Powerful Parental Preferences

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Abstract

In this study, we examine how parents' educational aspirations for their offspring (referred to as parental preferences) are related to university attendance. Even after controlling for the cognitive abilities of the child, we document a considerable variation in parental preferences, which are, in turn, strongly associated with university attendance. Utilizing regressions based on machine learning techniques, we also find that parental preferences exert a large and significant effect on university attendance, even when accounting for factors that influence parental preferences, including parental education, household characteristics, effort, expectations, and the child's cognitive and non-cognitive abilities.

Keywords: University attendance, Locus of control, Machine learning, PDS Lasso, Educational aspiration
JEL: D91, I21, I23, I24, I26

1. Introduction

Educational attainment has become an increasingly important determinant of success in many domains, ranging from the labor market to health outcomes (Oreopoulos and Salvanes, 2011). Psacharopoulos and Patrinos (2018) report that returns to investment in education are high and that returns to higher education have even increased in recent decades, despite sustained growth in university enrollment. Tamborini et al. (2015) document that in the US, the lifetime income of individuals with at least a bachelor's degree is approximately $587,000$ higher for females and $840,000$ higher for males than for those without a diploma, even after accounting for factors such as race, ethnicity, the number of children, or high school type. Similarly, more educated people tend to enjoy a longer and healthier life (Cutler and Lleras-Muney, 2006; Clark and Royer, 2013), and the gap between less and more educated appears to grow over time (Meara et al., 2008; Case and Deaton, 2017).[4] Given this evidence, it is puzzling to observe large gaps in educational attainment between individuals from different family backgrounds (Björklund and Salvanes, 2011). These gaps are evident not only in educational outcomes but also in aspirations. Both parents' aspirations for the child's educational level (referred to as parental preferences) and the child's educational aspiration strongly correlate with family background. Educational aspirations and outcomes are interconnected, as aspiring to a high level of education seems to be a prerequisite to achieve it. Therefore, understanding the factors that influence parental preferences, how these preferences affect children's educational aspirations, and the mechanisms through which these aspirations influence educational outcomes is of significant interest.

In this paper, we use a representative sample of the Hungarian adolescent population and their parents to examine the role of parental preferences on university attendance. We measure parental preferences with the following question: *What is the highest level of education you would like your child to achieve?* Our data include detailed information on individual characteristics of adolescents, such as cognitive and non-cognitive skills, as well as family background, which includes parental education, household income and financial status, and home environment. This comprehensive dataset allows us to explore variations in parental preferences based on family background and other observable factors.

We document a large gap in parental preferences based on family background, even after adjusting for the children's cognitive abilities. We also show that parental

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[4]Several studies established causal relationships between education and health outcomes (Conti et al., 2010; Davies et al., 2018).

preferences are strongly linked to university attendance, even after accounting for the cognitive skills of the child. It is evident that parental preferences are influenced by a multitude of factors that also predict educational attainment. Thus, in our regression analysis, we systematically consider the determinants of parental preferences as identified in the literature. We find that even when controlling for all such factors, there remains a strong positive correlation with university attendance. This result suggests that there is a direct causal link between parental preferences and the child's academic attainment.

In our study, we use the post-double selection lasso model, a machine learning method which selects the most relevant explanatory variables from a dictionary, a large pool of possible explanatory variables. We report the coefficient estimates for various models, where ever more groups of explanatory variables are included in the variable dictionary. In our last model, not only are each type of variables included that are discussed in the literature, but also possible channels, such as student effort and expectations, are also included, but the coefficient of parental preferences remain large and statistically significant.

The study is structured as follows. Section 2 reviews the literature. In Section 3 the data are presented. The methodology used in this study is described in section 4, and the results are shown in section 5.

2. Related literature

Early literature demonstrates that 'significant others,' including parents, teachers, and peers, shape high school students' educational ambitions and attitudes (Haller and Butterworth, 1960; Sewell and Shah, 1968; Sewell et al., 1969; Haller and Woelfel, 1972; Hout and Morgan, 1975; Sewell and Hauser, 1972). Educational ambitions can be measured through expectations and aspirations: expectations reflect what individuals think will happen, while aspirations concern what they hope will happen (Saha, 1997; Jacob and Wilder, 2010).[5] Research indicates that parents' educational aspirations often exceed their expectations, with a correlation coefficient around 0.3 (Goldenberg et al., 2001).[6]

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[5]For example, Ashby and Schoon (2010) measure parental expectations with the question, "Which of the following do you think he/she will actually do after this school year?" and parental preferences with, "Which of the following would you like your teenager to do after this school year?"

[6]The concept of parental encouragement is closely related to parental preferences. It reflects adolescents' perceptions of what their parents desire for them after finishing high school, and it significantly influences adolescents' educational aspirations and outcomes (Sewell and Shah, 1968; Carpenter and Fleishman, 1987).

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Parental preferences, the main focus of our study, are heavily shaped by family background and the individual characteristics of the child, which may also be influenced by parental preferences. Additionally, parental preferences are correlated with the child's aspirations and educational attainment. Figure 1 illustrates the connections between these factors. Arrows indicate potential causal links (e.g., family background may affect parental preferences, but the reverse effect is unlikely), while simple lines represent associations without clear directionality.

The family background may influence both the parental preferences and the students' educational aspirations (Schoon and Parsons, 2002; Schoon et al., 2007), as illustrated by links 1 and 2. Parental preferences vary according to socioeconomic status. For instance, Chowdry et al. (2011) report that while 75.8% of parents of children aged 13-14 in the lowest SES quintile in the UK would like their child to stay in full-time education at 16, the same number for parents from the highest quintile is 91%, with the difference being significant at 1%. Similar results have been reported in numerous studies (e.g., Willitts et al., 2005; Bleemer and Zafar, 2018; Lergetporer et al., 2021; Cheng et al., 2021).

In terms of the relationship between family background and the educational aspirations of students, socioeconomic status is positively associated with college aspirations (e.g., Chowdry et al., 2011; Gutman and Akerman, 2008; Kao and Tienda, 1998; James, 2000). There is also a clear connection (see link 7) between family background and educational attainment (e.g., Haveman and Wolfe, 1995; Black and Devereux, 2010; Bailey and Dynarski, 2011; Björklund and Salvanes, 2011; OECD, 2015; Chetty et al., 2017; Chmielewski, 2019). Hertz et al. (2008) report that the raw intergenerational correlation between the educational attainment of parents and their offspring ranges from 0.1 to 0.66, with most developed countries exhibiting correlations between 0.3 and 0.5. This phenomenon may be partly explained by the intergenerational transmission of cognitive abilities (Bouchard and McGue, 1981; Bowles and Gintis, 2002; Black et al., 2009; Crawford et al., 2011). Additionally, family income and financial constraints, factors related to family background, significantly influence an individual's ability to engage in higher education (James, 2000; Schoon and Parsons, 2002; Schoon, 2006).[7]

Link 3 indicates that family background affects the child's characteristics, as supported by abundant literature (e.g., Mistry et al., 2010; Lawson et al., 2018; Hoff and Laursen, 2019; Chowdhury et al., 2022), with some studies indicating causal

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[7]Concerning the relative importance of financial constraints and other factors, Cameron and Heckman (1998) and Chevalier and Lanot (2002) find that the influence of such constraints on educational choice is less significant than family background in the US and the UK, respectively.

links (e.g., Duncan and Magnuson, 2012; Neville et al., 2013). These characteristics (e.g., cognitive and non-cognitive skills) may, in turn, influence parental preferences (e.g., Sewell and Shah, 1968; Marini, 1978; Davies and Kandel, 1981; Bond and Saunders, 1999; Sacker et al., 2002), as shown by link 4. Student characteristics are also associated with the student's educational aspirations, as indicated by link 5 (e.g., Boxer et al., 2011; Hsin and Xie, 2014; Khattab, 2015; Schoon and Polek, 2011). Additionally, there is a relationship between student characteristics and educational attainment (see link 10), as exemplified by existing literature (e.g., Almlund et al., 2011; Heckman et al., 2006; Richardson et al., 2012).

Parental preferences are significantly correlated with students' educational aspirations, as shown by link 6 (e.g., Davies and Kandel, 1981; Marjoribanks, 1984, 1997; Schoon and Parsons, 2002). This influence can be bi-directional, with adolescents' aspirations affecting parental preferences and vice versa.

Parental preferences also impact academic performance, as shown by link 8. Studies show a strong association between parental aspirations and student academic effort and achievement (e.g., Natriello and McDill, 1986; Singh et al., 1995; Fan and Chen, 2001; Boonk et al., 2018).

Educational aspirations are also related to educational attainment (link 9) and contribute to explaining educational attainment gaps between different SES groups (Schoon, 2001; Chowdry et al., 2011; Polidano et al., 2013).

Figure 1: Factors affecting educational attainment, with a special focus on parental preferences and students' educational aspirations
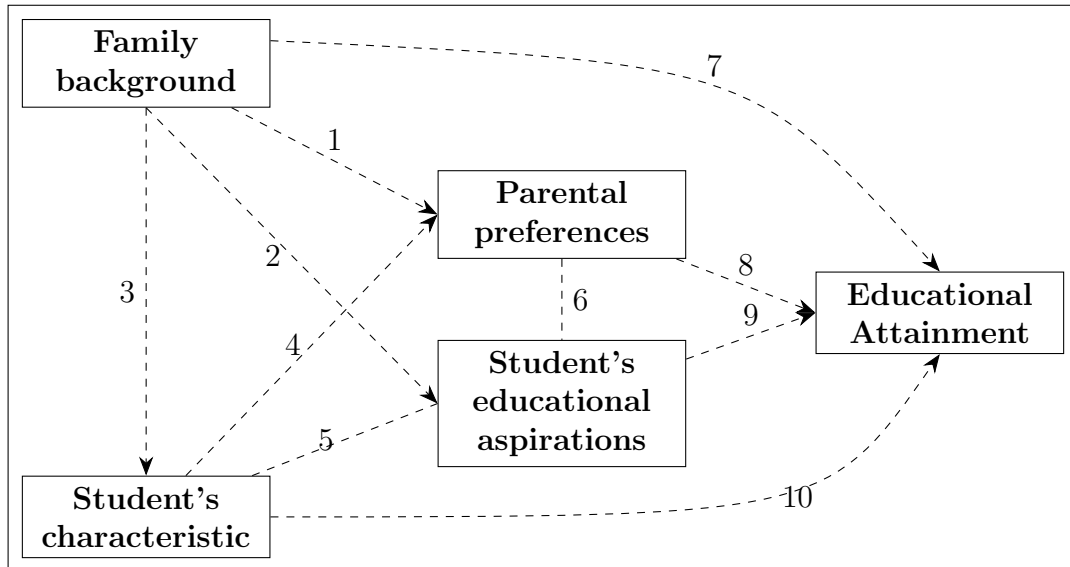
As Figure 1 illustrates, all these factors are highly interwoven. Therefore, to isolate the role of parental preferences, we need to account for these interconnected factors. In our data analysis, we include a wide range of variables to control for these factors and partial out their effect.

3. Data

In our analysis, we used the Life Course Survey (Életpálya) from Hungary. This database consists of a representative sample of adolescents who were attending the 8th grade in May 2006. A sample of 10,000 students was selected from those who took the 8th grade Hungarian National Assessment of Basic Competencies that year. The selected students were born between 1990 and 1992. Due to attrition, we lose 23.6% of the original sample, and we use population weights to preserve representativeness. Additionally, 53.5% of the observations are dropped because these students did not complete a high school track that allows university application. Finally, 2.6% of the observations are dropped due to missing variables.

The variable of interest in this study is parental preferences. In the 2006 questionnaire, parents were asked about the ideal level of education for their child, from elementary school to the Ph.D. level that is our proxy of parental preferences (*What is the highest level of education that you would like your child to achieve?*). We construct a binary variable from this, coded 1 if the parents indicated at least college to be the ideal level of education. This is our measure of parental preferences.

First, we study how parental preferences vary according to family background and the characteristics of the child. At least three aspects of the family background are relevant: parental education, home characteristics, and family income or financial hardships. Regarding parental education, we have detailed information on educational attainment of parents and grandparents as well. Regarding home characteristics, in addition to usual characteristics such as household size or marital status, we have accurate knowledge of the emotional and cognitive aspects of the home environment by means of the HOME scale (Home Observation for Measurement of the Environment, see Totsika and Sylva (2004)). HOME includes measures related to objects, activities, circumstances and events at home that can play a role in the development of adolescents. In the survey a short version for young adolescents was administered, based on the National Longitudinal Survey of Youth (for Human Resource Research, 2004).[8] The HOME scale is often used to proxy parental investments (see, for instance Gennetian, 2005; Mistry et al., 2010; Coneus et al.,

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[8]The elements of the scale are described in Appendix B.

2012) because it captures direct aspects of parental investment to provide a cognitively stimulating and emotionally stable environment. We have rich data about the financial situation of the family as we know i) if the family experienced financial distress, ii) household income, iii) if the parents work, and iv) if they are able/willing to pay for the child's education. Regarding the characteristics of the child, we focus on cognitive ability and non-cognitive skills. Cognitive ability is captured by reading and mathematics scores that the child achieved in the Hungarian National Assessment of Basic Competences (NABC), a nationwide test similar to the PISA test, see Sinka (2010) for details. Variables of non-cognitive skills include measures of the locus of control from a short version of the standard Rotter test, self-esteem from the Rosenberg scale, and emotional stability of the child.

In our dataset, the educational aspirations of the student are also included. More concretely, we know if the student plans to go to university. In addition, there is information on their expectations for the future, which is a possible channel through which parental preferences affect the child's educational attainment. Expectations are measured through five questions in 2008. Respondents have to rate the probability that at the age of 35, i) they will earn more money than the average, ii) they will be in the decile with the highest earnings, iii) they will have a permanent job after finishing school, iv) they will earn more than HUF 100,000 (EUR 278) per month, and v) they will earn more than HUF 200,000 (EUR 556) per month.[9] Our interest in future expectations of students is motivated by the fact that previous research showed that students with more positive expectations perform better academically (Coleman and DeLeire, 2003; Cebi, 2007).

A second possible channel is effort, which we measure in various ways. First, teacher-given diligence grades (in 2007, 2008 and 2009) are a good proxy of effort. Second, the time spent studying in a week and whether the individual studied after 8 PM on weekdays or studied on weekends (in 2007 and 2008) are also measures of effort. Parental preferences may affect effort since if parents have higher aspirations for their child, then the child may make more effort in studying.

The dependent variable in our regressions is college attendance, which is equal to one if the student attended college at least once during the observation period. We present the summary statistics in Table 1.

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[9]The corresponding amounts in USD are 338 and 676. In 2008, HUF 200,000 was considered a high salary.

4. Empirical method

In this paper, we use a post-double selection (PDS) lasso model (Belloni et al., 2012) to choose the best possible control variables from a rich pool of controls. The dictionary size, the number of variables of which the algorithm is allowed to choose from is 82. This method uses shrinkage and thus selects the optimal model with a relatively modest number of variables.

In the double selection process, PDS lasso selects control variables that make the best out-of-sample prediction for college attendance (C_i) in the first step, and parental preferences variable (P_i) in the second step. In the final step, a simple OLS regression is estimated using the union of the selected control variables.

$$C_i = \alpha P_i + X_i'\gamma + \xi_i \tag{1}$$

Parental preferences (P_i) for the student's ideal highest level of education are measured in 2006, and college attendance (C_i) is measured in 2011 and 2012. Given this timing, any statistical association between these can be the result of two factors. First, it can be the causal effect of parental preferences on college attendance. Second, it may include any common factors that influence both parental preferences and college attendance. These common factors may be part of the family background (such as parental education and labor market status, financial status of the family, etc.), the student's cognitive abilities (math and reading test scores) or non-cognitive skills (such as self-esteem, emotional stability, and locus of control), which are all measured in 2006. We aim to control for all the important factors affecting P_i and U_i in specifications (1) to (4).

One may be concerned that the parental preferences already reflect the preferences of the student. Thus, we add the student's educational aspirations as measured in 2009 as a control variable. This variable captures the student's future plans and may or may not be influenced by the parental preferences. Once controlled for (in specification (5)), the coefficient of P_i will reflect the effect of parental preferences cleared from the student's aspirations. Furthermore, it is also important to include the student's aspirations in the model because they capture relevant aspects of the school environment and the effect of the peers on the educational outcomes.

We are able to include some further variables that reflect the student's aspirations other than the revealed plans. Such factors include the effort and expectations of the student. We report the regression results in specification (6) after adding these as control variables.

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5. Findings

5.1. Descriptive statistics

The descriptive statistics for the most important variables are reported in Table 1. The parents' preferences regarding the ideal level of education of the child are strongly associated with most of the characteristics reported in the table. Better family background (captured by mother's education, household income or home environment), better cognitive abilities (proxied by scores on the national standardized test and GPA), non-cognitive skills, student's aspirations and effort all correlate positively with parental preferences.

Table 1: Descriptive statistics

	Total	Vocational	Vocational High	High/school Diploma	Technical school after HSD	College	Univ.	PhD
				Parental preference: Ideal level of education for the child				
College aspiration	0.541	0.082	0.136	0.227	0.191	0.516	0.782	0.846
College attendance	0.434	0.000	0.081	0.145	0.110	0.369	0.698	0.792
Mother's education:								
- low	0.363	0.711	0.675	0.535	0.601	0.383	0.171	0.338
- mid	0.383	0.266	0.295	0.317	0.318	0.429	0.380	0.292
- high	0.254	0.022	0.030	0.148	0.081	0.188	0.449	0.370
GPA	3.765	3.004	3.222	3.427	3.323	3.694	4.117	4.326
Reading test score*	0.223	-0.734	-0.460	-0.360	-0.345	0.111	0.721	0.753
Math test score*	0.239	-0.659	-0.443	-0.474	-0.337	0.084	0.763	1.027
Female	0.515	0.351	0.415	0.550	0.453	0.546	0.518	0.574
Household income*	12.147	11.953	12.000	11.983	12.050	12.117	12.278	11.959
HOME cognitive scale*	90.948	62.241	74.644	83.026	79.738	89.984	100.066	99.518
HOME emotional scale*	100.125	93.958	96.964	99.721	97.574	100.276	101.428	103.391
Study time**	3.906	3.502	3.466	3.469	3.547	3.822	4.223	4.423
LoC***	0.129	-0.497	0.005	-0.167	-0.002	0.121	0.207	0.504
Observations	4297	47	451	74	496	1815	1318	96

* measured in 2006 / ** measured in 2007 / *** measured in 2009

Figure 2: Average of preferred level of school (by mother's education)
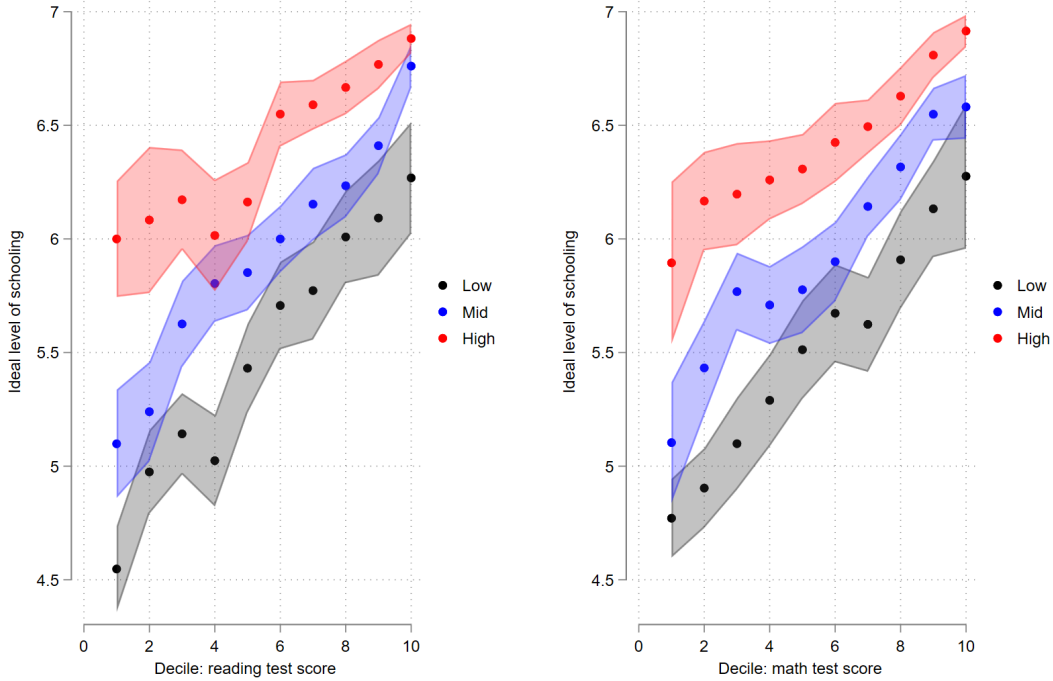
Note: Ideal level of schooling: 1: elementary 2: vocational 3: vocational high school 4: high school
5: technical training after high school diploma 6: college 7: university 8: PhD
Mother's education: Low: Less than high school Mid: High school High: College or higher

Moving beyond simple correlations, parental preferences are associated with family background, even if the child's cognitive skills are taken into account. In Figure 2, the average ideal level of education is shown, categorized by the level of education of the mother and the cognitive test scores of the students. An average mother with a diploma considers college or higher education the ideal level even if the child reaches only the lowest decile in reading test scores and the second decile in math test scores. In contrast, the average child of a mother without high-school graduation has to reach at least the 9th decile in math and the 8th decile in reading test scores for the mother to view college or higher as the ideal level of education. This strongly indicates that parental preferences vary according to family background, even when cognitive abilities are taken into account. More concretely, the confidence intervals around the averages show that there is a clear, statistically significant difference be-

tween parental preferences of mothers without high school graduation and parental preferences of mothers with a diploma for any level of their child's cognitive skill.

Figure 3: Probability of college attendance (by parental preferences)
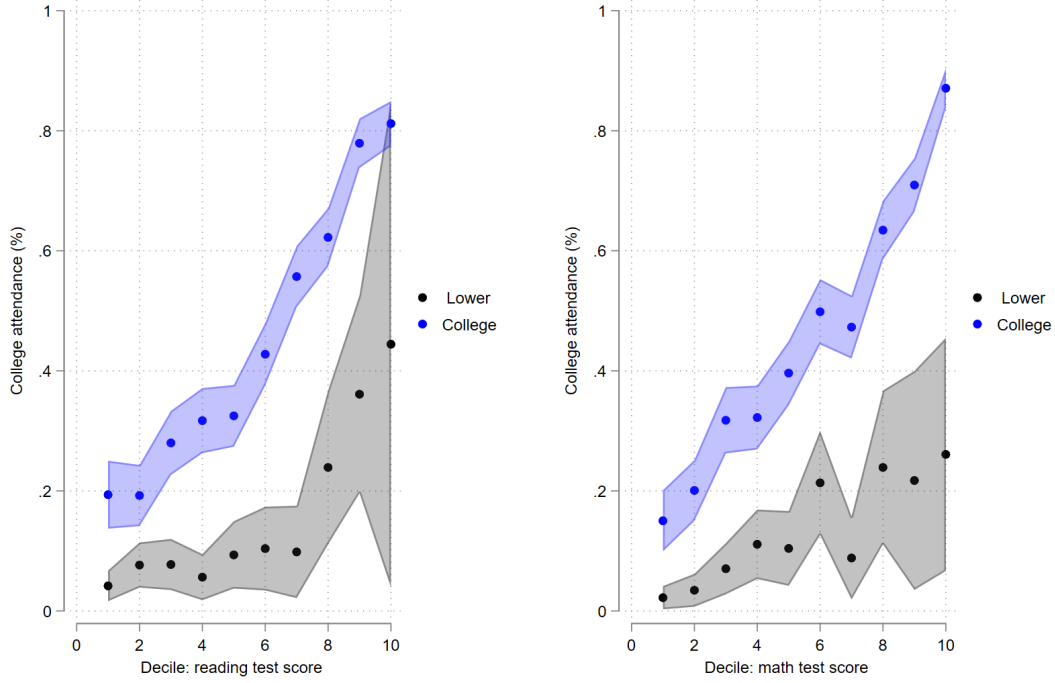
Note: Parental preferences: Lower: ideal education for child is lower than college; College: ideal education for child is at least college

Going one step further, parental preferences not only differ according to family background but also seem to influence the educational outcomes of the child. Figure 3 illustrates the importance of parental preferences for the level of education of the child. Children whose parents prefer at least a college education have, on average, a 20 percentage point higher probability of attending college compared to their peers in the same reading and math test score deciles but with lower parental preferences. These figures are based on raw data, so we turn to the regression results to uncover the association between parental preferences and educational outcomes.

5.2. Regression analysis

In Table 2 we report the regression results from the PDS lasso model.[10] In the baseline model (1), the coefficient is 0.427. Thus, without controlling for any other factors, students whose parents think that the ideal level of education is at least college have a 45 percentage point higher probability of attending college compared to those with parents who have lower preferences. In model (2), we add 50 variables related to family background to the variable dictionary, including parental education, parental investment, HOME scale, and variables related to the financial status of the family. Adding these variables decreases the coefficient of parental preferences by about a third to 0.163. This indicates that, while taking family background into account mitigates the effect of parental preferences, children from families where parents aspire for them to attend university are still 26.4 percentage points more likely to do so. Next, we add cognitive and non-cognitive traits in models (3) and (4), which further shrink the coefficient of parental preferences to 0.163. As Table 2 indicates, adding cognitive skills and non-cognitive skills reduces the coefficient of parental preferences by around 0.101, but it is still significant at the 1% level. Note that at this point, the PDS lasso algorithm selects 12 out of the 56 available variables.

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[10]The full regression results are reported in Table C.5 in the Appendix.

Table 2: Association of parental preferences with university attendance

	Baseline	+Family background	+Cognitive	+ Noncogn.	+ Aspirations	+ Asp. + Exp. + Eff.
	(1)	(2)	(3)	(4)	(5)	(6)
Ideal education: university	0.427***	0.264***	0.163***	0.163***	0.158***	0.108***
	[0.017]	[0.018]	[0.018]	[0.018]	[0.019]	[0.020]
Parents' education		yes	yes	yes	yes	yes
Financial background		yes	yes	yes	yes	yes
Home environment		yes	yes	yes	yes	yes
Cognitive (test scores)			yes	yes	yes	yes
Noncognitive traits				yes	yes	yes
Student's aspirations					yes	yes
Expectations						yes
Effort						yes
Observations	4,297	3,922	3,821	3,821	3,819	3,364
Clusters	886	866	855	855	853	745
Selected controls	0	15	12	12	13	16
Dictionary size	0	50	52	56	64	82
R-squared	0.124	0.242	0.325	0.325	0.332	0.366

Note: Robust standard errors in brackets, clustered by school id. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The full regression results are reported in Table C.5 in the Appendix

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As a further step, in models (5) and (6), we include various factors that capture the student's aspirations as well as the effect of the school and peers. Aspirations (proxied by the student's plan to attend university) appear to be an important mediating factor as their inclusion decreases the coefficient of parental preferences to 0.088. Note that at this stage, we have included most of the variables in the regression that the previous literature has found to play a role in explaining parental preferences. Nevertheless, the coefficient of parental preferences is still large and significant at the 1% level. In the last specification, we take into account mechanisms through which parental preferences may operate. However, inclusion of the students' expectations about the future and their effort, captured through variables related to study time, decrease the coefficient of parental preferences only modestly. Note that in models (5) and (6), we include factors that are themselves affected by parental preferences and are likely to be channels between parental preferences and the child's educational attainment. Nevertheless, we want to filter out every possible confounder from the coefficient of parental preferences.

After controlling for all these factors, the coefficient of parental preferences is still significant at the 1% level and large in magnitude. Students whose parents think that the ideal level of education would be at least college have a 10.8 percentage point higher probability of attending college. For comparison, to reach a similar increase, one would need to have a two standard deviations higher reading test score, based on the point estimates of the same model. In the final model (6), there are 82 variables in the variable dictionary, and 16 variables are chosen by the machine learning algorithm (see Table C.5 in the Appendix). The variable selection is based entirely on predictive power statistics, yet the chosen set of variables is in line with the previous literature.[11] This relatively large variable dictionary covers all the potential factors suggested by the previous literature, thus, it is very likely that this estimate is very close to the causal effect of parental preferences on the student's college attendance. Moreover, the fact that we also included channel variables such as aspirations, expectations and effort suggests that our result is a lower estimate for the effect.

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[11]The explanatory variables included in the last model are related to parental education (mother's education being less than high school, father having university diploma), the cognitive aspects of the home environment, cognitive test scores, student's aspiration to go to university, diligence grade.

6. Discussion

In this article, our objective is to quantify the degree to which parental preferences are associated with an important educational outcome, attending university. We use a machine learning algorithm (PDS lasso) to select the most important control variables from a pool of 82 potential variables that cover all potential factors shaping parental preferences discussed in the literature.

We find that parental preferences are very strongly related to educational outcomes even after controlling for family background, parental input, the child's cognitive and non-cognitive skills, as well as the child's educational aspirations and some channels, such as the student's expectations and effort. The association between parental preferences measured in the first year of high school and the probability of attending college remains large and significant.

According to our results, it is important for the school, the students, and the parents to be equal partners in the process of improving the educational outcomes of the children. To enhance the chances of college attendance for children from disadvantaged backgrounds, schools could try to provide parents with more information, offer partnerships, and stronger cooperation in planning higher studies, and shape their preferences in other ways.

7. Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT in order to improve the readability and language of the manuscript. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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Appendix A. Variables

Appendix A.1. Dictionary of variables

In the regressions we let lasso select from the following set of variables.

Table A.3: Set of variables

Variable	Type	N	Mean	SD	Min	Max
College attendance		6861	0.272264	1	0	0.445157
Ideal wanted education for child: university (2006)		6861	0.550066	1	0	0.497523
Minimum wanted education for child: university (2006)		6861	0.254919	1	0	0.435848
Mother's education: less than high school	Pre-determined	6861	0.522227	1	0	0.499542
Mother's education: high school	Pre-determined	6861	0.303309	1	0	0.459721
Mother's education: university	Pre-determined	6861	0.174464	1	0	0.379536
Father's education: less than high school	Pre-determined	6861	0.714182	1	0	0.451836
Father's education: high school	Pre-determined	6861	0.178108	1	0	0.382632
Father's education: university	Pre-determined	6861	0.10771	1	0	0.310037
HOME cognitive scale	Parental investment	6776	81.2314	130	0	26.42838
HOME emotional scale	Parental investment	6699	98.95358	140	10	22.04381
How many hours did the parent study with the child	Parental investment	6832	1.802693	3	1	0.876341
# of people sleeping in the same room (2006)	Pre-determined	6861	1.528534	8	0.659152	0.854833
Household size	Pre-determined	6861	4.320653	15	2	1.358515
Social disadvantage (2006)	Pre-determined	6861	0.364087	1	0	0.481208
Financial distress (2006)	Pre-determined	6861	0.313074	1	0	0.463778
Financial distress (2009)	Pre-determined	6861	0.322694	1	0	0.467541
Female	Pre-determined	6861	0.457659	1	0	0.49824
Lives with mother	Pre-determined	6861	0.973328	1	0	0.161136
Lives with father	Pre-determined	6861	0.804256	1	0	0.396801
Has special education needs (SEN)	Pre-determined	6861	0.091386	1	0	0.288178
SEN students in the class	Pre-determined	6853	1.155115	23	0	2.574634
# of students in the class	Pre-determined	6861	22.39047	43	1	6.033857
Household income (2006)	Pre-determined	6855	203505.6	2661000	-120748	140827.9
Time enrolled to childcare	Pre-determined	6861	2.847908	3	0.5	0.458169
How often did the parents read tales?	Pre-determined	6861	17.06078	25	0	8.835586
Age of female caretaker	Pre-determined	6861	41.16777	78	9	6.36951
Age of female caretaker - squared	Pre-determined	6861	1735.35	6084	81	566.9224
Age of female caretaker - squared	Pre-determined	6861	1735.35	6084	81	566.9224
Mental, physical or sexual abuse before age 14	Pre-determined	6861	1.478356	19	0	2.518041
Parents divorced	Pre-determined	6861	0.208279	1	0	0.406107
Roma ethnicity	Pre-determined	6861	0.056989	1	0	0.231838
Birthweight under 2500g	Pre-determined	6861	0.082204	1	0	0.274695
Been in social home (2006)	Pre-determined	6861	0.008745	1	0	0.093112
Has step parents	Pre-determined	6861	0.007579	1	0	0.086734
Mother's mother: less than elementary school	Pre-determined	6861	0.181023	1	0	0.385065
Mother's mother: elementary school	Pre-determined	6861	0.498032	1	0	0.500033
Mother's mother: high school	Pre-determined	6861	0.272701	1	0	0.445381
Mother's mother: university	Pre-determined	6861	0.048244	1	0	0.214296
Mother's father: less than elementary school	Pre-determined	6861	0.131905	1	0	0.338412
Mother's father: elementary school	Pre-determined	6861	0.393674	1	0	0.4886
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Table A.3 – continued from previous page

Variable	Type	N	Mean	SD	Min	Max
Mother's father: high school	Pre-determined	6861	0.399942	1	0	0.489922
Mother's father: university	Pre-determined	6861	0.074479	1	0	0.262568
Father's mother: less than elementary school	Pre-determined	6861	0.146334	1	0	0.353467
Father's mother: elementary school	Pre-determined	6861	0.635184	1	0	0.481414
Father's mother: high school	Pre-determined	6861	0.188748	1	0	0.391337
Father's mother: university	Pre-determined	6861	0.029733	1	0	0.169863
Father's father: less than elementary school	Pre-determined	6861	0.111646	1	0	0.314953
Father's father: elementary school	Pre-determined	6861	0.537531	1	0	0.498626
Father's father: high school	Pre-determined	6861	0.294126	1	0	0.455682
Father's father: university	Pre-determined	6861	0.056697	1	0	0.23128
Mental, physical or sexual abuse AFTER age 14	Pre-determined	6861	0.76432	18	0	1.849352
Death in the family (2008)	Pre-determined	6861	0.05626	1	0	0.23044
Death in the family (2009)	Pre-determined	6861	0.051159	1	0	0.220337
Accident in the family (2007)	Pre-determined	6861	0.04562	1	0	0.208675
Accident in the family (2008)	Pre-determined	6861	0.036438	1	0	0.187391
Accident in the family (2009)	Pre-determined	6861	1.960647	2	1	0.194447
Illness in the family (2007)	Pre-determined	6861	0.073459	1	0	0.260907
Illness in the family (2008)	Pre-determined	6861	0.072876	1	0	0.259951
Illness in the family (2009)	Pre-determined	6861	1.906573	2	1	0.291051
Household income (2006)	Pre-determined	6855	203505.6	2661000	-120748	140827.9
Household income (2007)	Pre-determined	6859	227449.9	2.65E+08	-1296761	3201266
Household income (2008)	Pre-determined	6859	197380.4	1.80E+07	-17167.3	240044.8
Household income (2009)	Pre-determined	6858	196510.5	850000	27000	84531.86
Reading score	Cognitive	6861	-0.32874	2.870647	-3.77606	1.049014
Mathematics score	Cognitive	6332	-0.19194	3.077888	-3.16042	1.032035
Emotional stability (2006)	Non-cognitive	6861	6.767381	8	0	1.4585
Self esteem (2006)	Non-cognitive	6861	8.186853	10	0	2.117278
Locus of control (2006)	Non-cognitive	6861	7.38E-09	1.034737	-2.79959	1
Sociable (2006)	Non-cognitive	6861	5.653695	7	0	1.544537
How do you feel about your school	School and peers	6861	1.835447	4	1	0.742427
How much pressure do you feel about the school requirements	School and peers	6861	1.777438	4	1	0.729945
My teachers incentivize me to tell my opinion	School and peers	6861	2.453432	5	1	1.021801
Teachers usually act justful	School and peers	6861	2.406646	5	1	0.970667
If I need extra help I get it from the teachers	School and peers	6861	2.076519	5	1	0.910485
My teachers care about my personality	School and peers	6861	2.648885	5	1	1.051527
A teacher hit one of my classmates	School and peers	6861	1.963416	2	1	0.187751
A classmate hit one of the teachers.	School and peers	6861	1.978866	2	1	0.143841
Applied to university		6861	0.392363	1	0	0.488312
Exp.: earn more than avg (2008)	Expectations	6861	0.532154	1	-0.20324	0.265093
Exp.: earn best 10% (2008)	Expectations	6860	0.253149	1	0	0.238339
Exp.: permanent employment (2008)	Expectations	6861	0.674177	1	-0.22407	0.276184
Exp.: earn ¿ net HUF100.000 (2008)	Expectations	6861	0.601115	1	-0.20751	0.303027

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Variable	Type	N	Mean	SD	Min	Max
Exp.: earn ¿ net HUF200.000 (2008)	Expectations	6861	0.329336	2	-0.09618	0.271105
Sedulity grade (2009)	Effort	6861	3.789244	8	1	0.820585
Region						
Central Hungary (%)	Pre-determined	6861	0.218919	1	0	0.413543
Central Transdanubia (%)	Pre-determined	6861	0.119079	1	0	0.323905
Western Transdanubia (%)	Pre-determined	6861	0.101443	1	0	0.301936
Southern Transdanubia (%)	Pre-determined	6861	0.100131	1	0	0.300197
Northern Hungary (%)	Pre-determined	6861	0.136423	1	0	0.343263
Northern Great Plain (%)	Pre-determined	6861	0.183647	1	0	0.387224
Southern Great Plain (%)	Pre-determined	6861	0.140359	1	0	0.347384
Mother works (2006)	Pre-determined					
No (%)	Pre-determined	6853	0.338246	1	0	0.473147
Yes (%)	Pre-determined	6853	0.642346	1	0	0.479344
We did not ask (%)	Pre-determined	6853	0.019408	1	0	0.137963
Mother works (2007)	Pre-determined					
No (%)	Pre-determined	6861	0.296167	1	0	0.456599
Yes (%)	Pre-determined	6861	0.652092	1	0	0.476342
We did not ask (%)	Pre-determined	6861	0.051742	1	0	0.221521
Mother works (2008)	Pre-determined					
No (%)	Pre-determined	6861	0.269057	1	0	0.443502
Yes (%)	Pre-determined	6861	0.691882	1	0	0.461749
We did not ask (%)	Pre-determined	6861	0.039061	1	0	0.193755
Mother works (2009)	Pre-determined					
No (%)	Pre-determined	6861	0.273575	1	0	0.445826
Yes (%)	Pre-determined	6861	0.67789	1	0	0.467319
We did not ask (%)	Pre-determined	6861	0.048535	1	0	0.21491
Father works (2006)	Pre-determined					
No (%)	Pre-determined	6830	0.183602	1	0	0.387187
Yes (%)	Pre-determined	6830	0.627526	1	0	0.483499
We did not ask (%)	Pre-determined	6830	0.188873	1	0	0.391436
Father works (2007)	Pre-determined					
No (%)	Pre-determined	6815	0.150697	1	0	0.35778
Yes (%)	Pre-determined	6815	0.628613	1	0	0.483211
We did not ask (%)	Pre-determined	6815	0.22069	1	0	0.414742
Father works (2008)	Pre-determined					
No (%)	Pre-determined	6717	0.150216	1	0	0.35731
Yes (%)	Pre-determined	6717	0.621855	1	0	0.48496
We did not ask (%)	Pre-determined	6717	0.227929	1	0	0.419528
Father works (2009)	Pre-determined					
No (%)	Pre-determined	6647	0.175568	1	0	0.380481
Yes (%)	Pre-determined	6647	0.579961	1	0	0.493602
We did not ask (%)	Pre-determined	6647	0.244471	1	0	0.429806

Appendix B. Description of the Home Cognitive and Emotional Scale

Here we present the items that make up the Home Cognitive and Emotional Scale.

Table B.4: Home Cognitive and Emotional Scale

Home Cognitive Scale Question	Freq.	Percent	Home Emotional Scale Question	Freq.	Percent
Has more than 20 books.			I used to tidy up and clean my room.		
Not true	3,402	(34.2%)	Not true	1,512	(15.1%)
True	6,546	(65.8%)	True	8,501	(84.9%)
There is at least one musical instrument at home.			I used to clear away the things in my room.		
Not true	7,239	(72.34%)	Not true	1,581	(15.81%)
True	2,768	(27.66%)	True	8,421	(84.19%)
The family has at least one newspaper subscription.			I usually subsume my time.		
Not true	7,155	(71.63%)	Not true	567	(5.67%)
True	2,834	(28.37%)	True	9,433	(94.33%)
Reads for fun at least weekly.			We meet with relatives and friends at least once in a month.		
Not true	5,592	(56.29%)	Not true	3,071	(30.73%)
True	4,343	(43.71%)	True	6,924	(69.27%)
The family encourages to have a hobby.			I spend time with my father more than once in a week.		
Not true	1,898	(19.02%)	Not true	5,101	(51.2%)
True	8,083	(80.98%)	True	4,860	(48.8%)
Participates in tutorial lectures.			Outdoor activity with my father at least once in a week.		
Not true	6,022	(60.15%)	Not true	4,960	(50.75%)
True	3,990	(39.85%)	True	4,813	(49.25%)
Have gone to museum in the past year with a family member.			Eat a meal with both parents each day.		
Not true	5,807	(58.11%)	Not true	5,911	(59.33%)
True	4,186	(41.89%)	True	4,052	(40.67%)
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Table B.4 – continued from previous page

Home Cognitive Scale Question	Freq.	Percent	Home Emotional Scale Question	Freq.	Percent
Have been to a concert or theatre in the past year with a family member.			The parent would not hit the child is he/she were cursing.		
Not true	5,939	(59.47%)	Not true	357	(3.59%)
True	4,048	(40.53%)	True	9,587	(96.41%)
There are discussions in the family about what was seen on TV.			The parent had to hit the child at most once in the past week.		
Not true	2,868	(29.71%)	Not true	28	(0.29%)
True	6,784	(70.28%)	True	9,777	(99.71%)
The flat is not dark or dreary.			The mother encouraged the child to participate in the conversation.		
Not true	1,593	(16.04%)	Not true	2,912	(29.59%)
True	8,340	(83.96%)	True	6,930	(70.41%)
The rooms are mostly clean.			The mother answered the child's questions.		
Not true	958	(9.65%)	Not true	4,528	(46.1%)
True	8,969	(90.35%)	True	5,295	(53.9%)
The rooms are mostly tidy.			The mother talked to the child.		
Not true	1,052	(10.59%)	Not true	3,849	(39.14%)
True	8,878	(89.41%)	True	5,985	(60.86%)
The building is safe.			The mother introduced the child to the interrogator.		
Not true	538	(5.45%)	Not true	5,876	(59.61%)
True	9,342	(94.55%)	True	3,981	(40.39%)
			The mother spoke in a positive voice about the child.		
			Not true	936	(9.52%)
			True	8,898	(90.48%)

Appendix C. Complete regression

Table C.5: Association of parental preferences with university attendance

	Baseline	+Family background	+Cognitive	+ Noncogn.	+ Aspirations	+ Asp. + Exp. + Eff.
	(1)	(2)	(3)	(4)	(5)	(6)
Ideal education: university	0.427***	0.264***	0.163***	0.163***	0.158***	0.108***
	[0.017]	[0.018]	[0.018]	[0.018]	[0.019]	[0.020]
Female		0.050***				
		[0.017]				
Special education needs		-0.104***				
		[0.035]				
HOME cognitive scale		0.043***	0.016*	0.016*	0.015	0.000
		[0.010]	[0.009]	[0.009]	[0.009]	[0.010]
Mother high school		0.099***	0.078***	0.078***	0.075***	0.077***
		[0.021]	[0.020]	[0.020]	[0.020]	[0.020]
Mother university		0.188***	0.155***	0.155***	0.149***	0.126***
		[0.028]	[0.027]	[0.027]	[0.027]	[0.027]
Father high school		0.065***				
		[0.022]				
Father university		0.203***	0.106***	0.106***	0.100***	0.061***
		[0.027]	[0.024]	[0.024]	[0.024]	[0.023]
Less than 50 books at home		0.025				
		[0.033]				
Appr 50 books at home		-0.031	-0.044*	-0.044*	-0.043*	
		[0.026]	[0.024]	[0.024]	[0.024]	
Internet access at home		0.065***	0.031*	0.031*	0.025	0.016
		[0.020]	[0.019]	[0.019]	[0.019]	[0.019]
Mother works in 2006		0.012				
		[0.021]				
Number of rooms per HH member		-0.025***				
		[0.008]				
Always had money to pay for bills		0.055**	0.000	0.000	0.000	0.092***
		[0.026]	[0.000]	[0.000]	[0.000]	[0.027]
Sometimes no money to pay for bills		0.000	-0.071***	-0.071***	-0.075***	0.000
		[0.000]	[0.024]	[0.024]	[0.024]	[0.000]
Free books as social benefit		-0.033*	-0.045**	-0.045**	-0.047***	
		[0.020]	[0.018]	[0.018]	[0.018]	
Go to theater with parents			0.004	0.004		
			[0.008]	[0.008]		
Reading score			0.101***	0.101***	0.096***	0.060***
			[0.010]	[0.010]	[0.010]	[0.011]
Mathematics score			0.100***	0.100***	0.096***	0.070***
			[0.010]	[0.010]	[0.010]	[0.011]
Sedulity grade last term					0.016	
					[0.012]	
Sedulity grade last term					0.026**	0.018**
					[0.012]	[0.008]
Mark of last term: literacy						0.038**
						[0.018]
Mark of last term: hungarian grammar						0.020
						[0.032]
Mark of last term: literature						0.017
						[0.033]
Mark of last term: conduct						-0.011
						[0.026]
Mark of last term: sedulity						0.043
						[0.033]
Student's standard literacy score						0.045**
						[0.017]
Constant	0.097***	-0.023	0.188***	0.188***	0.200***	0.152***
	[0.011]	[0.033]	[0.020]	[0.020]	[0.020]	[0.031]
Parents' education		yes	yes	yes	yes	yes
Financial background		yes	yes	yes	yes	yes
Home environment		yes	yes	yes	yes	yes
Cognitive (test scores)			yes	yes	yes	yes
Noncognitive traits				yes	yes	yes
Student's aspirations					yes	yes
Expectations						yes
Effort						yes
Observations	4,297	3,922	3,821	3,821	3,819	3,364
Clusters	886	866	855	855	853	745
Selected controls	0	15	12	12	13	16
Dictionary size	0	50	52	56	64	82
R-squared	0.124	0.242	0.325	0.325	0.332	0.366

Note: Robust standard errors in brackets, clustered by school id.
*** p < 0.01, ** p < 0.05, * p < 0.1.