Peer Influence in Test Scores and Health Outcomes: Evidence from New York City Public Schools*

Hamid Noghanibehambari†

Jason Fletcher‡

Abstract

The public debates and familial concerns over the effects of immigrant peer students on children's outcomes have been intensified over the past decades. This is more striking in the US where secular rises in the number and share of immigrants have coupled with geographic expansions in their residential settlements to "new destination" areas without histories of immigrant populations. This paper address this policy concern by investigating the effect of attending school with a higher share of immigrant classmates on test scores and health-related outcomes. We explore this question using the data on all public school students in New York City between the years 2006-2017. We correct for endogenous school choice and sorting of students to schools by exploiting the arguably exogenous variations in the within-school across-cohort share of immigrants. We find effects on native-born students' math and English Language Art (ELA) scores that are indistinguishable from zero, statistically and economically. Moreover, there are small health gains from exposure to immigrants for native-born students as observed in their weight-for-age and fitness scores. However, there are small effects of immigrant concentration on immigrant students' ELA scores but no effects on their math scores.

Keywords: Peer Effect, Immigrant Students, Children Anthropometric, Obesity, Fitness, Health, Test Scores

JEL Codes: J15, I12, I21, Z20

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† Center for Demography of Health and Aging, University of Wisconsin-Madison, 1180 Observatory Drive, Madison, WI 53706

Email: noghanibeham@wisc.edu, Phone: +1-806-620-1812

‡ Lafollette School of Public Affairs, University of Wisconsin-Madison, 1225 Observatory Drive, Madison, WI 53706-1211, USA

Email: jason.fletcher@wisc.edu

1. Introduction

The share of foreign-born K-12 students in the US population has increased over time and exhibits geographical expansions. In 1980, 7 percent of primary and secondary students had a foreign origin. This number increased to 11 in 1990 and 23 in 2015 (Griffith & Zeigler, 2017). The demographic composition of states that historically did not have many immigrants changed towards a higher share of foreign-born residents. For instance, the share of the population of immigrants in North Carolina, Nevada, and Utah was 1.3, 6.7, and 3.5 percent in 1980 while it increased to 7.5, 18.8, and 8.3 percent in 2010, respectively. In 1980, the ten leading destinations of immigrants (New York, Hawaii, New Jersey, Connecticut, California, Massachusetts, Florida, Rhode Island, Illinois, and Arizona) contained about 78 percent of all immigrants in the nation. This number dropped to 70 percent in the year 2010. This space-time expansion of immigrant families and consequently foreign-born students has brought controversial public debates on the potential negative influences of immigrant students on local students. Anti-immigrant sentiments were disproportionately higher in states with no tradition of welcoming immigrants (Eger et al., 2021). It is also reflected in the number of passed bills regarding immigration. For instance, in 2009, approximately 1,500 bills and resolutions were passed by states legislatures regarding immigration (National Conference of State Legislatures, 2011). Hence, it is important to understand how and in what ways immigrants may influence their peers' outcomes in schools.

From an empirical perspective, the effect of exposure to a higher share of foreign-born peers is a priori unknown. The extensive research on peer effects highlights the relevance of peer influence for a variety of outcomes including socializing, major choice, sexual behavior, health behavior, obesity, crime, risky behaviors, test scores, and educational achievements (Ajilore, 2015; Arcidiacono & Nicholson, 2005; Bifulco et al., 2011; Billings et al., 2019; Damm & Dustmann,

2014; J. M. Fletcher, 2010; Fletcher & Ross, 2018a; Kremer & Levy, 2008; Sacerdote, 2001; Smith & Christakis, 2008). However, several studies show that immigrant students outperform their native-born counterparts in health outcomes, revealing better health behavior and fewer risky behaviors (Antecol & Bedard, 2006; Hamilton et al., 2015; Harris, 1999). From an academic achievement perspective immigrant students often face a complex set of disadvantages including a lack of English fluency, citizenship and hence access to welfare benefits, often come from lower socioeconomic status families, reside in urban areas and attend lower-quality public schools and obtain lower scores and reveal poorer outcomes (Crosnoe & López Turley, 2011; Stiefel et al., 2010). In contrast US-born, white, English speaking students face different advantages and disadvantages, suggesting a their effect on their peers, as compared to immigrant students, is an empirical question. Indeed, immigrants have been shown to outperform native-born students that belong to similar demographic and socioeconomic backgrounds. This contradictory pattern is termed the *immigrant paradox* (Feliciano & Lanuza, 2017; Fuligni, 1997; Greenman, 2013; Marks et al., 2014; Perreira et al., 2006). This paradox is often attributed to unobservable characteristics of immigrants such as having more respect for teachers and mentors, higher educational aspirations, and stronger family ties (Conger, 2015; Raleigh & Kao, 2010; Salikutluk, 2016; St-Hilaire, 2002). As long as peer effects operate through replicating peers' behavior and exhibiting a tendency to absorb peers' mindset, these channels could offer a positive effect of a higher share of immigrants on naïve-born students' academic and non-academic outcomes. On the other hand, lack of fluency in the English language may decelerate the learning process and detract other students which in turn may adversely affect their outcomes (Conger, 2015). The literature on the overall effect of foreign-born peers on academic and educational achievements is mixed and far from conclusive (Angrist & Lang, 2004; Bifulco et al., 2011; Burke & Sass, 2015; Cascio & Lewis,

2012; Diette & Uwaifo Oyelere, 2014; Figlio & Özek, 2019a; Gaviria & Raphael, 2001; Geay et al., 2013; Gould et al., 2009; Hardoy & Schøne, 2015; Jensen & Rasmussen, 2011; Ohinata & van Ours, 2013; Tonello, 2015).

The current study advances this literature by providing new evidence of immigrant peer effects on native-born and foreign-born students' academic and health outcomes using a novel dataset from New York City public schools. We ask whether attending school with a higher share of foreign-born students affects test scores, anthropometric outcomes, and fitness scores. The empirical challenge in assessing peer influence is that the demographic composition of schools is not random. Students' sorting to schools depends on a wide range of observable socioeconomic features as well as hard to difficult measures such as their innate ability or their opinions towards diversification and anti-immigrant sentiments. To account for endogenous selection to schools, we implement a quasi-natural experimental design to exploit the variation of within-school and across-cohort changes in the composition of immigrant students. The assumption behind this empirical design is that while parents/students chose a school based on its characteristics, they are unable to predict across-grade-years changes in immigrant compositions and across-cohort changes are due to random factors (Conger, 2015; J. Fletcher et al., 2021; Gould et al., 2009; Hanushek et al., 2003b; Hoxby, 2000). Our balancing test reveals no evidence of an association between the share of cohort-year-level immigrants within a school-year with a wide range of observable characteristics.

Our findings offer heterogeneous effects on test scores. The effects of immigrant peers on native-born test scores are indistinguishable from zero, economically and statistically. Also, there is no evidence that having more immigrant peers in schools influences foreign-born math test scores. However, there is some evidence on the negative effects of immigrant peers on immigrants'

English Language Art (ELA) test scores. Nonetheless, these effects are small in magnitude, suggesting only 0.03 percent of a standard deviation reduction for attending school with a 10 percent higher share of immigrants, equivalent to only a 1.3 percent reduction from the mean of ELA score among immigrants. There are small but positive effects on native-born students' weight-for-age score and fitness score suggesting small health gain as a result of exposure to immigrant concentration. While there are no effects on BMI, obesity, and weight-for-age of immigrants' students, there are some small negative effects on their fitness score as an increase in the share of immigrant peers in school-grade-year composition. Overall, these effects are quite small and we can rule out economically significant negative effects.

Moreover, we explore the nonlinearity of the effects across school characteristics. We find that attending school with above-median share of foreign-born and above-median non-English speakers amplifies the negative effects of immigrant peers on immigrants' ELA test scores. We do not observe any heterogeneity in math test scores, and other anthropometric and fitness outcomes. We also explore how the results vary across immigrants who attend a school with a higher/lower share of own-race immigrants. Increases in the share of own-race-ethnicity immigrants in a school influence the immigrant peer effects: we observe positive effects on math test scores and reductions in BMI and weight-for-age z-scores. We provide a discussion on the theories and previous evidence that justify these findings.

We add to the literature in two ways. First, we ask the important and policy-relevant question of immigrant peer effects using a novel unexplored and large dataset. The New York City public school system is the largest in the nation with a diverse population where immigrants account for almost one-third of students (Cherng et al., 2017). This data provides a unique and yet unexploited setting to explore the immigrant peer effects questions. Second, we improve the

literature by investigating the immigrant peer exposure on unexplored anthropometric outcomes and under-studied fitness outcomes.

The rest of the paper is as follows. Section 2 provides a brief literature review. Section 3 overviews the data and sample selection. Section 4 discusses the empirical methodology. Section 5 reviews the main results and heterogeneity analyses. In section 6, we make some concluding remarks.

2. Literature Review

A relatively large and old literature evaluates the determinants of students' academic and non-academic outcomes (Booker et al., 2011; Dearden et al., 2002; Hanushek et al., 2015; Jackson et al., 2016; Todd & Wolpin, 2003, 2015). One important factor in these studies is peer influence that appears not only in educational outcomes but also in other non-academic areas including obesity, smoking, drinking, sexual behavior, crime, and health outcomes (Billings et al., 2014, 2019; J. Fletcher et al., 2021; J. M. Fletcher & Ross, 2018b; Kremer & Levy, 2008; McMillan, 2019; Walsh et al., 2010). For instance, Strombotne et al. (2019) show that among New York public school children, peer BMI influences one's BMI score. They find that a one standard-deviation change in the cohort's BMI is associated with a 0.4 standard deviation change in one's BMI. Gwozdz et al. (2015) also document the peer effect in obesity and BMI in eight European countries. Liu et al. (2014) find the presence of peer effects in adolescents' sports activities. Ali et al. (2011) show that friends' behavior in fast food consumption, sports activity, exercising regularly, and sleeping patterns is positively associated with one's own behavior. Implementing student and school-grade fixed-effect models, Hanushek et al. (2003a) show that peer academic achievement is positively associated with a child's achievement growth. Gaviria & Raphael (2001)

document the peer-group effects among juveniles in cigarette smoking, alcohol drinking, and church-going.

A subset of this literature explores how immigrant peers affect students' outcomes. These studies do not offer conclusive evidence and the findings are mixed. However, most studies using US data do not find consistent and significant effects of immigrant peers on test scores. Figlio & Özek (2019) use data on Florida public school system and explore the effect of an unexpected immigration inflow caused by the 2010 earthquake in Haiti. They show that exposure to the new immigrants, who were mostly poor and non-English-speakers, resulted in zero and even modestly positive effects on incumbent students. Conger (2015) employs data from Florida public high schools and implement a strategy that relies on the within-school across-cohort compositional change in immigrant peers to investigate the effect of immigrant peers on one's academic performance. She finds effects that are indistinguishable from zero and statistically insignificant. These results hold whether or not the foreign-born peers are English language learners. Geay et al. (2013) explore the effects of attending schools with a higher share of non-English speakers in England on students' outcomes. They find that the negative correlations are the result of the selective sorting of students into schools and that poor native-born students are more likely to attend schools with a higher share of non-native speakers. They report that the true effects, once they account for selection issues, are close to zero. Gould et al. (2009) explore the immigrant peer effect in Israel during sharp increases in immigration inflows in the 1990s and find that immigrant concentration negatively affects native-born matriculation exam, a prerequisite exam for college attendance. Using another source of data over a similar time period and implementing hierarchical models, Chachashvili-Bolotin et al. (2016) do not find any negative spillover effects of immigrant students on Israeli-born students' matriculation exam.

Fletcher et al. (2021) use Add Health dataset and exploit a within-school across-cohort foreign-born compositional change as an exogenous variation to explore the longer-run outcomes of exposure to immigrant peers in school. They find no discernible effects on native-born students' outcomes including social acceptance, mental health, risky behavior, and Picture-Vocabulary Test (PVT) scores. They find some evidence that PVT scores of foreign-born students are negatively affected by attending a school with a higher share of immigrants. However, they show that reductions in PVT scores do not affect the longer-run outcomes including earnings and socioeconomic status of their residential area.

Cortes (2006) uses data on first and second-generation immigrants in San Diego and Miami and finds that changes in immigrant peer composition have no effect on first and second-generation immigrants' math and reading test scores. Using Norwegian data, Hardoy & Schøne (2015) show that the proportion of immigrants in a grade level is associated with higher rates of dropout. However, they argue that the point estimates become economically meaningful only with a larger proportion of immigrants. Jensen & Rasmussen (2011) use data on math and reading test scores in Denmark and show that immigrant concentration in schools has an adverse effect on native children's math and reading test scores. Tonello (2015) used administrative data of Italian junior high schools and showed that immigrant peers have no effect on native-born children's math test scores but have some weak effects on their language scores. Ohinata & van Ours (2013) find no effect of immigrant peers on native-born Dutch children's reading, math, and science scores.

3. Data Source and Sample Selection

We use the restricted-access NYC-Fitnessgram dataset obtained from the New York City Department of Health and Mental Hygiene (NYC DOHMH). Starting from 2005, it has been obligatory for all K-12 public schools within New York City to gather and report anthropometric

and fitness measures including height, weight, curl-up score, push-up score, and pacer score. The dataset is then linked with public school students' test scores including math and English Language Art (ELA) tests. The data also include additional necessary variables such as demographic characteristics including race, ethnicity, age, birthplace, English Language Learner (ELL) status, Individual Education Plan (IEP) status, and whether the individual is eligible for free/reduced meal.

We exclude missing values on test scores. To mitigate selective cross-school movements, we drop those who change school within primary school years or middle-school years. We also drop those whose age is more than 2 years above or below the average age-for-grade level. This leaves us with a sample of 4,050,646 students in grades 3 to 8 between the years 2006-2017. Roughly 13 percent of these students have a foreign origin. Appendix Table A-1 provides a list of countries of origin of immigrants in the final sample. New York City public school immigrant students come from more than 200 countries with the majority from the Dominican Republic (17.9 percent), China (10.1 percent), Bangladesh (6.5 percent), Mexico (5.8 percent), Jamaica (5.7 percent), and Guyana (5.3 percent). Among the US-born students, 92.6 percent are born in New York City, 2.71 percent in other places of New York, and 4.7 percent in other states. Figure 1 shows the geographic distribution of immigrants across census tracts in five counties of the city. Figure 2 illustrates the density distribution of foreign-born students as a fraction of the whole sample. Approximately 18 percent of schools have less than a 2 percent share of immigrants. The concentration of immigrants varies across grade, year, and race. Figure 3 depicts slight increases in the share of immigrants in higher grades. This relative increase is more pronounced among students of other races. However, we observe a different pattern as we look into the changes across years in Figure 4. The share of foreign-born Asian-pacific students dropped through the sample

period and the share of other races increase from 2006 to 2013 and then slightly decreased. The share of foreign-born blacks remained quite stable throughout the years and the share of whites reduced until 2012 and reached back to its initial level by 2017.

Summary statistics of the final sample are reported in Table 1 for immigrants and US-born students in two consecutive panels, separately. The race-ethnicity composition of both groups exhibits a diverse population. The share of non-Hispanic whites and blacks are 16.7 and 28.5 percent among US-born and 13.4 and 18.7 percent among foreign-born students, respectively. Immigrants are more likely to be from other races (32.4 percent) than their US-born counterparts (13.5 percent). Roughly 35 percent of all foreign-born students are categorized as English language learners. They are also more likely to come from low socioeconomic status families as 84 percent of immigrants are eligible for free/discounted meal at school while the share of eligible students among US-born students is 76 percent. There is also a difference in the treatment variable between these two subpopulations. Foreign-born individuals are, on average, exposed to 20.6 percent share of immigrant students in their school-grade-year while US-born students experience a share of 14.3 percent of immigrant peers.

Since the outcomes are compared across different grades/cohorts, we convert them into standardized values in two ways. First, we standardize test scores based on grade-year level average and standard deviation of raw test scores. Second, we use age-gender mean and standard deviations in order to standardize BMI, weight-for-age, curl-up score, push-up score, and pacer score. We then add the standardized values of push-up, pacer, and curl-up to compute the fitness z-score.

On average, immigrants outperform native-born peers in math test scores but they fall behind in ELA test scores. Immigrants gain 0.02 standard deviations above their (grade-year) peers

in math and 0.2 standard deviations below the average in the ELA test. They are less likely to be obese and have lower BMI z-scores and weight-for-age z-scores.[4]

4. Empirical Method

Parents chose a school for their children based on various factors including the housing market, the safety of the school's neighborhood, school racial composition, transaction costs, school quality as measured by test scores and placements, as well as difficult to observe parents' characteristics and parents' preferences over those determinants (Billingham & Hunt, 2016; Bosetti, 2007; Deming et al., 2014; Glazerman & Dotter, 2017; Goldring & Phillips, 2008; Hanushek et al., 2007; Holme, 2002). Therefore, comparing outcomes of students across schools may only reveal the consequences of parents' decisions or reflect other determinants of students' sorting to schools. For instance, parents of high-income native-born students, who would have higher test scores for other unobservable reasons, may prefer schools with a higher share of native-born students. Therefore, looking at the association between group and own test scores reveal a spurious negative correlation. To overcome this issue, a strand of studies rely on within-school across-cohort variation in immigrant concentration (Bifulco et al., 2011; Conger, 2015; J. Fletcher et al., 2021; Gould et al., 2009; Hanushek et al., 2003a; Hoxby, 2000). The assumption is that parents/students make their choice based on overall school characteristics and not the grade-year specific features. Therefore, the changes within a school and across-cohort in immigrant concentration are due to factors not related to parents/students' characteristics.

Specifically, we implement the specifications of the following fixed effect model:

[4] The fact that, in terms of obesity, immigrants are healthier at arrival compared to their US-born peers has been documented in several studies. Immigrants tend to converge to average obesity of US-born peers the longer they stay in the US, a phenomenon that is often called "*unhealthy assimilation*" (Antecol & Bedard, 2006; García-Pérez, 2016; Giuntella & Stella, 2017; Ishizawa & Jones, 2016; Lu et al., 2017; Park et al., 2009).

$$y_{igts} = \beta_0 + \beta_1 \overline{FB}_{gts} + \beta_2 \overline{FB}_{gts} \times FB_{igts} + \beta_3 X_{igts} \times FB_{igts} + \beta_4 Z_{gts} \times FB_{igts} + \eta_{st} \times FB_{igts} + \zeta_{gt} \times FB_{igts} + \varepsilon_{igts} \quad (1)$$

Where y is the outcome of student i in grade-level g observed in year t who attends school s. The parameter $\overline{FB}$ represents the average school-grade-year-level share of foreign-born students. The variable FB is a dummy that equals one if the student is born outside of the 51 US states. In X, we include as individual controls dummies for being foreign-born, race, ethnicity, gender, IEP status, English learner status, reduce/discounted meal eligibility status, and a quadratic function of age. In Z, we include the share of non-Hispanic blacks and the total number of students in each cohort-school-year. We include school-by-year fixed effects (represented by η) to account for all unobservable characteristics of schools that vary by time and influence parental school choice decisions. We also include grade-by-year fixed effects (represented by ζ) to account for unobservable grade-year-specific changes such as city's budget changes for primary/secondary schooling, changes in curriculum, and changes in test designs and criteria that are specific to a grade in a given year but affect all schools similarly. Moreover, we also allow for these fixed effects as well as all other controls to have a differential impact for foreign-born and US-born students by interacting the foreign-born dummy with all right-hand-side variables. Finally, ε is a disturbance term. We cluster standard errors at the school level.

The parameter β_1 and β_2 capture the effect of exposure to immigrants on native-born and foreign-born students, respectively. We also explore the heterogeneity of the effects across schools with a high/low share of immigrants and non-English speakers. In so doing, we interact with share of immigrants a dummy for school having above-median foreign-born and having above-median non-English speakers. In addition, we ask whether the effects on foreign-born students vary in schools that contain similar racial/ethnic composition as the focal student. We create a variable

that measures the share of immigrant students who share the same race/ethnicity within each school year as the focal student, whether foreign-born or US-born. Specifically, we calculate:

$$W_{ist} = \sum_{r} S_{rst} \times \gamma_{ir} \quad (2)$$

Where γ is a binary variable indicating whether the student belongs to race/ethnicity group r. The parameter S represents the share of immigrants in school s and year t who belong to race/ethnicity group r. We then interact this variable with the measures of immigrant concentration in equation 1.

5. Results

5.1. Balancing Test

We examine whether the across cohort deviations within each school-year are driven by factors that had an influence on parental school choice. In other words, if the set of fixed effects and covariates can capture the endogenous sorting of students we do not expect to find an association between the concentration of immigrants and students' observable and unobservable characteristics. We then can claim that the remaining variation, after netting out fixed effects, interactions, and covariates, are primarily due to random factors not related to determinants of school choice. Also, we can argue that if parents do not sort in accordance with the observables, it is unlikely to sort by unobservables, too (Altonji et al., 2015; Fletcher et al., 2021).

We investigate this assumption by regressing a series of observable characteristics on the share of immigrants and the interaction of this variable with a foreign-born dummy. The results are reported in Table 2. Panel A reports the results with year and grade dummy and pools all schools together. Among native-born students, whites and blacks are less likely to attend schools

with a higher share of immigrants, and students from poor families[5] are more likely to be exposed to immigrants. On the other hand, foreign-born whites and blacks are more likely to attend schools with a higher share of immigrants. However, once we implement a full set of fixed effects and their interaction with a foreign-born dummy, the marginal effects converge to zero, economically and statistically. There is virtually no evidence of sorting by race, gender, ethnicity, and a proxy for a family's socioeconomic status. Therefore, the balancing test offers a framework net of endogenous selection to test the immigrant peer effects.

5.2. Main Results

The main results are reported in Table 3 for test score outcomes in columns. The first panel includes only fixed effects and we add more covariates over consecutive panels. The first panel suggests some negative effects of immigrant exposure on math test scores of foreign-born students. However, the effects can be explained by individual observables and cohort characteristics. In the fully parameterized model (panel D), there is no effect of exposure to a higher share of immigrant students on native-born test scores. Also, the effects are small and insignificant for math test scores of foreign-born individuals. However, the effect on ELA test score of foreign-born students is negative and statistically significant although economically quite small. It suggests that a standard-deviation rise in the share of immigrants (11 percent) is associated with a 2.7 percent of a standard deviation reduction in ELA test score of immigrants. This is equivalent to a reduction of 14.3 percent from the mean ELA score among immigrants.

These findings are in line with several studies on the effect of immigrant peers on students' test scores and academic achievements in the US that document small-sized marginal effects that are in most cases insignificant (Conger, 2015; Cortes, 2006; Figlio & Özek, 2019b; Fletcher et al.,

[5] Throughout the paper we use free/discounted meal as a proxy for family socioeconomic status.

2021). Moreover, the negative effects on ELA test scores exhibit the language spill-over effects on immigrants' reading tests from a higher concentration of immigrants (Chiswick & Miller, 1996; Ohinata & van Ours, 2013).

In Table 4, we replicate these results with other outcomes including a dummy to indicate obesity (BMI≥30), BMI z-score, weight-for-age z-score, and fitness z-score. In the full specification of panel D, we do not observe any effect on obesity and BMI z-score although the effects are negative for BMI z-scores. However, we do observe a reduction in weight-for-age and gains in fitness tests among native-born students as a result of exposure to immigrants. An increase of one standard-deviation in the share of immigrants leads to a 0.7 percent of a standard deviation reduction in weight-for-age and 2.7 percent of a standard deviation increase in fitness z-score among native-born students. Foreign-born students exhibit lower fitness scores when face a higher concentration of immigrants. The absolute value of the magnitude of the effect is somewhat larger than the effect on native-born students (3.7 versus 2.7), both statistically significant at 10 percent level but economically modest-sized.

5.3. Heterogeneity Analyses

The results so far suggested virtually zero effects on native-born test scores and modest-sized but positive effects on their anthropometric and fitness outcomes. In addition, there are some negative effects on immigrants' ELA test scores and fitness z-score. However, one may truly argue that immigrant behavior and their interaction with their immigrant peers could alter in environments where they are minority versus places where they are the majority of pupils. To explore this heterogeneity, we interact a dummy with measures of immigrant concentration that indicates whether or not the school has above median foreign-born students and later a dummy that equals one if the school has above median non-English speaker students. The results are

reported in Table 5 and Table 6 for test scores and health/fitness outcomes, respectively. The triple-interaction terms suggest that the effects of exposure to immigrants on the foreign-born math test, obesity, BMI, weight-for-age, and fitness scores do not vary by schools with higher versus lower share of immigrants or in schools with higher versus lower share of non-English speaker students. However, in schools with above-median immigrants versus below median immigrants, the negative effects of the share of foreign-born students on immigrants' ELA scores are larger (-0.0027 versus -0.0006).

We also interact our constructed measure of own race-ethnicity share of immigrants in school-year (introduced in equation 2) with the share of immigrants (and their interaction with foreign-born dummy). The results are reported in Table 7 and Table 8 for test scores and health/fitness outcomes, respectively. The triple-interaction term of the effects on math test scores become positive and significant though still quite small even for relatively large changes in the share of own race/ethnicity and share of immigrants. This is also true for the negative effects of the triple-interaction term on ELA test scores. Looking at health/fitness outcomes in Table 8, we observe the negative effects on BMI z-score and weight-for-age z-score are more pronounced among foreign-born students when they are acquainted with a larger share of immigrants from their own race/ethnicity. This suggests that part of these health gains in weight-related measures operate through feelings of identity, belonging, potential discrimination environment, and socializing with other students (Brewis, 2014; Manns-James et al., 2021; Schafer & Ferraro, 2011).

6. Conclusion

The overtime increases in the number and share of immigrant populations in the country during the last decades coupled with spatial changes in their residential settlements have generated concerns regarding the consequences of these demographic shifts. One of the highly debated

among policymakers and concerning issues among families is the changes in school peers of students as the new shifts bring more concentration of immigrant students to schools. The studies that investigate how a higher share of immigrants influence students' academic outcomes provide mixed evidence. In the case of the US, studies point to insignificant and small or at worse modest-sized effects on test scores. Some studies also argue that these modest effect sizes do not persist through later-life outcomes such as adulthood earnings.

In this paper, we provide novel evidence on how a higher (lower) share of immigrants influence US-born and foreign-born students' outcomes including math and ELA test scores, obesity, BMI, weight-for-age, and fitness scores. We find no evidence that the share of immigrants influences US-born peers. The point estimates are close to zero and statistically insignificant. Consistent with the negative spill-over effects of immigrant peers on language skills, we find some small effects on foreign-born ELA test scores.

Moreover, there are small-sized gains from exposure to a higher share of immigrants on native-born weight-for-age and fitness outcomes. An additional 10 percent increase in the share of immigrants is associated with 2.4 percent of a standard-deviation rise in fitness score. However, there are some negative effects on fitness score of foreign-born students from their foreign-born peers. There are no discernible impacts on obesity and BMI z-score.

We explore the heterogeneity in the effects by interacting the share of own race/ethnicity in the immigrant population within a school-year with the share of immigrants to examine whether the immigrant peer effects differ in schools where they share more/less a student's own racial background and ethnic origin. We find that the effects on immigrants' ELA test scores are larger (but still quite small) in schools with a higher share of own-race immigrants. Also, there are

benefits (though small) observed in BMI and weight-for-age z-scores for immigrants to attend a school with a share of higher own-race peers.

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Tables

Table 1 - Summary Statistics by Foreign-Born Status

	Foreign Born			US-Born		
	Observations	Mean	SD	Observations	Mean	SD
Female	543696	.491	.5	3506950	.495	.5
Race: Non-Hispanic White	543696	.134	.34	3506950	.167	.373
Race: Non-Hispanic Black	543696	.187	.39	3506950	.285	.451
Race: Hispanic	543696	.344	.475	3506950	.403	.49
Race: Asian Pacific	543696	.324	.468	3506950	.135	.342
Race: Other	543696	.011	.103	3506950	.01	.099
Individual Educational Plan Status	543696	.082	.274	3506950	.179	.383
English Learner Status	543696	.343	.475	3506950	.075	.263
Free/Reduced Meal	543696	.835	.371	3506950	.763	.425
Age	543696	11.115	1.731	3506950	10.636	1.752
Math Scale Z-Score	543696	.016	1.044	3506950	-.002	.993
ELA Scale Z-Score	543696	-.192	1.142	3506950	.03	.973
Obese (BMI≥30)	485427	.03	.172	2969346	.051	.221
BMI Z-Score	485427	-.147	.878	2969346	.024	1.017
Weight-for-Age Z-Score	485427	-.145	.88	2969346	.024	1.016
Fitness Z-Score	423082	-.058	2.143	2415167	.012	2.251
%School-Year-Grade Share of Foreign-Born	543696	20.578	10.764	3506940	14.311	8.999
School-Grade Number of Students (Cohort Size)	543696	233.333	173.05	3506950	187.162	149.597
School-Grade Share of Non-Hispanic Blacks	543696	.242	.276	3506940	.281	.289

Table 2 – Within-School and Across-Grades Selection based on Observables

	Outcomes:								
	Female	Age	White	Black	Hispanic	Asian-Pacific	Other	Individual Education Plan	Reduced/Free Meal
	(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)
Panel A. Without School Fixed Effects									
Share Foreign Born	-.000518***	.000082	-.005546***	-.007674***	.005283***	.00804***	-.000079**	-.001058***	.007237***
	(.000159)	(.00026)	(.001013)	(.000955)	(.000955)	(.000657)	(.000035)	(.000243)	(.000663)
Share Foreign Born×	-.000463**	-.000013	.004136***	.001217*	-.004587***	-.000799	.000029	.000215	-.003089***
Foreign Born	(.00018)	(.000272)	(.000771)	(.000734)	(.001064)	(.00123)	(.000044)	(.000201)	(.000501)
Observations	4050636	4050636	4050636	4050636	4050636	4050636	4050636	4050636	4050636
R-squared	.000169	.95784	.01727	.033091	.009767	.06911	.003137	.011036	.042696
	0.494	10.700	0.162	0.272	0.395	0.161	0.010	0.166	0.773
Panel B. With School Fixed Effects									
Share Foreign Born	.000039	.00028**	.000023	-.000101	.000139	-.000071	6.000e-06	-.0002	.000199
	(.000139)	(.000119)	(.000106)	(.000105)	(.000128)	(.000105)	(.00003)	(.000125)	(.000123)
Share Foreign Born×	-.000118	.000147	-.000082	-.000263	.000261	-.000023	.000105*	.00004	-.000084
Foreign Born	(.000347)	(.000349)	(.000235)	(.000197)	(.00031)	(.000268)	(.00006)	(.000204)	(.000197)
Observations	4049830	4049830	4049830	4049830	4049830	4049830	4049830	4049830	4049830
R-squared	.019511	.96015	.371565	.434877	.318004	.323854	.04416	.068141	.29752
	0.494	10.701	0.162	0.272	0.395	0.161	0.010	0.166	0.773

Standard errors, clustered at the school level, are in parentheses. Regressions in panel A include grade, and year fixed effects and a binary indicator for being foreign born. Regressions in panel B include year fixed effects, grade-by-year fixed effects, school-by-year fixed effects, and the interaction of a dummy for foreign born with all fixed effects.

*** p<0.01, ** p<0.05, * p<0.1

Table 3 – The Effect of School-Grade Immigrant Peers on Native-Born and Immigrants' Test Scores

	Math Scale Z-Score	ELA Scale Z-Score
	(1)	(2)
Panel A. School, Grade, Year Fixed Effects interacted with Foreign Dummy		
Share Foreign Born	.000648	.000118
	(.000519)	(.000425)
Share Foreign Born× Foreign Born	-.00132*	-.004571***
	(.000785)	(.000762)
Observations	4049830	4049830
R-squared	.249447	.210787
Panel B. Adding Gender and Race Dummies		
Share Foreign Born	.00068	.000134
	(.000499)	(.000409)
Share Foreign Born× Foreign Born	-.001252	-.004435***
	(.000765)	(.000762)
Observations	4049830	4049830
R-squared	.292224	.245663
Panel C. Adding Age, Age Squared, Individual Educational Plan, English Learner, Reduced/Free Meal, Days absent		
Share Foreign Born	.000501	-.00019
	(.000456)	(.000361)
Share Foreign Born× Foreign Born	-.000034	-.002624***
	(.000725)	(.000608)
Observations	4049537	4049537
R-squared	.432979	.411651
Panel D. Adding Cohort Size and Share of Blacks in each School-Grade-Year		
Share Foreign Born	.000341	-.000276
	(.000453)	(.00036)
Share Foreign Born× Foreign Born	6.000e-06	-.002512***
	(.000727)	(.000615)
Observations	4049537	4049537
R-squared	.433032	.41169

Standard errors, clustered at the school level, are in parentheses. Regressions include year fixed effects, grade-by-year fixed effects, school-by-year fixed effects, the interaction of a dummy for foreign born with all fixed effects. Race dummies include indicators of non-Hispanic white, non-Hispanic black, Hispanic, Asian-pacific, and other races. Z-scores are calculated based on grade-year average values of respective variables.
*** p<0.01, ** p<0.05, * p<0.1

Table 4 – The Effect of School-Grade Immigrant Peers on Native-Born and Immigrants' Anthropometric/Fitness Outcomes

	Obese	BMI-Z	Weight-for-Age Z	Fitness Z
	(1)	(2)	(3)	(4)
School, Grade, Year Fixed Effects interacted with Foreign Dummy				
Share Foreign Born	-.000026	-.000381	-.000638*	.002616*
	(.000065)	(.000332)	(.000331)	(.001441)
Share Foreign Born×	.000094	.000375	.000613	-.003821**
Foreign Born	(.000125)	(.000651)	(.000685)	(.00187)
Observations	3454293	3454293	3454293	2837696
R-squared	.039658	.05457	.045763	.297753
Adding Gender and Race Dummies				
Share Foreign Born	-.000028	-.000402	-.000651**	.002651*
	(.000066)	(.000329)	(.000328)	(.001429)
Share Foreign Born×	.000095	.000343	.000635	-.003773**
Foreign Born	(.000124)	(.000636)	(.000674)	(.00187)
Observations	3454293	3454293	3454293	2837696
R-squared	.041576	.06487	.053838	.301417
Adding Age, Age Squared, Individual Educational Plan, English Learner, Reduced/Free Meal, Days absent				
Share Foreign Born	-.000042	-.00041	-.000676**	.002539*
	(.000065)	(.000327)	(.000328)	(.001405)
Share Foreign Born×	.000093	.000394	.000766	-.003302*
Foreign Born	(.000123)	(.000632)	(.000663)	(.001839)
Observations	3454197	3454197	3454197	2837619
R-squared	.04867	.070485	.059381	.324498
Adding Cohort Size and Share of Blacks in each School-Grade-Year				
Share Foreign Born	-.000044	-.000349	-.000631*	.002439*
	(.000065)	(.00033)	(.00033)	(.001401)
Share Foreign Born×	.000098	.000435	.000842	-.003394*
Foreign Born	(.000124)	(.000635)	(.000667)	(.001845)
Observations	3454197	3454197	3454197	2837619
R-squared	.04867	.070494	.059389	.32453

Standard errors, clustered at the school level, are in parentheses. Regressions include year fixed effects, grade-by-year fixed effects, school-by-year fixed effects, the interaction of a dummy for foreign born with all fixed effects. Race dummies include indicators of non-Hispanic white, non-Hispanic black, Hispanic, Asian-pacific, and other races. Z-scores are calculated based on age-sex average values of respective variables. BMI score is calculated as a person's weight (in kilograms) divided by the square of height (in meters). Obese is a binary indicator that equals one if BMI score is greater than (or equal to) 30 and zero otherwise. Fitness score is the summation of three normalized scores including push-up score, curl-up score, and PACER score.
*** p<0.01, ** p<0.05, * p<0.1

Table 5 – Immigrant Peers and Test Scores, Interaction with School-Year Dummies

	Math Scale Z-Score	ELA Scale Z-Score
	(1)	(5)
School Above Median Foreign-Born Dummy		
Share Foreign Born× Foreign Born×Above Median Foreign Born at School-Year	-.000028	-.002739**
	(.00121)	(.001165)
Share Foreign Born× Foreign Born	-.000612	-.00066
	(.000943)	(.00098)
Observations	4049537	4049537
R-squared	.433047	.411694
School Above Median Non-English Home-Language Dummy		
Share Foreign Born× Foreign Born×Above Median Non-English Speaker at School-Year	-.000297	-.004686***
	(.001249)	(.001053)
Share Foreign Born× Foreign Born	-.000109	.000677
	(.000881)	(.000855)
Observations	4049537	4049537
R-squared	.433046	.411697

Standard errors, clustered at the school level, are in parentheses. Regressions include year fixed effects, grade-by-year fixed effects, school-by-year fixed effects, the interaction of a dummy for foreign born with all fixed effects, and controls for race, gender, age, age squared, English learner dummy, individual educational plan dummy, free/reduced mea dummy, cohort size, and cohort share of blacks. Race dummies include indicators of non-Hispanic white, non-Hispanic black, Hispanic, Asian-pacific, and other races. Z-scores are calculated based on grade-year average values of respective variables.

*** p<0.01, ** p<0.05, * p<0.1

Table 6 – Immigrant Peers and Anthropometric/Fitness Outcomes, Interaction with School-Year Dummy Having above Median Immigrants

	Obese	BMI-Z	Weight-for-Age Z	Fitness Z
	(1)	(5)	(7)	(8)
School Above Median Foreign-Born Dummy				
Share Foreign Born× Foreign Born×Above Median Foreign Born at School-Year	-.000057	.000306	.001078	-.004035
	(.00024)	(.001299)	(.001311)	(.003285)
Share Foreign Born× Foreign Born	.000172	.000412	.000236	-.001207
	(.000211)	(.001246)	(.00126)	(.0029)
Observations	3454197	3454197	3454197	2837619
R-squared	.048671	.070496	.059391	.324539
School Above Median Non-English Home-Language Dummy				
Share Foreign Born× Foreign Born×Above Median Non-English Speaker at School-Year	-9.000e-06	.00076	.000899	.002635
	(.00024)	(.001228)	(.001279)	(.003065)
Share Foreign Born× Foreign Born	.000139	.000075	.000333	-.005983**
	(.000213)	(.001148)	(.001211)	(.002546)
Observations	3454197	3454197	3454197	2837619
R-squared	.048674	.070498	.059391	.324544

Standard errors, clustered at the school level, are in parentheses. Regressions include year fixed effects, grade-by-year fixed effects, school-by-year fixed effects, the interaction of a dummy for foreign born with all fixed effects. Race dummies include indicators of non-Hispanic white, non-Hispanic black, Hispanic, Asian-pacific, and other races. Z-scores are calculated based on age-sex average values of respective variables. BMI score is calculated as a person's weight (in kilograms) divided by the square of height (in meters). Obese is a binary indicator that equals one if BMI score is greater than (or equal to) 30 and zero otherwise. Fitness score is the summation of three normalized scores including push-up score, curl-up score, and PACER score.
*** p<0.01, ** p<0.05, * p<0.1

Table 7 – Immigrant Peers and Test Scores, Interaction with School-Year School-Level Share of Own Race Immigrants

	Math Scale Z-Score	ELA Scale Z-Score
	(1)	(5)
Share Foreign Born× Foreign Born×School-Share of Own race Immigrant	.000104*	-.000125**
	(.000059)	(.000059)
Share Foreign Born× Foreign Born	-.001521	-.000718
	(.001047)	(.001045)
Observations	4049537	4049537
R-squared	.433101	.411705

Standard errors, clustered at the school level, are in parentheses. Regressions include year fixed effects, grade-by-year fixed effects, school-by-year fixed effects, the interaction of a dummy for foreign born with all fixed effects, and controls for race, gender, age, age squared, English learner dummy, individual educational plan dummy, free/reduced mea dummy, cohort size, and cohort share of blacks. Race dummies include indicators of non-Hispanic white, non-Hispanic black, Hispanic, Asian-pacific, and other races. Z-scores are calculated based on grade-year average values of respective variables.
*** p<0.01, ** p<0.05, * p<0.1

Table 8 – Immigrant Peers and Anthropometric/Fitness Outcomes, Interaction with School-Year School-Level Share of Own Race Immigrants

	Obese	BMI-Z	Weight-for-Age Z	Fitness Z
	(1)	(5)	(7)	(8)
Share Foreign Born× Foreign Born×School-Share of Own race Immigrant	-6.000e-06 (6.000e-06)	-.00005* (.00003)	-.000073** (.000032)	.000032 (.000123)
Share Foreign Born× Foreign Born	.00018 (.000143)	.001159 (.000765)	.001884** (.000809)	-.003859* (.002177)
Observations	3454197	3454197	3454197	2837619
R-squared	.048671	.070496	.059409	.324534

Standard errors, clustered at the school level, are in parentheses. Regressions include year fixed effects, grade-by-year fixed effects, school-by-year fixed effects, the interaction of a dummy for foreign born with all fixed effects. Race dummies include indicators of non-Hispanic white, non-Hispanic black, Hispanic, Asian-pacific, and other races. Z-scores are calculated based on age-sex average values of respective variables. BMI score is calculated as a person's weight (in kilograms) divided by the square of height (in meters). Obese is a binary indicator that equals one if BMI score is greater than (or equal to) 30 and zero otherwise. Fitness score is the summation of three normalized scores including push-up score, curl-up score, and PACER score.
*** p<0.01, ** p<0.05, * p<0.1

Figures

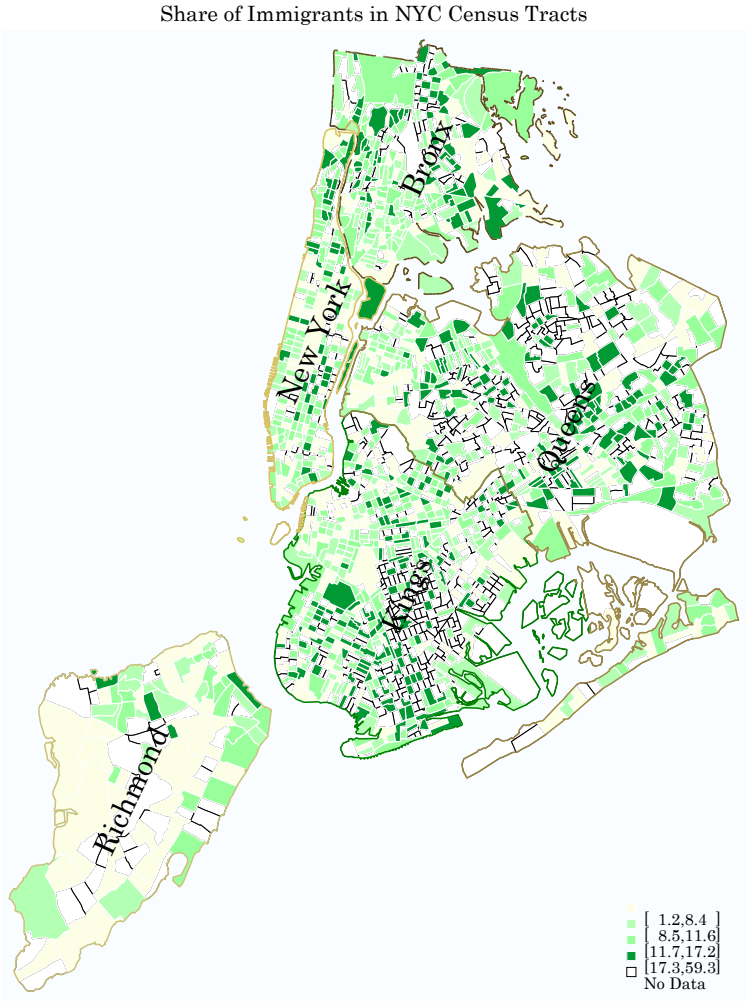

Figure 1 - Distribution of Immigrants across New York City's Census Tracts

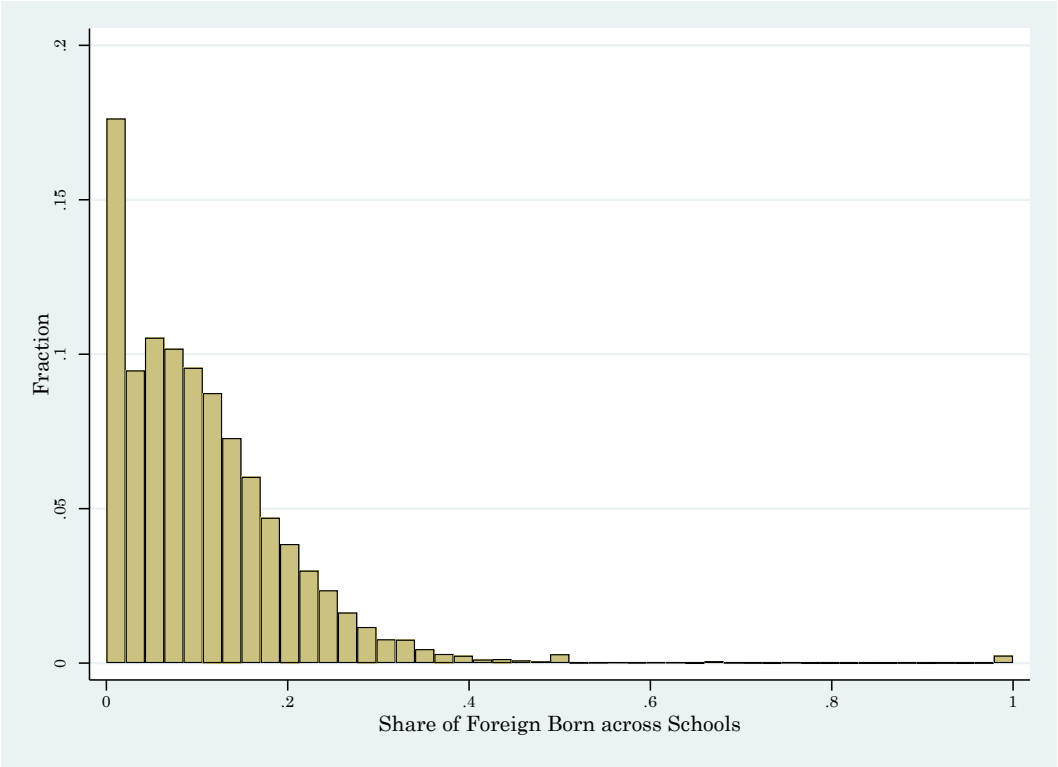

Figure 2 - Density Distribution of Immigrants across New York City's Public Schools

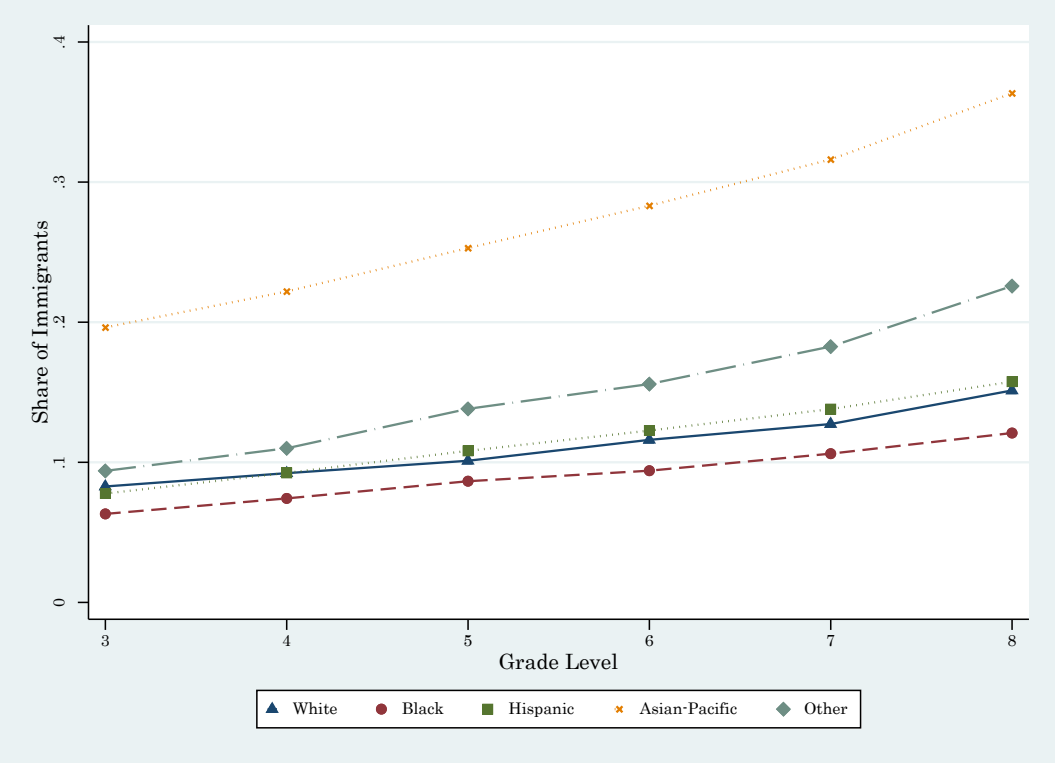

Figure 3 - Share of Immigrants across Grades by Race/Ethnicity

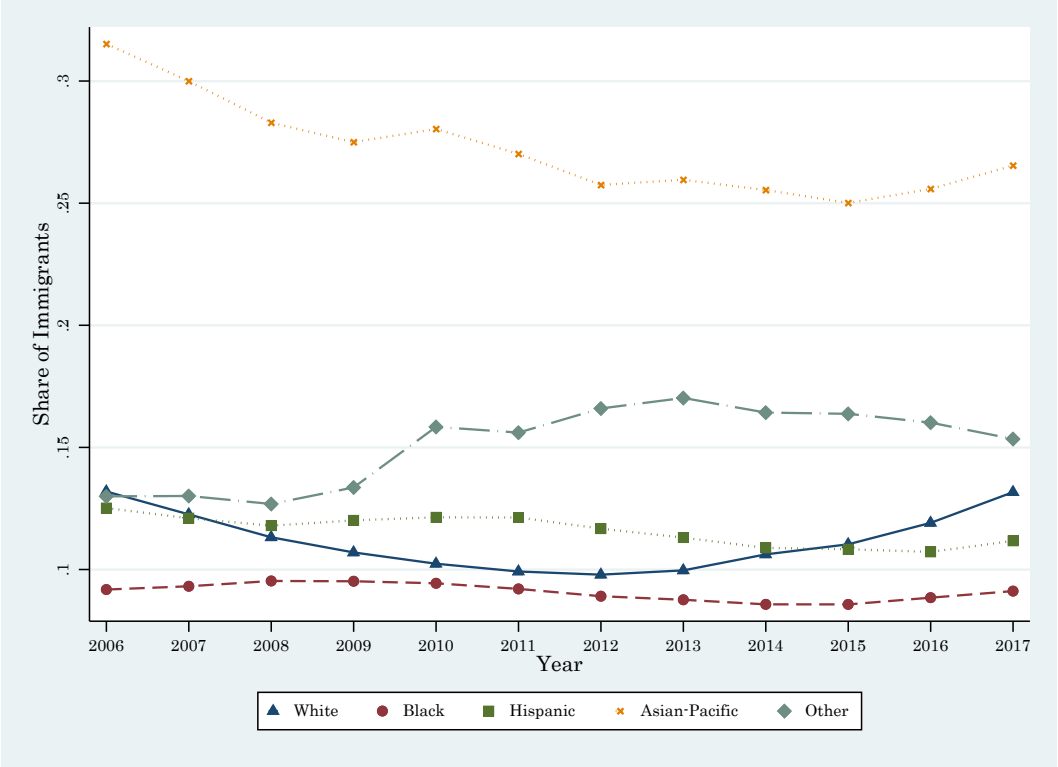

Figure 4 - Share of Immigrants across Years by Race/Ethnicity

Appendix A

Appendix Table A-1 - Tabulation of Source Countries among Immigrants in New York City

	Freq.	Percent	Cum.
AFGHANISTAN	638	0.12	0.12
ALBANIA	5485	1.01	1.13
ALGERIA	361	0.07	1.20
ANDORRA	5	0.00	1.20
ANGOLA	63	0.01	1.21
ANTIGUA &BARBUDA	796	0.15	1.36
ARGENTINA	1289	0.24	1.60
ARMENIA	461	0.09	1.68
AUSTRALIA	730	0.13	1.82
AUSTRIA	175	0.03	1.85
AZERBAIJAN	555	0.10	1.95
BAHAMAS	268	0.05	2.00
BAHRAIN	94	0.02	2.02
BANGLADESH	35042	6.47	8.49
BARBADOS	959	0.18	8.67
BELARUS	818	0.15	8.82
BELGIUM	228	0.04	8.86
BELIZE	842	0.16	9.02
BENIN	113	0.02	9.04
BERMUDA	97	0.02	9.06
BHUTAN	95	0.02	9.07
BOLIVIA	365	0.07	9.14
BOSNIA-HERZEGOVI	205	0.04	9.18
BOTSWANA	2047	0.38	9.56
BRAZIL	1534	0.28	9.84
BRIT VIRGIN IS.	658	0.12	9.96
BRITISH W INDIES	188	0.03	10.00
BRUNEI DARUSSALAM	26	0.00	10.00
BULGARIA	568	0.10	10.11
BURKINA-FASO	865	0.16	10.27
BURMA (MYANMAR)	706	0.13	10.40
BURUNDI	30	0.01	10.40
CAMBODIA	140	0.03	10.43
CAMEROON	205	0.04	10.47
CANADA	3463	0.64	11.11
CAPE VERDE	1	0.00	11.11
CAYMAN ISLANDS	48	0.01	11.12
CENTRAL AFR.REP	224	0.04	11.16
CHAD	46	0.01	11.17
CHILE	430	0.08	11.24
CHINA	54426	10.06	21.30
COLOMBIA	7962	1.47	22.77
COMOROS	224	0.04	22.81
CONGO (DEM.REPB)	97	0.02	22.83
CONGO (REPB OF)	173	0.03	22.86
COSTA RICA	433	0.08	22.94
CROATIA	149	0.03	22.97

CUBA	299	0.06	23.03
CYPRUS	89	0.02	23.04
CZECH REPUBLIC	87	0.02	23.06
CZECHOSLOVAKIA	32	0.01	23.06
DEM REP KOREA/NO	358	0.07	23.13
DENMARK	197	0.04	23.17
DJIBOUTI	12	0.00	23.17
DOMINICA	714	0.13	23.30
DOMINICAN REP.	96818	17.89	41.19
ECUADOR	17643	3.26	44.45
EGYPT	6973	1.29	45.74
EL SALVADOR	4350	0.80	46.54
EQUAT. GUINEA	4	0.00	46.54
ERITREA	18	0.00	46.54
ESTONIA	62	0.01	46.56
ETHIOPIA	436	0.08	46.64
FIJI	84	0.02	46.65
FINLAND	81	0.01	46.67
FRANCE	1508	0.28	46.95
FRENCH GUIANA	133	0.02	46.97
FRENCH POLYNESIA	12	0.00	46.97
FRENCH W INDIES	95	0.02	46.99
GABON	59	0.01	47.00
GAMBIA	794	0.15	47.15
GEORGIA	1754	0.32	47.47
GERMANY	1315	0.24	47.71
GHANA	5234	0.97	48.68
GREECE	1252	0.23	48.91
GREENLAND	21	0.00	48.92
GRENADA	1780	0.33	49.25
GUATEMALA	3078	0.57	49.81
GUINEA	2013	0.37	50.19
GUINEA - BISSAU	268	0.05	50.24
GUYANA	28881	5.34	55.57
HAITI	17356	3.21	58.78
HONDURAS	5546	1.02	59.80
HONG KONG	2272	0.42	60.22
HUNGARY	436	0.08	60.30
ICELAND	101	0.02	60.32
INDIA	11970	2.21	62.53
INDONESIA	700	0.13	62.66
IRAN	189	0.03	62.70
IRAQ	197	0.04	62.73
IRELAND	276	0.05	62.78
ISRAEL	3128	0.58	63.36
ITALY	1720	0.32	63.68
IVORY COAST	679	0.13	63.81
JAMAICA	30569	5.65	69.45
JAPAN	2521	0.47	69.92
JORDAN	537	0.10	70.02
KAZAKHSTAN	528	0.10	70.12
KENYA	146	0.03	70.14
KIRIBATI	201	0.04	70.18
KUWAIT	165	0.03	70.21
KYRGY REPUBLIC	264	0.05	70.26
LAO PEO DEM REP	22	0.00	70.26

LATVIA	119	0.02	70.29
LEBANON	495	0.09	70.38
LESOTHO	19	0.00	70.38
LIBERIA	948	0.18	70.56
LIBYA	99	0.02	70.57
LITHUANIA	181	0.03	70.61
LUXEMBOURG	24	0.00	70.61
MACAU	101	0.02	70.63
MADAGASCAR	330	0.06	70.69
MALAWI	55	0.01	70.70
MALAYSIA	819	0.15	70.85
MALDIVES	13	0.00	70.86
MALI	337	0.06	70.92
MALTA	55	0.01	70.93
MARSHALL ISL	9	0.00	70.93
MAURITANIA	108	0.02	70.95
MAURITIUS	40	0.01	70.96
MEXICO	31636	5.84	76.80
MICRONESIA (FS)	15	0.00	76.80
MOLDOVA	286	0.05	76.86
MONACO	40	0.01	76.86
MONGOLIA	64	0.01	76.88
MONTENEGRO	126	0.02	76.90
MOROCCO(W SAHAR)	1284	0.24	77.14
MOZAMBIQUE	20	0.00	77.14
NAMIBIA	52	0.01	77.15
NASU	18	0.00	77.15
NAURA	11	0.00	77.16
NEPAL	3098	0.57	77.73
NETHER ANTILIES	208	0.04	77.77
NETHERLANDS	345	0.06	77.83
NEW ZEALAND	139	0.03	77.86
NICARAGUA	441	0.08	77.94
NIGER	204	0.04	77.98
NIGERIA	5280	0.98	78.95
NORWAY	869	0.16	79.11
OMAN	38	0.01	79.12
PAKISTAN	18531	3.42	82.54
PANAMA	1135	0.21	82.75
PAPUA NEW GUINEA	104	0.02	82.77
PARAGUAY	661	0.12	82.89
PERU	3731	0.69	83.58
PHILIPPINES	7938	1.47	85.05
POLAND	4398	0.81	85.86
PORTUGAL	238	0.04	85.91
QATAR	35	0.01	85.91
REP OF KOREA/SO	7190	1.33	87.24
ROMANIA	776	0.14	87.38
RUSSIAN FEDERATN	7972	1.47	88.86
RWANDA	21	0.00	88.86
SAINT LUCIA	1886	0.35	89.21
SAMOA(WESTERN)	10	0.00	89.21
SAN MARINO	8	0.00	89.21
SAO TOME	3	0.00	89.21
SAUDIA ARABIA	442	0.08	89.29
SENEGAL	884	0.16	89.46

SERBIA	133	0.02	89.48
SEYCHELLES	24	0.00	89.49
SIERRA LEONE	728	0.13	89.62
SINGAPORE	253	0.05	89.67
SLOVAK REPUBLIC	207	0.04	89.71
SLOVENIA	64	0.01	89.72
SO YEMEN (OLD)	87	0.02	89.73
SOLOMON ISLANDS	108	0.02	89.75
SOMALIA	16	0.00	89.76
SOUTH AFRICA	399	0.07	89.83
SPAIN	1656	0.31	90.14
SRI LANKA	1395	0.26	90.39
ST VINCENT &GREN	1375	0.25	90.65
ST.KITTS & NEVIS	385	0.07	90.72
SUDAN	417	0.08	90.80
SURINAM	528	0.10	90.89
SWAZILAND	27	0.00	90.90
SWEDEN	179	0.03	90.93
SWITZERLAND	246	0.05	90.98
SYRIA	282	0.05	91.03
TAIWAN	627	0.12	91.15
TAJIKISTAN	352	0.07	91.21
THAILAND	467	0.09	91.30
TOGO	514	0.09	91.39
TONGA	20	0.00	91.40
TRINIDAD &TOBAGO	8873	1.64	93.03
TUNISIA	47	0.01	93.04
TURKEY	906	0.17	93.21
TURKMENISTAN	162	0.03	93.24
TURKS AND CAICOS	82	0.02	93.26
TUVALU	5	0.00	93.26
UGANDA	37	0.01	93.26
UK (BRITAIN)	3209	0.59	93.86
UKRAINE	4789	0.88	94.74
UN REP TANZANIA	116	0.02	94.76
UNARAB EMIRATES	232	0.04	94.81
UPPER VOLTA	2	0.00	94.81
URUGUAY	325	0.06	94.87
UZBEKISTAN	11183	2.07	96.93
VANUATU	122	0.02	96.95
VENEZUELA	1786	0.33	97.28
VIETNAM	1319	0.24	97.53
YEMEN	11540	2.13	99.66
YU REP MACEDONIA	284	0.05	99.71
YUGOSLAVIA	1349	0.25	99.96
ZAMBIA	114	0.02	99.98
ZIMBABWE	90	0.02	100.00
Total	541254	100.00	