick & Miller, 2010, Mora & Dávila, 2006). According to the 2010 U.S. Census, the proportion of the foreign-born population speaking a language other than English at home has increased to about 85 percent (up from 70 percent in 2000). Half of this foreign-born population speaks English less than "very well," including 29 percent who either do not speak English well or do not speak English at all. Although there is research that examines the early educational or labor market consequences of limited English proficiency, less is known about how this limitation affects immigrants' ability to participate in their child's schooling and subsequent educational performance throughout their K-12 school years. This is becoming particularly relevant given that in the last 25 years the number of immigrant children in the U.S. has grown by over 50 percent.[1] One key determinant of socioeconomic status is educational attainment (Card, 1999, 2001). Moreover, research finds that parents' involvement in their children's academic life is positively associated with their academic achievement (Jeynes, 2007, Ji & Koblinsky, 2009, Park & Holloway, 2017). Given that the number of immigrants and their children is expected to rise for the foreseeable future, it is imperative to understand what affects their socioeconomic outcomes. The aim of this paper is two-fold: (1) to estimate the effect of immigrants' English proficiency on the educational performance (i.e. math and reading) of their children; and (2) examine the role of English proficiency on parental involvement with a child's schooling.

Academics have documented a swath of evidence indicating that language acquisition is critical for immigrant success. This is exacerbated by the fact that testing in the U.S. is almost exclusively in English. By randomizing an achievement test between Spanish and English, Akresh and Akresh (2011) demonstrate that 37% of the Hispanic-white gap in reading is due to language bias. In later life, English skill continues to yield returns due to the importance of language for most high-powered occupations. Non-pecuniary benefits befall immigrants with higher English ability as well, such as the improved likelihood of health insurance coverage (Dillender, 2017). English proficiency has also been associated with better health outcomes, lower fertility, improved academic outcomes, and reduced residence in language enclaves (Aoki & Santiago, 2018, Bleakley & Chin, 2010, Clarke & Isphording, 2017, Fenoll, 2018). As a whole, previous work suggests that English proficiency may also play an important role in the academic achievement and development of immigrant children. The many important short- and long-term consequences of fluency inspire our paper to look further into the effects of language ability, namely the effects on immigrants' offspring.

This paper is also related to the intergenerational effects of immigrant educational attainment. Although there is some research on educational transfer within immigrant families (Borjas, 2006, Card, 2005, Luthra & Soehl, 2015, Park & Myers, 2010),

[1] https://www.childtrends.org/indicators/immigrant-children/.

much less is known about the impacts of English knowledge. One notable exception, set in the U.S., is Bleakley and Chin (2008). They use 2000 Census microdata and find a positive effect of parental English proficiency on their children's English proficiency as well as preschool attendance. Using longitudinal data from Germany, Casey and Dustmann (2008) also find a link between parents' and children's English fluency and subsequent labor market outcomes for females. Locay, Regan and Diamond Jr (2013) examine the effect of speaking Spanish at home on academic performance and find a decrease in test scores. Note that there is a distinction between education and language proficiency; this is particularly pertinent when parental educational attainment, specifically in the home country, can be independent of English proficiency. In our paper, we take a closer look at immigrant parents' English fluency and its role in their children's academic outcomes than the looser linkages made in the literature. Further in this vein we also explore the mechanism of parental involvement. That is, whether English fluency increases immigrant parents' participation in their children's education and thus improves academic outcomes.

Confounding factors associated with English proficiency make it challenging to derive causal estimates when addressing our research question. The core concern confronting research on this subject is that language in the U.S. is near inextricably tied to being foreign-born. To overcome this limitation, we employ an instrumental variables (IV) two-stage least squares strategy similar to Bleakley and Chin (2010) and Bleakley and Chin (2004). Specifically, we instrument for English proficiency by using the interaction between an immigrant's age upon arrival with an indicator signaling whether their country of origin is English speaking or not. Using this methodology, this study focuses on the children of immigrants' academic performance and parental involvement while they are still in school. We examine parental involvement by using variables that measure the likelihood of assisting a child with their schoolwork, being a member of a parent-teacher organization, and visiting or speaking with a child's school.

We contribute to this literature in several ways. Although prior research has focused on the effects of parental English proficiency on preschool attendance or labor market outcomes (e.g. Bleakley and Chin (2008)), much less is known about a child's academic performance across grade levels and a limited English parent's involvement with their child's schooling. This is the first study to examine whether parental English ability influences child educational performance (i.e. math and reading test scores) for children ranging from ages three through fifteen (i.e. elementary school through high school age) and across multiple surveys. More critically, this paper is also the first to examine potential mechanisms, namely parental involvement. We explore whether parents with better English skills, for example, communicate with their children's teachers more often.

We focus on a broad age group of children across two distinct data sources that contain information on the children of immigrants. The first, the Children of Immigrants Longitudinal Study (CILS), primarily surveys children in high school. The second is the New Immigrant Survey (NIS), a survey of new legal immigrants that mainly contains information on children ages three to twelve. For the NIS sample, our results suggest that children of immigrant parents with higher English proficiency score higher on reading/literacy tests and on some math-related assessments (e.g., word problems). For the CILS sample, we do not see an effect on the

math-related assessments; we do, however, see a positive effect on reading scores due to parental English proficiency. We also consider the effects of parental involvement. For the younger sample, we find that improved English proficiency results in immigrant parents being more likely to speak to a child's teacher and visit a child's class. For the older sample, we find that English proficiency leads to a higher likelihood of being part of a parent-teacher organization. Conversely, we find weaker evidence of English proficiency affecting an immigrant parent's propensity to assist their child with homework. The homework assistance result may indicate that, on average, parents with low English proficiency do want to be involved in their child's schooling, but are unable to or dissuaded due to their limited English proficiency. Overall, our findings suggest that the English proficiency of immigrant parents has a persistent and lasting effect on their children's academic performance as well as their own involvement. Our results are consistent across various specifications, including the use of alternative instrumental variables.

The rest of the paper is organized as follows. Section 2 discusses the identification strategy used to obtain causal estimates. Section 3 discusses the two main datasets used in this paper. Section 4 discusses our results. Section 5 presents alternative specifications and robustness checks. Section 6 concludes.

2 Data

In our investigation of immigrants' children, we use two data sets: (1) the Children of Immigrants Longitudinal Study (CILS) and (2) the New Immigrant Survey (NIS). Importantly, these cover two different age groups, among other differences. We describe the CILS and NIS in the following subsections.

2.1 Children of Immigrants Longitudinal Study

The CILS sampled 5,262 children attending the 8th and 9th grades in public and private schools in the metropolitan areas of Miami/Ft. Lauderdale, Florida, and San Diego, California, with at least one foreign-born parent. At the time of the survey in 1992, 93% of the children surveyed were between the ages of 13 and 15. Given that the children of immigrants are our focus, this dataset has many advantages. For instance, it provides demographic information about the schools that the students attended in addition to math and reading assessments. However, it is also limited in that parental English ability is not asked of all students. In addition to the students being surveyed, about half of the children (chosen at random) had one parent or guardian respond to a parent survey. This limits the number of children we can include in our baseline analysis. Parents who were surveyed were asked to provide a self-reported assessment of their English ability and that of their partner along four dimensions: comprehension, reading, writing, and speaking. Each parent was asked to assess themselves on the following English proficiency scale: "Not at All" (assigned a 1), "A little" (assigned a 2), "Well" (assigned a 3), and "Very Well" (assigned a 4). We then assigned the mother's self-assessment to the child. For ease of interpretation, we take the average across all measures to construct a binary indicator of English language ability. We set this measure equal to one if the average is above 2 and zero

Table 1 CILS Summary Statistics

	Mean	Std. Dev.	Min	Max
Outcomes				
Reading Score	669.81	47.27	0	808
Math Score	701.40	52.42	0	846
Parent HW Help	0.58	0.49	0	1
Parent-Teacher Org	0.47	0.50	0	1
Parent Attend PTA	0.81	0.39	0	1
Parent variables				
Mother English Ability	2.87	0.96	1	4
Father English Ability	3.04	0.92	1	4
Mother Age	41.01	5.82	25	70
Father Age	43.78	7.27	20	73
Mother Years of Education	12.12	4.36	3	17
Father Years of Education	12.66	4.17	3	17
Mother Age at Arrival	26.02	9.56	0	64
Father Age at Arrival	24.71	13.53	0	60
Mother Non-English Country	0.76	0.43	0	1
Father Non-English Country	0.74	0.44	0	1
Both Parents Biological	0.71	0.46	0	1
Number in Household	4.82	1.54	2	14
Child and school variables				
Child Age	14.15	0.86	12	17
Child Female	0.56	0.50	0	1
Child Born in US	0.48	0.50	0	1
School Free Reduced Lunch	44.88	24.47	0	92.30
School Population	7.43	0.43	6.56	8.18
Inner City School	0.32	0.47	0	1

Data source: Children of Immigrants Longitudinal Study. $N = 1200$

otherwise. In Table 1, we report the summary statistics for the CILS data used in our analysis; on a 1-to-4 scale, the average maternal English proficiency is about a 2. We also include parental control variables. For instance, in our specifications we control for parents' age and years of education. We also include an indicator equal to one if both parents are present and biological and zero otherwise.

Academic performance is measured using scores on the Stanford Math and Reading Achievement Test. The averages are about 666 and 698 for math and reading, respectively; we standardize these scores when running our analysis. We also consider parental involvement outcomes. The outcomes from this data are (1) an indicator equal to one if the parent reported helping their child with homework more frequently than once a month and zero if they reported helping seldom or never; (2) an indicator equal to one if the parent reported that they belonged to a parent-teacher organization and zero otherwise; and (3) an indicator equal to one if the parent reported that they attended meetings of a parent-teacher organization and zero otherwise. Of course, these measures are imperfect. We do not have information on

the type of homework (e.g. math versus writing composition) nor on the interaction between the parents and teachers across subjects. Thus, we do not have information on the reason for a parent joining a parent-teacher organization or attending the meetings. Nonetheless, any effects that we find may be an indication as to how parental English ability affects involvement in a child's education. From Table 1 we see that roughly 50% of parents reported assisting with homework more frequently and about 80% of parents attended meetings of a parent-teacher organization. An advantage of the CILS data is that it includes some school information. We include the school population, whether the school was located in an inner city, and the percent of students eligible for subsidized lunch at school. From Table 1, we see that the average school population is about 1,710. We also control for whether a child was born in the U.S. About 45% of the children in our sample were born in the U.S.

2.2 New Immigrant Survey

Although the CILS survey specifically targets the children of immigrants, we complement it with the New Immigrant Survey (NIS) data for several reasons. First, the NIS provides a more comprehensive set of countries of origin – given the location of the surveys, CILS respondents' parents are overwhelmingly from Cuba or the Philippines. This fact does not bias the aforementioned results but may limit the external validity of any findings. Second, the NIS children are of a different age group (ranging from 3–12 years of age). It is of interest to determine whether the CILS results on 8th and 9th graders hold for younger children. Knowing if any effects persist from a young age can help lawmakers prescribe appropriate policies. A further advantage is that the NIS provides access to a measure of parental English ability that is not self-assessed. Given the issues surrounding self-reported language ability (Dustmann & Soest, 2001), English proficiency as assessed by the interviewer is likely more reliable than the self-reported outcome in the CILS dataset. In conducting the survey, interviewers were asked to evaluate the English ability of the respondents. Further, this survey also occurs eleven years after the CILS survey, allowing us to analyze a slightly different time period. And lastly, the NIS presumably surveys a different set of individuals. Confirming whether the CILS result is either robust or specific to those children is also policy-relevant.

The NIS is a nationally representative sample of adult immigrants admitted to legal permanent residence. The first sampled cohort was surveyed in 2003. Sampled children ranged between the ages of 3 and 12, and were assessed using the Woodcock-Johnson Tests of Achievement battery. From this battery, all children were administered a Letter-Word Identification and Applied Problem assessment. In addition, children ages 6-12 were given a Passage Comprehension and Calculation assessment. Table 2 reports the summary statistics for the assessment variables for children in our analysis. As with the CILS assessment scores, we standardize each of these outcomes. Our main variable of interest, parental English ability, is determined by the NIS survey interviewer (distinct from the self-assessed English ability in the CILS). The interviewer was tasked with determining "How good was the respondent's English" on a scale consisting of "Very good," "Good," "Fair," "Poor," and "Interview not conducted in English." The latter category is considered worse than "Poor" because the respondent was unable to interview in English at all. These

Table 2 NIS Summary Statistics

	Mean	Std. Dev.	Min	Max
Outcomes				
Letter Word Identification	31.02	23.95	0	76
Applied Problems	20.61	14.01	0	59
Calculation	20.85	9.57	0	47
Passage Composition	16.49	7.30	0	45
Parent Checks HW	0.81	0.39	0	1
Parent Spoke to Teacher	0.70	0.46	0	1
Parent Visited Class	0.76	0.43	0	1
Parent variables				
Mother English Ability	2.73	1.82	1	5
Father English Ability	3.07	1.84	1	5
Mother Age	36.89	6.28	19	66
Father Age	37.03	6.22	19	66
Mother Years of Education	12.07	4.64	0	23
Father Years of Education	12.59	4.90	0	23
Mother Age at Arrival	26.36	12.22	0	65
Father Age at Arrival	24.72	12.86	0	65
Mother Non-English Country	0.74	0.44	0	1
Father Non-English Country	0.70	0.46	0	1
Both Parents Biological	0.77	0.42	0	1
Number in Household	4.94	1.88	2	18
Child variables				
Child age	7.04	2.95	3	12
Child female	0.50	0.50	0	1
Child Born in US	0.50	0.50	0	1

Data source: New Immigrant Survey.The sample size is $N = 2843$ for all variables except for the parental involvement variables where the sample size is $N = 2340$

categories are ranked 1 to 5, from worst to best English proficiency. In Table 2 we see that the average maternal English proficiency is about 2.7, which is between "poor" and "fair." As with the CILS English ability measure, we create a binary indicator taking a value of one if the English ability was assessed to be "very good" or "good" and zero otherwise. One limitation of the NIS data is that one must rely on parental responses to questions about other individuals in the family—including their children. These questions are sometimes skipped or not responded to and limit the number of observations. We also do not have access to school variables as we did with the CILS data. The remaining characteristics are similar to what we collected from the CILS data. We attempt to construct similar parental involvement variables to those found in the CILS data: (1) an indicator equal to one if the parent reported checking their child's homework often and zero if they stated "sometimes," "rarely," or "never"; (2) an indicator equal to one if the parent reported that they phoned or spoke to a teacher or counselor within the last year and zero otherwise; and (3) an indicator equal to one if the parent reported that they visited their child's class within

the last year and zero otherwise. As noted above, our data does not have information on the reason for visiting a child's class or speaking with a teacher over the phone. A meeting with the teacher is likely if a student is not doing well; however, students who do well may have parents who are very involved and motivated to check in with a teacher. Moreover, it is common for schools to have events where parents are invited to meet with teachers. In this instance, students who do well may have parents who do not get in touch with a teacher. One key difference is that for the NIS parent involvement variables, the parents of any randomly selected child between the ages of 5 to 17 were asked these questions, not necessarily parents of children who also took the Woodcock-Johnson assessment (from earlier). For the NIS parent involvement variables, we see that roughly 80% of parents reported checking their child's homework often and about 77% of parents visited their child's class.

2.3 Validity

Given that our surveys are not representative of all possible countries globally and our regressions do not include all immigrants in each survey, we now discuss limitations surrounding internal and external validity. Although there is no selection on the actual test taken by children since all children tested take the assessments (by the design of each survey), we worry about the observations not included once incorporating the other covariates. Tables A1 and B1 examine the difference between those in the sample and those missing from the analysis. We run a series of linear regressions where the outcome is an indicator equal to one if an observation is missing from the main regression (i.e., missing) and zero if the observation is in our main analysis. Each coefficient of Tables A1 and B1 represents an estimate of each variable in the left-panel of the tables. Each regression includes mother country of origin indicators. These results indicate some differences for each sample. We see some suggestive evidence that the missing student observations do not score as high on the assessments. However, the point estimates are precise zeros in the CILS data and not statistically significant in the NIS sample. It also seems that the English ability is better for mothers included in our CILS regressions. Children outside our CILS sample also have more members in the household, are less likely to be female, and attend smaller schools. For the NIS, mothers missing from the analysis are older, arrive in the US at an older age, and have a child that is more likely to be born in the US. Although it is not clear how the inclusion of these missing observations would affect our results, the differences across both surveys indicate that students in our analysis may be of higher ability. If this is the case, it may indicate a lower bound for our results.[2]

We also note that our sample's distribution of countries of origin does not mirror the U.S. for each survey. Figure A2 provides the most common countries and regions of the world present in the CILS and NIS, respectively. In the CILS sample, Cuba, Philippines, Mexico, and Nicaragua make up roughly 50% of the mother countries of origin. Although not directly comparable to the U.S. population, 18.2% of respondents reporting Cuban origin in the CILS is similar to the 18.9% of 10-14-year-old children of Cuban ancestry in Miami-Dade county's 2000 Census. Other groups,

[2] To further address the issue of missing data we also impute values for the missing data for a few specifications. Tables A7, A12, B7, and B12 present these results.

such as Filipinos at 15.5%, appear at first glance to be overrepresented relative to national or even local demographics. Overall, the CILS primarily contains Latin American respondents; roughly 33% of the sample are from other world regions. In the NIS sample, there is a more representative mix of countries. Mexico makes up 22% of respondents, but over 12% of respondents are from Europe, and roughly 23% are from Asia. Nonetheless, our results are most relevant to those from developing countries and should thus be interpreted with caution if extrapolating to more developed countries.

3 Empirical Methodology

With both the CILS and NIS data we can use the same methodology to estimate the effect of parental English proficiency on their children's outcomes. Before addressing the endogeneity concerns associated with English ability we follow the previous literature and start by presenting a naive ordinary least squares (OLS) model:

$$Y_{ija} = \alpha + \beta PE_{ija} + \delta CA_a + n_j + \gamma \mathbf{X}'_{\mathbf{ija}} + u_{ija}. \quad (1)$$

In equation (1), Y_{ija} represents the outcome for a parent (or their child) i from country j arriving in the U.S. at age a. PE_{ija} is an indicator of the English ability of a parent (as discussed in the previous section). The variable CA_a is an indicator for arriving young, n_j are country of origin indicators that also account for differences between English and non-English speaking countries, and $\mathbf{X}'_{\mathbf{i}}$ contains a host of control variables including parent and child characteristics.[3] Our parameter of interest is β; however, this measure of parental English ability may be endogenous and lead to biased estimates. Parents' English-language ability is correlated with other variables that may influence their children's outcomes (i.e., omitted variable bias), and simple linear regression estimates would be biased. It is not clear which direction the bias from the sum of all these factors would go. Higher levels of English proficiency are associated with several positive outcomes that may also affect a child's educational outcomes, independent of English proficiency. For instance, better access to well-paying jobs could increase parent's time spent with their children, overstating the effect of English proficiency on their children's education. Yet other factors, such as cultural emphasis on education or parental expectations, could negatively correlate with English proficiency, leading to a downward bias. For instance, Figlio, Giuliano, Özek and Sapienza (2019) finds that in countries and cultures that emphasize delayed gratification, students test higher in both reading and math, even for countries where learning English would be relatively more difficult (Bakker et al., 2009). Indeed, this may be one reason that children of immigrants appear to gain more years of education than natives, despite previously mentioned countervailing forces (Chiswick & DebBurman, 2004). Alternatively, we may be concerned about reverse causality. If children assist their parents with English acquisition, regression coefficients will overstate the impact of parental English. Conversely, if parents make a greater effort to learn English to help a poorly performing child, the OLS estimates would understate the impact of English proficiency.

[3] In the Appendix, Table C2 we present the countries considered to be English speaking in our analysis.

To address the confounding issues we employ an instrumental variables (IV) approach. This method addresses the endogeneity concern by introducing another variable (i.e. an instrument) that naturally induces the exogenous variation in the endogenous regressor. The exogenous instrument must exist outside the explanatory equation but must be highly correlated with our endogenous variable, PE_{ija}. Our instrument is the interaction between a parent's age at arrival and an indicator equal to one if the parent is from a non-English speaking country. This instrument has been widely borrowed in the literature from the seminal work of Bleakley and Chin (2004, 2010). The instrument relies on the "critical period" theory, developed notably by linguist Eric Lenneberg in a 1967 work, which contends that there is a window in early life where it is easiest to acquire languages. Thus, immigrant English proficiency is greater the younger the age at migration (Chiswick, Lee & Miller, 2005). However, relying on age-at-arrival alone and simply comparing younger to older immigrants does not uncover the causal impact of linguistic ability, since younger immigrants assimilate further and come from more advantaged families (Clarke, 2016). By including immigrants from English-speaking countries we can parse out the non-language effects associated with age of arrival to the U.S. This pitfall is avoided by making a second comparison between immigrants from English-speaking and non-English-speaking countries, thereby controlling for non-language differences inherent to age at arrival. We define "English-speaking countries" as countries where either English is the primary language of communication or English is an official language from the lists in Bleakley and Chin (2004) and Fenoll (2018). This includes, for instance, India, where English is an extensively used second language. This instrument is plausibly exogenous, only affecting the dependent variable (e.g. child test scores) through the confounding variable (i.e. English proficiency) and allowing for the causal estimation of immigrant English proficiency on children's academic performance. Put another way, the IV allows us to capture and use the exogenous variation in English proficiency that is independent of the confounding effects discussed earlier.

Under the assumption that our instrument allows us to explain the exogenous variation in parental English ability, we can explain the first stage as

$$PE_{ija} = \alpha + \theta z_{ija} + CA_a + n_j + \gamma \mathbf{X}'_{\mathbf{ija}} + \mu_{ija}, \tag{2}$$

where $z_{ija} = \max(0, a - 11) \times \mathrm{NEC}_j$. Here, NEC_j is a dummy variable for being born in a non-English speaking country, and zero otherwise. As in Bleakley and Chin (2010), we impose the restriction that the difference is zero between parents from non-English-speaking countries, NEC_j, and parents from English-speaking countries up through age eleven at arrival, but has a linear relationship with age at arrival thereafter. To determine whether this age is relevant for our analysis, Figure C1 plots estimates from a regression of mother's English ability on binned age at arrival indicators for the CILS and NIS surveys, respectively. Both regressions include country of origin and age at the time of survey indicators. Across both surveys, we see that that there is a negative relationship between age at arrival and English proficiency. The estimates are relatively large and statistically significant for the group 9-12 years of age. This figure indicates that choosing an age in this range is sufficient for our instrument. Nonetheless, as in Bleakley and Chin (2004, 2010), we consider alternative age at arrival cut-offs (presented in Appendix Figures A1 and B1).

Our main specification uses the mother's characteristics, given that this gives us a larger sample size and stronger IV, relative to the father. We later discuss results from the father specification. The estimation of equation (2) provides exogenous predictions, $\widehat{PE_{ija}}$, that can be used in the second stage

$$Y_{ija} = \alpha + \beta\widehat{PE_{ija}} + \delta CA_a + n_j + \gamma \mathbf{X'_{ija}} + u_{ija}. \quad (3)$$

The first-stage $\widehat{PE_{ija}}$ should be composed of the exogenous variation of parental English ability, and therefore yield an unbiased 2SLS estimate of β. As with equation (1), we include parent country of origin indicators, n_j. These country of origin indicators also absorb assimilation differences related to age at arrival that may be country specific. We present the results for reading and math assessments separately for each data sample. We further report the coefficient on the first-stage IVs in Table C1. As in other studies, the F-statistic indicates that our instrument is sufficiently correlated with all of our endogenous regressors and thus does not seem to suffer from the "weak identification" problem (Stock, Wright and Yogo, 2002, Stock & Yogo, 2005). In addition to test scores, we also consider parental involvement that may mediate any effects resulting from parental English ability. Finally, in Section 5, we consider alternative specifications that exclude the most common parental countries of origin within each data set. This helps alleviate potential concerns that the results are driven by parents' origins rather than their English ability. We also consider using alternative instrumental variables that measure the linguistic distance between English and the mother tongue of a country of origin instead of an indicator for non-English speaking country.

4 Results

We now present the effects of parental English ability on educational performance and scholastic involvement. Given that other studies focus on child English ability, we provide these results in the Appendix. As in previous studies, we confirm that parental English ability positively affects child English ability; these results are presented in Tables A13 and B13.

4.1 CILS Test Scores

We start by presenting the results for the CILS sample. Table 3 partitions the analysis into OLS and IV-2SLS. The results indicate that the OLS estimates underestimate the effects of parental English proficiency. As suggested earlier, this could be due to cultural differences in academic expectations or reverse causality, either of which would be instrumented out via the comparison among children of low English-ability parents who arrive when they are younger versus older, among other things. The more appropriate two-stage least squares result in columns (3) and (4) shows that the significant result only holds for the reading assessment. A parent with English ability above the median results in a 0.81-standard-deviation increase in reading assessment. Although the coefficient for the math assessment is positive (column (4)), it is imprecisely estimated. Note

Table 3 CILS parental english ability and child test scores

	OLS		IV-2SLS	
	(1) Reading	(2) Math	(3) Reading	(4) Math
Parent English Ability	0.117**	0.108	0.810**	0.311
	(0.0589)	(0.0674)	(0.382)	(0.358)
F-Stat of Excluded Inst.	–	–	26.30	29.55
No. of Obs.	1200	1185	1200	1185

The outcomes are the standardized Stanford math and reading achievement test scores. Parental English Ability is an indicator equal to one if the mother or female guardian's average English ability is self-reported as "Well" or "Very Well" and zero otherwise. Columns (1) and (2) are the OLS specification, and columns (3) and (4) use the IV-2SLS method: see equation (3). Each specification includes parent, child, and school controls. Standard errors in parentheses. Stars indicate significance with $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Data source: Children of Immigrants Longitudinal Study

that we cannot distinguish between the types of math content. In the following section, using the NIS sample, we are able to separate math outcomes into assessments that are more applied (e.g. word problems) and those that require more rote strategies (e.g. Calculation). In Appendix Table A2, we report the point estimates for the other covariates used in the analysis. We also show a specification without control variables. Columns (3) and (4) of Table A2 show that living with biological parents is associated with improved both reading and math test scores, while the percent of peers on free or reduced lunch is associated lowers test scores. Both of these estimates are smaller in magnitude than the coefficient on the measure of English proficiency.

Our findings are consistent with previous studies finding a positive effect between parental English proficiency and reading test scores. However, the CILS surveys older students. Thus our result coincides with that of Bleakley and Chin (2008). We find that there exist English reading disparities between children of immigrants that are more and less proficient in English – even among teenagers. We later examine other outcomes related to parental interaction with the schools of the children in the CILS sample.

4.2 NIS Test Scores

We now turn to the younger cohort using the NIS sample; Table 4 presents the simple linear regression results. Columns (1) and (2) include all children ages 3 to 12. The assessment outcomes of columns (3) and (4) were solely administered to children ages 6 to 12. As in the previous section, the findings in Table 4 suggest that parental English is associated with improved reading assessments.

Table 5 shows the estimates once we instrument for English ability. The results are now more pronounced. For instance, the effect is roughly a .37-standard-deviation increases in the Letter-Word identification. We also see a .84-standard-deviation increase in the Applied Problems assessment. Interestingly, we see no effect on the Calculation assessment. However, the Woodcock-Johnson Calculation assessment does not involve processing extraneous information as one would in the Applied

Table 4 NIS Parental English Ability and Child Test Scores (OLS)

	(1) Letter Word	(2) Applied Probs.	(3) Passage Comp.	(4) Calculation
English Ability	0.0550**	−0.00978	0.132***	−0.00841
	(0.0280)	(0.0340)	(0.0501)	(0.0412)
R-squared	2843	2843	1745	1745
No. of Obs.	0.761	0.616	0.387	0.602

The outcomes are the standardized scores of Letter-Word identification, Applied Problems, Calculation, and Passage Composition Woodcock-Johnson assessments. Parental English Ability is an indicator equal to one if the mother or female guardian's English ability is classified as "Good" or "Very Good," as recorded by an interviewer. Each specification includes parent and child controls. Standard errors in parentheses. Stars indicate significance with $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Data source: New Immigrant Survey

Table 5 NIS Parental English Ability and Child Test Scores (IV-2SLS)

	(1) Letter Word	(2) Applied Probs.	(3) Passage Comp.	(4) Calculation
Parent English Ability	0.370**	0.842***	1.269***	0.0457
	(0.172)	(0.230)	(0.415)	(0.279)
F-Stat of Excluded Inst.	63.50	63.50	24.61	24.61
No. of Obs.	2843	2843	1745	1745

The outcomes are the standardized scores of Letter-Word identification, Applied Problems, Calculation, and Passage Composition Woodcock-Johnson assessments. Parental English Ability is an indicator equal to one if the mother or female guardian's English ability is classified as "Good" or "Very Good," as recorded by an interviewer. The estimation uses the IV-2SLS method: see equation (3). Each specification includes parent and child controls. Standard errors in parentheses. Stars indicate significance with $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Data source: New Immigrant Survey

Problems assessments. Calculations typically do not include judgments about which operations or data to include. Thus, if we can interpret Applied Problems as being akin to "word problems" it would follow that this assessment responds in the same manner as the reading/literacy components. This result may also indicate that immigrant children whose parents are less proficient in English may have had to sacrifice non-reading subjects to catch up in language proficiency. The education literature has some limited evidence towards non-English immigrants having weaker mathematics achievement growth Wang and Goldschmidt (1999). Appendix Table B2 also reports the coefficients on the control variables included in the NIS sample analysis. As with the CILS sample, children residing with their biological parents perform better on the assessments, specifically on the math-related tests. There is also some evidence of children in the NIS performing better on some assessments when residing in households with fewer individuals.

Together, the CILS and NIS results indicate that parents' English proficiency affects their children's academic achievement. Although comparable in subject matter, it is essential to reiterate that the assessments and content across both datasets are not the same. We see no effect on the CILS mathematics outcomes, but this may

be due to the type of assessment; the same may be true for the NIS outcomes. Interestingly, we do see that the reading result responds across both datasets. Note that IV-2SLS estimates may seem large; however, this is due to how we code English proficiency. Our primary variable of interest is a dichotomous indicator for mothers' English proficiency, which compares mothers with little to no English proficiency to those that are very proficient. Thus, we would expect a large effect since we do not have a more nuanced (or continuous) measure of English proficiency available in our data. An increase from zero to one would place a parent with poor English skills close to the highest recorded English category. Moreover, note that IV estimates exceeding the OLS estimate are not peculiar to this paper in the literature. Indeed, in Bleakley and Chin (2008) all the main IV estimates of the effects of parental English, for example, on the child's high school drop-out rate, exceed their OLS estimates, often by many multiples.

4.3 Parental Involvement

In this section, we examine a few avenues by which parental English ability may affect the assessment results from above. It may be that a lack of English proficiency limits how parents can assist their children with schooling. The education literature has indicated that parental involvement in their children's schooling is associated with higher academic performance both in the short and long terms (Barnard, 2004, Fan & Chen, 2001, Park & Holloway, 2017). Yet parents with poor English ability may be less able to render this help, leading to weaker learning for their already disadvantaged children. Indeed, among immigrant families, parents' involvement in their children's academic life is positively associated with English language skills and time spent in the U.S. (Ji & Koblinsky, 2009, Turney & Kao, 2009). The source of this relationship is likely multifactorial. For one, a parent cannot easily assist their child with homework that they themselves do not understand. Parents with poor English reading comprehension could be expected to face this obstacle on most non-math homework. Other reasons are less obvious. For instance, those who are more proficient in English are also more likely to use a computer (Chiswick & Miller, 2007). Parents with weak computer ability, then, would likely face difficulties assisting their children with online assignments or keeping up with school emails as education becomes more digital. Lastly, due to the weaker job opportunities available to workers with limited English, these parents may lack the flexibility necessary to attend parent-teacher meetings or assist with homework. Although we cannot directly determine the mechanisms that can affect test scores, we use some proxies for parental involvement that may assist policymakers when addressing disparities amongst children with parents who have varying levels of English proficiency.

Using the same estimation strategy from the previous sections, we now consider whether school involvement may be a potential mechanism by which English proficiency can affect the children of immigrants. Unfortunately, the survey questions across our datasets are not exactly comparable, so we attempt to construct variables that are similar across each. For each dataset, we construct several variables to indicate parental assistance with homework as well as involvement in school more generally.

Table 6 CILS Parent English Ability and Involvement

	(1) HW Help	(2) Parent-Teacher Org	(3) Parent-Teacher Meeting	(4) HW Help	(5) Parent-Teacher Org	(6) Parent-Teacher Meeting
Parent English Ability	0.0689**	0.139***	0.00917	0.260	0.405**	−0.0111
	(0.0347)	(0.0354)	(0.0292)	(0.189)	(0.193)	(0.158)
F-Stat of Excluded Inst.	–	–	–	39.92	39.72	38.72
No. of Obs.	1357	1356	1362	1357	1356	1362

The outcome in columns (1) and (4) is an indicator equal to one if the parent reported helping their child with homework more frequently than once a month and zero if they reported helping seldom or never; the outcome in columns (2) and (5) is an indicator equal to one if the parent reported that they belonged to a parent-teacher organization and zero otherwise; the outcome in columns (3) and (5) is an indicator equal to one if the parent reported that they attended meetings of a parent-teacher organization and zero otherwise. Parental English Ability is an indicator equal to one if the mother or female guardian's average English ability is classified as "Well" or "Very Well". Columns (1)-(3) are the OLS specification, and columns (4)-(6) use the IV-2SLS method: see equation (3). Each specification includes parent, child, and school controls. Standard errors in parentheses. Stars indicate significance with $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Data source: Children of Immigrants Longitudinal Study

The CILS mechanism results are reported in Table 6. The findings from Table 6 indicate a positive but statistically insignificant effect on the propensity of homework assistance. However, we do see a positive effect on the likelihood of being part of a parent-teacher organization. Although we see no impact on the attendance of organization meetings, attendance is presumably conditional on being a member. The parent-teacher variables serve as a proxy for school involvement and perhaps an ability to more readily interact with teachers or keep up with student progress. Thus, we see that Parental English ability does affect what may be an initial step in interacting with teachers, but we do not see that this affects meetings with teachers.

Table 7 presents our NIS results for parental involvement. As with the CILS results, we estimate a positive coefficient on the homework variable, but the result is statistically insignificant. Similarly, we see an effect on parental communication to teachers or counselors. An English ability of "good" or "very good" results in about a 45% increased likelihood of speaking to a teacher or counselor over the phone. We also see a significant increase in the likelihood of a class visit. Our results in Table 6 and Table 7 indicate some potential avenues by which parental English proficiency may affect children's academic performance.

There is some inconsistency between Table 6 and Table 7, particularly with regard to teacher interaction. However, note that the measures are not identical across datasets and we do not have specifics on subject matter nor on teacher type. In fact, these variables may not at all be the mechanism by which English proficiency affects academic achievement. It may be that differences in English proficiency do not markedly affect a parent's involvement or effort as it pertains to parent teacher meeting or checking homework—as shown in Table 6– and that the mechanism occurs much sooner. Early language environments have been associated with language development and educational outcomes (Forget-Dubois et al., 2009, Huttenlocher et al., 2002, Kim et al., 2015). Parents can be the most important source of

Table 7 NIS Parent English Ability Parental Involvement

	(1) HW Check	(2) Phone Teacher	(3) Visit Class	(4) HW Check	(5) Phone Teacher	(6) Visit Class
Parent English Ability	0.0656***	0.134***	0.0403*	0.222	0.452***	0.576***
	(0.0209)	(0.0246)	(0.0239)	(0.142)	(0.171)	(0.173)
F-Stat of Excluded Inst.	–	–	–	46.91	47.64	48.07
No. of Obs.	2453	2458	2459	2335	2339	2340

The outcome in columns (1) and (4) is an indicator equal to one if the parent reported checking their child's homework often and zero if they stated "sometimes," "rarely," or "never"; the outcome in columns (2) and (5) is an indicator equal to one if the parent reported that they phoned or spoke to a teacher or counselor within the last year and zero otherwise; the outcome in columns (3) and (6) is an indicator equal to one if the parent reported that they visited their child's class within the last year and zero otherwise. Parental English Ability is an indicator equal to one if the mother or female guardian's English ability is classified as "Good" or "Very Good," as recorded by an interviewer. Columns (1)-(3) are the OLS specification, and columns (4)-(6) use the IV-2SLS method: see equation ((3)). Each specification includes parent and child controls. Standard errors in parentheses. Stars indicate significance with $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Data source: New Immigrant Survey

early language input to children (Suskind et al., 2016). That said, it is of note that the variables used to capture speaking or contacting teachers were positive and significant. Independent of academic outcomes, this result may signal that lack of English proficiency prevents or dissuades parents from interacting with school officials. To be clear, the parental involvement result does not mean that the parents with limited English proficiency do not want to get involved. On the contrary, the findings suggest that there may be benefit to being involved in a child's schooling, and that limited English is preventing parents from communicating with their children's school. If we assume that there is some non-zero cost to taking the time to be part of a parent teacher organization or speaking with a student's school, then one can make a revealed preference argument about the benefits of interacting with a child's school. Moreover, the lack of statistical significance in assistance with homework may indicate that parents with low English proficiency *do* want to be involved but are unable to or dissuaded due to their limited English proficiency.

5 Sensitivity, Robustness, and Heterogeneity

Thus far, our results suggest that improved parental English proficiency improves scores on assessments that require reading or text comprehension (as opposed to simple math calculations) and increases the likelihood of parents interacting with their child's school or teachers. However, there may be some concerns with our IV construction, and our findings may mask some of the heterogeneity. We address these by re-estimating our model using alternative instruments and stratify our sample across various demographics to determine if our results are most salient for any particular groups. Lastly, we consider whether the academic outcomes differ by

Fig. 1 Alternate Specifications, CILS. The outcomes in the left panel are standardized Stanford math and reading achievement test scores. The outcomes in the right panel are an indicator equal to one if the parent reported helping their child with homework more frequently than once a month and zero if they reported helping seldom or never, an indicator equal to one if the parent reported that they belonged to a parent-teacher organization and zero otherwise, and an indicator equal to one if the parent reported that they attended meetings of a parent-teacher organization and zero otherwise. The estimation uses the IV-2SLS method where the coefficient for mother English ability is plotted: see equation (3). Each specification includes parent, child, and school controls. Standard errors in parentheses. Stars indicate significance with $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. Data source: Children of Immigrants Longitudinal Study

type of parental involvement measure. Note that when stratifying by some of the variables reported in Figures 1 and 2 our first-stage is significantly weakened. Thus, these results should be interpreted with caution. [4]

5.1 Other Instruments

We first consider alternative critical ages to construct our IV. In addition to age 11, we consider ages 9, 10, 12, 13, and 14. We plot these estimates and 95% confidence interval for each of the academic and parental involvement variables in Figures A1 and B1. The alternative ages result in similar estimates in sign and magnitude to our main results.

Given that we used the mother's English proficiency and characteristics, we also consider the effects of the father or male parent/guardian. These results are presented in Appendix Tables A3 and A8 for the CILS data and Tables B3 and B8 for the NIS data. We also run our analysis using variables for the father and find that the test

[4] In these cases, we replace country of origin indicators from equation (3) with a dummy variable for whether the parent is from a non-English speaking country.

Fig. 2 Alternate Specifications, NIS. The outcomes in the left panel are the standardized scores of Letter-Word identification, Applied Problems, Calculation, and Passage Composition Woodcock-Johnson assessments. The outcomes in the right panel are an indicator equal to one if the parent reported checking their child's homework often and zero if they stated "sometimes," "rarely," or "never", an indicator equal to one if the parent reported that they phoned or spoke to a teacher or counselor within the last year and zero otherwise, and an indicator equal to one if the parent reported that they visited their child's class within the last year and zero otherwise. The estimation uses the IV-2SLS method where the coefficient for mother English ability is plotted: see equation (3). Each specification includes parent and child controls. Standard errors in parentheses. Stars indicate significance with $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Data source: New Immigrant Survey

score results are weaker; this is potentially due to a weaker IV. However, when examining the parental involvement outcomes, we see that the CILS results are stronger than those from the mother specification, Appendix Table A8. The propensity to assist with homework is now positive and significant, and the variable indicating membership in a parent-teacher organization is stronger. It is important to note that our results do not necessarily mean that paternal English proficiency is relatively less likely to impact children. There is a higher likelihood that if a child has only one parent in the household it is the mother. Thus, it is possible that we may have too few fathers in the dataset to make a distinction between paternal and maternal effects.

We also acknowledge that the dichotomous variable used to catalog a country as English speaking or not may be too crude of a measure. Instead, it could be that countries, and more specifically their languages, are on a continuum where it may be easier to learn English for some individuals depending on their birthplace. Therefore, we use a measure of linguistic distance that captures an individual's difficulty in learning the English language. Although some languages share similarities with English, the difficulty of learning may differ across countries. We construct the same IV but replace our dichotomous non-English speaking country variable with a

continuous variable that measures the linguistic distance between English and each country's primary or official language. These data come from the Automatic Similarity Judgement Program (ASJP) database, which contains constructed pairwise distances between languages based on phonetic distance.[5] The complete theory behind and construction of the ASJP linguistic distance measure falls outside the scope of our paper and in the linguistics literature. We summarize the ASJP linguistic distance measure as follows. The ASJP compares words with the same meaning across languages from a 40-word list capturing basic concepts like "you." These words are first translated into a phonetic alphabet for each language since the focus is on pronunciation; this also allows comparisons across languages with different writing systems. Then, pairwise analysis calculates the number of insertions, deletions, and substitutions of sounds required to change one synonym into the other, divided by the number of sounds in the longer of the two words to handle differences in word length. Finally, to calculate a summary linguistic distance measure, the average distance between the pairs of synonyms is divided by the average distance between words with different meanings between the languages. The ASJP measure quantifies comparisons that would otherwise be difficult to ascertain qualitatively, e.g., whether Chinese or Tagalog is closer to English since each of the three belongs to a different language family. A lower distance value indicates a higher probability of the two languages sharing characteristics, such as grammar, presumably making a language easier to learn. We present these results in Appendix Tables A4 and A9 for the CILS data and Appendix Tables B4 and B9 for the NIS data. The results from the linguistic distance specification are consistent with those from our baseline specification. Another linguistic distance measure is presented by Chiswick and Miller (2005).[6] The results for this analysis are presented in Table A14 and B14. As with Bakker et al. (2009) measure, the overall findings are similar to the results from our main specifications.

Given that our data contains missing values for some of the survey questions, we re-estimate our models by imputing missing values for the independent variables. We replace missing values of a variable with the average of the variable. We include a dummy variable in each regression that equals one if the observation contains an imputed value and zero otherwise. Appendix Tables A7, A12, B7, and B12 present these results. We present several specifications. First, we impute values for control variables but do not impute Parental English Ability or the components of the IV. The second specification imputes controls and parental English Ability values but does not impute the IV components. The last model imputes all independent variables. Generally, the results are consistent with our main findings when using these models.

[5] The algorithm is developed by Bakker et al. (2009). Isphording and Otten (2013) provide a detailed explanation of the ASJP dataset and the linguistic distance measure.

[6] We do not focus on this measure as it may be less appropriate in our context because it is based on the language scores from adult English-speaking Americans learning another language. This construction assumes symmetry in the difficulty between English-speaking natives learning another language and an immigrant speaking that language learning English. It also assumes that the only reason for differences between test scores is the difficulty of learning a language when motivating factors like differential economic or social returns across languages likely also play a role.

5.2 Excluding Countries

As noted above and in Figure C2, we acknowledge that our datasets may include migrants who disproportionately immigrate from selected countries (e.g., developing countries). In the CILS dataset, a sizable portion of the foreign-born students are either from the Philippines (15%) or Cuba (18%). We exclude each of these countries and rerun our analysis. Our results are robust to each of these specifications. In the NIS dataset, almost 22% of the children are of Mexican nationality. In the Appendix, Tables A5, A10, B5, and B10 provide estimates excluding these children, and again we find that our results are robust to these specifications.

Another possible concern with our IV estimation is that it relies on identifying English-speaking countries, see Appendix Table C2. It may be that the exposure to the United Kingdom's culture or institutions through the residual effects of colonization contribute to the effects we find (Acemoglu et al., 2001). However, our current instrument may address this concern. One of the comparisons built into the IV is between parents who arrived in the United States at different ages but who are all from an English-speaking country. This variable construction removes the time-invariant effects from a parent being from an English-speaking country. It is possible that the influence of culture and institutions also have time-varying effects based on an immigrant's age at arrival. While we cannot control this possibility, we expect language to have a much greater differential effect based on age at immigration over these other potential factors. Nonetheless, we can empirically address this concern by considering an analysis that excludes English-speaking countries by leveraging the fact that the linguistic distance measure is continuous (Bakker et al., 2009). We find comparable results to our main findings when restricting the results to non-English speaking countries and using the linguistic distance instrument. These results are presented in Tables A6 and A11 for the CILS data and Tables B6 and B11 for the NIS data.

5.3 Child Characteristics

We also consider whether our effects differ across child characteristics available in our data. To do this, we stratify each sample in various ways. First, we estimate the model for foreign-born and U.S. born children, respectively. Second, we consider children who have resided in the U.S. above and below the median number of years in the data. Lastly, we examine whether the effects differ by a child's gender. These results are presented in the first seven rows of Figures 1 and 2.

For the CILS sample, in Figure 1, it is clear that the findings are concentrated among foreign-born children (rows 2 and 3). The estimated effect of parental English for math and reading assessments is similar to the original estimates (row 1). We also see that parents of foreign-born children have a lower propensity to assist with homework and are much more likely to be part of a parent-teacher organization. Together, these results indicate that parents of foreign-born children with higher English ability are less likely to assist their child with schoolwork but are otherwise engaged in their child's schooling. In rows 4 and 5, we restrict the sample to children who have resided in the U.S. above and below the median number of years in the sample (9 years or fewer). This analysis shows that the effects are driven by those residing in the U.S. for fewer years. Now, not only are the effects on reading scores significant but also the math assessments. For homework

assistance and being part of a parent-teacher organization, we see little difference for those children that have resided in the U.S. for many years or fewer years. Rows 6 and 7 partition the CILS sample by child gender. For both male and female children, we see similar effects to the original estimates. Although, the female estimates are less precise for the reading test.

The heterogeneous estimates for the NIS sample are presented in Figure 2. Rows 2 and 3 stratify the results by foreign-born status. Unlike the CILS results, we do see that U.S. born children's test scores are affected by parental English ability. Both the applied and passage comprehension results are positive, although only precisely estimated for the latter assessment. Similar to the CILS, we see that foreign-born children benefit the most from parental English. The coefficient of the effect of parental English ability on the letter-word, applied problems, and passage comprehension tests are all statistically significant. Foreign-born parents are also more likely to visit the class and speak to a teacher, which indicates that visiting the class and speaking to a teacher is associated with better educational outcomes. For the number of years residing in the U.S., rows 4 and 5, the results suggest a stronger effect for those in the U.S. for a shorter time (fewer than four years), specifically for the letter-word and applied problems assessment. We also see that the parental involvement findings are driven by those who have resided in the U.S. for a shorter time. Lastly, results in the NIS sample are stronger for female children. The results for females are similar to our baseline estimates. For males, parental English only affects the passage composition score. The parental involvement findings are similar across gender; parental English is associated with speaking to a teacher and visiting class.

In summary, both sets of data indicate that parental English proficiency has the largest impact on foreign-born children or those with fewer years of U.S residence. We also see more pronounced results for the younger or female NIS cohort and no gender difference for the older children in the CILS.

5.4 Parent Characteristics

We also consider whether our results differ across parent (i.e., mother) characteristics. Rows 8 and 9 of Figures 1 and 2 stratify the sample by mother's age (above and below the median, respectively). In rows 10 and 11 of each figure, we consider whether our findings differ for children with both biological parents at home. Rows 12 and 13 stratify the sample by mothers' years of education (above and below the median, respectively).

It may be that parenting styles differ across parents' ages, so we consider whether our findings differ by stratifying our findings by mothers above and below the median age within each dataset, respectively. For the CILS respondents, Figure 1, the math result seems to be concentrated among younger mothers, similar to our main findings, rows 8 and 9. For older mothers, English proficiency does not seem to affect the reading or math outcomes. Conversely, English proficiency among older mothers is associated with being part of a parent-teacher organization, where this is not the case for younger mothers. In rows 10 and 11, we consider the effect of English proficiency by family structure. What is clear is that English proficiency seems to benefit children residing in homes where at least one biological parent is not present. Interestingly, for these students, the effect of parental English proficiency is

statistically significant for both math and reading assessment specifications. This result indicates that English proficiency matters most for students in relatively less stable homes. On the other hand, the positive effect on joining a parent-teacher organization is driven by children living with both biological parents. We also consider whether the effect of English proficiency differs depending on mothers' educational attainment. Row 12 restricts the sample to mothers with above the median number of years of education (high school or more), and row 13 restricts the sample to less than high school. Similar to the family structure result, English proficiency seems to have the largest impact for children with mothers with less than a high school degree, row 13. However, we find that the parental involvement findings are driven by mothers with relatively more years of education.

Rows 8 and 9 of Figure 2 show that the result for both older and younger mothers in the NIS sample are similar to our results for the assessment of the applied problems. We find that the positive effect of English proficiency on the letter-word assessment dissipates for older mothers. The passage comprehension results are now imprecisely estimated for younger mothers. English proficiency is more likely to lead older mothers to phone a teacher but not more likely to visit, while younger mothers with higher English ability are more likely to do both. Taken together, we do not see any consistent differences across maternal age groups. In row 10, we stratify the sample to children that reside with both of their biological parents. Row 11 restricts the sample to all other parental configurations. What is evident for the CILS respondents is that English proficiency has the largest impact on test scores for those with biological parents. The estimated effects on the letter-word, applied problems, and passage comprehension assessments are larger than our baseline estimates. The parental involvement results are also driven by children residing with biological parents. When stratifying by mother's education, we see consistency for both older and younger mothers; however, the results for test scores are most precisely estimated for mothers with fewer years of schooling.

5.5 Household Characteristics

We also examine the effects of household size. The number of individuals in a household or siblings can affect the number of educational resources devoted to each child. Conversely, siblings may be able to assist parents by helping with their brother or sister's education. Rows 14 and 15 of Figures 1 and 2 stratify the sample by the median number of individuals in the household (above and below 4 members, respectively). In rows 16 and 17, we stratify the model by children with more or fewer than the median number of siblings (2), respectively.

For the CILS sample, Figure 1 shows that the prior academic findings are concentrated among larger households, specifically the reading assessment. Conversely, English proficient parents are most likely to assist with homework and be a part of a parent-teacher organization in smaller households. English proficiency improves reading test scores for children above and below the median number of siblings; however, children with more than two siblings also experience relatively higher math scores. Not surprisingly, parental English results in a lower likelihood of homework assistance for households with many siblings. In contrast, English proficient parents are more likely to provide schoolwork assistance when there are fewer siblings.

Rows 14-17 of Figure 2 provide the heterogeneous effects by household size in the NIS sample. Rows 14 and 15 split the sample by the number of residents in the household. Parental English proficiency improves test scores across household size, but the effects seem largest for smaller households. Parental involvement is also consistent across household size– parent English proficiency increases the likelihood of a class visit and contacting a teacher. Rows 16 and 17 examine the effects by the number of siblings. Here, the impact on test scores seems to be driven by children with relatively more siblings. Those with more siblings also are most likely to have English proficient parents be involved by phoning a teacher or visiting a class.

In summary, the effects of Parent English proficiency seemed to be most pronounced in larger households with more children. This is particularly true for the older cohort (i.e., the CILS sample).

5.6 Academic Outcomes by Parental Involvement

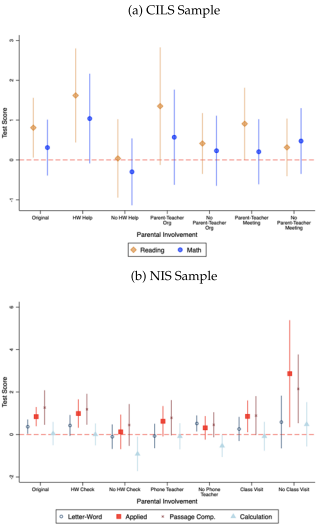
We now consider the interaction of our parental involvement variables with our measure of English proficiency and the effect on test scores. Figure 3 presents the estimates and 95% confidence interval of our main model stratified by measures of parental involvement.[7] These results should be interpreted as associations and with caution given that, as shown above, English proficiency also affects parental involvement.

For the CILS sample, Figure 3a, we find that the effects of English proficiency on math and reading assessment scores are most pronounced in instances where parents are involved in their child's schooling. For example, the point estimates on parental English for those parents that help children with their homework are larger than our baseline findings. Conversely, for parents who seldom assist their children, the point estimates are near zero for math and reading test scores. Similarly, for parents who are part of a parent-teacher organization or attend parent-teacher meetings, English proficiency has a larger effect.

In the NIS sample, Figure 3b, we see a similar pattern for parents that check their children's homework. Parental English proficiency is positively associated with test scores when the parent checks the child's homework, and there is no impact if homework is seldom checked. Unlike in the CILS sample, the other measures of parental involvement do not amplify the effects of English proficiency. The effects are relatively stronger for parents that speak to the teacher but imprecisely estimated in both cases. And, for class visits, we see that the point estimate on English proficiency is larger for parents that do not visit the class.

Moreover, the interaction of our parental involvement variables and English proficiency, raises the question of whether parents with children that are doing well in school find it unnecessary to be involved? We examine this possibility in Appendix Figures A2 and B2. In Figure A2, we plot the estimates from an OLS regression of the CILS parent-teacher meeting indicator on the other measures of involvement as well as the reading and math scores. Figure B2 plots the estimates

[7] We are unable to perform a causal mediation analysis in instrumental variables as proposed in Dippel et al. (2019) due to our IV being too weak in the mediator first stage. A strong instrument for this stage requires an F-statistic of 30. See Dippel, Ferrara and Heblich (2020) for a concise explanation and instructions on how to implement this estimator.



Notes: The outcomes in the Panel (a) are the standardized Stanford math and reading achievement test scores. The outcomes in Panel (b) are the standardized scores of Letter-Word identification, Applied Problems, Calculation, and Passage Composition Woodcock-Johnson assessments. Each regression is restricted by the parental involvement measure on the x-axis. The restrictions for Panel (a) are as follows: parents that reported helping their child with homework more frequently than once a month (column 2); parents that reported helping seldom or never (column 3); parents that reported that they belonged to a parent-teacher organization (column 4); parents that did not belong to a parent-teacher organization (column 5); parents that reported that they attended meetings of a parent-teacher organization (column 6); parents that reported that they did not attended meetings of a parent-teacher organization (column 6). The restrictions for Panel (b) are as follows: parents that reported checking their child's homework often (column 2); parents that reported checking their child's homework "sometimes," "rarely," or "never" (column 3); parents that reported that they phoned or spoke to a teacher or counselor within the last year (column 4); parents that reported not speaking to a teacher or counselor within the last year (column 5); parents that reported that they visited their child's class within the last year (column 6); and parents that reported that they did not visit their child's class within the last year (column 7). The estimation uses the IV-2SLS method where the coefficient for mother English ability is plotted: see equation (3): see equation (3). Each specification includes parent and child controls. Standard errors in parentheses. Stars indicate significance with * p<0.10, ** p<0.05, ***p<0.01. The data source for Panel (a) is the Children of Immigrants Longitudinal Study and for Panel (b) it is the New Immigrant Survey.

Fig. 3 Test Scores Stratified by Parental Involvement. The outcomes in the Panel (a) are the standardized Stanford math and reading achievement test scores. The outcomes in Panel (b) are the standardized scores of Letter-Word identification, Applied Problems, Calculation, and Passage Composition Woodcock-Johnson assessments. Each regression is restricted by the parental involvement measure on the x-axis. The restrictions for Panel (a) are as follows: parents that reported helping their child with homework more frequently than once a month (column 2); parents that reported helping seldom or never (column 3); parents that reported that they belonged to a parent-teacher organization (column 4); parents that did not belong to a parent-teacher organization (column 5); parents that reported that they attended meetings of a parent-teacher organization (column 6); parents that reported that they did not attended meetings of a parent-teacher organization (column 6). The restrictions for Panel (b) are as follows: parents that reported checking their child's homework often (column 2); parents that reported checking their child's homework "sometimes," "rarely," or "never" (column 3); parents that reported that they phoned or spoke to a teacher or counselor within the last year (column 4); parents that reported not speaking to a teacher or counselor within the last year (column 5); parents that reported that they visited their child's class within the last year (column 6); and parents that reported that they did not visit their child's class within the last year (column 7). The estimation uses the IV-2SLS method where the coefficient for mother English ability is plotted: see equation (3). Each specification includes parent and child controls. Standard errors in parentheses. Stars indicate significance with $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. The data source for Panel (a) is the Children of Immigrants Longitudinal Study and for Panel (b) it is the New Immigrant Survey

from a regression of the NIS class visit indicator on the other measures of involvement as well as the test scores from NIS. Each figure separates the estimates by mothers' English ability. Overall, these specifications suggest that the parental involvement measures are positively correlated. This result provides suggestive evidence against a lack of interest driving the null results for some involvement

measures. Conversely, there is a weaker relationship between the test scores and the parent-teacher meeting/class visit variables. One exception is in Figure B2, which suggests that for low-English ability parents, a higher passage composition score increases the likelihood of a class visit. This finding indicates that English proficiency may contribute to the parental involvement results and that a child's academic ability does not solely drive a parent's participation in their child's schooling.

6 Conclusion

This paper attempts to capture the effect of immigrants' English proficiency on parental involvement and the educational performance of their children. Using the Children of Immigrants Longitudinal Survey and the New Immigrant Survey, this paper causally estimates the effect of immigrant English proficiency on the academic achievements (specifically, in math and reading) of their children. Together, the data allows us to examine children ranging from three to fifteen years of age. Given the confounding factors associated with English knowledge, we employ an instrumental variables two-stage least squares strategy similar to Bleakley and Chin (2004, 2010). For the NIS sample, our results suggest that children of immigrant parents with higher English proficiency score higher on reading/literacy tests as well as applied math-related assessments (e.g. word problems). For the CILS sample, we do not see an effect on the math-related assessment. However, we still see a positive effect on reading scores. We also consider parental involvement for these effects and find that, across both samples, a parent's English proficiency results in a higher likelihood of interaction with a child's school and teachers.

Overall, our findings suggest that the English ability of immigrant parents has a persistent and lasting effect on their children's academic performance. We understand that these findings may be pertinent to the greater debate around targeted immigration policy and how to value the skills and capital accrued by individuals prior to immigrating. However, our results alone do not suggest limiting or increasing any types of immigrants without considering broader general equilibrium effects. We also want to note that our results are not an indictment on children learning their parents' native tongue or culture. For instance, there is evidence that knowledge of a second language results in a wage premium (Saiz and Zoido, 2005). Learning a second language can also vary by ethnicity/ancestry. For instance, there may be little benefit for third-generation immigrants in learning the mother tongue of their great-grandparents. Moreover, recent work by Figlio et al. (2019) suggests that in countries and cultures that emphasize delayed gratification[8] - and many value delayed gratification more than the U.S. - students test higher in both reading and math. As we interpret our results, we find that they tell us more about addressing disparities between students with and without English proficient parents. Policy makers should make a concerted effort to identify students whose parents are less proficient in English and provide them with additional resources to not only improve their academic performance but their parents ability to communicate with teachers and schools.

Compliance with Ethical Standards The authors declare no competing interests.

[8] Termed *Long-term Orientation*.

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