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The effects of age at arrival and enclave schools on the academic performance of immigrant children

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Abstract

This paper analyzes the relationship between age at arrival and immigrant-receiving high schools (i.e., enclave schools) on the academic performance of first- and second-generation immigrant children using data from the Children of Immigrants Longitudinal Study (CILS). The CILS survey was conducted in two major immigrant-receiving cities in the US—San Diego and Miami. Results show that the test score gap between first- and second-generation immigrant children decreases the longer first-generation immigrant children reside in the US. In addition, results indicate that students who attend enclave schools do not perform any differently on their reading and math tests and that the assimilation profiles of immigrant children in enclave schools do not differ from those who attend non-enclave schools.

JEL Classifications: I20; J00; J13

Keywords: Human capital; Rate of return; School choice

1. Introduction

The majority of research on immigrant adaptation in the US has focused on immigrants who are of working age and in the labor market (Chiswick, 1978; Grossman, 1982; Borjas, 1985; Card, 1990, 2001; Altonji & Card, 1991; Friedberg, 1993; Friedberg & Hunt, 1995). Few studies, however, have paid attention to the adaptation of their children.[1] Because most immigrant youths will remain in the US, their success later in life is presumably determined by their adaptation to the US school system. Studies have shown that low test scores of youths are associated with negative labor market outcomes as adults (Murnane, Willet, & Levy, 1995; Currie & Thomas, 1999). Since children of immigrants make up a non-trivial 20% of the nation's student population (Urban Institute, 2000), the assimilation of their children is of extreme importance.

This paper analyzes the relationship between age at arrival and attendance at an immigrant receiving high school (hereafter, enclave schools) on the academic performance of first-generation immigrant children (those born abroad) and second-generation children (those born in the US of one or two immigrant parents) using data from the Children of Immigrants Longitudinal Study (CILS).[2] The CILS data set contains

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[1] With the exception of the research conducted by Chiswick and DebBurman (2004), Gonzalez (2003), and Card, DiNardo, and Estes (1998).

[2] The CILS data only contains information on first-generation immigrant children and second-generation children of immigrants; unfortunately, third-generation children (those who are

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detailed information on various academic performance measures, school characteristics, and parental characteristics of these children in two major immigrant-receiving cities in the US—San Diego and Miami.

This study contributes to the literature in two ways. First, it examines the academic performance of first-generation immigrant children (hereafter, immigrant children) relative to second-generation children of immigrants (hereafter, second-generation) by analyzing their test scores from two widely used cognitive tests: the English reading vocabulary and comprehension subtest of the Abbreviated Stanford Achievement Test (ASAT-Reading) and the mathematics subtest of the Abbreviated Stanford Achievement Test (ASAT-Math). Secondly, it compares the academic performance of children who attend enclave schools to those who attend non-enclave schools. These two different school settings could potentially slow down or speed up the school performance of these two distinct immigrant generations. Because immigrants tend to predominantly settle in ethnic and low-income communities (Bartel, 1989; Borjas, 1998, 2002; Jaeger, 2000), one might expect the school performance of their children to differ in these two distinct school environments.

Overall, the findings of this study are in line with previous studies which show that immigrant children who arrive in the US before their formal schooling commences perform as well as those who were born in the US to immigrant parents. Results show that the test score gap between second-generation and immigrant children decreases the longer the immigrant children reside in the US. In fact, immigrant children, with more than 10 years of US residence perform as well as their second-generation counterparts.

The findings of the San Diego sample indicate that students who attend enclave schools do not perform more poorly on their reading test than students who attend non-enclaves, and the assimilation profiles of immigrant children who attend enclave schools do not differ from those of immigrant children in non-enclave schools. For children in the Miami sample, there is a slight enclave school effect (within the OLS framework) on both reading and math test scores. In addition, propensity score matching technique is used to counter the non-randomness of the sample. This alternative procedure attempts to mediate the potential bias in the sample due to possible selection into enclave schools. For the San Diego sample, this second approach obtains the same qualitative conclusions as when the ordinary least-squares estimation is employed; however, the enclave effect is no longer present for the Miami sample.

2. Literature review

The research on immigrant education ranges from post-migration schooling (Shultz, 1984; Chiswick & Miller, 1994; Khan, 1997) to the effect of education acquired in the source country on immigrant earnings in the host country (Friedberg, 2000; Schaafsma & Sweetman, 2001; Bratsberg & Terrell, 2002). The educational attainment of immigrants will differ depending on immigrant generation and the age at which the immigrant arrives in the host country (Kao & Tienda, 1995; Riphahn, 2001; Gonzalez, 2003; Chiswick & DebBurman, 2004). Studies have found that second-generation children fare better academically than first-generation children and native-born children. However, first-generation children who arrive at relatively young ages will attain education levels equivalent to those of their second-generation counterparts. Chiswick and DebBurman (2004) conduct a thorough analysis using the Current Population Survey (CPS) and show that the educational attainment of second-generation adults exceeds that of foreign- and native-born adults. They also show that children who migrate as teenagers have fewer years of education than those who came to the US in their pre-teen or post-teen years.

There has also been scant but expanding research on the effects of ethnic enclaves (e.g., immigrant concentration) on the assimilation of immigrants in the host country. This line of research focuses on the effects of enclaves on the following: educational attainment (Borjas, 1995; Gang & Zimmermann, 2000), linguistic proficiency (Chiswick & Miller, 2002), and labor market outcomes (Gonzalez, 1998; Chiswick & Miller, 2002; Edin, Fredriksson, & Åslund, 2003). A priori, the effect of ethnic enclaves on immigrant outcomes is ambiguous because enclaves themselves can either help immigrant adaptation (e.g., by providing job opportunities through occupational niches already well-established in the host country) or hinder assimilation (e.g., by decreasing the opportunity for proficiency in the host country's native language). One study in particular stands out among this research: Edin et al.(2003), who used experimental data from an immigrant policy enactment in Sweden (in which the government distributed refugee immigrants across locales) and found that living in enclaves improves labor market outcomes for less-skilled immigrant workers.

Though there has been research conducted on educational attainment by immigrant generation, age at arrival, and the effects of ethnic enclaves on immigrant adaptation, we know little about how an enclave school setting affects the school performance of

(*footnote continued*)
native-born of native-born parents) were not collected. An equally important question that the CILS data cannot address is how long it takes for the performance of first- and second-generation immigrant children to catch up to that of their native-born counterparts.

children of immigrants. This study aims to fill in the gap in the literature by analyzing the school performance (measured by standardized reading and math test scores) of students who attend enclave schools and the assimilation profiles of immigrant children who attend those schools.

3. Data and sample summary statistics

3.1. Data sources

The data for this analysis comes from the first wave of the CILS, which gathered detailed information on over 5200 children in the spring of 1992. This data set constitutes a rich source of information on academic performance, school characteristics, parental information, educational and occupational aspirations of the immigrant child, and subjective measures of personal experience (e.g., discrimination, peer pressure, family conflict, self worth, etc.). The CILS survey was conducted in two key immigrant receiving-cities: San Diego and Miami. The children in this study consist of students enrolled in the eighth and ninth grades at the time of the survey from the San Diego Unified School District (17 schools) and the Dade and Broward County Unified School Districts (23 schools).[3] Students were eligible to participate in the CILS study if they were US-born and had at least one immigrant parent (i.e., second-generation), or if they were foreign-born and immigrated to the US before the age of ten (i.e., first-generation). The sample was drawn from the eighth and ninth grades, when dropout rates are still relatively low, in order to avoid the potential bias of differential dropout rates among ethnic groups at the senior high school level. Public schools in the CILS universe are classified as enclave schools based on the fraction of children in the school sample who were born abroad. More precisely, individual schools from which greater than 25% of the interviewed sample were born abroad were classified as immigrant-receiving schools.

In addition to the CILS data, the Common Core of Data (CCD) (1992–1993) is used to match each public high school in the CILS with the CCD to obtain information on school characteristics. The CCD consists of four surveys completed annually by state education departments and provides data on almost all US public elementary and secondary schools, local education agencies, and state education agencies. One of the four surveys—The Public School Universe—is used here, and provides information on all public elementary and secondary schools in operation during a school year, including school location and type, enrollment by grade, student characteristics, and the number of classroom teachers.

3.2. Summary statistics

The children interviewed in these high schools are representatives of today's immigrant flows to the US. Recent immigrant flows originate predominantly from Mexico, Central America, South America, East Asia, South Asia, and Southeast Asia (South East Asians are more likely to be from refugee-sending countries).[4] Table 1 presents the pooled sample sizes of immigrant and second-generation children in Miami and San Diego public high schools by nationality and gender. The long-standing immigrant settlement patterns are evident in this table. The Miami sample consists mainly of Cubans, Central Americans, Caribbeans, and South Americans. By comparison, the San Diego sample consists of Mexicans, Filipinos, East and South Asians, and Southeast Asians. The category "Others" in Table 1 refers to smaller nationality groups originating from the Middle East, Africa, Europe, and Canada.

Table 2 presents some descriptive statistics for both the San Diego and Miami samples by enclave and non-enclave school status. Overall, we observe different sample characteristics for students who attend enclaves versus non-enclave school attendees. For both the San Diego and Miami samples, test performances differ depending on the school setting: students who attend non-enclave schools have higher ASAT-Reading and ASAT-Math percentile scores than those who attend enclave schools. For the San Diego sample, non-enclave school attendees score 12 and 7 percentiles higher in their reading and math tests, respectively, relative to enclave school attendees. The Miami sample shows the same test differences by school: non-enclave school attendees score 8 and 11 percentiles higher in their reading and math tests.

We also observe that enclave schools have a higher percentage of first-generation students and fewer second-generation students; this pattern is observed for both the San Diego and Miami samples. For instance, in the San Diego sample, 69% versus 31% are first- and second-generation children, respectively, who attend enclave schools compared to 49% and 51% who attend non-enclave schools. Further inspection of the first-generation group by number of years lived in the US shows that enclave schools have higher percentages of recent immigrant children (although the Miami sample has very few recent immigrant children under the category "less than five years").

[3]The estimation only includes public high schools, which make up the majority of the sample. The original survey sampled 40 public high schools and only two private high schools.

[4]See Cortes (2004) for detailed discussion on this point.

Table 1
Sample sizes of children by mother's national origin and by percent in Miami and San Diego public high schools

Mother's national origin*	Immigrant and second-generation children				
	Girls ($N = 2658$)	Boys ($N = 2397$)	Percent immigrant	Percent in Miami	Percent in San Diego
Cuban	555	489	35.34	99.81	0.19
Central American[a]	259	235	82.59	93.52	6.48
Caribbean[b]	351	204	55.86	95.50	4.50
South American[c]	229	191	54.06	92.86	7.14
Mexican	366	388	44.69	3.58	96.42
Filipino	412	407	52.87	1.34	98.66
Southeast Asian[d]	337	336	89.45	1.49	98.51
East and South Asian[e]	86	86	46.51	26.16	73.84
Other[f]	63	61	33.06	95.16	4.84

Source: Children of Immigrants Longitudinal Study (CILS) 1992, Wave T1.
Notes: *Sample includes both immigrant and second-generation children under the heading column Girls and Boys.
[a]Central Americans consist of: Nicaraguans, Salvadorians, Guatemalans, Honduras, Costa Ricans, and Panamanians.
[b]Caribbeans consist of: Dominicans, Jamaicans and West Indies.
[c]South Americans consist of: Colombians, Argentineans, Chileans, Ecuadorians, Peruvians, and Venezuelans.
[d]Southeast Asians consist of: Vietnamese, Laotians, Cambodians, and Hmongs.
[e]East and South Asians consist of: Chinese, Taiwanese, Japanese, Koreans, Indians, and Pakistanis.
[f]Other consists of the following smaller groups: Middle East, Africa, Europe, and Canada.

The CILS survey collected a variety of parental and household information on each child, the most salient being parental education, family structure, and home ownership. There are noticeable differences in parental education between enclave and non-enclave school status: for children in enclave schools, average years of schooling for mothers and fathers is much lower than in non-enclave schools. This pattern is seen in both the San Diego and Miami samples. For instance, in the San Diego sample we observed that mean years of schooling for mothers who have a child in an enclave school is 10.35 compared to 11.67 for mothers who have a child in a non-enclave school. A similar pattern is also seen with fathers' education. Another interesting feature emerges when we look at the household composition by enclave and non-enclave schools: immigrant parents who are married to a US citizen tend to be concentrated in non-enclave schools. In addition, the fraction of two-parent families is higher in non-enclave schools. Home ownership also varies significantly for parents of children who attend enclave versus non-enclave schools—parents of non-enclave children are more likely to own their home. These overall patterns between enclave and non-enclave schools for marriage, family structure, and home ownership are seen for both the San Diego and Miami samples.

There are also observable differences in school-level characteristics for both the San Diego and Miami samples by school type. The proportion of children eligible for the federally subsidized lunch program (which is a standard indicator of the average socio-economic status of a school) is higher for the enclave schools. In the San Diego enclave schools, 64% of students are eligible for federally subsidized lunch meals compared to 41% of students at the non-enclave schools. The Miami sample school student eligibility is similar—53% versus 35% in the enclave and non-enclave schools, respectively. Also, enclave schools are more likely to be in an inner-city location than non-enclave schools. For the San Diego sample, 80% of the enclave schools are located in an inner city; in the Miami sample about 54% of the enclave schools are in an inner-city location.

4. Model specification and empirical results

As noted earlier, students were eligible to participate in CILS if they were US-born and had at least one immigrant parent (i.e., second-generation children) or if they were foreign-born and arrived in the US before the age of ten (i.e., immigrant children). Three categories of immigrant children are distinguished in the analysis: those that have been in the US less than five years, those that have been in the US between five to nine years, and those that have resided in the US for more than ten years. If adaptation occurs, we should observe the test score gap, for example, between second-generation and immigrant children to be inversely proportional to time spent in the US. In addition, there might be different test score outcomes for immigrant children who attend enclave schools compared to those who attend

Table 2
Descriptive statistics

	San Diego				Miami			
	Enclave schools		Non-enclave schools		Enclave schools		Non-enclave schools	
Dependent variables								
ASAT-reading percentiles	29.69	(29.19)	42.20	(29.43)	39.92	(23.68)	48.33	(25.03)
ASAT-math percentiles	43.70	(31.34)	51.33	(30.07)	52.18	(27.17)	62.89	(27.88)
Immigrant generation								
First	0.691	(0.016)	0.489	(0.013)	0.577	(0.013)	0.410	(0.016)
Second	0.309	(0.462)	0.511	(0.500)	0.423	(0.494)	0.590	(0.492)
Years in the US (first-generation)								
Less than 5	0.082	(0.274)	0.043	(0.202)	0.001	(0.038)	0.006	(0.075)
Between 5–9	0.276	(0.447)	0.164	(0.370)	0.282	(0.450)	0.172	(0.377)
10 or more	0.333	(0.472)	0.283	(0.451)	0.294	(0.456)	0.231	(0.422)
Basic controls								
Age	14.09	(0.878)	14.22	(0.822)	14.42	(0.848)	13.99	(0.790)
Girl	0.490	(0.500)	0.508	(0.500)	0.568	(0.496)	0.550	(0.497)
Grade dummies:								
Eighth	0.709	(0.454)	0.443	(0.497)	0.422	(0.494)	0.776	(0.417)
Ninth	0.291	(0.454)	0.557	(0.497)	0.578	(0.494)	0.224	(0.417)
Mother's education	10.35	(3.540)	11.67	(3.864)	11.71	(3.321)	12.82	(2.882)
Father's education	11.17	(3.426)	12.21	(3.368)	11.78	(3.292)	13.16	(2.943)
Family controls								
One parent US-born	0.127	(0.333)	0.180	(0.386)	0.083	(0.276)	0.196	(0.397)
Family structure:								
2 biological parents	0.681	(0.466)	0.752	(0.432)	0.542	(0.498)	0.646	(0.478)
1 biological and step parent	0.086	(0.280)	0.100	(0.300)	0.160	(0.364)	0.137	(0.344)
1 parent (mom or dad alone)	0.206	(0.405)	0.128	(0.335)	0.263	(0.440)	0.203	(0.402)
Other guardian	0.026	(0.160)	0.020	(0.139)	0.035	(0.184)	0.014	(0.116)
Parents own their home	0.308	(0.462)	0.612	(0.487)	0.508	(0.500)	0.729	(0.445)
Nationality controls								
Cuban	—	—	0.002	(0.040)	0.416	(0.493)	0.398	(0.490)
Central American	0.009	(0.096)	0.012	(0.108)	0.234	(0.224)	0.113	(0.317)
Caribbean	0.011	(0.102)	0.009	(0.093)	0.174	(0.380)	0.185	(0.389)
South American	0.008	(0.089)	0.012	(0.108)	0.137	(0.344)	0.172	(0.377)
Mexican	0.287	(0.452)	0.289	(0.454)	0.010	(0.101)	0.011	(0.106)
Filipino	0.148	(0.355)	0.471	(0.499)	0.004	(0.061)	0.006	(0.075)
Southeast Asian	0.491	(0.500)	0.149	(0.356)	—	—	0.009	(0.095)
East and South Asian	0.044	(0.204)	0.054	(0.227)	0.007	(0.085)	0.032	(0.176)
Other	0.003	(0.051)	0.002	(0.049)	0.018	(0.132)	0.073	(0.261)
School controls								
Percent white	28.56	(13.80)	33.52	(16.26)	5.943	(5.028)	35.37	(19.66)
Percent black	16.36	(10.76)	13.11	(5.311)	17.20	(23.09)	14.47	(19.52)
Percent Hispanic	24.72	(11.10)	23.08	(19.49)	75.70	(25.53)	47.69	(28.90)
Percent Asian/Native Amer.	30.04	(10.20)	30.29	(15.96)	0.953	(0.375)	2.478	(1.799)
Percent subsidized lunch	64.20	(22.59)	40.58	(16.73)	52.76	(24.49)	35.17	(18.56)
School population	1326	(474.5)	1772	(521.1)	2374	(962.6)	1570	(322.6)
Inner-city location	0.803	(0.340)	0.157	(0.364)	0.535	(0.500)	0.054	(0.226)
Pupil/teacher ratio	24.05	(1.488)	25.89	(2.180)	26.57	(2.954)	24.52	(2.659)
Sample size	757		1269		1359		874	

Source: Children of Immigrants Longitudinal Study (CILS) 1992, Wave T1, and Common Core of Data (CCD) 1992–1993.
Notes: These descriptive statistics are based on the pooled sample of both immigrant and second-generation children. Means and standard deviations are in parentheses.

non-enclave schools. The following model specification will allow an analysis of the effects of age at arrival and enclave school attendance on academic performance. Ordinary least-squares (OLS) estimation is employed to the following model specification:

$$\begin{aligned}\mathrm{TEST}_i = {} & \alpha + \mathrm{USYRS}_i \cdot \delta + \phi \cdot \mathrm{ENCLAVE}_i \\ & + \mathrm{ENCLAVE}_i \cdot \mathrm{USYRS}_i \cdot \pi \\ & + X_i \cdot \beta + \mathrm{CHILDNAT}_i \cdot \lambda + \mathrm{SC}_i\theta + \mu_i, \quad (1)\end{aligned}$$

where TEST_i represents ASAT-Reading or ASAT-Math percentile score of student i. USYRS_i is a vector of binary variables (1/0) indicating number years in the US: less than five years, between 5 to 9 years, and more than 10 years. $\mathrm{ENCLAVE}_i$ is a binary variable (1/0) indicating enclave school status, and $\mathrm{ENCLAVE}_i \cdot \mathrm{USYRS}_i$ is a vector of interactions between the enclave school variable and the years in the US variables. X_i is a vector of standard controls: age, gender, eighth and ninth grade dummies, highest grade completed by mother or father, if one parent is US-born, family structure, and home ownership. $\mathrm{CHILDNAT}_i$ is a vector of binary variables (1/0) indicating the nationality of the children (shown in Table 2). SC_i is a vector of school-level characteristics: pupil/teacher ratio, total school population, percent of students on subsidized lunch meals, and inner-city school dummy. Lastly, μ_i is an error term.

Tables 3 and 4 report the San Diego and Miami regression results for three versions of Eq. (1) for the reading and math percentile test scores. Model 1 is a parsimonious specification that includes only the X_i variables. Model 2 includes the standard controls plus individual nationality controls for the birthplace of the children. Lastly, model 3 is the full specification, which includes the standard, individual nationality, and school characteristics controls.

4.1. The effects of years in the US on reading and math test scores

Looking at the reading percentile results for the first model (for both the San Diego and Miami samples) in Tables 3 and 4, respectively, we observe that the longer an immigrant child resides in the US, the higher is his or her reading test score. For instance, in San Diego schools we see that an immigrant child with less than five years in the US scores 17 percentiles less than his/her second-generation counterpart; a child who has been in the US five to nine years scores about 5 percentiles less; and one who has been in the US for ten or more years scores slightly higher. In the Miami schools the same assimilation profile is observed for immigrant children. Models 2 and 3, in Tables 3 and 4, yield the same general results for both the San Diego and Miami samples (these models additionally control for the child's nationality and school-level characteristics).[5] With respect to the math percentile results, also shown in Tables 3 and 4, we see that immigrant children who have lived in the US for more than five years score about the same or slightly better on their math tests. Focusing on Model 3 (Table 3) for explanatory purposes, we observe that in San Diego schools an immigrant child with less than five years in the US scores about 8 percentile points less than a second-generation child. With more than five years of US residence the immigrant child has completely caught up. The math results suggest that at least for the first few years of US residence, immigrant children have a test score disadvantage; however, after five years they are scoring relatively well on their math tests. Overall, the noticeable test score gap between immigrant and second-generation children decreases the longer immigrant children reside in the US. These findings suggest that immigrant children that come to the US at an early age and do most of their schooling in the US perform as well as their second-generation counterparts for both the San Diego and Miami samples.

4.2. The effects of enclave schools on reading and math test scores

As previously discussed, Table 2 showed notable differences in both reading and math percentile test scores across enclave and non-enclave school attendees for both the San Diego and Miami samples. Enclave school attendees appeared to score lower on both tests than non-enclave school students. This section addresses whether there is an enclave effect on test scores and whether the assimilation profiles of immigrant children who attend enclave schools are different.

For explanatory purposes, Model 1 (Table 3) for the San Diego sample is discussed in detail here (reading results for models 2 and 3 are the same). Students who attend enclave schools do not score differently on their reading tests than non-enclave school attendees. For immigrant children in enclave schools we observe that with less than five years in the US they score 19 percentile points less, with five to nine years in the US they score about 10 percentile points less, and with more than ten years of residence an immigrant child scores about 3 percentile points less than his/her second-generation counterpart. Wald tests were conducted to assess overall enclave effects on tests scores and for different assimilation profiles for immigrant children (the corresponding F-statistics for each of these tests are shown in Table 3).

[5]For space considerations, the estimated coefficients for standard controls (e.g., age, gender, eighth and ninth grade dummies, highest grade completed by mother or father, if one parent is US-born, family structure, and home ownership) and nationality controls (shown in Table 2) are not reported in Tables 3 and 4, but are available upon request.

Table 3
San Diego regression results—Abbreviated Stanford Achievement Test (ASAT) reading and math percentile scores[†]

	Reading percentile						Math percentile					
	(1)		(2)		(3)		(1)		(2)		(3)	
Intercept	81.670***	(13.84)	123.05***	(16.97)	128.36***	(16.97)	126.91***	(15.32)	140.36***	(19.07)	148.94***	(22.58)
Less than 5 Yrs	−17.168***	(3.487)	−20.919***	(3.367)	−21.287***	(3.367)	−3.068	(3.693)	−7.304**	(3.569)	−7.624**	(3.570)
Between 5–9 Yrs	−4.866**	(2.128)	−7.043***	(2.030)	−7.224***	(2.030)	2.327	(2.318)	−1.186	(2.240)	−1.375	(2.232)
10 or more Yrs	2.475	(1.763)	0.607	(1.699)	0.303	(1.699)	3.468*	(1.907)	−0.805	(1.871)	−1.016	(1.866)
Enclave	−2.849	(1.942)	−1.857	(1.997)	1.509	(1.997)	−2.396	(2.233)	−1.171	(2.161)	3.164	(2.408)
Enclave *X* <5 Yrs	0.928	(4.974)	0.589	(4.848)	1.889	(4.848)	7.539	(5.290)	3.906	(5.113)	5.020	(5.105)
Enclave *X* 5–9 Yrs	−2.747	(3.203)	−2.962	(3.179)	−1.754	(3.179)	1.964	(3.532)	−3.077	(3.449)	−2.075	(3.443)
Enclave *X* 10+ Yrs	−2.866	(2.865)	−3.364	(2.865)	−1.889	(2.865)	1.470	(3.193)	−3.759	(3.112)	-2.586	(3.112)
Pupil/teacher ratio	—		—		0.039	(0.409)	—		—		−0.509	(0.447)
% subsidized lunch meals	—		—		−0.032	(0.079)	—		—		0.004	(0.085)
School population	—		—		−0.004***	(0.001)	—		—		0.001	(0.001)
Inner-city	—		—		−8.767**	(3.948)	—		—		−10.30	(4.255)
Basic and family controls[a]	Yes		Yes		Yes		Yes		Yes		Yes	
Nationality controls[b]	No		Yes		Yes		No		Yes		Yes	
Schools controls[c]	No		No		Yes		No		No		Yes	
F-statistics: [#] slope effects	$F_{(3,2137)}^{c} = 0.51$		$F_{(3,2129)}^{c} = 0.63$		$F_{(3,2125)}^{c} = 0.32$		$F_{(3,2035)}^{c} = 0.69$		$F_{(3,2027)}^{c} = 1.06$		$F_{(3,2023)}^{c} = 0.85$	
F-statistics: [##] level effects	$F_{(4,2137)}^{c} = 3.05$		$F_{(4,2129)}^{c} = 2.14$		$F_{(4,2125)}^{c} = 0.28$		$F_{(4,2035)}^{c} = 0.61$		$F_{(4,2027)}^{c} = 1.65$		$F_{(4,2023)}^{c} = 1.05$	
No. observations	2156		2156		2156		2054		2054		2054	
Adjusted R^2	0.249		0.291		0.304		0.153		0.223		0.230	

***, **, * denotes significance at the 1, 5, and 10 percent level.

#,## Statistical significance of the *F*-statistic at the 1, 5, and 10 percent: $F_{(3,\infty)}$*(0.01) = 3.78, $F_{(3,\infty)}$*(0.05) = 2.60, $F_{(3,\infty)}$*(0.10) = 2.08, $F_{(4,\infty)}$*(0.01) = 3.32, $F_{(4,\infty)}$*(0.05) = 2.37, $F_{(4,\infty)}$*(0.10) = 1.94.

Source: Children of Immigrants Longitudinal Study (CILS) 1992, Wave T1, and Common Core of Data (CCD) 1992–1993.

[†]*Notes:* English reading vocabulary and comprehension subtest of the ASAT and the mathematics subtest of the ASAT. The reference category is second-generation children. Standard errors are in parentheses.

[a]Basic and family controls include the following variables: age, gender, grade dummies, parental education, US-born status for parent, family structure dummies, and home ownership.

[b]Nationality controls are listed in Table 2, the omitted comparison group is "other", which is composed of smaller sample sizes: Middle East, Africa, Europe, or Canada.

[c]School controls are shown in this table, however, the race percentage variables have been excluded from the set of school controls.

Table 4
Miami regression results—Abbreviated Stanford Achievement Test (ASAT) reading and math percentile scores[†]

	Reading percentile						Math percentile					
	(1)		(2)		(3)		(1)		(2)		(3)	
Intercept	85.913***	(12.13)	86.807***	(12.27)	98.100***	(15.00)	134.40***	(13.88)	135.72***	(13.94)	130.99***	(15.02)
Less than 5 Yrs	−26.735***	(10.55)	−24.287**	(10.44)	−24.755**	(10.45)	−32.154***	(12.03)	−30.262***	(11.87)	−30.001***	(11.70)
Between 5–9 Yrs	−6.021***	(2.098)	−4.629**	(2.127)	−4.612**	(2.105)	−1.302	(2.391)	−1.508	(2.417)	−1.379	(2.382)
10 or more Yrs	−1.347	(1.889)	−0.072	(1.893)	−0.012	(1.875)	−0.906	(2.147)	−0.739	(2.146)	−0.785	(2.115)
Enclave	−4.229***	(1.529)	−3.759***	(1.528)	2.947	(2.091)	−8.208***	(1.739)	−7.963***	(1.734)	−1.469	(2.309)
Enclave *X* <5 Yrs	41.254**	(19.57)	41.628**	(19.33)	41.842**	(19.21)	49.835**	(22.31)	50.806**	(21.99)	58.806***	(21.70)
Enclave *X* 5–9 Yrs	2.067	(2.596)	2.412	(2.580)	2.271	(2.555)	5.658*	(2.956)	5.892**	(2.932)	6.083	(2.889)
Enclave *X* 10+ Yrs	−1.236	(2.429)	−1.658	(2.407)	−1.662	(2.381)	1.316	(2.763)	1.393	(2.732)	1.901	(2.691)
Pupil/teacher ratio	—		—		0.044	(0.280)	—		—		0.884***	(0.282)
% subsidized lunch meals	—		—		−0.157***	(0.081)	—		—		−0.101**	(0.045)
School population	—		—		−0.003***	(0.002)	—		—		−0.004***	(0.001)
Inner-city	—		—		−3.519***	(1.339)	—		—		−10.43***	(1.412)
Basic and family control[a]	Yes		Yes		Yes		Yes		Yes		Yes	
Nationality controls[b]	No		Yes		Yes		No		Yes		Yes	
Schools controls[c]	No		No		Yes		No		No		Yes	
F-statistics: # slope effects	$F_{(3,2221)}^{c}$= 1.90		$F_{(3,2213)}^{c}$= 2.14		$F_{(3,2209)}^{c}$= 2.13		$F_{(3,2226)}^{c}$= 3.00		$F_{(3,2118)}^{c}$= 3.09		$F_{(3,2214)}^{c}$= 3.84	
F-statistics: ## level effects	$F_{(4,2221)}^{c}$= 7.33		$F_{(4,2213)}^{c}$= 5.72		$F_{(4,2209)}^{c}$= 2.02		$F_{(4,2226)}^{c}$= 12.57		$F_{(4,2118)}^{c}$= 10.80		$F_{(4,2214)}^{c}$= 2.88	
No. observations	2240		2240		2240		2245		2245		2245	
Adjusted R^2	0.105		0.128		0.138		0.101		0.127		0.154	

***, **, * denotes significance at the 1, 5, and 10 percent level.

#, ## Statistical significance of the *F*-statistic at the 1, 5, and 10 percent: $F_{(3,\infty)}$*(0.01) = 3.78, $F_{(3,\infty)}$*(0.05) = 2.60, $F_{(3,\infty)}$*(0.10) = 2.08, $F_{(4,\infty)}$*(0.01) = 3.32, $F_{(4,\infty)}$*(0.05) = 2.37, $F_{(4,\infty)}$*(0.10) = 1.94.

Source: Children of Immigrants Longitudinal Study (CILS) 1992, Wave T1, and Common Core of Data (CCD) 1992–1993.

[†]*Notes:* English reading vocabulary and comprehension subtest of the ASAT and the mathematics subtest of the ASAT. The reference category is second-generation children. Standard errors are in parentheses.

[a]Basic and family controls include the following variables: age, gender, grade dummies, parental education, US-born status for parent, family structure dummies, and home ownership.

[b]Nationality controls are listed in Table 2, the omitted comparison group is "other", which is composed of smaller sample sizes: Middle East, Africa, Europe, or Canada.

[c]School controls are shown in this table, however, the race percentage variables have been excluded from the set of school controls.

Overall findings for the San Diego sample indicate students who attend enclave schools do not perform any worse on their reading test and that the assimilation profiles of immigrant children attending enclave schools do not differ from those immigrant children in a non-enclave school.[6] These same conclusions are reached with regard to the math test scores (also shown in Table 3).

For the Miami sample, however, there is an overall enclave effect on test scores, as well as an effect on the assimilation profiles of immigrant children who attend these enclave schools. A student who attends an enclave school has a test score disadvantage of 4 percentiles on his/her reading test (Model 1 in Table 4). For the Miami enclave schools (Model 1 in Table 4) we observe, most notably, that an immigrant child with less than five years in the US scores 10 percentile points *more* than a second-generation child. It must be noted, however, in the Miami sample there are only seven immigrant children that have been in the US for less than five years (i.e., two observations in enclave schools and five observations in the non-enclave schools). Thus, the result is most likely being driven by these outliers in the data. If we consider only immigrant children who have resided in the US for more than five years, we then observe that an immigrant child that has lived in the US between five to nine years scores 8 percentile points less, and an immigrant child residing more than ten years in the US scores about 7 percentile points less than a second-generation child. Models 2 and 3 yield the same results after controlling for the child's nationalities and schools-level characteristics. After testing for enclave effects on tests scores and different assimilation profiles for immigrant children, the results indicate small and only marginally significant effects of enclave school attendance for the reading test results (*F*-statistics are shown in Table 4). However, in the Miami sample a stronger enclave effect is observed on the math results for immigrant children attending enclave schools. Model 3 (Table 4) shows that after controlling for school-level characteristics, immigrant children attending enclave schools are scoring slightly higher on their math test than immigrant children in non-enclave schools.

4.3. A robustness test: propensity score matching technique

The previous section showed an enclave effect for the Miami but not for the San Diego; this section further probes this finding. In addition to the OLS estimation presented in the previous section, the potential problem of non-random selection into these two different schools is addressed with a semi-parametric technique called propensity score matching (Rosenbaum & Rubin, 1983, 1984; Dehejia & Wahba, 1995). This alternative procedure attempts to control for potential biases in the sample induced by selection into enclave schools. The selection into enclave schools may occur for a variety of reasons; for instance, immigrant parents who were less successful in their first few years in the US may have stayed in immigrant neighborhoods, leading to a correlation between unobserved parental characteristics and their child's attendance at an enclave school. As shown in Table 2, there are notable differences across these school types by socioeconomic status, family background, and school-level characteristics of students who attend enclave schools. Also, information on previous schools attended by each child in the sample is not available; therefore, it is not possible to observe children who might have switched between enclave and non-enclave schools in the first few years after migration to the US. We therefore might be observing immigrant children who were self-selected into an enclave school setting, and the "true sample" might tell a slightly different story. An ideal experiment compares the outcomes from two identical children who are exposed to an enclave and a non-enclave school setting. The propensity score matching method is an approximation of such an experiment—to match children with similar probabilities of getting the treatment (i.e., attending an enclave school). That is, the best control for any student attending an enclave school is a student who did not, but was equally likely to actually do so on the basis of observables. The first step of the propensity score method is to run a probit model, where the dependent variable is a binary variable indicating enclave school. The controls used in the probit model were parental education, family structure, and home ownership. After running the probit regression, a propensity score (p-score) is predicted and this predicted-score is used to match each enclave child to a non-enclave child with the closest p-score. The final step to this procedure is to calculate a simple *t*-test on the mean difference between the matched ASAT test scores.[7]

The results from the propensity score matching are presented in Table 5 for both the San Diego and the Miami sample, respectively. This table reports the means of treated students (enclave school attendees) and control students (non-enclave school attendees) along

[6]However, it is observed in Model 1 and Model 2 a level effect with a corresponding *F*-statistic of 3.05 and 2.14, respectively. That is, children attending an enclave school, regardless if the child is US-born or an immigrant, score 2.85 percentiles (Model 1) and 1.85 percentiles (Model 2) lower than children attending a non-enclave school. However, Model 3 shows that after controlling for the schools' characteristics the level effect is no longer present.

[7]The "psmatch2" command in STATA is used (Leuven & Sianesi, 2003), which matches the treatment group (i.e., immigrant child in an enclave school) to the control group (i.e., immigrant child in a non-enclave school) with the closest predicted propensity score.

Table 5
Propensity score matching results

	San Diego sample					Miami sample[‡]				
	Mean treated, enclave attendees	Mean control, non-enclave attendees	Mean difference		t-statistic for H_0: mean difference = 0	Mean treated, enclave attendees	Mean control, non-enclave attendees	Mean difference		t-statistic for H_0: mean difference = 0
Reading percentiles										
Less than 5 years	14.547	19.016	−4.469	(9.151)	−0.488	—	—	—	—	—
Between 5–9 years	22.329	28.860	−6.531	(4.219)	−1.588	36.965	42.244	−5.279	(3.325)	−1.588
10 or more years	31.152	37.657	−6.505	(3.443)	−1.889	38.722	44.491	−5.769	(3.398)	−1.698
Second-generation	38.056	38.191	−0.132	(3.076)	−0.043	42.676	44.386	−1.710	(2.349)	−0.728
Math percentiles										
Less than 5 years	40.463	36.582	3.881	(10.67)	0.364	—	—	—	—	—
Between 5–9 years	42.474	42.621	−0.147	(4.531)	−0.033	53.945	56.605	−2.660	(3.913)	−0.679
10 or more years	44.733	47.686	−2.953	(3.742)	−0.789	50.648	54.638	−3.990	(3.838)	−1.039
Second-generation	43.996	46.374	−2.278	(3.295)	−0.691	51.898	56.751	−4.854	(2.656)	−1.827

Source: Children of Immigrants Longitudinal Study (CILS) 1992, Wave T1.
[‡]*Notes*: The category "Less than Five Years in the US" is omitted for Miami due to lack of adequate sample size. Standard errors are in parentheses.

with some summary statistics. The column of interest in Table 5 is the mean difference of the treated and control groups. In general, the results from the matching technique do not differ qualitatively from the results reported previously that used the OLS estimation for the reading and math results for San Diego sample. In the case of the Miami sample, however, the enclave effect observed for both test scores no longer exists with the propensity score estimation. Matching an immigrant child in an enclave school with a counterfactual immigrant child in a non-enclave school with the same observed characteristics depicts non-differential test scores (and non-differential assimilation profile) for these two immigrant children. In fact, the strong enclave effects on the math test scores for immigrant children reported in OLS results in the previous section are no longer present.

5. Conclusions

This paper analyzes the relationship between age at arrival and immigrant-receiving schools on the academic performance of immigrant children. The data used come from the first wave of the Children of Immigrants Longitudinal Study (CILS). The CILS survey was conducted in two major immigrant-receiving cities in the US (San Diego and Miami) and contains detailed information on academic performance, school characteristics, and parental information of immigrant children.

The academic performance of immigrant children with their second-generation counterparts is compared by analyzing their reading and math test scores from the Abbreviated Stanford Achievement Test. In addition, the test score outcomes of immigrant children who attend immigrant-receiving schools are compared to those of children attending non-immigrant receiving schools. The school setting is important because it could potentially affect the academic performance of immigrant children. Since immigrant parents tend to settle in predominantly immigrant communities, one might expect the test score outcomes to differ between these two schools. However, the results show that the test score gap between second-generation and immigrant children narrows with longer US residence for immigrant children. Also, the results show that the assimilation profiles of immigrant children in San Diego who attend enclave schools do not differ from those of children attending non-enclave schools. In Miami, on the other hand, there appears to be an enclave effect on test scores and an effect on the assimilation profiles for immigrant children. An alternative estimation (propensity score matching) was employed to probe the enclave effects shown for the Miami results to counter the non-randomness of the sample that could be induced by

selection into enclave schools. The latter approach, employed for the San Diego sample, yields the same qualitative conclusions as the standard ordinary least squares estimation; however, for the Miami sample the enclave effect is no longer present.

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