The Rise of the Second Generation: Aspirations, Motivations and Academic Success of Chinese Immigrants' Children in Hong Kong

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ABSTRACT

Most studies adopt the culture perspective to explain the second-generation immigrants' advantage in education, paying little attention to immigrants' selectivity based on unmeasured psychological attributes. We identify four subjective factors that could contribute to immigrants' outstanding performance, and employ mediation analysis to examine how much of the effect of immigrant status on academic achievement is mediated through these factors. We examine the self-selection hypothesis in the context of Hong Kong, as its unique setting enables us to control for the effect of cultural factors and focus on the selectivity effect. The analysis of 2003 PISA data confirm that, having strong motivations to find a better life and high aspirations for upward mobility can largely explain immigrant children's academic success, with educational aspiration playing a particularly important role.

Immigrants are a highly selected group. Even when they have relatively modest educations and few financial resources, they have shown that they have the drive, ambition, courage, and strength to move from one nation to another. Their second generation offspring are, therefore, the children of exceptional parents. Although parents may have measurable characteristics that put their children at risk----low education, low incomes, poor language skills, and so on----they have unmeasured characteristics that make them different kinds of parents, mostly in ways that are advantageous for their children.

Inheriting the City: The Children of Immigrants Come of Age,
Kasnitz, *Mollenkopf, Waters, Holdaway* (2009)

INTRODUCTION

Comparing immigrants' children and natives' children in terms of their socioeconomic achievements has been the central interest of immigrant assimilation studies over the past decades (Zhou 1997). Some scholars argue that such a comparison can better measure immigrants' level of adaptation than simply focusing on the gap between foreign-born immigrants and their native-born counterparts (Schleicher 2006). In an attempt to be integrated into the host society, first-generation immigrants encounter many difficulties because of the disruption of schooling/work and their positions as newcomers. Second-generation immigrants, however, have much more in common with their native peers, because they were born in the same country. Yet studies have repeatedly found significant differences between these two groups. More intriguingly, despite various socioeconomic barriers, children from immigrant families have been found to achieve comparable, or even better, developmental outcomes when compared to their native counterparts (Coll and Marks 2012; Kasnitz et al. 2009).

The unexpected success of immigrants' school-aged children in terms of their educational outcomes is particularly striking. A growing body of literature has shown their advantages in a wide range of educational outcomes, including educational attainment(Boyd 2002; Boyd and Grieco 1998; Zhang 2014), standard test scores (Duran and Weffer 1992; Harris, Jamison and Trujillo 2008; Kao and Tienda 1995; Palacios, Guttmannova and Chase-Lansdale 2008), grade point averages (Greenman 2013; Kao and Tienda 1995; Pong, Hao and Gardner 2005), school retention rates (Driscoll 1999; Perreira,

Harris and Lee 2006), and college attendance (Bennett and Lutz 2009; Glick and White 2004).

Scholars have mainly relied on two theories—the cultural perspective and the self-selection perspective—to explain the interesting phenomenon. The cultural perspective emphasizes the role of distinctive cultural and behavioral patterns unique to certain immigrant families in explaining the differences between natives' children and immigrants' children, whereas the self-selection perspective highlights the psychological merits characterizing all voluntary immigrant groups, such as their exceptionally strong motivations and high aspirations. Nevertheless, it is very difficult, if not entirely impossible, to distinguish between these two mechanisms generating the positive effect of second-generation status on school performance. In this article we re-examine the issue in the context of Hong Kong, where nearly 40 percent of the population was not locally born and the majority are Chinese immigrants from neighboring Guangdong Province. To a large extent, the cultural factor is fixed in the context of Hong Kong, as natives and immigrants share the same ethnicity and culture. Therefore, any significant difference between the two groups could be attributed to the effect of immigrants' selectivity (Zhang 2014).

We empirically examine the roles played by motivation and aspiration and provide solid evidence showing that immigrants' selectivity based on psychological traits can largely explain the second generation's academic advantage, net of the cultural factors. Using data from the Programme for International Student Assessment (PISA) in Hong Kong, 2003, we identify four subjective factors that may explain immigrant children's outstanding performances, and employ mediation analysis to measure how much of the immigrant status effect on children's academic achievement is mediated through these factors. Specifically, we aim to answer three research questions: (1) do immigrants' children have higher aspirations and stronger motivations than natives, net of other family background factors? (2) If they do, to what extent can these psychological traits explain (or mediate) the second generation's academic advantage? (3) Is the mediation effect especially strong for children from more disadvantaged families since they are presumably more motivated to achieve upward mobility via academic success?

TWO PERSPECTIVES ON THE SECOND GENERATION'S ADVANTAGE

The Cultural Perspective

Central to the cultural perspective is the assumption that the reason for differential outcomes between children of immigrants and children of natives mainly lies in the distinctive cultural and behavioral patterns (e.g., cultural values, parenting practices, and social networks) unique to immigrants' families. The linear (straight-line) assimilation theory implies that the success of immigrants' offspring depends on the level of assimilation. Therefore, the more they embrace the native mainstream culture and abandon their own, the more likely they will catch up to their native peers and eventually become "indistinguishable" in host societies (Gordon 1964; Park 1914). Segmented assimilation theory greatly improved the model by emphasizing that not all assimilation is desirable—some patterns of adaption lead to convergence, whereas others may lead to divergence (Portes and Zhou 1993; Zhou 1997). Some immigrant groups have succeeded precisely because they distanced themselves from the native culture and "accommodated without assimilating" (Gibson 1988), whereas others were influenced by the oppositional culture in host societies and experienced downward assimilation through the process of acculturation (Rumbaut 1999).

The most successful second-generation immigrants, however, are those who selectively adopted traits from their own culture and integrated into the mainstream culture (Portes and Rumbaut 2001; Zhou 1997). An obvious example of this selective acculturation is the exceptional success of the East Asian subgroups (e.g., Chinese, Vietnamese, Koreans, Japanese), who have benefited from certain aspects of their own cultures, such as close family relationships, strong study/work ethics, and a high level of social cohesion (Zhou 1997). Some scholars even claimed that the real second-generation advantage came from being located between two cultures (Kasnitz et al. 2009).

The Self-Selection Perspective

While sociological studies of immigrants have long been dominated by the cultural perspective, another factor—immigrants' selectivity—is overlooked to a large extent. As a self-selected group, immigrants usually are "more capable and more highly motivated" (Borjas 1987; Chiswick 1978). Whereas new arrivals may initially lag behind in terms of certain observable factors such as education and income, as they stay longer they may start

climbing up the ladder driven by unobserved psychological factors such as aspiration, motivation, and other forms of "mental abilities". The seminal work by Borjas (1987) suggests that the endogeneity of migration decisions should be taken into account in explaining the differential performances between immigrants and native workers. Portes and Rumbaut (2001) also claim that immigrants tend to be those with a strong disposition for upward mobility who believe that good employment is only possible through a high level of educational attainment. Such a self-selection process can also be applied to understand immigrant children and adolescents' academic advantages over their local counterparts, as immigrants may pass on the "immigration drive" to their children and imprint on them the importance of achieving academic excellence (Kao and Tienda 1995; Sue and Okazaki 1990; Xie and Goyette 2003).

Numerous studies have shown that immigrants' children usually have higher aspirations in education, occupation and earnings (Kao and Tienda 1998; Minello and Barban 2012; Portes, McLeod Jr and Parker 1978). Moreover, immigrant students are often observed to be motivated learners who hold more positive attitudes and behaviors toward schooling (Fuligni 1997; Greenman 2013; Pong and Zeiser 2011; Rosenbaum and Rochford 2008; Schleicher 2006). Compared to their local counterparts, they like and value schools more, build better relationships with teachers, and also put more effort into schoolwork. Therefore, high aspirations and strong motivations among second-generation children may largely mediate the relationship between their disadvantaged immigrant status and academic success.

The key difference between the cultural perspective and the self-selection perspective is that, the former is often ethnicity-specific, whereas the latter applies to all voluntary immigrant groups. While the differential circumstances of immigrant groups can be largely explained by their cultural attributes, it is still essential to determine the fundamental common features that enable immigrants' children to overcome various obstacles and achieve upward mobility. A recent study by Hsin and Xie (2014) attributes Asian immigrants' success in academic performance to both their cultural beliefs and their immigrant status. However, in a diverse society like the US, it is almost impossible to disentangle these two effects. Even after controlling for the effect of ethnicity, we still cannot tell whether the advantage of the second generation relative to the so-called "natives" comes from the fading of the "immigration drive" or the gradual integration into the mainstream culture.

Hong Kong is a society with a long history of immigration and a considerable immigrant population from mainland China. According to the 2011 census data, about one-third of the total population was born in mainland China (mostly in neighboring Guangdong Province). These people share the same ethnicity, culture, and even language as Hong Kong locals. Therefore, Hong Kong provides a unique setting to examine unresolved issues pertaining to the effect of immigration selectivity. On one hand, cross-border migration from mainland China to Hong Kong closely mirrors international migration between two nations (Zhang and Wu 2011); and on the other hand, the fact that mainland Chinese immigrants share the same ethnicity as the local people would enable us to rule out the cultural explanation and focus on the selectivity effect in explaining immigrant children's academic outperformance, in which aspiration and motivation play important roles (Chan et al. 2003; Zhang 2014).

BEATING THE ODDS: THE ROLES OF ASPIRATION AND MOTIVATION

Strong motivations for better life chances and high aspirations for social and economic upward mobility usually underpin a family's decision to migrate, and parents tend to transmit these psychological traits to their offspring (Hagelskamp 2010). While immigrants' children are often disadvantaged because of limited family resources, less-educated parents, poor neighborhoods, and all kinds of social barriers, the psychological traits they inherit from their parents could enable them to beat the odds. Even though these psychological factors can be reasonably expected to determine the academic success of immigrants' children, present research has provided little evidence(Coll and Marks 2012), mainly because few surveys have comprehensive and accurate measures of aspirations and motivations.

Aspirations, used interchangeably with expectations, refer to future goals of individuals. Ever since the Wisconsin model (Sewell, Haller and Portes 1969), scholars have advocated for social psychological factors such as educational and occupational aspirations to be included in the studies of status attainment. It has been well recognized that educational aspirations play an important role in shaping not only the choices that are relevant for the educational trajectory but also school-related behavior that affects school performance. Occupational aspiration, on the other hand, has proved to be a strong predictor for future career-related choices and socioeconomic status (SES) (Mau and Bikos

2000; Rojewski 2005; Sewell, Haller and Portes 1969), but whether it also affects school performance remains unknown. However, given that education may be the most important path to desirable jobs in labor markets, a positive association may also exist between occupational aspiration and academic performance. Plenty of studies have illustrated that immigrant children have relatively high aspirations that are quite resilient to their unfavorable social origins (Kao and Tienda 1998; Minello and Barban 2012; Portes, McLeod Jr and Parker 1978).

Apart from the general and long-term goals, immigrant children may also transform their pursuit of better future into specific learning motivations. Studies carried out over time indicate that motivation influences both what students want to study and how they perform (Wigfield, Eccles and Rodriguez 1998). Psychologists have conducted a tremendous amount of work on this subject. According to self-determination theory (Ryan and Deci 2000b), motivations may be divided into the intrinsic type and the extrinsic type: the former is driven by an interest or enjoyment in the task itself (e.g. "I study math because I like it"), whereas the latter is driven by instrumental rewards or pressure (e.g. "I study math because it can help me get a job in the future") (Ryan and Deci 2000a). Some studies have shown that immigrant children score high in both types of motivations, especially the latter type (Chen and Stevenson 1995; Próspero, Russell and Vohra-Gupta 2012; Singh 2002). For instance, based on the analyses of PISA data across OECD countries, immigrant students are more likely than local students to believe that making an effort in mathematics is worthwhile because it will help them in their work later. The same trend can be seen across all questions related to students' instrumental motivation for learning mathematics (Schleicher 2006).

Based on the discussions above, we thus expect that:

Immigrants' children have higher educational and occupational aspirations and stronger intrinsic and extrinsic motivations than natives' children, net of other factors. These four psychological attributes, to a large extent, can explain away second-generation immigrants' premium in academic achievement.

The literature usually looks at the impacts of family background and immigrant status on educational outcomes separately, while overlooking their potential interaction. Although in general, families with lower SES face more constraints in promoting their children's life chances, such disadvantages may have differential impacts on native and

immigrant families. Hao and Ma (2012), for example, found a significantly weaker effect of family SES on postsecondary educational outcomes for immigrant youth than their native counterparts. Zhang (2014) also reported that in Hong Kong, the positive effects of parental education and occupation status on children's likelihood of attending university full-time are much smaller for Chinese immigrants than their local peers. Those findings suggest that the second-generation advantage is more pronounced among those coming from low SES families. In other words, the overall advantage of immigrant children is mainly attributed to the resiliency of those coming from the most disadvantaged family background. Zhang (2014) termed this phenomenon the "contingent transition to triumph." A plausible explanation could be that the motivation for academic success and upward mobility are particularly strong for those immigrants whose family SES is at the bottom of the society. Accordingly, we would expect that:

Among immigrant students, the academic advantage is especially pronounced for those coming from families of lower socioeconomic status. The extra advantage of the most disadvantaged immigrant students can be attributed to their higher aspirations and stronger motivations.

To test the above hypotheses empirically, we analyze Hong Kong data from the OECD's PISA surveys. In the following, we first describe the data, variable measures and methods, and then present the results from both linear regression and structural equation models. The article concludes with discussions.

DATA, MEASURES AND METHODS

Data

The OECD's PISA survey is conducted every three years in participating countries. It is designed to collect information on 15-year-old students, especially their reading, mathematical and scientific literacy. Hong Kong has participated in the survey since its beginning in 2000. The empirical analysis in this article is based on the 2003 data with a focus on mathematics. Detailed information is available from the survey on students' learning motivations and future aspirations. While the original sample size is 4,478, we restrict the analytical sample to native children and second-generation immigrant children. Since the survey did not solicit information on students' ethnicity, we can only infer ethnicity from their parents' birthplaces. Only those whose parents were born in Hong Kong

or mainland China are treated as Chinese and thus are included in the analyses. After list-wise deletion of cases with missing data on relevant variables, we obtain 3,310 students from 145 schools, among which 1,678 are native children and 1,632 are second-generation immigrant children. Note that in this paper "immigrants" refer to mainland Chinese immigrants only.

The PISA assessment employs a two-stage stratified sampling design. First, schools are sampled systematically from a list of all eligible schools with probabilities that are proportional to a measure of enrollment. Then, 20-35 students are sampled within each school (OECD 2005a). To give correct point estimates and standard errors, both overall sampling weights and replicate weights (available in the publicly accessible data) are used in the following analyses. The replicate weights are calculated with the balanced repeated replication (BRR) method (OECD 2005b).

Variable Measures

The main outcome variable is mathematics literacy, but reading literacy and science literacy will also be used as supporting evidence if necessary. To measure students' mathematics achievement, the data offer five plausible values which are randomly drawn from the estimated distribution of a student's mathematical ability (OECD 2005a). As plausible values are essentially imputed values for latent variables, every statistic of interest will be calculated using each of the five plausible values and then summarized by averaging the results in accordance with recommendations by Little and Rubin (1987).

Immigrant status is the key independent variable and the classification is as follows: (1) Natives: students whose parent(s) were born in Hong Kong; and (2) second-generation immigrants: students who were born in Hong Kong with at least one parent born in mainland China. Cases with missing responses for either the student or for both parents are dropped out of the analysis.

As pointed out before, students' future aspirations and learning motivations are important mediators. Aspiration is divided into two types: educational and occupational aspirations. Educational expiration is measured by the highest level of education that the student expects to achieve, which is classified according to the International Standard Classification of Education (ISCED). It is treated as a continuous variable, where higher scores indicate higher educational aspirations. Occupational aspiration is measured by the

occupations at age 30 that the students expect to be employed in. It is converted into a four-digit International Standard Classification of Occupation (ISCO) code and then mapped to the International Socioeconomic Index (ISEI), where higher scores indicate higher occupational aspirations (OECD 2005a).[1] Motivation is split into intrinsic motivation and extrinsic motivation, both of which were measured in the 2003 PISA survey. Intrinsic motivation refers to "interest in and enjoyment of mathematics" whereas extrinsic motivation refers to "instrumental motivation to learn mathematics." Both are constructed from a variety of items listed in Appendix. Other control variables include, gender, coded as a dummy (male=1), grade level (modal grade or higher=0, one grade lower=-1, two grades lower=-2, three grades lower=-3), family structure (single-parent family=1, else=0), and family ESCS (economic, social and cultural status) index. The ESCS index in PISA 2003 was derived from three variables related to family background: parent's highest level of education, parent's highest occupation and number of home possessions.

Methods

Two approaches of mediation analysis are widely used by scholars. The first is multiple regression modeling and the second is structural equation modeling. The multiple regression approach, originating from Baron and Kenny (1986), and Judd and Kenny (1981), establishes mediation in four steps.[2]

Step 1: Conduct a simple regression analysis with X predicting Y to test for path c. This step establishes an effect that could be mediated.

$$Y = \alpha + cX + \varepsilon \qquad (1)$$

Step 2: Conduct a simple regression analysis with X predicting M to test for a path. This step establishes a correlation between the causal variable and the mediator.

$$M = \alpha + aX + \varepsilon \qquad (2)$$

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[1] As approximately 30 percent of the sample has missing values for the occupational aspiration variable, we performed imputation by running a linear regression on a series of variables including immigrant status, gender, school grade, family economic, social and cultural status (ESCS), school average ESCS, and academic achievements.

[2] These studies use a single independent variable as illustration, but other covariates can be easily included in each step of the procedure.

Figure 1: Visual Depiction of Baron and Kenney's Four-step Mediation Analysis
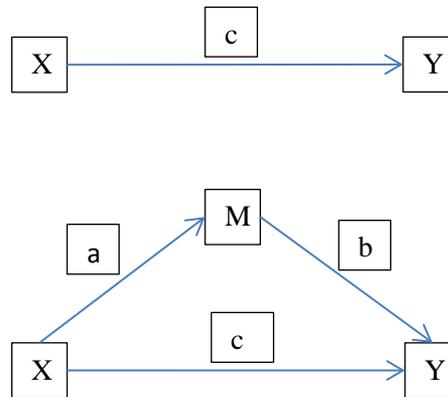
Step 3: Conduct a multiple regression analysis with M predicting Y after controlling for X. Show that the mediator affects the outcome variable. It is not sufficient to simply correlate the mediator with the outcome; the mediator and the outcome may be correlated because they are both caused by the causal variable X. Thus, it is important to control for the causal variable in establishing the effect of the mediator on the outcome.

Step 4: To establish that M completely mediates the X to Y causal relationship, the effect of X on Y controlling for M, namely path c', should be zero. The effects in both Steps 3 and 4 are estimated from the same equation. If all four steps succeed, then the data are consistent with the hypothesis that variable M completely mediates the X-Y relationship, and if the first three steps succeed but not the Step 4, then it suggests a partial mediation.

$$Y = \alpha + c'X + bM + \varepsilon \qquad (3)$$

where c' is the direct effect of X on Y, and a*b (or $c - c'$) is the indirect effect of the mediator. The sum of c' and a*b is equal to coefficient c in the first equation. To test the significance of a*b, as suggested in Baron and Kenny(1986), we use the Aroian version of the Sobel test as it releases the unnecessary assumption that the product of a's and b's standard errors is vanishingly small.[3]

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[3] Specifically, the test equation is as follows: $Z - value = \dfrac{a*b}{\sqrt{b^2*S_a^2 + a^2*S_b^2 + S_a^2*S_b^2}}$.

Another widely used approach of mediation analysis is structural equation modeling (SEM). SEM has its own theoretical and statistical superiority over regression, both in assessing the classic mediation questions and in enabling researchers to extend beyond basic inquiries(Iacobucci 2008; Iacobucci, Saldanha and Deng 2007). The related models can estimate the effect of multiple mediators simultaneously, while allowing for the existence of correlation between observable variables, thus providing flexibility for model specifications. Therefore, we also employ SEM to model the direct and indirect effects of immigrant status on mathematics achievement. The conceptual model is shown in Figure 2.

Figure 2: Conceptual Structural Equation Model of the Direct and Indirect Effects of Immigrant Status on Mathematics Achievement, HKPISA 2003
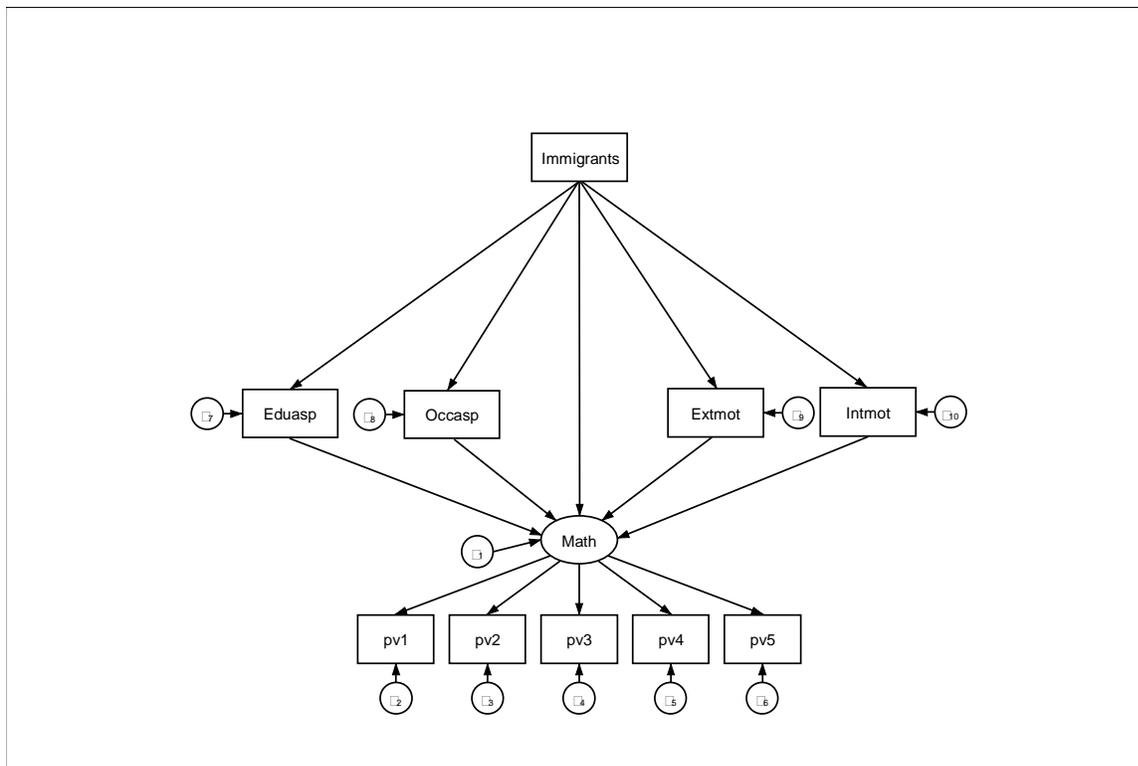
Notes: Immigrants—Second-generation Immigrants=1, Natives=0; Eduasp—Educational Aspiration; Occasp—Occupational Aspiration; Extmot—Extrinsic Motivation; Intmot—Intrinsic Motivation; Math—Mathematics Literacy; pv1-pv5—Plausible Values of Mathematics Score.

Note that we have controlled for the effects of gender, grade level, and family ESCS index in every step of the analysis. To reduce visual clutter, however, they are not presented in the figure. We also allow all the observable variables in the structural part to be correlated with one another. For the measurement part, we treat plausible values as imputed values for the latent variable, mathematics ability, and constrain the five parameters to be equal (give them the same weight).

RESULTS

Descriptive Statistics

In most immigrant societies, children in immigrant families experience major challenges associated with their parents' limited access to socioeconomic resources. The same situation applies to the Chinese immigrant children in Hong Kong, because their parents migrated to Hong Kong mostly as refugees from mainland China during its chaotic years or as family members for reunion with earlier refugees (Chan et al. 2003; Zhang 2014). Table 1 compares family background characteristics between native children and second-generation immigrant children. Apparently, immigrant parents have significantly lower occupational status, less education, and consequently fewer important possessions at home. The index of socioeconomic and cultural status, which combines the three variables above, clearly shows that immigrant children grew up in families with considerable disadvantages compared to native families.

Table 1: Descriptive Statistics on Selected Family Characteristics of Children, by Immigrant Status, HKPISA 2003

VARIABLES	Natives	Second-generation Immigrants	Adjusted Wald test (Prob > F)
Index of Socioeconomic & Cultural Status	-0.501 (0.040)	-0.812 (0.025)	0.000
Parental Highest Occupational Status	45.56 (0.610)	40.05 (0.414)	0.000
Parental Highest Years of Schooling	10.44 (0.139)	9.445 (0.096)	0.000
Index of Home Possessions	-0.097 (0.026)	-0.213 (0.022)	0.000
Unweighted No. of Cases	1,678	1,632	

Note: 1. Standard deviations in parentheses are calculated by the balanced repeated replication (BRR) method. 2. Data are weighted.

However, notwithstanding their disadvantaged family background, immigrants' children are performing unexpectedly well in school. For instance, Figure 3 shows the scatterplot of mathematics achievement measured by the ESCS index for natives and second-generation immigrants, as well as the corresponding LOWESS lines. One can see from the figure that, while disparities are negligible among high ESCS families, immigrant students greatly outperform their native counterparts among low ESCS families. This is consistent with the "contingent transition to triumph" thesis proposed by Zhang (2014).

Figure 3. Scatterplot of Math Score by the ESCS Index, with Nonparametric LOWESS Lines for Natives and Second-generation Immigrants, HKPISA 2003
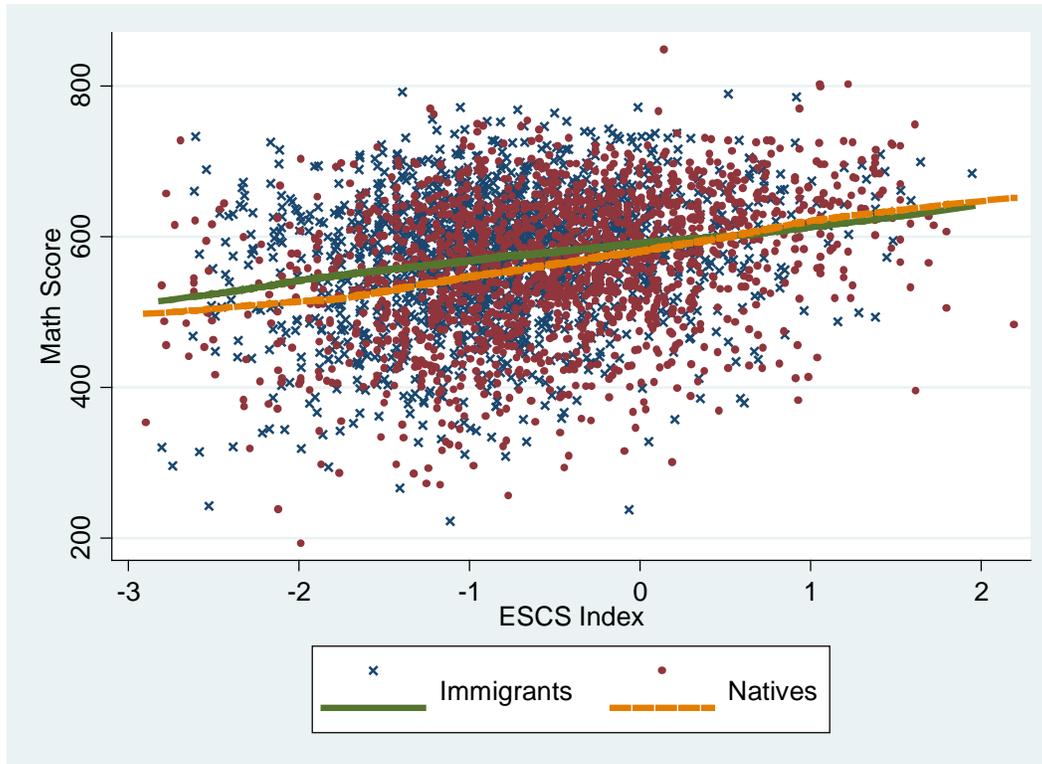
Note: Math score is the average score of five plausible values.

To test the "contingent transition to triumph" thesis in a rigorous way, we further divide the sample into two using the 50th percentile of the family ESCS index as the cut-off point, and focus on differential patterns of the second generation's advantage between students from these two groups of families. Table 2 presents descriptive statistics on variables by family background and immigrant status. Similar to what we have observed in Figure 3, those second-generation immigrant children coming from low ESCS families seem to have more pronounced academic success than those coming from high ESCS families. The same pattern can be found for educational and occupational aspirations, but to a less extent for extrinsic and intrinsic motivations. To further understand whether motivation for upward mobility can explain immigrant children's advantages contingent on family socioeconomic status, we now move on to multivariate analysis.

Table 2: Descriptive Statistics on Selected Variables, by Family Background and Immigrant Status, HKPISA 2003

	VARIABLES	Natives	Second-generation Immigrants	Difference (Natives-Second-generation Immigrants)
Low ESCS Families	Mathematics Score	531.4(6.061)	558.8(4.625)	-27.4*
	Reading Score	493.7(5.021)	515.1(4.034)	-21.4*
	Science Score	519.9(5.869)	547.1(4.478)	-27.2*
	Educational Aspiration	3.660(0.058)	3.913(0.048)	-0.25*
	Occupational Aspiration	53.78(0.679)	55.43(0.499)	-1.65
	Extrinsic Motivation	-0.239(0.039)	-0.136(0.031)	-0.10
	Intrinsic Motivation	0.111(0.047)	0.251(0.029)	-0.14
	Male	0.479(0.024)	0.507(0.023)	-0.03
	Grade	-0.341(0.025)	-0.383(0.018)	0.04
	Single-parent Family	0.249(0.018)	0.195(0.013)	0.05
	Family ESCS Index	-1.282(0.022)	-1.291(0.016)	0.01
	Unweighted No. of Cases	672	965	
High ESCS Families	Mathematics Score	580.4(4.151)	583.3(5.837)	-2.90
	Reading Score	530.8(3.476)	533.6(4.463)	-2.80
	Science Score	566.6(3.670)	570.9(5.197)	-4.30
	Educational Aspiration	4.375(0.042)	4.399(0.045)	-0.02
	Occupational Aspiration	60.81(0.566)	60.44(0.630)	0.37
	Extrinsic Motivation	-0.144(0.034)	-0.039(0.045)	-0.11
	Intrinsic Motivation	0.208(0.031)	0.324(0.045)	-0.12
	Male	0.512(0.043)	0.483(0.034)	0.03
	Grade	-0.304(0.027)	-0.364(0.025)	0.06
	Single-parent Family	0.187(0.015)	0.177(0.014)	0.01
	Family ESCS Index	0.029(0.026)	-0.139(0.025)	0.17*
	Unweighted N	1,006	667	

Notes: 1. Standard deviations in parentheses are calculated by the balanced repeated replication (BRR) method. 2. Data are weighted. 3. Mathematics/reading/science score is the average score of five plausible values. 4. Sample divided into low/high ESCS families using the 50th percentile of the family ESCS index as the cutoff point. 5. *$p<0.01$.

Regression Models

Table 3 presents the results from a regression that predicts academic achievements in three subjects/skills: mathematics, reading, and science. Results consistently show that after controlling for family structure and socioeconomic status, along with gender and grade, second-generation immigrants outperform their native peers. Such advantages are significant and non-trivial. Other things being equal, immigrant students score 19 more points in mathematics, 15 more points in reading, and nearly 20 more points in science than their native counterparts. As expected, family ESCS index is positively related to academic achievements. To examine whether the effect of immigrant status varies with family background, we include an interaction term between the two variables in the models. The negative and significant coefficients suggest that academic advantages are larger for those students coming from families of lower socioeconomic status.

Table 3: OLS Regression Models Predicting Academic Achievements, HKPISA 2003

VARIABLES	Mathematics		Reading		Science	
	(1)	(2)	(1)	(2)	(1)	(2)
Second-generation Immigrants	19.30***	11.48*	15.22***	9.113*	19.78***	13.07*
	(4.404)	(5.309)	(3.549)	(4.303)	(4.078)	(5.110)
Male	10.52	10.30	-25.88***	-26.05***	2.945	2.754
	(5.550)	(5.560)	(4.768)	(4.777)	(5.003)	(5.004)
Grade	42.24***	42.23***	31.60***	31.60***	36.03***	36.02***
	(3.510)	(3.495)	(3.052)	(3.045)	(3.738)	(3.727)
Single-parent Family	-15.48***	-15.22***	-16.14***	-15.94***	-16.19***	-15.96***
	(4.512)	(4.562)	(4.222)	(4.246)	(4.537)	(4.545)
Family ESCS Index	28.66***	33.65***	21.99***	25.89***	28.54***	32.82***
	(3.186)	(4.067)	(2.586)	(3.560)	(2.848)	(3.906)
Family ESCS Index×Second-generation Immigrants		-11.55*		-9.021*		-9.910*
		(5.022)		(3.970)		(4.604)
Constant	586.5***	589.0***	553.2***	555.2***	575.5***	577.6***
	(4.538)	(4.381)	(3.300)	(3.428)	(3.887)	(3.995)
Average R-squared	0.135	0.137	0.148	0.150	0.131	0.133

Notes: 1. Standard errors in parentheses are calculated by the balanced repeated replication (BRR) method. 2. Data are weighted. 3. *p<0.05;**p<0.01;***p<0.001.

In Table 4 we replicate the analyses above for the four presumed mediators as dependent variables: educational aspiration, occupational aspiration, extrinsic motivation and intrinsic motivation. It can be seen that second-generation immigrants enjoy higher aspirations and stronger motivations than their native peers, confirming the previous argument that immigrant students are motivated learners. An ensuing question is, do immigrant students' stronger motivations vary by family background? We include an interaction term between the two, but find the effect to be statistically insignificant.

Hence, we have now confirmed that Chinese immigrant students in Hong Kong not only achieve academic success but also demonstrate higher aspirations and stronger motivations than their native counterparts. However, it would be premature for us to conclude that aspirations and motivations are mediators explaining Chinese immigrant students' achievement in education. For these psychological factors to be valid mediators, one more condition must be met: the original effect of the independent variable must be non-significant (for complete mediation) or reduced to a large extent (for partial mediation) in the presence of the mediator. Therefore, we further predict the effects of immigrant status

Table 4: OLS Regression Models Predicting Different Presumed Mediators, HKPISA 2003

VARIABLES	Educational Aspiration		Occupational Aspiration		Extrinsic Motivation		Intrinsic Motivation	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Second-generation Immigrants	0.177***	0.135**	1.065*	0.779	0.112**	0.106*	0.135***	0.132**
	(0.042)	(0.043)	(0.522)	(0.659)	(0.036)	(0.052)	(0.038)	(0.047)
Male	-0.193***	-0.194***	-0.087	-0.096	0.197***	0.197***	0.247***	0.247***
	(0.051)	(0.051)	(0.609)	(0.611)	(0.036)	(0.036)	(0.035)	(0.035)
Grade	0.108*	0.108*	0.813*	0.812*	-0.095**	-0.095**	0.034	0.034
	(0.046)	(0.046)	(0.409)	(0.410)	(0.030)	(0.029)	(0.032)	(0.032)
Single-parent Family	-0.141**	-0.139**	-1.081	-1.071	-0.060	-0.060	-0.139**	-0.138**
	(0.048)	(0.048)	(0.584)	(0.582)	(0.042)	(0.042)	(0.045)	(0.046)
Family ESCS Index	0.468***	0.495***	4.827***	5.009***	0.101***	0.105***	0.077**	0.079**
	(0.023)	(0.032)	(0.331)	(0.517)	(0.026)	(0.030)	(0.024)	(0.030)
Family ESCS Index×Second-generation Immigrants		-0.062		-0.422		-0.010		-0.005
		(0.048)		(0.670)		(0.048)		(0.043)
Constant	4.481***	4.495***	60.919***	61.012***	-0.247***	-0.245***	0.124***	0.125***
	(0.041)	(0.041)	(0.510)	(0.547)	(0.031)	(0.033)	(0.035)	(0.034)
Average R-squared	0.124	0.125	0.075	0.075	0.029	0.029	0.027	0.027

Notes: 1. Standard errors in parentheses are calculated by the balanced repeated replication (BRR) method. 2. Data are weighted. 3. *p<0.05;**p<0.01;***p<0.001.

on mathematics achievement,[1] after controlling for a presumed mediator. Results are presented in Table 5. As one can see, each of the four presumed mediators has a significant impact on math scores, while the immigrant effect is still significant but reduced to a large extent, suggesting the existence of a partial mediation.

Table 5: OLS Regression Models Predicting the Effects of Immigrant Status on Mathematics Achievement Controlling for Presumed Mediators, HKPISA 2003

VARIABLES	Model 1	Model 2	Model 3	Model 4
Presumed Mediator				
Educational Aspiration	37.66***			
	(2.386)			
Occupational Aspiration		2.100***		
		(0.205)		
Extrinsic Motivation			26.27***	
			(2.101)	
Intrinsic Motivation				29.63***
				(2.183)
Second-generation Immigrants	12.64**	17.06***	16.35***	15.28***
	(3.922)	(4.133)	(4.202)	(4.189)
Male	17.78***	10.71*	5.350	3.212
	(4.387)	(4.866)	(5.236)	(5.177)
Grade	38.16***	40.53***	44.73***	41.22***
	(3.256)	(3.420)	(3.358)	(3.072)
Single-parent Family	-10.19**	-13.21**	-13.89**	-11.37**
	(3.787)	(4.144)	(4.304)	(4.152)
Family ESCS Index	11.04***	18.53***	26.01***	26.39***
	(2.752)	(2.783)	(3.037)	(3.070)
Constant	417.7***	458.5***	593.0 ***	582.8***
	(11.55)	(14.25)	(4.172)	(4.392)
Average R-squared	0.306	0.224	0.190	0.221

Notes: 1. Standard errors in parentheses are calculated by the balanced repeated replication (BRR) method. 2. Data are weighted. 3. *$p<0.05$;**$p<0.01$;***$p<0.001$.

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[1] Due the limited space, we only present results for mathematic achievement. Results for reading and science literacy, available upon request, exhibit similar patterns.

We calculate the specific indirect effect for each of the four mediators by differencing the original effect of immigrant status and the adjusted effect. Using the methods proposed by Sobel (1982), we also test whether these indirect effects are statistically significant. As shown in Table 6, while all four variables do mediate a portion of the total immigrant effect, their relative importance differs. Individually, educational aspiration may be the most important because it alone mediates over one-third of the second generation's advantage, followed by intrinsic motivation to learn mathematics, which explains more than one-fifth of the total immigrant effect. Occupational aspiration and extrinsic motivation explain 12 percent and 15 percent of the indirect effects, respectively.

Table 6: Aroian Version of the Sobel Significance Test on Indirect Effects, by Presumed Mediators, HKPISA 2003

	Educational Aspiration	Occupational Aspiration	Extrinsic Motivation	Intrinsic Motivation
Indirect Effect	6.659	2.236	2.944	4.013
Test Statistic	4.064	1.992	3.010	2.743
S.E.	1.640	1.123	0.977	1.426
P-value	0.000	0.046	0.003	0.006
% of Indirect Effect	34.51%	11.59%	15.26%	20.80%

Structural Equation Models

Compared to the regression approach we have used above, SEM has certain merits. Instead of estimating the mediation effect for aspirations and motivations separately, we can assume that all four variables may mediate a portion of the total immigrant effect, which can be estimated accordingly. The simultaneous estimation of all the equations would show the mediating paths more clearly. Finally, in SEM estimation, the exogenous variables and mediation variables are allowed to be correlated with each other.

Given that the interaction term family background and immigrant status is found to be statistically significant in regression analysis, we now run structural equation models separately for the subsamples of low and high ESCS families. Based on the conceptual model in Figure 2, Figure 4 further shows the path diagrams for low ESCS and high ESCS families.

Figure 4: Direct and Indirect Effects of Immigrant Status on Mathematics Achievement among Low and High ESCS Families, HKPISA 2003
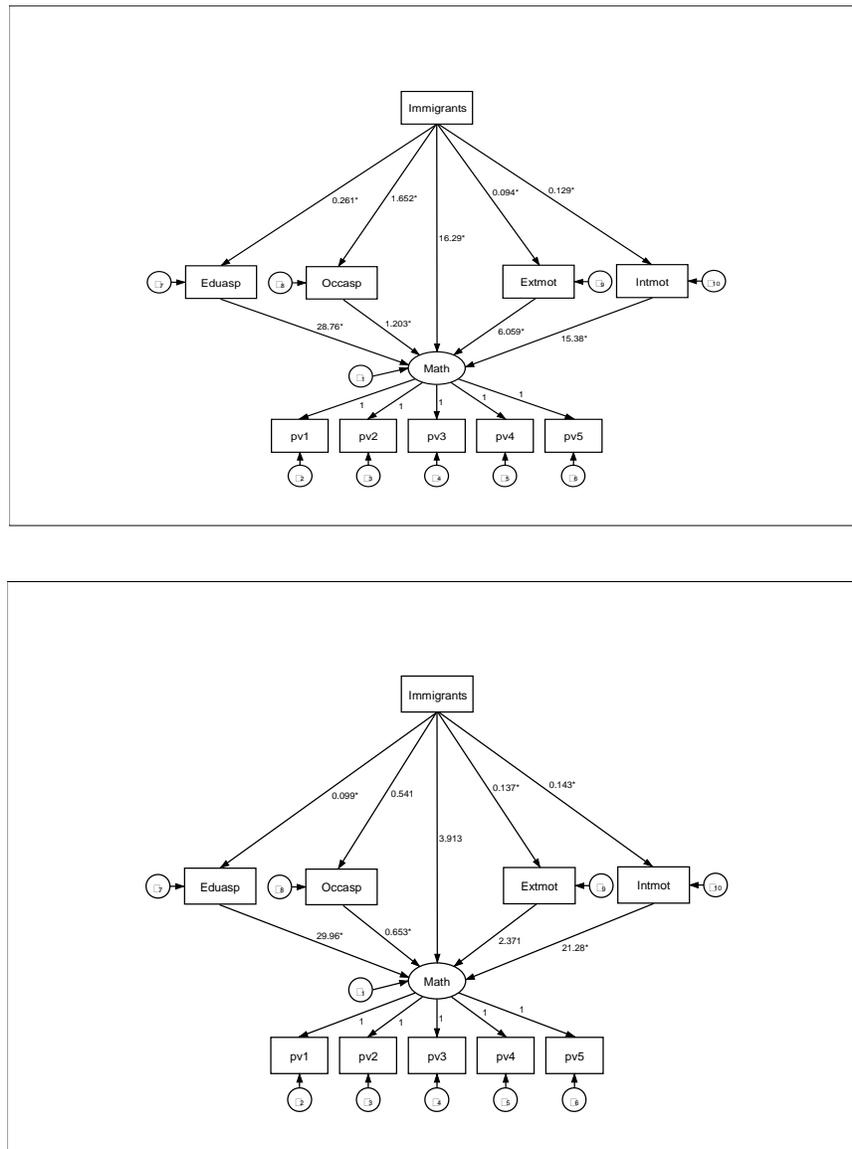
Notes: see Fig 2

As previously mentioned, the indirect effect is the product of immigrant status's effect on the mediator and the mediator's effect on the outcome (mathematics score). A mediation effect exists only if both paths have non-zero effects. Against this criterion, the second-generation immigrants from high ESCS families do not have significantly higher occupational aspiration, and extrinsic motivation has no influence on their mathematics scores. Therefore occupational aspiration and extrinsic motivation do not have a mediating effect among second-generation immigrants from well-off families. Other than that, results

show that both aspirations and motivations strongly mediate the effect of immigrant status on mathematics achievement. In other words, a large part of the second generation's advantage over natives in education can be explained by their higher future aspirations and stronger learning motivations.

Once again, we find that the explanatory power of these mediators varies by children's family background. Table 7 summarizes the total and specific indirect effects based on SEM by family ESCS. First, the table shows that the total effect of immigrant status on mathematics achievement is much larger for low ESCS families, but such resiliency cannot be fully explained by their higher aspirations and motivations. In fact, less than half of the total effect is mediated by the four factors. As for students from high ESCS families, the mediation effect is much stronger: after adding the four mediating variables, the direct effect of immigrant status on mathematics achievement becomes insignificant, suggesting the presence of a complete mediation. How can we explain the differential explanatory power of aspirations and motivations between students from low and high ESCS families? Since we find no evidence supporting the assumption that immigrant children from lower ESCS families have greater incentives to excel academically, we suspect that some other unobserved factors are also mediating the immigrant effect, and such mediator(s) are especially prominent for those immigrant children from low ESCS families.

Table 7: Specific and Total Indirect Effects from Structural Equation Modeling, by Immigrant Status and Family ESCS, HKPISA 2003

	Low ESCS Family			High ESCS Family		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Specific Indirect Effect						
Educational Aspiration	7.494	0.908	0.000	2.969	0.749	0.000
Occupational Aspiration	1.987	0.511	0.000	0.354	0.248	0.154
Extrinsic Motivation	0.568	0.228	0.013	0.325	0.189	0.085
Intrinsic Motivation	1.979	0.437	0.000	3.043	0.522	0.000
Total Indirect Effect	12.03	1.427	0.000	6.691	1.169	0.000
Total Effect	28.31	2.840	0.000	10.60	2.736	0.000
% of Indirect Effect	42.49%			63.12%		

CONCLUSIONS AND DISCUSSION

The paradoxical academic success of Asian immigrant children, especially those of East Asian descent, has perplexed many scholars and policymakers. While most explanations rely on these immigrants' unique culture influenced by Confucianism, one important factor—immigrants' self-selection process—is often neglected. One thing almost all voluntary immigrants have in common is that they migrate to seek better lives for themselves and their offspring. Such aspirations for upward mobility will rub off on their children, who are in turn motivated to study hard in school, as education is undoubtedly one of the most effective channels to realize upward mobility. This mechanism, may offer an alternative, if not more important, explanation for the second generation's academic success. We tested this argument in the setting of Hong Kong, which is a typical immigrant society like the US except immigrants from mainland China share a similar culture to the natives. Based on data from the 2003 PISA, we conducted analyses through regression and structural equation models, and obtained a number of interesting findings.

First, we found strong evidence of the second generation's advantage in education, with immigrants' children outperforming natives' children in Hong Kong in mathematics, reading, and science. This finding cannot be explained by immigrants' distinct culture, as scholars have previously claimed in other settings, because Chinese immigrant families share more or less the same cultural values as native families in Hong Kong.
Second, our results show that educational and occupational aspirations, as well as extrinsic and intrinsic motivations, are all closely related to mathematics achievement, and second-generation immigrant students possess significantly higher aspirations and stronger motivations than their native peers.

Third, the mediation analysis through both multiple regressions and structural equation modeling reveals that all four proposed variables measuring aspirations and motivations are valid mediators and account for a considerably large portion of the immigrant effect on mathematics achievement. Therefore, immigrant children's strong desire for upward mobility can partly explain the immigrant paradox. Among the four mediators, educational aspiration seems to be particularly important.

Finally, the interaction effect between family background and immigrant status was also examined. Results show that the effect of family ESCS on learning outcomes is much weaker for immigrants' children than for natives' children. Furthermore, the second-generation immigrants from lower ESCS families seem to enjoy greater net advantage in educational achievement. Such resiliency, nevertheless, could not be fully explained by

their aspirations and motivations. Instead, those four mediators seem to play a greater role among those immigrant children from higher ESCS families. Therefore, we found no evidence supporting the "contingent assimilation hypothesis" put forward by Zhang (2014) that the over-achievement of immigrant children from lower ESCS families is attributed to their higher aspirations and stronger motivations.

To sum up, using the PISA data in 2003 from Hong Kong, we have demonstrated that, even with the same culture and ethnicity, immigrant children can still outperform their native counterparts in academic achievement, and this is largely associated with their higher aspiration for upward social mobility and stronger motivation for success. Hence, in the unique setting of Hong Kong, we have empirically verified that aspirations and motivations, to some extent, can explain the second generation's advantage in academic performance. This theoretically plausible explanation may be applicable to any other immigrant society but nevertheless is confounded with cultural explanations in the studies of immigration in western countries, as immigrants often come from different ethnic/cultural background. In the case of Hong Kong, we are able to partial out the cultural difference between immigrants and natives and show that selectivity plays an important role in the adaptation of immigrants and their children to the host society. In other words, it is the aspiration for a better life that drives immigrants to leave their homeland, to overcome hardship and settle down in the host society, and to motivate their children to study hard with the aim of achieving upward social mobility through educational attainment.

These findings suggest that more emphasis should be placed on immigrants' selectivity pertaining to psychological attributes in the study of immigrant assimilation. Along this line, while we cannot explain why the mediation effects of the four variables pertaining to aspiration and motivation are strong for high ESCS families but weak for low ESCS families, we suspect that other unobserved factors are at play which could mediate the immigrant effect, especially for those immigrant children coming from lower ESCS families. For instance, immigrant children may have a strong desire to get along in school and win recognition from their native peers and teachers, and they may study hard to build positive images of themselves. Such a social motivation is possibly stronger for children from low ESCS families than children from high ESCS families. Family obligation or parental expectations could also explain immigrant children's hope for academic success. We do not have measures of these factors in the data analyzed here and can only hope that future data collection and research will allow us to empirically verify these claims.

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APPENDIX

Item Parameters for Constructed Variables

Constructed Variables	Item Parameters
Instrumental Motivation to Learn Mathematics (Extrinsic Motivation)	Thinking about your views on mathematics: To what extent do you agree with the following statements? 1. Making an effort in mathematics is worth it because it will help me in the work that I want to do later on. 2. Learning mathematics is worthwhile for me because it will improve my career prospects. 3. Mathematics is an important subject for me because I need it for what I want to study later on. 4. I will learn many things in mathematics that will help me get a job.
Interest in and Enjoyment of Mathematics (Intrinsic Motivation)	Thinking about your views on mathematics: To what extent do you agree with the following statements? 1. I enjoy reading about mathematics. 2. I look forward to my mathematics lessons. 3. I do mathematics because I enjoy it. 4. I am interested in the things I learn in mathematics.

Note: Item categories were "strongly agree", "agree", "disagree" and "strongly disagree". All items were inverted for scaling.