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The Generation 2.5 Curse? Comparing Educational Outcomes for Children of Immigrant Intermarriages in the United States

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Abstract

Is having one native-born parent an advantage for the child of an immigrant? Much of the classical literature on immigrant assimilation would suggest that children with one native-born and one foreign-born parent (generation 2.5) should fare better than those whose parents are both foreign-born (generation 2.0) Generation 2.5 individuals should have greater access to native networks, face less discrimination, and better bicultural awareness. Despite these seeming advantages, recent studies suggest the opposite, with generation 2.5 having worse educational outcomes than their generation 2.0 counterparts. In this paper, we utilize propensity score matching to evaluate differences in educational outcomes between these two groups. We estimate that on average, generation 2.5 have nearly half a year less education than their generation 2.0 counterparts despite having better-educated parents on average. A number of explanations for this are explored, with a higher degree of bilingualism for generation 2.0, foreign-born parents investing more in children's education, and access to highly skilled immigrant networks being the most promising explanations.

Key Words: immigration, intergenerational mobility, intermarriage

JEL classifications: F22, J12, J15

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1 Introduction

How does the immigrant story unfold across generations? The classical theory of immigrant assimilation, known as the "straight line theory" (Park, 1950) suggests that immigrants steadily improve their socioeconomic status across generations. The first generation (those born outside the host country) have the lowest levels, while subsequent generations assimilate into the local society and eventually catch up to their non-immigrant peers. However, the data do not always support this theory. On one hand, some immigrants are actually better educated to begin with than their native peers. Second, we do observe worse socioeconomic outcomes for 2nd and 3rd generation immigrants in some cases.

These confounding results have led to alternative theories of assimilation that better fit the data. For example, the selective assimilation theory argues that while the children of immigrants learn the local language and follow host-country customs at school, their parents discourage primary interaction with natives (Kao and Tienda, 1995). Selective assimilation tends to characterize the children of immigrants with better resources and socioeconomic prospects. Their parents' generally higher levels of education foster more opportunistic than oppositional orientations toward economic incorporation. Also, such parents and children usually belong to ethnic networks and institutions that have enough resources to offer support unavailable outside the ethnic community. As such, we are likely to observe a decline in educational outcomes across immigrant generations as cultural assimilation across generations reduces access to these networks.

Immigrant optimism is another "new assimilation theory" which argues that the educational attainment of children of immigrants relies on the combination of their parents' strong values on education and the children's English proficiency. It predicts that the second generation have the highest educational attainment, while the first generation have lower educational attainment due to lower English proficiency. The educational attainment of the third generation declines as their view on the importance of educational attainment declines.[1]

In this study, we examine the question of immigrant assimilation across generations by comparing the educational outcomes of generation 2.0 (both parents born abroad) and generation 2.5 (one foreign- born and one native-born parent). According to the straight line theory of assimilation, generation 2.5 should have an advantage since they are more likely to have access to native networks and are more advanced in the process of assimilation. However, the selective assimilation and immigrant optimism theories suggest that generation 2.5 may do worse given their worse access to immigrant networks and potentially lower levels of an "immigrant work ethic." The notion of generation 2.5 being substantially different from generation 2.0 is a relatively new one, with Ramakrishnan (2004) and Rumbaut (2004) being the first to document large differences in terms of age structure, racial identification, educational attainment, and income between these two groups. Examining the differences in outcomes between these groups as well as exploring explanations for these differences is useful in identifying the challenges and opportunities to integrating immigrants into society. While a number of studies discussed below have explored this topic, ours is the first to examine differences between immigrant groups, a key feature given large variation in education levels between these groups.

1.1 Why would generation 2.0 differ from 2.5?

Why would the presence of a native-born parent lead to different socioeconomic outcomes? Dennis et al (2016) present several explanations. Having both foreign and native-born parents can enhance bi-cultural adaptation. They find that generation 2.5 have a greater American orientation than their 2nd generation counterparts, but retain more native culture than 3rd generation. These bi-cultural advantages may be an asset to this generation. They argue that bi-cultural competence is associated with positive psychological health outcomes such as greater life satisfaction, self-esteem, and academic adjustment. In addition, generation 2.5 face less discrimination than their 2.0 peers. On the other

[1] See for example Landale, Opresa, and Llanes (1998) or Bejerano, Manzano, and Montoya (2011).

hand, a 2.5 generation immigrant exists between worlds in a sense and may not feel accepted by either the immigrant or the native-born communities. These individuals could experience a distinct form of alienation that then has a deleterious impact on adolescent and adult educational and socioeconomic outcomes (i.e. aculturative stress).

One reason why generation 2.0 may outperform 2.5 is that 2.0 immigrants are more likely to be bilingual.[2] This may matter as many studies have shown that bilingualism has positive effects on cognitive development. For example, Bialystok et al (2012) find that bilingual children exhibit greater executive functions (such as greater attention to detail, inhibitory control, working memory, and cognitive flexibility) than monolingual children. There is also evidence that the advantages of bilingualism on cognitive functions extend beyond childhood and into adulthood.[3] In our sample, 81% of generation 2.0 is bilingual (regularly speaks a language other than English at home), while only 38% of generation 2.5 is bilingual. The cognitive advantages afforded by this higher level of bilingualism could have a large effect on educational outcomes.

Feliciano and Lanuza (2017) argue that failing to control for parental education could lead to differing results across generations. First generation immigrants are more likely to have a high level of education relative to the average in their country of birth. Although these individuals may have a lower level of education relative to the average in their new home country, they are nonetheless high-ability individuals who may pass this trait to their offspring who will then be able to outperform peers with native-born parents. As such, there may be a genetic advantage that generation 2.0 has over 2.5 given that immigrants may have on average more inherent ability than their native-born peers. While we can never fully control for inherent ability, we certainly can control for parental education and hopefully reduce this potential bias.

Exposure to networks will likely differ between generation 2.0 and 2.5. Those in generation 2.0 will have greater exposure to immigrant networks. In fact, the level of exposure may differ depending on the gender of both the immigrant parent and the child. For example, Gonzalez et al (2008) find that the interaction between the genders of the immigrant parent and child may have implications for the development of cultural capital. Generation 2.5 individuals with Latina mothers reported a greater degree of familial ethnic socialization than those with Latino fathers. Emonds and Van Tubergen (2015) argue that 2.5 generation immigrants may be exposed to greater diversity as they will likely have access to both native-born and immigrant networks. The exposure to different peer groups experienced by 2.5 generation immigrants may foster a more cosmopolitan worldview and, through this channel, could influence academic achievement and career choice.

Finally, a number of studies have examined the potential advantages of immigrant intermarriage (exogamy). Meng and Gregory (2005) determine that immigrants to Australia involved in exogamous marriages have higher earnings than than endogamously married peers even after holding constant measures of human capital like schooling and English proficiency. Amuedo-Dorantes and Mundra (2013) find that immigrants to Spain who intermarried own homes at a higher rate than their coun- terparts who married within their immigrant group. Maffioli, Peterno, and Gabrielli (2014) find that in Italy, the foreign spouse/partner in mixed couples tends to be younger and better educated than their Italian partner as compared to purely endogamous couples. That the parents of generation 2.5 immigrants appear to have more advantages suggests that this group should have an easier path to socioeconomic achievement.

1.2 Evidence on differences between generation 2.0 and 2.5

Several studies have examined differences in educational outcomes between these two immigrant generations. Portes and Rumbaut (2005) study schoolchildren in both Miami/Ft. Lauderdale, Florida and San Diego, California (Children of Immigrants Longitudinal Study) and find that generation 2.5

[2] A number of studies as well as our on data confirm this. See Portes and Rumbaut (2005) for an example.
[3] See for example Bialystok et al (2003)

children graduated high school at higher rates and were more likely to be employed when compared to second generation immigrants. However, using a multiple mediation model to improve causal identification, Emonds and Tubergen (2015) find worse educational outcomes for generation 2.5. While generation 2.5 benefits from higher parental human capital and greater English proficiency, they suffer from lower educational attitudes and less stable family situations. Interestingly, having more native friends had a negative effect on educational outcomes, suggesting that access to native networks may even be a disadvantage. Another study documenting worse outcomes for generation 2.5 is Siahaan, Lee, and Kalist (2014), who use NLSY data to show that generation 2.0 achieves greater educational outcomes than generation 2.5.

1.3 Our contribution

Our study builds upon the work of those mentioned in the preceding section. Our first contribution is the use of a different dataset with a much larger number of observations (the 2000 U.S. Census and the 2001-2016 American Community Surveys). This is important, as it allows us to consider differences across immigrant groups. This is critical as some immigrant groups are better educated than natives while others are less educated. Both selective assimilation theory and immigrant optimism theory suggest potentially different results based on the relative education levels of these groups. By comparing the results for Mexican immigrants (a group with levels of education lower on average than natives) to those of South Asian immigrants (a group with generally higher education than natives), we can better identify the importance of immigrant networks. Replacing a Mexican immigrant network with a native network may be an advantage for generation 2.5 Mexican immigrants, while replacing a South Asian immigrant network with a native one may actually be detrimental. Considering these nuances between immigrant groups is an important contribution that our paper is the first to make.

The second major contribution of this study is to go beyond simple regression analysis when estimating the differences between immigrant generations. We use a non-parametric matching approach that better controls for factors that could be influencing differences in educational outcomes. This is especially relevant since generation 2.0 and generation 2.5 do appear to have very different characteristics.

Finally, we consider this question through the lens of gender, both of the immigrant parent and the immigrant child. Do the results differ depending on whether the native parent is male or female? What does this suggest about how different immigrant groups view being part of the community depending on gender? For example, anecdotal evidence suggests that for some immigrant groups, a male marrying outside of their immigrant community would still retain ties to that community. However, a female immigrant marrying exogamously would lose out on connections to the immigrant network. If immigrant network access matters for the educational outcomes of immigrants, then perhaps this could explain differences in any observed generation 2.5 education "penalties" between native mother./immigrant father or native father/immigrant mother couples.

In the next section, we discuss the data used to assess differences in educational outcomes between these immigrant generations. We follow this with a description of both the regression based and propensity score matching methodologies we employ. Section 4 discusses our estimates and section 5 concludes.

2 Data

2.1 Data source and transformations

We utilize data from the 2000 U.S. Census and the 2001-2016 American Community Survey. A key feature of this dataset is that it includes parent characteristics for a subset of the sample. We restrict our sample to individuals born in the United States who have identifiable information on both parents present. We then further refine the sample to include only those observations with either both parents

born abroad (generation 2.0) or one foreign-born and one native-born parent (generation 2.5).[4] We further restrict the sample to only include individuals over the age of 18, though the results do not noticeably change if we restrict the sample to those over the age of 25 (suggesting similarity in age structure between the two immigrant generations).

When characterizing immigrant groups, there is a tradeoff between having a large number of observations per group and the total number of groups included. In this study, we have opted for the former and aggregated several immigrant groups together. In defining immigrant groups, we made sure that each grouping had at least 10,000 observations. The groups were defined on the basis of geography. This resulted in 10 different immigrant groups: Central America (including Mexico), the Caribbean, East Asia, Eastern Europe, the Middle East/North Africa, South America, South Asia, Southeast Asia, Sub-Saharan Africa, and Western Europe.[5] By far, Central America was the largest group, comprising over 40% of the sample. That said, each group displayed a decent amount of variation in terms of educational outcomes, generational shares, and parental characteristics.

Another issue is how to assign membership to immigrant groups. For generation 2.5, this is fairly straightforward, it is simply the place of birth of the foreign-born parent. For generation 2.0, the problem arises when the parents come from two different immigrant groups. Though these scenarios represent a minority of cases (ranging from less than 5% of cases for Central America up to 35% for South America), they do create problem in terms of defining immigrant groups. For these cases, we simply assign individuals to both groups.[6]

2.2 Variable definitions and construction

The key variable we are trying to explain is an individual's total years of education. This is simply defined as the number of years of education the observation has completed. The key explanatory variable is a dummy variable for membership in generation 2.5 (equal to 1 if the observation has one native and one foreign born parent, equal to 0 if both parents are foreign born.) To this key relationship, we add several controls. First, we include the number of years of education for both the observation's mother and father. This is a critical control as not only is parent's education a key determinant of own education, it also somewhat addresses the immigrant ability bias referenced by Feliciano and Lanuza (2017).

We also include the number of years that an immigrant's parent was in the US before the immigrant was born. This is computed by comparing the immigrant's parent year of arrival in the U.S. to the immigrant's year of birth. For generation 2.0, this is computed as an average of both parents, while for generation 2.5 it is computed for the foreign-born parent only. The idea behind this variable is that a child born to parents who have just arrived in the U.S. may face different challenges and opportunities than one born to parents who have been in the U.S. for an extended time and have had more opportunities to assimilate. We also include a dummy variable for whether or not the immigrant is bilingual. This is equal to 1 if the immigrant regularly speaks a language other than English at home and 0 otherwise.

[4] A potential problem is in selection bias as we are eliminating people who do not have characteristics for BOTH parents attached. Thus, we are likely under-sampling children of divorced parents, which could potentially be a problem if divorce rates differ between these generations. Evidence from Adsera and Ferrer (2014) as well as Milewski and Kulu (2014) suggest this may in fact be the case. In addition, we may be biasing the results if parent characteristics are picking up some of the effects of familial closeness. Thus, we are oversampling people with a strong family connection, which would be magnifying any role that network effects play in educational outcomes. Some of this bias will be corrected for in the propensity score matching methodology employed in this paper. That we are still finding a generation 2.5 penalty despite using a sample of individuals with strong network effects suggests that we are estimating a lower bound of the generation 2.5 penalty.

[5] A complete listing of the birthplace countries for which we have data in each group is given in Table A1 in the Appendix.

[6] Preliminary evidence suggests that the key results do not qualitatively change if these observations are dropped from the sample. Similarly, the conclusions do not change depending on if we assign these individuals to groups based on mother's or father's birthplace.

A number of studies have shown that living in an ethnic enclave can have both positive and negative effects on an immigrant's experiences in a host country.[7] To control for this effect, We define a variable that measures how prevalent a particular immigrant group is in a community. This is done by looking at a very fine level of geographic dis aggregation, the Census Public Use Microdata Area (PUMA). These are places with a minimum of 100,000 people geographically defined at the sub-metropolitan level. To measure the intensity of ethnic enclaves, I define an "agglomeration index" as

$$A_{j,k} = \frac{Imm_{j,k}/Imm_j}{Pop_k/Pop} \quad (1)$$

The numerator of this expression is the number of immigrants from group j living in location k as a fraction of all immigrants from group j. The denominator is location k's share of the US population. This is a scale-free index that identifies how much more or less likely an immigrant is to live in a particular location than the average American resident. An index of 1 means they are equally likely, an index of 0.5 means they are 50% as likely, and an index of 3 means they are three times more likely. The larger this number, the greater the intensity of the ethnic enclave in a particular location.

Table 1 below gives summary statistics on the sample both across immigrant generations and immigrant groups.

Table 1: Summary Statistics Across Immigrant Groups and Generations

		Years Education		College Degree		Professional Degree		Bilingual	
	Share	Gen 2.0	Gen 2.5	Gen 2.0	Gen 2.5	Gen 2.0	Gen 2.5	Gen 2.0	Gen 2.5
All	-	12.9	12.7	16.7%	14.1%	3.0%	2.4%	81.5%	38.3%
C.America	42.0%	12.3	12.2	6.7%	7.3%	0.9%	1.1%	96.0%	69.2%
Caribbean	9.8%	13.0	12.7	17.9%	13.7%	3.5%	2.7%	66.0%	39.6%
E.Asia	6.6%	14.0	13.1	40.4%	20.2%	7.0%	3.1%	81.0%	21.5%
E.Europe	3.0%	13.3	13.2	24.9%	23.4%	4.7%	5.2%	77.9%	21.6%
MENA	3.4%	13.4	13.2	25.7%	22.0%	5.8%	4.5%	73.8%	29.0%
S.America	5.5%	13.1	12.9	18.8%	16.9%	3.3%	2.3%	78.8%	44.2%
S.Asia	2.9%	14.0	13.1	38.2%	21.0%	9.6%	4.6%	71.4%	27.9%
S.E.Asia	10.2%	13.3	12.8	24.0%	14.5%	3.0%	1.8%	58.9%	19.3%
S.S.Africa	1.3%	13.3	12.8	23.6%	15.2%	4.6%	2.5%	42.4%	18.8%
W.Europe	15.4%	13.5	12.9	28.0%	18.0%	6.4%	3.2%	61.4%	17.4%

Looking across the whole sample (the first row in Table 1), it appears that there are not large differences between generation 2.0 and 2.5. Average years of education are basically identical and the fraction with undergraduate and graduate degrees are fairly close to one another. As expected, generation 2.0 displays a much higher level of bilingualism than generation 2.5. Looking across immigrant groups, the largest differences appear for immigrants from East Asia and South Asia. For these groups, generation 2.0 has nearly a full year more education on average than generation 2.5 and much higher rates of holding advanced degrees. Interestingly, these two groups are among the most educated groups (regardless of immigrant generation) in the U.S. This may suggest that losing out on the immigrant network of these groups could be a detriment to generation 2.5.

Table 2 gives parental characteristics across generation and immigrant group. The most striking observation is that for generation 2.5, parent education is almost universally higher than for generation 2.0. That we did not observe a large difference in educational outcomes between immigrant generations despite generation 2.5 having better educated parents suggests that once we control for parental education, we are likely to observe a significant penalty for generation 2.5. The largest gaps in parental education between generation 2.0 and 2.5 are for the least educated groups, while the smallest gaps are

[7] See Foad (2014) for a review of this literature.

for the most educated. Recall that the most educated groups also had the largest differences in education between generations 2.0 and 2.5. This again suggests that controlling for parent education would likely magnify the gap in education between generations 2.0 and 2.5. Looking at how long immigrant parents were in the U.S. before the observation was born, we see that the parents of generation 2.5 children lived in the U.S. for about 13 years, while those in generation 2.0 were in the US for about 8 years.[8] This makes sense as we would expect more exposure to the native population to increase the likelihood of an exogamous marriage. Similarly, generation 2.0 is much more likely to live in an ethnic enclave than generation 2.5. Both groups tend to cluster in areas heavily populated by members of the same immigrant group, but the enclave intensity is much higher for generation 2.0 (living in locations that are 8 times more likely to have immigrants from their group as compared to generation 2.5 that live in locations that are about 4 times as likely). This suggests that generation 2.0 are more closely connected to immigrant networks than generation 2.5.

Table 2: Summary Statistics for Immigrant Parents across Groups and Generations

	EdYears Mother		EdYears Father		Years US		Agg. Index	
	Gen 2.0	Gen 2.5	Gen 2.0	Gen 2.5	Gen 2.0	Gen 2.5	Gen 2.0	Gen 2.5
All	10.5	12.8	10.7	12.8	7.7	13.4	7.6	4.3
C.America	8.5	11.1	8.4	10.6	7.5	10.2	6.9	5.3
Caribbean	12.3	13.3	12.2	13.1	8.3	12.1	15.3	8.8
E.Asia	12.9	13.4	13.7	14.4	7.3	15.1	8.1	3.1
E.Europe	12.8	13.6	12.9	13.9	7.6	15	6.9	4.4
MENA	12.9	14.2	13.9	14.8	8.6	12.9	9.3	5.0
S.America	12.3	13.6	12.5	13.8	7.6	11.6	8.1	4.4
S.Asia	14.3	14.6	15.4	15.7	6.4	9.3	5.9	3.7
S.E.Asia	12.0	13.2	12.4	13.9	7.0	9.7	6.5	4.2
S.S.Africa	14.2	14.4	15.7	15.0	6.5	8.2	6.6	4.1
W.Europe	11.3	13.5	11.4	13.7	11.4	18.2	3.6	1.9

EdYears refers to the years of education completed by the observation's mother and father. Years US is the number of years the observation's foreign-born parent spent in the U.S. before the observation was born. In the case of generation 2.0, it is the average number of years between the foreign-born mother and father. See equation 1 for a description of the agglomeration index that measures how strong of an ethnic enclave the immigrant's neighborhood is.

Another way to consider this issue is through the lens of intergenerational-mobility. Turning back to assimilation theory, the straight line theory would suggest that the children of immigrants will do better than their parents and this process continues across generations. Thus, we should see a larger relative increase in educational outcomes for generation 2.5 as compared to generation 2.0. Table3A looks at this issue in terms of years of education for an immigrant as compared to their mother and father. The results are quite stark. On average, immigrants in generation 2.0 have 2.3 more years of education than their parents. However, immigrants in generation 2.5 actually have -0.1 fewer years of education. This strongly refutes the straight line theory of assimilation and provides support for the selective assimilation and immigrant optimism theories. Looking across immigrant groups, the only group in which generation 2.5 outperforms their parents is for Central American immigrants. Even for that group, however, the improvement is much smaller than that for generation 2.0 Central American immigrants.

Table 3B provides similar evidence in terms of college graduation. On average, about the same fraction of generation 2.0 immigrants have completed an undergraduate degree as their parents. The same cannot be said for generation 2.5, with rates of undergraduate degree holders about 11 percentage points lower than their parents. This pattern is repeated across all groups in the sample, with generation 2.5 showing a lack of intergenerational mobility (or rather downward mobility) as compared to generation

[8] Note that we are not controlling for birth order here. The observation need not be the couple's first child.

Table 3A: Intergenerational Mobility across Groups and Generations

	Generation 2.0				Generation 2.5			
	Yrs Educ	-Mother	-Father	Gap	Yrs Educ	-Mother)	-Father	Gap
All	12.9	10.5	10.6	2.3	12.7	12.8	12.9	-0.1
C.America	12.3	8.2	8.1	4.1	12.2	11	10.5	1.5
Caribbean	13.0	12.3	12.1	0.8	12.7	13.3	13.1	-0.5
E.Asia	14.0	12.8	13.6	0.7	13.1	13.4	14.5	-0.9
E.Europe	13.3	12.7	12.9	0.5	13.2	13.7	13.9	-0.6
MENA	13.4	12.9	13.9	0.0	13.1	14.2	14.9	-1.4
S.America	13.1	12.3	12.5	0.7	12.9	13.6	13.9	-0.9
S.Asia	14.0	14.3	15.5	-1.0	13.1	14.7	15.7	-2.1
S.E.Asia	13.3	12.0	12.4	1.1	12.8	13.2	13.9	-0.8
S.S.Africa	13.3	14.2	15.7	-1.7	12.8	14.5	15.2	-2.1
W.Europe	13.4	11.1	11.2	2.3	12.9	13.4	13.7	-0.7

The gap is measuring the difference between the observation's years of education and the average years of education of their parent. A negative gap implies that on average, observations obtain less education than their parents, while a positive gap suggests that the observations have more education than their parents.

2.0.

Of course, these estimates are unconditional means. To truly assess both the potential penalty from being in generation 2.5 and the causes of such a penalty, we need a more sophisticated estimation methodology.

Table 3B: Intergenerational Mobility across Groups and Generations

	Generation 2.0				Generation 2.5			
	College	-Mother	-Father	Gap	College	-Mother	-Father	Gap
All	17.5%	16.4%	19.1%	-0.2%	14.4%	23.1%	28.6%	-11.4%
C.America	7.1%	3.2%	3.6%	3.7%	7.5%	9.5%	11.2%	-2.8%
Caribbean	18.4%	17.8%	18.8%	0.2%	13.9%	26.3%	27.5%	-13%
E.Asia	39.5%	33.9%	44.2%	0.5%	20.3%	31.7%	43.4%	-17.3%
E.Europe	24.9%	23.5%	25.9%	0.2%	24.1%	30.9%	38.1%	-10.4%
MENA	26.1%	30.3%	45%	-11.5%	22.1%	40.8%	52.8%	-24.7%
S.America	19.2%	17.3%	20.6%	0.2%	17.1%	30.4%	37.2%	-16.7%
S.Asia	37.3%	52.2%	65.2%	-21.4%	22.4%	49.4%	63.8%	-34.2%
S.E.Asia	23.5%	33.5%	30.6%	-8.5%	14.2%	30.1%	34.1%	-17.9%
S.S.Africa	25.2%	45.9%	66.3%	-30.9%	16.9%	44.9%	55.9%	-33.5%
W.Europe	28%	13.5%	18%	12.3%	17.9%	25.9%	32.9%	-11.5%

3 Methodology

3.1 OLS Regression

Much of the existing literature on this topic has utilized simple regression techniques to estimate differences in educational outcomes between generations 2.0 and 2.5. As a baseline estimate, we also utilize regression, but prefer the propensity score matching methodology discussed in the next subsection. To evaluate the differences in educational outcomes between generation 2.0 and 2.5 immigrants, we estimate the following model:

$$YrsEd_i = \alpha + \beta * Gen2.5 + Z\Gamma + u \quad (2)$$

Immigrant i's years of education are regressed on $Gen2.5$ (a dummy variable equal to 1 if they are in generation 2.5 and 0 if they are in generation 2.0) and a number of control variables in Γ. The control variables include mother's years of education, father's years of education, the number of years the observation's parent(s) lived in the US before the observation was born, the agglomeration index for the observation's location, whether or not the immigrant is bilingual, the immigrant's age, and a dummy variable equal to 1 if the immigrant is male. Under this methodology, the coefficient β gives us the relative premium or penalty of being a generation 2.5 immigrant (relative to 2.0) on years of education, holding the factors in Γ constant. For example, a coefficient of +1 would suggest that generation 2.5 immigrants have 1 more year of education (a generation 2.5 premium), while a coefficient of -1 would suggest a generation 2.5 penalty of 1 fewer year of education.

3.2 Propensity Score Matching

Including the control variables in Γ helps to mitigate some of the omitted variable bias present in this analysis (i.e. can we really infer causality?). However, there is likely to be considerable bias still present using a simple regression since we are unlikely to be able to control for all the factors that could make generation 2.5 and 2.0 different. Ideally, we would be able to run a randomized control trial in which immigrants are randomly assigned into treatment (generation 2.5) and control (generation 2.0) groups. Any observed differences in educational outcomes could then be causally attributed to the immigrant's parental structure. Of course it is neither ethical nor feasible to run such an experiment.

We can, however, attempt to run a quasi experiment using propensity score matching (PSM).[9] This methodology is generally used to evaluate the effects of a specific policy, though it can be adapted to our specific problem. We can think as being born with one native and one immigrant parent as the "treatment." The problem with simply comparing average years of education between the treatment (generation 2.5) and control (generation 2.0) groups is that there may be confounding variables that suggest that assignment to these two groups is not random. In fact, the summary statistics in Table 2 suggest that these groups are fundamentally different in terms of their parent's education, bilingualism, location, etc. A potential solution is to find individuals in both the treatment and control groups that are as close to identical as possible other than the fact that one got the treatment and the other did not. We would then compare the difference in years of education between this match and average these differences across all matches in our sample. This would then give us the average treatment effect of being in generation 2.5 on years of education.

The basic procedure for PSM is to first run a logistic regression in which we predict the probability of receiving the treatment given a set of confounding variables. A natural choice for confounding variables would be the set contained in Γ. However, an advantage of PSM is that it is non-parametric in the sense that we really only care about the predicted probabilities of receiving the treatment, not the individual coefficients in this first stage regression. As such, we also include squares and cross-products of all the variables in Γ in an attempt to account for any non-linearities in this first stage. This regression gives us a "propensity score" that is the predicted probability of being in generation 2.5. We then must check that the propensity scores are balanced across both groups so as to find a sufficient number of matches. This can be done using an overidentification test for covariate balance, comparing differences in means of the confounding variables, or even examining density plots between the groups. The next step is to match each observation in the treatment group with an observation in the control group. We utilize nearest neighbor matching in which each observation in the treatment is matched to the observation in the control that has the closest propensity score.[10]. The average treatment effect is then

[9] This technique was first published by Rosenbaum and Rubin (1983). See Crown (2014) for a more recent survey of the literature on this technique.

[10] Increasing the number of "neighbors" that observations are matched with does not significantly change the results

the average difference in years of education between the matched treatment and control observations. To implement this methodology, we utilized the Stata program `tefects psmatch`.

4 Results

4.1 Regression results

As a baseline, regression estimates from equation 2 are presented in Table 4 below. Looking across all groups, we estimate that generation 2.5 individuals have on average 0.56 fewer years of education than their generation 2.0 counterparts, holding factors like parental education, tenure in the US, ethnic enclave residence, bilingualism, age, and gender constant. That this conditional estimate of the generation 2.5 penalty is larger than the unconditional estimates in Table 1 is not surprising given that generation 2.5 had on average better educated parents. Despite this seeming advantage, something is causing members of generation 2.5 to have worse educational outcomes.

Table 4: OLS Estimates of the Determinants of Education

	All	C.Amer	Carib	E.Asia	E.Eur	MENA	S.Amer	S.Asia	S.E.Asia	S.S.Afr	W.Eur
Gen25	-0.560	-0.271	-0.470	-0.805	-0.302	-0.336	-0.322	-0.906	-0.616	-0.475	-0.497
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
YrsEdMom	0.066	0.044	0.080	0.040	0.088	0.064	0.058	0.052	0.045	0.063	0.070
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
YrsEdDad	0.074	0.044	0.060	0.050	0.061	0.068	0.059	0.064	0.044	0.084	0.062
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
YrsUS	0.015	0.021	0.028	0.012	0.017	0.008	0.019	0.030	0.008	0.035	0.011
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Agg.Index	0.007	0.011	0.006	0.014	0.012	0.006	0.011	0.016	0.002	-0.004	0.078
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.08]	[0.49]	[0.00]
Bilingual	0.137	0.308	0.086	0.392	0.269	0.264	0.109	0.229	0.199	0.522	0.447
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Age	0.082	0.043	0.089	0.145	0.079	0.172	0.107	0.256	0.111	0.167	0.065
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Male	-0.401	-0.384	-0.580	-0.363	-0.415	-0.345	-0.428	-0.362	-0.387	-0.404	-0.456
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]

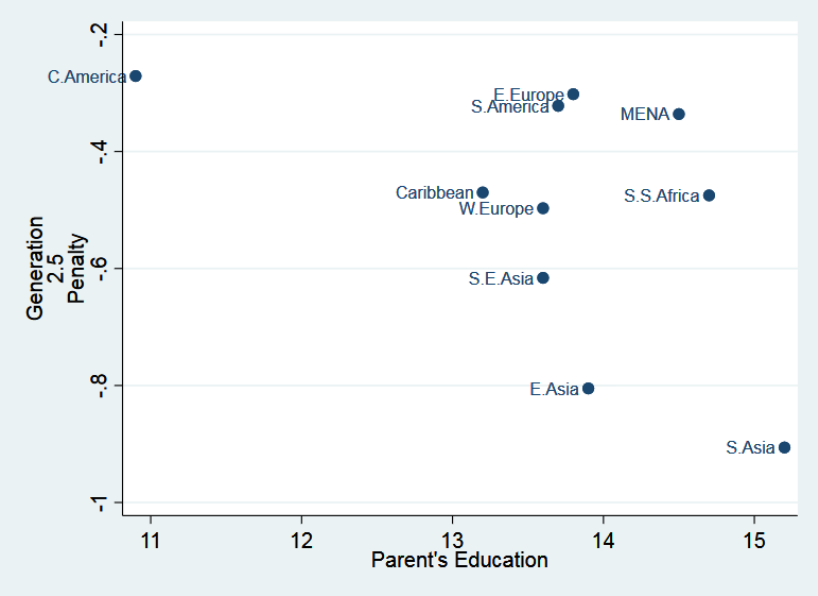
OLS estimates of equation 2. p-values are given in brackets below each coeffi cient estimate. The estimates for Gen25 can be thought of as conditional average treatment effects of being in generation 2.5 on years of education.

This pattern holds across all immigrant groups, but is strongest for immigrants from East and South Asia. Interestingly, these two groups are among the most educated immigrant groups on average. In fact, Figure 1 plots out the estimated "penalty" for being a member of generation 2.5 against the average years of parent's education. We see a very strong negative relationship, suggesting that the gap in education between generation 2.0 and 2.5 is largest for the most educated immigrant groups. This makes sense, as losing out on an immigrant network will matter the most when that network has a lot to offer. In other words, the loss of a Central American network does matter, but not nearly as much as losing out on much more highly educated South Asian network.

Looking at the other coefficient estimates, we see that parental education has a positive effect on own education as expected and there does not appear to be much of a difference in effects between mother's education and father's education. Years the parent(s) spent in the US before the observation was born has a positive effect, though the magnitude is so small as to render this variable economically

insignificant. The same holds for the agglomeration index: generally positive, but so small in magnitude that the effect is negligible. This suggests that living in an ethnic enclave neither helps nor harms educational outcomes. As predicted, bilingualism has a strong effect on years of education. While there is likely some simultaneity bias here (maybe the observation is bilingual because they spent so many years in school), the way the Census question is worded and the fact that I have an immigrant sample suggests more of a causal effect. The Census question asks subjects about the language they speak primarily at home. If the second language was learned in school, it is less likely that it would be the primary language spoken at home, especially when we consider that the sample consists of immigrants. In any event, being bilingual appears to increase education by up to half a year. As expected, older individuals have more education. Finally, the coefficient on male is universally negative, suggesting that in my sample, females are actually more educated than males. This actually fits with the general
U.S. population in which females have slightly more education than males (a trend that has been growing over time.)

Figure 1: The Generation 2.5 "Penalty" and Parental Education



4.2 PSM results

The regression results certainly are informative, but we believe that the PSM methodology gives us a better estimate of the gap in education between generation 2.5 and 2.0. The first step in conducting PSM is to estimate propensity scores via logit. We predict membership in generation 2.5 by including all of the explanatory variables in regression analysis as well as squares and cross-products of these variables. Table 5 below gives the first stage estimates for the variables in level (the squares and cross-products are included in the model, but the estimates have not been shown for brevity). Though we are less concerned with the coefficient values from this regression and more interested in predictive power, it is informative to discuss a few trends that emerged. First, parent's education has a generally positive effect on membership in generation 2.5, confirming the unconditional estimates of generation
2.5 having better educated parents than generation 2.0. Interestingly, these results tend to be weakest for the most educated groups. Thus, educated immigrants are more likely to marry a native if they come from a relatively low education immigrant group. This makes perfect sense if we see marriage as a market in which people match on (amongst other things) education. A highly educated Mexican immigrant is more likely to find a highly educated spouse among native-born persons while a highly

educated South Asian immigrant would be more likely to find a highly educated spouse among other immigrants born in South Asia.[11]

Tenure in the U.S. does not appear to have much of an effect on being in generation 2.5. This is somewhat surprising, as more time spent in the US should increase the chances of finding a native-born spouse. Similarly, residence in an ethnic enclave reduces the likelihood of having a native-born parent as you are less likely to interact with native-born people within these immigrant enclaves. Matching previous estimates, generation 2.5 is much less bilingual than generation 2.0 and tend to be a bit older. This second result may reflect the fact that the rate of exogamous marriages has been steadily declining since the passage of the 1965 Immigration and Naturalization Act in the U.S.[12] Finally, gender does not appear to matter much.

Table 5: Logit Regression Estimates of Generation 2.5

	All	C.Amer	Carib	E.Asia	E.Eur	MENA	S.Amer	S.Asia	S.E.Asia	S.S.Afr	W.Eur
YrsEdMom	0.25	0.33	0.16	0.26	0.43	0.17	0.16	-0.01	0.26	0.22	0.50
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.80]	[0.00]	[0.00]	[0.00]
YrsEdDad	0.18	0.15	0.11	0.49	0.39	0.19	0.07	0.14	0.36	-0.08	0.38
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.03]	[0.01]	[0.00]	[0.24]	[0.00]
ParYrs	-0.01	-0.02	0.04	0.00	0.11	-0.04	0.04	-0.09	-0.03	-0.06	0.07
	[0.13]	[0.00]	[0.01]	[0.87]	[0.00]	[0.09]	[0.02]	[0.03]	[0.09]	[0.11]	[0.00]
Agg.Index	-0.08	-0.05	-0.05	-0.25	0.02	-0.01	-0.10	-0.11	-0.11	-0.16	-0.33
	[0.00]	[0.00]	[0.00]	[0.00]	[0.52]	[0.53]	[0.00]	[0.05]	[0.00]	[0.00]	[0.00]
Bilingual	-2.66	-2.46	-0.83	-4.51	-2.79	-2.36	-1.34	-2.30	-5.06	-3.08	-3.51
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Age	0.07	0.09	0.07	0.10	0.04	0.02	0.05	0.06	0.09	0.03	0.07
	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]	[0.41]	[0.00]	[0.08]	[0.00]	[0.46]	[0.00]
Male	-0.02	-0.06	-0.04	-0.39	0.01	0.21	0.11	-0.94	0.10	0.90	-0.14
	[0.75]	[0.41]	[0.84]	[0.12]	[0.97]	[0.49]	[0.64]	[0.04]	[0.63]	[0.08]	[0.38]

p-values are given in brackets below each coeffi cient estimate. The full logistic regression includes squares and cross-products of the explanatory variables.

Having computed propensity scores from the first stage logistic regression, we can proceed with propensity score matching. Table 6 gives the PSM estimates for the average treatment effect (ATE) of being in generation 2.5 alongside the same estimates obtained from the regression analysis in section 4.1. The PSM and regression estimates are fairly close to one another. However, the estimates of the ATE are almost universally lower using PSM, suggesting that the regression methodology was causing us to overestimate the education penalty of being in generation 2.5. A similar, though less pronounced, pattern holds. The groups that have the most educated parents (South Asia, Sub-Saharan Africa) suffer the largest penalty from being in generation 2.5. This further supports the idea that one reason why there is a penalty for being in generation 2.5 is losing out on a migrant network. That the penalty still holds for less educated groups like Central and South America suggests that other explanations like immigrant optimism still play a role.

Table 6: Propensity Score Matching Estimates

Group	ATE: PSM	ATE: Regression
All	-0.444	-0.560
C.America	-0.291	-0.271
Caribbean	-0.461	-0.470
E.Asia	-0.563	-0.805
E.Europe	-0.217	-0.302
MENA	-0.284	-0.336
S.America	-0.244	-0.322
S.Asia	-0.584	-0.906
S.E.Asia	-0.487	-0.616
S.S.Africa	-0.518	-0.475
W.Europe	-0.330	-0.497

ATE: PSM refers to the average treatment effect obtained from the propensity score matching method. ATE: Regression is the average treatment effect from the OLS regression in section 4.1 All estimated treatment effects are significantly different from zero at the 1% level.

4.3 Comparison by gender of native born parent

Does the gender of the native-born parent influence these results at all? Anecdotal evidence suggests that in some cultures, a male marrying outside their group is more accepted than a female marrying outside their group. If this is the case, then children with immigrant mothers and native fathers should have less access to migrant networks than those with native mothers and immigrant fathers. If losing out on an immigrant network imposes an education penalty (as it likely would for highly educated immigrant groups), then we should observe on average less education for generation 2.5 with foreign-born mothers.

Table 7: ATE of having a Native-Born Mother Relative to an Immigrant Mother

Group	Regression	PSM
C.America	-0.178***	-0.125***
Caribbean	-0.152***	-0.163***
E.Asia	0.077*	0.030
E.Europe	0.050	-0.081
MENA	-0.054	-0.072
S.America	-0.096**	-0.193***
S.Asia	0.113	-0.045
S.E.Asia	-0.089**	-0.065
S.S.Africa	0.091	0.163
W.Europe	0.054**	0.016

Regression and PSM estimates of the average treatment effect of having a native-born mother (and foreign-born father) restricted to a generation 2.5 sample only. Thus, the control group are people with a foreign-born mother and native-born father. Statistical significance at the 10%, 5%, and 1% level are given by *, **, and *** respectively.

[11] This supports other studies finding evidence of assortative matching such as Furtado (2012) and Foad (2018)
[12] See Foad (2018) for more on trends in inter-ethnic marriage

On the other hand, several studies have shown that mothers tend to play a larger role and have greater influence in their children's education.[13] In that case, then having an immigrant mother could potentially be a greater benefit than having a native mother if immigrant mothers are predisposed to focus more on the education of their children (the immigrant optimism theory).

Table 7 presents regression and PSM estimates of the average treatment effect of having a native-born mother and foreign-born father as compared to the control group with a foreign-born mother and native-born father. The estimates support both of the theories discussed above. For the least educated groups in the sample (Central America, Caribbean, South America, SE Asia), Generation 2.5 with native-born mothers have less education on average than those with foreign-born mothers. This supports the immigrant optimism theory if we believe that mothers play a larger role in education of their children than fathers and that immigrant mothers place a greater emphasis on education than their native-born counterparts. While this same trend holds for the other groups in the sample, it is being tempered by less access to the relatively more valuable migrant networks due to having an immigrant mother partnering with a native-born father. In other words, the loss of the relatively less educated Central American migrant network is not nearly as costly as the loss of the highly educated South Asian migrant network. As such, we see the biggest gender differences in Generation 2.5 penalty occuring for the least educated migrant groups for which immigrant optimism is the only factor at work and not being counter-balanced by the loss of a migrant network.

4.4 Comparison by gender of native born parent and child

So far, we have found that the generation 2.5 penalty is in general larger for more educated groups. For less educated groups, having a native-born mother and immigrant father exerts a larger penalty than having an immigrant mother and native father. For better educated groups, there does not appear to be a difference across the gender of the immigrant parent. But how do these results vary when considering the gender of the children of immigrant/native parents?

Table 8 presents PSM estimates across the gender of generation 2.0 and 2.5 members. The first two columns give the estimated effects of being in generation 2.5 on education across both males and females. In general, the generation 2.5 penalty is fairly consistent across genders. The one notable exception is for South Asians, where male members of generation 2.5 do not suffer as severe a penalty as female members. This may suggest that female South Asian members of generation 2.5 are more shut out of the valuable South Asian migrant network than their male counterparts.

The last two columns in Table 8 present estimates across the gender of both the parent and child for generation 2.5. Across all immigrant groups, it appears that for both male and female members of generation 2.5, having a native mother and immigrant father exerts a greater education penalty than having an immigrant mother and native father. This is again magnified when looking at the least educated groups. Interestingly, this pattern does appear to be strongest for female members of generation 2.5, suggesting that the influence of immigrant mothers may be strongest on their daughters for these less educated migrant groups. The pattern reverses for Sub-Saharan African generation 2.5 males, as those with native mothers actually do better than those with immigrant mothers. This may be indicative of S.S. African immigrant networks being gender-biased and more open to male children of immigrant fathers than female children.

[13] See the review in Haveman and Wolfe (1995) for a survey of the literature on this topic.

Table 8: Differences across gender of parent and child

	Gen 2.5 vs. Gen 2.0		Gen 2.5: Native vs Immigrant Mothers	
Group	Males	Females	Males	Females
All	-0.434***	-0.448***	-0.078***	-0.064***
C.America	-0.287***	-0.296***	-0.170***	-0.186***
Caribbean	-0.379***	-0.443***	-0.078	-0.154**
E.Asia	-0.611***	-0.525***	-0.017	-0.075
E.Europe	-0.328***	-0.212**	0.026	0.145
MENA	-0.292***	-0.216**	-0.139	-0.117
S.America	-0.289***	-0.455***	-0.079	-0.091
S.Asia	-0.580***	-0.936***	0.238	-0.057
S.E.Asia	-0.440***	-0.436***	-0.059	-0.095
S.S.Africa	-0.386***	-0.573***	0.326**	0.043
W.Europe	-0.415***	-0.415***	0.022	0.096*

The first two columns give the PSM estimates of being in generation 2.5 as compared to generation 2.0 across the gender of the observation. The last two columns give the PSM estimates of having a native mother and immigrant father as compared to an immigrant mother/native father across the gender of the observation. Statistical significance at the 10%, 5%, and 1% levels are given by *, **, and *** respectively.

5 Conclusion

The goal of this paper was to not only identify any differences in educational outcomes between generation 2.0 and 2.5 immigrants, but also to explore why such differences may exist. Within the context of assimilation theory, we find strong evidence against the classical straight line theory of assimilation as generation 2.5 immigrants are estimated to have fewer years of education than their generation 2.0 counterparts once we account for confounding differences between these groups. This leaves two potential explanations: selective assimilation and immigrant optimism. We find evidence of both theories at work. The dedication to child education that foreign-born parents have (immigrant optimism) clearly matters, as shown by the smaller generation 2.5 penalty for those whose mothers are foreign-born. However, we also find strong evidence that access to migrant networks matters. For the most educated immigrant groups in our sample (those that are even more educated than the general native-born population), losing out on access to immigrant networks carries with it a great cost that even greater access to native networks cannot overcome.

6 References

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Appendix

Table A1: Individual countries of birth in each immigrant group

Group	Countries of birth
C. America	Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama
Caribbean	Antigua-Barbuda, Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, St. Kitts-Nevis, St. Lucia, St. Vincent, Trinidad and Tobago
E. Asia	China, Hong Kong, Japan, Korea, Macau, Taiwan
E. Europe	Bulgaria, Albania, Armenia, Azerbaijan, Bosnia, Byelorussia, Croatia, Czech Republic, Es- tonia, Georgia, Hungary, Kazakhstan, Kosovo, Latvia, Lithuania, Macedonia, Moldavia, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Ukraine, Uzbekistan
MENA	Algeria, Cyprus, Egypt, Iran, Iraq, Israel/Palestine, Jordan, Kuwait, Lebanon, Libya, Morocco, Saudi Arabia, Sudan, Syria, Turkey, UAE, Yemen
S. America	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Uruguay, Venezuela
S. Asia	Afghanistan, Bangladesh, Bhutan, India, Myanmar, Nepal, Pakistan, Sri Lanka
S.E. Asia	Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, Vietnam
S.S. Africa	Cameroon, Congo, D.R., Congo, Rep., Eritrea, Ethiopia, Gambia, Ghana, Guinea, Kenya, Liberia, Nigeria, Senegal, Sierra Leone, Somalia, South Africa, Tanzania, Togo, Uganda, Zambia, Zimbabwe
W. Europe	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom