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ABSTRACT

Motivated to Succeed? Attitudes to Education among Native and Immigrant Pupils in England*

We study attitudes to education among English adolescents. Using PISA data, we show there is considerable variation in these attitudes depending on background: immigrant students have substantially and significantly more positive attitudes to school than native children, a difference that amounts to around 0.2 standard deviations. There is no difference between first- and second-generation immigrants, and the attitude gap does not appear to depend on particular schools' policies. We also show that students in London have more positive attitudes to education on average, but this is entirely accounted for by the distribution of children of immigrants in that city.

JEL Classification: I21, I24
Keywords: education, human capital, motivation, immigrants

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1. Introduction

A fruitful line of recent education research has looked at the interaction between non-cognitive factors – such as psychological traits, motivations, and culture – and cognitive skills in generating higher student achievement. Different researchers focus on different types of non-cognitive factors: for example, Heckman (2004) studies 'perseverance, motivation, self-control' (p. 180), Hadsell (2010) as well as Duckworth and Seligman (2005) investigate the importance of 'locus of control' or 'self-discipline', Duckworth et al. (2007) analyse a trait they call 'grit', variously defined as involving perseverance, motivation, persistence, zeal, and tenacity, and Heckman and Kautz (2012) discuss 'conscientiousness, perseverance, sociability, and curiosity'. Conscientiousness is perhaps the most useful psychological construct for studying achievement; Heckman and Kautz (2012, p. 5) define it as 'tendency to be organized, responsible, and hardworking'. Perhaps unsurprisingly, there is also evidence to suggest that pupils' scores on achievement tests are influenced by such non-cognitive skills as well as by their cognitive ability (see Almlund et al., 2011, Cunha et al., 2006). Indeed, Borghans et al. (2008, 2016) show that a substantial fraction of the variation in scores in achievement tests can be explained by personality variables, while Duckworth et al. (2007) show that 'grit' is predictive of success over and above cognitive ability.

Yet studies of where these traits come from and how they develop are only in their infancy (see Schurer, 2017). We contribute to this developing literature by studying an attitudinal variable that seems closely related to conscientiousness, zeal, motivation, and self-control: attitudes to education. We study students' attitudes to school and personal correlates of these characteristics, exploiting England's PISA sample covering over 4,500 adolescents.

We find that a key driver of positive attitudes to education is immigration status. Immigrant students (defined below) have quantitatively and statistically significantly more positive attitudes to education than native students, a difference that amounts to about 0.2 standard deviations. This effect appears to be general across schools and shows no sign of diminishing between first and second-generation immigrants. We interpret this as resulting from the intergenerational transmission of cultural traits from immigrating parents to the children. The act of immigration is selective in terms of personal attributes and allows parents to exhibit both aspiration and internal locus of control, displaying to their children that actions and attitudes matter at a very tangible level.[1] Unlike Galor and Özak's (2016) study – in which persistent economic conditions are theorised

[1] While the decision to emigrate clearly depends on context and options, it will also depend on individuals' levels of aspiration and risk attitudes. See Coleman and DeLeire (2003) for an economic model of locus of control in education decisions.

to induce parents to teach their children certain values – we treat student attitudes to education as long-term correlates of a single event: the act of emigration. This is closer to the results of Perez-Arce et al. (2011) and Voors et al. (2012) who show that personality traits can be affected by exposure to very strong exogenous shocks (for example, conflict or natural disasters).

Second, we highlight how our results may be a part explanation for the so-called 'London advantage' in achievement. The impressive performance of students attending secondary schools in London has prompted much debate, in particular whether the advantage is due to educational practices and policies (CfBT, 2014), the high fraction of children of immigrants (Burgess, 2014), or reforms in primary schools (Blanden et al., 2015). Interestingly, we find that students in London have much better attitudes to education on average compared with students in the rest of the country. However, this difference is entirely accounted for by immigration status: London has more immigrant pupils and therefore also more positive attitudes to education. This finding supports Burgess' (2014) finding that the 'London effect' is largely due to schools' ethnic composition .

Third, we consider whether immigrants' positive attitudes toward education are contagious. While our research design does not allow us to draw strong causal conclusions, the results suggest that immigrant students have positive attitudinal spill-over effects on non-immigrant students. How these spill-overs occur is an important question to investigate to develop public policy which might support dissemination of more positive attitudes to education overall.

Our paper is related to that of Figlio et al. (2016), who analyse the relationship between 'long term orientation' (LTO) – essentially delayed gratification or self-control – and academic achievement in Florida. They find that LTO has a strong positive association with achievement, after controlling for background characteristics and school-fixed effects. The authors do not have personal-level data on LTO, but instead link immigrant pupils to the average LTO level in their country of birth using an external dataset. This differs from our study: we do not study the question of how aggregate level 'national characteristics' predict achievement, but rather on the idea that the very act of emigration is selective on ambition, aspiration, resourcefulness, locus of control, 'grit' and so on – and that these values are transmitted to emigrants' children through different mechanisms. The broader issue of aspirations and educational attainment has been widely discussed, including its role in low achievement and social mobility (House of Commons, 2014). Studies include Berrington et al (2016), Khattab (2015), Goodman et al (2011), and Burgess et al (2009), though these are all correlational models of achievement and aspiration.

The paper proceeds as follows. Section 2 describes the data and Section 3 presents the results. In Section 4, we provide some reflections on the implications of these findings for the debate in

England on the extraordinary performance of students speaking a language other than English at home.

2. Data

We use the English PISA sample obtained from the OECD (2016a). PISA was created as a reliable metric of pupil knowledge, and has been carried out every three years since 2000. In the 2015 round, representative samples of pupils who have completed at least 6 years of formal schooling and are aged between 15 years and three months and 16 years and two months in 35 OECD countries – as well as in 37 other partner countries or economies – were tested in mathematical, reading, and scientific literacy. The PISA sample was designed as a two-stage stratified sample in which the first stage involved sampling of individual schools with 15-year old pupils. Schools were sampled with probabilities in proportion to their estimated number of 15-year old pupils. Replacement schools were also identified in case a sampled school chose not to participate. Among selected schools, 42 15-year old pupils who met the inclusion criteria were selected with equal probability, or, if the school had fewer than 42 such pupils, all 15-year old pupils in the school were selected. The number of pupils to be sampled in each school could deviate from 42, but could not be fewer than 20 (see OECD 2016b).

In total, 5,194 English pupils in 206 schools took part in PISA 2015[2] – 670 pupils sat the test in Greater London; 861 pupils in Northern England; 2,247 pupils in Southern England (not London); and 1,490 pupils in the Midlands. The pupils attended different types of schools: 4,279 attended non-selective state schools, 463 attended selective state schools, and 452 attended fee-paying schools. Due to non-response on the key independent and/or dependent variables of interest, the total sample included in the regressions is reduced slightly to between 4,610 and 4,641 pupils – depending on the outcome analysed – in 204 schools.

In addition to sitting the tests, pupils complete questionnaires with rich details on their background characteristics and personal views, which we use to obtain pupils' attitudes to education. The main

[2] While nonresponse in the PISA questionnaire is generally low, we deal with the item nonresponse that does exist by using the average of the relevant variable for the other pupils in the school/country for observations with missing values. We then also include indicators for missing values and interactions between these indicators and the relevant variable. Similar methods to deal with item nonresponse are used widely in PISA research (e.g. Falck and Woessmann 2013; Hanushek et al. 2013). Note that this approach is only used to deal with missing values in independent variables. Note also that the results are very similar if we only include observations with no missing values on the independent variables of interest.

variables used in this study are the attitudinal variables, two indicators of first- and second-generation immigrant status, and measures of their socioeconomic status.

We study answers to the four that relate to pupils instrumental motivation to studies in science: “Making an effort in my school science subject(s) is worth it because this will help me in the work I want to do later on”; “What I learn in my school science subject(s) is important for me because I need this for what I want to do later on”; “Studying my school science subject(s) is worthwhile for me because what I learn will improve my career prospects”; and “Many things I learn in my school science subject(s) will help me to get a job”. For each statement, pupils were asked to choose one of the following options: (1) ‘strongly agree’, (2) ‘agree’, (3), ‘disagree’, or (4) ‘strongly disagree’, which we recode so that higher values indicate more positive values. We standardise all outcome variables so they have a mean of 0 and standard deviation of 1.

From the above statements, the OECD (2017) has also created a summary index of instrumental motivation to learn science using an Item Response Theory scaling. The index of instrumental motivation was also constructed to allow for comparisons with the same index in 2006 using a common calibration linking procedure. The difference between a student who agrees with all four statements, and a student who disagrees with the statements, corresponds to 1.15 points on this scale, or about the average standard deviation in OECD countries (which equals 0.98). Nevertheless, to make the interpretation of the results consistent with the separate questions, we standardise both measures to have a mean of 0 and standard deviation of 1. Figure 1 displays a kernel density of the motivation index, separately for native pupils, first-generation immigrants, and second-generation immigrants. While the graph hints at the between-group regression findings to come, it also shows that there is the full range of degrees of motivation within each group.

Our principal independent variables are the two indicators of immigrant status: first-generation immigrants are foreign-born pupils whose parents are also foreign born and second-generation immigrants are pupils who were born in England and whose parents were born in another country. Non-immigrant pupils are therefore pupils whose mother or father was born in England, regardless of where the pupil himself or herself was born.

We also control for indicators of pupils’ socio-economic background. This includes the father’s and mother’s separate educational levels, ranging from (0) None, (1) primary education, (2) lower-secondary education, (3) vocational/pre-vocational upper-secondary education, (4) general upper-secondary education and/or non-tertiary post-secondary education, (5) vocational tertiary education, and (6) theoretically oriented tertiary and post-graduate education. It also includes their occupational status from 0 to 100, according to the occupation’s four-digit ISCO code mapped to the

international socio-economic index of occupational status (ISEI), and an index of home possessions, which includes the number of books at home as well as the availability of 16 household items that serve as a measure of family wealth.[3] Table 1 provides the descriptive statistics. In the sample, 9% of pupils report themselves as first-generation immigrant and another 9% as second-generation immigrant. This matches up reasonably well with data from the National Pupil Database (NPD), which show that around 14% of pupils report that for them English is an Additional Language (EAL) – that is, a different language is spoken by others at home. As expected give the sampling criteria, all the pupils in our sample are 15 or 16 years old and in school years 10, 11, or 12. In the total sample, only 42 pupils are in years 10 or 11 so we are studying pupils in the year they take their GCSEs. The parents' educational level varies between 0 and 6 with an average of 4.4, corresponding to slightly higher than general upper-secondary education/non-tertiary post-secondary education, while the occupational status varies between 11 and 89 with an average of about 51.

3. Results

Turning to the results, we first explore the relationship between the summary index of attitudes and personal characteristics, focussing in particular on the indicators for first- and second-generation immigrant status. Table 2 displays our findings. We report results from four specifications: one with no controls, one with school-fixed effects, one with other background controls included but without school-fixed effects, and one with both background controls and school-fixed effects. In accordance with OECD (2017c) guidelines, we adjust the standard errors using the BRR technique that allows for arbitrary correlation within schools and is also robust to sampling uncertainty. We include separately a marker for being a first-generation immigrant and being a second-generation immigrant, and report a test for the equality for these coefficients.

Our main finding is that attitudes to school are strongly linked to immigration status, a relationship that is statistically significant at the 1% level. The coefficients are interpretable as effect sizes and are in the range of 0.2-0.3 standard deviations in the English sample. This is equivalent to the impact of moving up about three steps on the 7-step scale of paternal education – or moving up about three standard deviations on the index of home possessions. Interestingly, the magnitude is only slightly reduced by the inclusion of the school-fixed effects and is unchanged when we add other background characteristics. This suggests that the relationship between the immigrant indicators

[3] The index of home possessions together with the highest level of educational level and occupational status of any of the parents form the broader ESCS index. Since we control for the educational level and occupational status of both parents, our approach is more restrictive than if we were to use this index.

and attitudes to school is not primarily due to school-level policies, but rather to immigrant status as such.

Third, there is a small difference in the coefficients for first- and second-generation immigrants, with second-generation immigrants having a marginally stronger relationship with school attitudes. These differences are statistically significant excluding school fixed effects, but not once these are accounted for.[4] Taking the point estimates at face value, this suggests that these attitudes are effectively transmitted across two generations within a family. That is, there is no sign of mean reversion or adoption of native pupils' culture in regard to their attitudes to education.

Attitudes to education do not differ by gender or parental occupation. However, higher levels of parental education and higher values on the index of possessions predict more positive attitudes to school.[5] While only the father's educational level is positive and statistically significant, this measure is correlated with the mother's educational level – and including either separately, or only including the highest level of the two, do not affect the immigration coefficients more than marginally.[6]

In PISA 2015, the statements regarding pupils' attitudes to school relate specifically to the study of science. In 2012, they were more general but the sample in England was also considerably smaller. Nevertheless, to test the robustness of our results, we study the index for attitudes to school (learning activities) composed from the following statements in PISA 2012: "Trying hard at school will help me get a good job", "Trying hard at school will help me get into a good university", "I enjoy receiving good grades", and "Trying hard at school is important". Table A1 displays the results. Despite the large reduction in observations, the coefficients of interest are very similar to the ones

[4] This suggests that the two groups generally go to different schools. Indeed, while the correlation between the share of first-generation immigrant pupils and second-generation immigrant pupils is positive, it is not particularly strong: in the available sample, the coefficient suggests that a one percentage point increase in the share of second-generation immigrants predict 0.3 percentage point higher shares of first-generation immigrants.

[5] In general, it is important to note that socio-economic variables are positively correlated, which means it is difficult to estimate them all consistently at the same time. Indeed, when we exclude the index of home possessions as well as the father's educational level and occupational level, the mother's educational and occupational levels are positively correlated with pupils' attitudes to education. Similarly, if we instead include the composite ESCS index as a single measure of socio-economic background, this has a significant positive relationship with attitudes and does not affect the coefficients on immigration status.

[6] We explored interactions of different personal characteristics with the immigrant variables (available on request). The immigrant gap in attitudes did not vary by either paternal education or family socio-economic status, it was much higher for female than male students among first generation immigrants, but no different among the second generation; ethnicity data are not available.

presented in Table 2.[7] We therefore conclude that our finding that immigrant pupils in England have more positive attitudes to education is robust to studying PISA 2012 data instead of PISA 2015 data.[8]

In Table 3, we study each attitudinal item in PISA 2015 separately, using the full specification that includes school-fixed effects and all background characteristics. The coefficients on first- and second-generation immigration status are almost identical across all the components. This suggests that we are estimating an association between immigrant status and the broad concept of a positive motivation to school, rather than a detailed wording of a specific survey question.

Pupil Motivation in London and the rest of England

Is there any regional variation in pupil motivation? While this might sound unlikely, there is one aspect of regional variation that has particular resonance in English education – the so-called "London Effect". Pupils in London perform disproportionally well in comparison with pupils in other parts of the country, an advantage that was created only in the last two decades (CfBT, 2014; Burgess, 2014; Blanden et al., 2015). To study whether there is a London effect in attitudes to education, we include a dummy for pupils attending schools in the Greater London area. Columns 1 and 3 of Table 4 include the full set of personal characteristics, but exclude the immigration status dummies. The results show that pupil motivations for school are considerably higher in London.

However, once we adjust for pupils' immigration status in columns 2 and 4, this London effect disappears entirely – and the coefficients on first- and second-generation immigrants are as sizeable and precisely defined as in Table 2. This fits well with one of the studies in the debate on London, who shows that the London Effect is explained and accounted for by the high presence in London of EAL students – who make exceptional progress between ages 11 through 16 (Burgess, 2014). There has been speculation that one reason behind this group's performance advantage is that they have more positive attitudes to school – and our results support this view.

Are positive school attitudes contagious?

Are there any positive spill-over effects among natives? A pupil working alongside a lot of highly motivated pupils with positive attitudes to school may find his or her own attitudes being positively affected. We thus explore the association between the index of instrumental motivation among

[7] However, the estimates for some of the background controls are different. For example, it appears girls have more positive general attitudes to education.

[8] In unreported regressions, we also studied responses to each statement separately and results were again similar. The exception was for the statement "Trying hard at school will help me get a good job", where immigrant pupils had about 0.06-0.10 SD more positive attitudes but these differences were not statistically significant.

native pupils only and the share of immigrant pupils in their school, adjusting for natives' background variables at the pupil level.[9] Of course, estimating such spill-over effects is difficult empirically and it is important to note that it is far from certain that the relationship is causal, an issue we return to below.

Table 5 displays the results. Column 1 includes only the background characteristics and the results regarding their relationships with the index of instrumental motivation are similar to previous findings. Column 2 then adds the school fraction of first- and second-generation immigrant pupils combined. The results show a significant positive relationship between the share of immigrant pupils and natives' attitudes to education. The coefficient implies that a 10 percentage point increase in the share of first- and second-generation immigrant pupils raises the index of instrumental motivation among natives by 0.03 SD. Column 3 separates the share of first- and second-generation immigrants with similar results. The coefficients imply that a 10 percentage point increase in the share of first-generation immigrant pupils raises the index of instrumental motivation among natives by 0.02 SD, while the same increase of second-generation immigrant pupils raises the index of instrumental motivation among natives by 0.03 SD. Only the latter is statistically significant from zero, but the coefficients of the shares of first- and second-generation immigrant pupils are not statistically different from each other. Taken at face value, therefore, moving from a school with no immigrant pupils to a school with 50% immigrant pupils is associated with about 0.15 SD higher motivation among native pupils.

As noted, the direction of causality here is unclear. The estimated relationship may reflect a causal effect of immigrant pupils on native pupils; alternatively, it may reflect the selection of especially-motivated native pupils into schools with a high percentage of immigrant pupils. The selection story is of course possible – assignment to schools in England is based on school choice and it would appear likely that parents of (on average richer) native pupils who seek out schools with high proportions of immigrant pupils would have a good chance of obtaining a place at them. However, it does not seem very likely. The share of immigrant pupils – both first and second generation – correlate negatively with the average index of home possessions in the schools, indicating that pupils in schools with higher proportion of immigrants are on average poorer. It thus seems difficult to argue that these schools are obviously attractive to motivated parents of native pupils. However, without a stronger research design, it is impossible to rule out the selection story, but it intuitively

[9] Naturally, since we study a school-level variable, we cannot estimate these regressions with school-fixed effects.

seems less plausible than the idea of a causal spill-over effect running from immigrant pupils to native pupils.

Are attitudes to education related to student performance?

We have analysed the relationship between immigrant background and attitudes to education. As discussed in Section 1, these attitudes are likely to capture important non-cognitive factors of importance to pupils' lives over and above any effects on academic achievement. We thus believe they are important outcomes in their own right. However, we also investigate the extent to which the index of instrumental motivation is related to PISA scores, once we adjust for all background characteristics – apart from immigration status – and school-fixed effects.[10]

The results are displayed in Table A2 and show that more positive attitudes to education are related to higher academic achievement: one standard deviation better attitudes to education is association with about 10 PISA points (about 0.10 standard deviations) in mathematics and reading and 15 PISA points (about 0.15 standard deviations) in science.[11] The fact that the impact is the largest in science is not surprising since the index of instrumental motivation measures attitudes to science specifically. Still, since we believe they also capture attitudes to education more generally, it is certainly plausible they predict mathematics and reading achievement as well.

Overall, we thus conclude that our attitudinal measure is a rather strong predictor of academic achievement, supporting research finding that test scores capture both cognitive and non-cognitive skills (e.g. Borghans et al. 2016).[12]

4. Conclusion

[10] In accordance with OECD (2017c) guidelines, our analysis using PISA scores as the dependent variable takes into account that these scores are constructed from ten plausible values. These are in turn derived from multiple imputations using pupils' answers to the sub-set of questions (to which they were randomly assigned) as well as their responses in the background questionnaire.

[11] We study the sample analysed in the attitudinal regressions – which is slightly reduced because of missing values – but the results are essentially identical if we instead analyse all pupils for which the attitudinal index is available.

[12] Adjusting for other background characteristics and school-fixed effects, we find no difference in PISA performance between immigrant and native students (but lower achievement among first-generation immigrants when we exclude these control variables). This differs from the finding that EAL students in England tend to perform better than non-EAL students (Burgess 2014). Yet this performance advantage appears when analysing value added – progress between ages 11 and 16 – which we cannot do with the data in this paper. Furthermore, the PISA test is low-stakes, whereas the measures analysed in prior studies are high-stakes, which also may affect our findings. Thus, overall, our findings do not necessarily contradict prior analyses in this respect.

It is now well established that non-cognitive factors influence student achievement and subsequent life chances. Several oft-cited traits – such as conscientiousness, locus of control, perseverance, patience, and grit – are also likely to be related to positive attitudes to education. In this paper, we found that immigrant pupils in England have more positive attitudes to education compared with native students. This difference is pervasive and does not depend on particular schools' policies towards these students. There is also no sign of any differences between first- and second-generation immigrants in this respect, suggesting a cultural impact that affects also children of immigrants via intergenerational transmission of traits. We further show that students in London have more positive attitudes to education – and that this is entirely explained by the distribution of children of immigrants in that city. Finally, although we argue that the attitudes we study are outcomes in their own right, we show that they predict PISA achievement in all three subjects rather well.

We interpret this as deriving from the intergenerational transmission of cultural traits from the emigrating parents to the children. This might be because emigration selects for aspiration, risk-taking and grit, and these values are passed on through different channels from parents to children. Additionally, the results of Voss et al (2012) may also apply here, showing that major life experiences (which would surely include the act of emigration) can change psychological traits.

In the next step in our research, we will use the LSYPE2 dataset – which matches administrative data on schools and school performance to rich survey data – to analyse whether or not more positive attitudes to education among immigrant students can explain their dramatically higher performance in domestic examinations specifically. Burgess (2014) showed that the value-added between ages 11 and 16 of immigrant students is fully 0.36 standard deviations higher than the value-added of native students, controlling for personal characteristics and school-fixed effects. Understanding this performance – and the extent to which it could be transferred to lower-performing groups – could have a substantial policy pay-off and is thus important to explore further.[13]

[13] The successful experimental intervention of Alan and Ertac (2017) shows that teaching patience is possible; Heckman and Kautz (2012) argue that the Perry Preschool Program improved non-cognitive skills, and Schurer (2017) provides a wider review of changing traits.

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Table 1: Descriptive statistics

Variable	Mean	SD	Min	Max
Instrumental motivation index	0	1	-2.42	1.41
Making an effort in my school science subject(s) is worth it because this will help me in the work I want to do later on	0	1	-2.55	1.12
What I learn in my school science subject(s) is important for me because I need this for what I want to do later on	0	1	-2.1	1.23
Studying my school science subject(s) is worthwhile for me because what I learn will improve my career prospects	0	1	-2.41	1.18
Many things I learn in my school science subject(s) will help me to get a job	0	1	-2.2	1.26
First-generation immigrant	0.09	0.29	0	1
Second-generation immigrant	0.09	0.29	0	1
Mother's educational level	4.43	1.38	0	6
Father's educational level	4.39	1.44	0	6
Mother's occupational status	51.26	22.13	11	89
Father's occupational status	51.04	22.26	12	89
Index of home possessions	0.33	1	-8.95	5.2
Year	10.99	0.11	10	12
Age	15.72	0.29	15.25	16.25
Male	0.51	0.50	0	1
Greater London	0.13	0.34	0	1
North	0.29	0.46	0	1
Midlands	0.31	0.46	0	1
South	0.27	0.44	0	1

Note: the data are weighted by sampling probabilities (without imputed values). All outcome variables are standardised to have a mean of 0 and a standard deviation of 1. The number of observations used to calculate the descriptive statistics varies between 3,658 and 5,194 depending on the variable analysed. The total number of observations analysed in Tables 2-4 vary between 4,610 and 4,641 since we only use observations with non-missing values on the dependent variable and the indicators for immigrant background.

Table 2: Immigrant status and instrumental motivation

	Instrumental motivation index	Instrumental motivation index	Instrumental motivation index	Instrumental motivation index
First-generation immigrant	0.21***	0.19***	0.23***	0.21***
	(0.06)	(0.06)	(0.06)	(0.05)
Second-generation immigrant	0.33***	0.23***	0.34***	0.27***
	(0.05)	(0.06)	(0.05)	(0.06)
Mother's educational level			-0.01	-0.01
			(0.01)	(0.01)
Father's educational level			0.06***	0.06***
			(0.01)	(0.01)
Mother's occupational status			-0.00	0.00
			(0.06)	(0.00)
Father's occupational status			0.00	0.00
			(0.00)	(0.00)
Index of home possessions			0.07***	0.09***
			(0.02)	(0.02)
Grade (year)			0.09	0.00
			(0.14)	(0.10)
Age			0.01	0.01
			(0.06)	(0.06)
Male			0.04	0.01
			(0.03)	(0.04)
First-generation immigrant = Second-generation immigrant (p-value)	0.06	0.38	0.05	0.28
School-fixed effects	No	Yes	No	Yes
R^2	0.01	0.07	0.03	0.09
n	4,634	4,634	4,634	4,634

Note: Significance levels: *p<0.10; **p<0.05; ***p<0.01. Standard errors are adjusted using the BRR technique, which takes into account sampling uncertainty and clustering at the school level.

Table 3: Immigrant status and instrumental motivation (all attitudes separate)

	(1)	(2)	(3)	(4)	(5)
	Instrumental motivation index	Making an effort in my school science subject(s) is worth it because this will help me in the work I want to do later on	What I learn in my school science subject(s) is important for me because I need this for what I want to do later on	Studying my school science subject(s) is worthwhile for me because what I learn will improve my career prospects	Many things I learn in my school science subject(s) will help me to get a job
First-generation immigrant	0.21***	0.16***	0.19***	0.14**	0.18***
	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)
Second-generation immigrant	0.27***	0.18***	0.27***	0.20***	0.23***
	(0.06)	(0.05)	(0.06)	(0.07)	(0.05)
First-generation immigrant = Second-generation immigrant (p-value)	0.28	0.68	0.26	0.34	0.49
Other background characteristics	Yes	Yes	Yes	Yes	Yes
School-fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.09	0.08	0.08	0.09	0.08
n	4,634	4,641	4,625	4,610	4,612

Note: Significance levels: *p<0.10; **p<0.05; ***p<0.01. Standard errors are adjusted using the BRR technique, which takes into account sampling uncertainty and clustering at the school level.

Table 4: The London effect on attitudes and its explanation

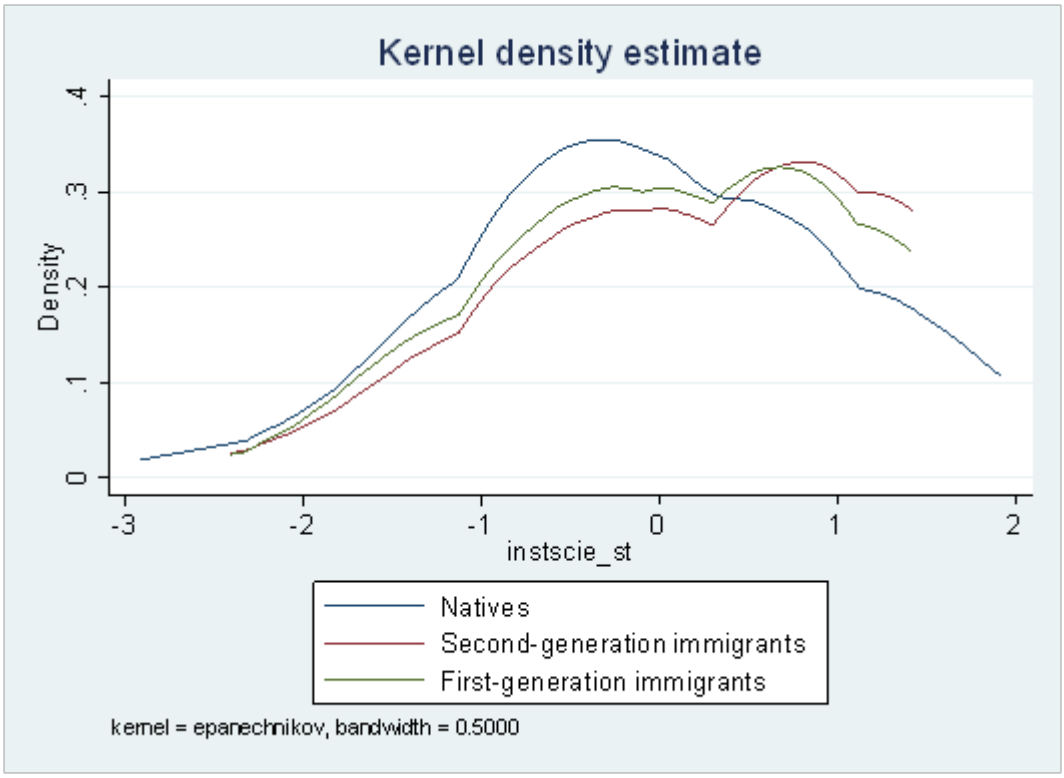
	(1)	(2)	(3)	(4)
	Instrumental motivation index	Instrumental motivation index	Instrumental motivation index	Instrumental motivation index
Greater London dummy	0.19***	0.07	0.17***	0.05
	(0.04)	(0.04)	(0.05)	(0.05)
First-generation immigrant		0.19***		0.21***
		(0.06)		(0.06)
Second-generation immigrant		0.30***		0.32***
		(0.05)		(0.05)
First-generation immigrant = Second-generation immigrant (p-value)		0.07		0.09
Other background characteristics	No	No	Yes	Yes
R^2	0.00	0.01	0.02	0.03
n	4,634	4,634	4,634	4,634

Note: Significance levels: *p<0.10; **p<0.05; ***p<0.01. Standard errors are adjusted using the BRR technique, which takes into account sampling uncertainty and clustering at the school level.

Table 5: Spill-over effects on natives

	(1)	(2)	(3)
	Instrumental motivation index	Instrumental motivation index	Instrumental motivation index
Share of first- and second-generation immigrants		0.26**	
		(0.13)	
Share of first-generation immigrants			0.19
			(0.25)
Share of second-generation immigrants			0.31**
			(0.15)
Mother's educational level	0.01	0.01	0.01
	(0.02)	(0.02)	(0.02)
Father's educational level	0.04***	0.04***	0.04***
	(0.01)	(0.01)	(0.01)
Mother's occupational status	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)
Father's occupational status	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Index of home possessions	0.08***	0.08***	0.08***
	(0.02)	(0.02)	(0.02)
Grade (year)	0.03	0.00	0.00
	(0.23)	(0.24)	(0.23)
Age	0.01	0.01	0.01
	(0.06)	(0.06)	(0.06)
Male	0.06	0.06	0.06
	(0.04)	(0.04)	(0.04)
Share of first-generation immigrants = Share of second-generation immigrants (p-value)			0.70
R^2	0.02	0.02	0.02
n	3,777	3,777	3,777

Note: Significance levels: *p<0.10; **p<0.05; ***p<0.01. Standard errors are adjusted using the BRR technique, which takes into account sampling uncertainty and clustering at the school level. The regressions include native pupils only.


Kernel density estimate
Density
0
.1
.2
.3
.4
-3
-2
-1
0
1
2
instscie_st
Natives
Second-generation immigrants
First-generation immigrants
kernel = epanechnikov, bandwidth = 0.5000

Appendix

Table A1: Immigrant status and attitudes towards school in PISA 2012 (learning activities)

	(1)	(2)	(3)	(4)
First-generation immigrant	0.19**	0.17*	0.22***	0.20**
	(0.08)	(0.09)	(0.08)	(0.08)
Second-generation immigrant	0.28***	0.24***	0.30***	0.24***
	(0.07)	(0.08)	(0.07)	(0.08)
Mother's educational level			0.04**	0.05**
			(0.02)	(0.02)
Father's educational level			0.03	0.02
			(0.02)	(0.02)
Mother's occupational status			-0.00	-0.00
			(0.00)	(0.00)
Father's occupational status			0.002*	0.002**
			(0.001)	(0.01)
Index of home possessions			0.07***	0.09***
			(0.02)	(0.03)
Grade (year)			0.22*	0.29
			(0.12)	(0.19)
Age			0.02	0.03
			(0.07)	(0.06)
Male			-0.16***	-0.14***
			(0.04)	(0.04)
First-generation immigrant = Second-generation immigrant (p-value)	0.37	0.55	0.46	0.71
School-fixed effects	No	Yes	No	Yes
R^2	0.01	0.09	0.04	0.12
n	2,692	2,692	2,692	2,692

Note: Significance levels: *p<0.10; **p<0.05; ***p<0.01. Standard errors are adjusted using the BRR technique, which takes into account sampling uncertainty and clustering at the school level. See Section 3 for details of the index analysed.

Table A2: The relationship between the instrumental motivation index and PISA scores

	Mathematics	Reading	Science
Instrumental motivation index	9.39***	10.10***	15.09***
	(1.63)	(1.58)	(1.46)
Other background characteristics	Yes	Yes	Yes
School-fixed effects	Yes	Yes	Yes
R^2	0.33	0.30	0.31
n	4,634	4,634	4,634

Note: Significance levels: *p<0.10; **p<0.05; ***p<0.01. Standard errors are adjusted using the BRR technique, which takes into account sampling uncertainty and clustering at the school level.