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## **Growth Mindset: A Predictor of Higher Education Attainment**

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# Growth Mindset: A Predictor of Higher Education Attainment

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## Abstract

A growth mindset—a belief that intelligence is malleable rather than a fixed trait—is a crucial factor for educational success. I investigate whether a growth mindset also plays a role in students' post-graduation life outcomes, specifically, in the pursuit of higher education in a nationwide sample of 35,329 Ecuadorian baccalaureate students. I find that a growth mindset is positively related to the students' graduation scores ( $\beta = 0.01$ ,  $p = 0.02$ ,  $d = 0.09$  SD difference between students with a growth and a fixed mindset), participation in the university aptitude test ( $\beta = 0.01$ ,  $p = 0.002$ ,  $d = 0.28$  SD), scores on the university aptitude test ( $\beta = 7.25$ ,  $p < 0.000$ ,  $d = 0.43$  SD), and successful university admissions ( $\beta = 0.01$ ,  $p < 0.000$ ,  $d = 0.26$  SD). The differences between students with a growth mindset and those with a fixed mindset are substantial; for example, the difference in scores on the university aptitude test exceeds the difference between students whose mothers received and didn't receive higher education. I do not find evidence that a growth mindset is more beneficial for high-income students; I find limited evidence to the contrary. Students with a growth mindset from the lowest wealth quantile have higher university acceptance rates than students with a fixed mindset from the highest wealth quantile.

## Main Text

### Introduction

Higher education is a crucial contributor to the economy (1, 2) and a significant channel of upward social mobility for individuals. Increasing the levels of higher education among the population has a significantly positive impact on GDP growth, particularly in countries at the initial stage of economic development (3). In addition, higher education is a significant predictor of people's longevity, health, and mental well-being, even when controlling for the income increase with additional years of education (4, 5).

For low- and middle-income countries, achieving high-quality tertiary education can be a significant challenge. They often face resource constraints, having less available public funding, and, as a result, higher education systems may become restricted to a small population of students from the wealthiest families (6).

Thus, as access to higher education increases, it does not necessarily increase equally for all socio-economic groups. On the contrary, the inequality in access to higher education may be increasing (7). Students from lower socio-economic backgrounds face financial constraints as well as a lack of necessary social-emotional and cognitive skills (8). For instance, family income is responsible for half of the university access gap between people from lower and higher socioeconomic backgrounds, while the other half was explained by parental education, students' previous educational performance, cognitive and social-emotional skills such as the big-five personality traits, and grit in Peru (9). These socio-emotional skills were associated with academic achievement in secondary schools and may have been related to the decision to pursue higher education.

Among the socio-emotional factors, growth mindset is a particularly strong and consistent predictor of academic achievement in secondary schools, which has yet to be investigated in terms of post-graduation educational outcomes. A growth mindset is the belief that a person's intelligence can be increased, as opposed to a fixed mindset - a belief that everyone has a predetermined level of intelligence that cannot be changed. Extensive meta-analyses have shown a positive correlation between a growth mindset and academic performance, as well as a negative association with

student distress (10, 11). Furthermore, mindsets can be altered, and interventions aimed at fostering a growth mindset among students have demonstrated a positive effect on students' academic achievements (10).

Could mindset also play a role in the pursuit of higher education? Do programs promoting a growth mindset in students mitigate or induce existing inequality in the pursuit of higher education?

According to a nationwide study on Chilean public secondary schools, having a growth mindset was especially beneficial to students from lower socio-economic backgrounds. For example, students in the lowest socio-economic percentile with a growth mindset had the same academic performance as students from the 80th socio-economic percentile with a fixed mindset (12). The results from a meta-analysis also provide evidence of this pattern (10). On the other hand, recent studies show that having a growth mindset is more beneficial for the academic achievement of students from a higher socio-economic background (13, 14)

Evidence of the role of the growth mindset after high school graduation, for example, in the pursuit of higher education, becomes more limited and controversial. A study on a sample of US students from four districts found that a growth mindset negatively predicted immediate college enrollment but positively predicted delayed college enrollment and wasn't a predictor of on-time graduation (15). This study highlighted the necessity to understand their results in larger and more diverse samples. Further studies attempting to link a growth mindset to academic achievement in university students yield varying results. No relationship was found between the growth mindset and the academic achievement of Czech university students (16), online college students in the United States (17), or undergraduate students in the United Kingdom (18). However, a study of undergraduate students in Greece found a positive correlation between a growth mindset and academic performance at the university (19). In addition, experimental evidence from a study on Peruvian high school students suggests that a growth mindset intervention can increase intentions to enter university, at least in the short term (20).

Given this contradicting evidence, I hypothesized that a mindset may play a role in the decision to apply to a university and in the success of the admission process, leading to a self-selection of students with a growth mindset into higher education. That could lead to a lower variation in mindset among university students compared to secondary school students.

I studied the role of mindset after graduation step-by-step, from the final secondary school exam to university enrollment. Following a registered pre-analysis plan, I examined each step of the graduation and university enrollment process: score on the final school exam, application to at least one higher education institution in the country, score at the university entrance exam, university admission, and admission to the STEM field programs. In addition, I explored heterogeneity by gender and wealth level.

I used the extensive administrative data on Ecuadorian last-grade students and their educational decisions after graduation. Like many Latin American countries, the Ecuadorian government financially manages public higher education institutions and provides free access to higher education. Co-funded and private universities also exist; they charge students tuition and often have higher financial capabilities. The government has been directing additional funds and introducing new laws and regulatory systems to increase the quality and accessibility of public higher education (21). Due to such policies, students should face relatively lower financial constraints as compared to countries with a more pronounced role of private education, and, thus, the potential role of mindset should be detectable.

## **Materials and Methods**

### *Context*

For this analysis, I used secondary survey and administrative data from a large educational project - "Showing Life Opportunities", conducted in cooperation with the Ministry of Education in Ecuador and the Ministry of Higher Education of Ecuador (SENESCYT). This project consisted of randomized controlled trials, which provided online entrepreneurship courses as part of the educational process in Ecuadorian schools, and collected data on life outcomes to evaluate the effectiveness of the courses. This project received human subjects approval from the Universidad San Francisco de Quito (USFQ), IRB approval number 2018-208E, and from the IRB Committee of Innovations for Poverty Action IRB-USA, IPA IRB Protocol #: 15629 with a waiver of consent.

The project consisted of three experimental waves. The first wave began in September 2019 and covered 108 schools in Educational Zone 2, where students took the surveys and completed the online course in computer labs under the supervision of their teachers. Grades K-10, K-11, and K-12 participated in this wave. The second wave began in May

2020, following the onset of the COVID-19 pandemic, and involved students completing a technical baccalaureate program in 416 schools across all educational zones in the country's Highland educational regime. The third wave began in September 2020 and involved students completing a technical baccalaureate program in 598 schools across all educational zones of Ecuador's Coastal educational regime. Only grade K12 participated in waves 2 and 3.

Baccalaureate in Spanish-speaking countries refers to the final stage of secondary education. In Ecuador, after completing secondary education, a student receives a science, bilingual intercultural, or technical baccalaureate degree. All of these baccalaureate degrees teach common general subjects like mathematics, physics, chemistry, history, English, philosophy, physical education, etc., and additional courses specific to the type of baccalaureate degree. Either degree entitles a student to apply to a university. More detailed descriptive data on the experimental waves can be found in Appendix Table S4.

#### *Data and Estimation*

Before performing the analysis, I wrote a pre-analysis plan for secondary data analysis and embargoed it in the OSF registry. The survey data, including the growth mindset 3-item scale and control variables, were collected at the beginning of each experimental wave. For the growth mindset scale, the students rated how much they agreed on a 5-point Likert scale with the following statements: (1). You have a certain amount of intelligence, and you can't really do much to change it; (2). Your intelligence is something about you that you can't change very much; (3). You can learn new things, but you can't really change your basic intelligence. Higher values on this scale indicate a lower growth mindset, so for the purposes of analysis, the items were recoded so that higher values indicate a higher growth mindset. The scale's Cronbach's alpha is 0.847. To calculate the growth mindset scale, I averaged the three items.

For the visual and descriptive comparison following (12), I have classified students as having a growth mindset if they scored in absolute values between 4 and 5 (i.e. disagreed or strongly disagreed with the abovementioned statements), fixed mindset if they scored between 1 and 2 (i.e. agreed or strongly agreed), and mixed mindset if they scored in between. 22% of students were classified as having a growth mindset, 34% as having a fixed mindset, and 44% as mixed mindset.

The explained variables – administrative data on educational outcomes were collected at the end of the respective educational year and are available for the K12 grade from each experimental wave. I focused on the following outcomes from the pre-analysis plan: the student's final school score, whether the student applied for an aptitude test necessary to enroll in a public or private university in Ecuador, the student's score at the aptitude test, and whether the student was admitted to a university - among those who applied to the university and among all students. The final application score that students in Ecuador use to apply to a university is constructed based on the final school score and the score obtained at the aptitude test. Administrative data used for this study includes both of these scores. Finally, I studied whether students with a higher growth mindset were more likely to enter a STEM-related program. University programs in Ecuador are classified by the Ecuadorian Ministry of Education in accordance with the ISCED-F 2013 field classification. I classified a program as STEM-related if it belonged to one of the following fields: "Natural Sciences, Mathematics, and Statistics", "Engineering, Industry, and Construction", or "Information and Communication Technologies (ICT)" in accordance with classification from OECD (22). The administrative data included all public, co-funded, and private universities in Ecuador.

I used a linear probability model to estimate the relationship between the growth mindset scale and the above-mentioned binary explanatory variables, and linear regressions to estimate continuous models. Given that the survey data contains a high number of potential student and school-level covariates (demographic and family data, previous knowledge levels, personality traits, psychological scales, educational zone, average school performance, experimental wave, etc.), I used a double-lasso regression procedure (23) to select relevant covariates. This approach relies on a two-step method to identify relevant covariates: fitting Lasso regression to predict the explained variable, and fitting Lasso regression to predict the explanatory variable. In the end, the union of predictors selected for the explained and explanatory variables is included in the linear regression. The method was developed for causal inference in observational data.

I double-check the results obtained from the administrative data against responses from the incentivized follow-up surveys, which aimed to capture the life outcomes of students six months after graduation. The surveys were done to random sub-samples of students who participated in the original study. The follow-up phone survey contained the following questions: 1) Did you take the aptitude test for applying to public universities?; 2) What was your grade on

the aptitude test?; 3) Are you currently enrolled in any form of education, such as in a university, technical academy, online course, vocational training, or other? (If answered yes, the student was asked to specify which form of education by selecting one of the forms of education.) 4) Is your main area of study a STEM subject (science, technology, engineering, or mathematics)?

In addition, as specified in the pre-analysis plan, I studied the heterogeneity of growth mindset by income and gender. As a proxy for income, I constructed a wealth index based on the family assets reported by the students in surveys. The students were asked how many of the following assets their households had: washing machine, air conditioner or dryer, flat-screen TV, family car, domestic employee (such as a driver or gardener), bathrooms, and bedrooms. The set of answers consisted of 0 to 5 or more than 5 (more than 5 coded as 6). Based on these variables, I calculate the wealth index as the first principal component of household assets. While the wealth index is a different measure from household income, it has been shown to be a reasonable proxy for inequality and can predict school attendance among Mexican schoolchildren (24).

## Results

### *Main Analysis*

The main analysis is performed according to a pre-analysis plan. Table 1 presents the results of the main analysis correlating the growth mindset scale with the final school grade, participation in the university aptitude test, score at the aptitude test, and university admission.

The growth mindset is measured by the standard 3-item scale (for more details, see Methods section below). In line with prior research, there is a positive relationship between a growth mindset and the final school grade. 86% of students in the sample participated in the final tests. The growth mindset scale is positively related to the final school test result ( $\beta = 0.01$ ,  $p = 0.02$ , Pearson's  $r = 0.03$ ). The difference between a student with a growth mindset and a fixed mindset is 0.09 SD, more than half of the difference between students with mothers who have a higher education and those who don't - 0.17 SD.

Next, I studied the relationship between the growth mindset and students' outcomes after high school graduation. To apply to a university in Ecuador, a student has to participate in the national university aptitude test. After receiving their score on the entrance exam, they send their documents to a number of universities, usually up to 5.

More than half of the students in the sample participated in the university aptitude test. Students with a higher growth mindset participate at higher rates ( $\beta = 0.01$ ,  $p = 0.002$ , Pearson's  $r = 0.1$ ). Specifically, 61% of students with a growth mindset apply to a university, compared to 54% of students with a fixed mindset, with a difference in standard deviations of 0.28 SD. The difference is comparable to the difference between students whose mothers have a higher education and those who don't - 0.29 SD.

Among students who participated in the university aptitude exam, students with a growth mindset scored higher. Students with a growth mindset scored 720 points on average, while students with a fixed mindset scored 662 points. This difference is substantial and statistically significant ( $\beta = 7.25$ ,  $p < 0.000$ , Pearson's  $r = 0.17$ ). In standard deviations, the difference between a student with a growth mindset and a fixed mindset is 0.43 SD, larger than the difference between students whose mothers received higher education and those who did not, at 0.24 SD.

Consequently, students with a higher growth mindset were more likely to be accepted to the university, both among those who applied to a university ( $\beta = 0.01$ ,  $p = 0.01$ , Pearson's  $r = 0.05$ ) and overall ( $\beta = 0.01$ ,  $p < 0.000$ , Pearson's  $r = 0.1$ ). 66% of students with a growth mindset who have applied to a university receive a placement compared to 60% of students with a fixed mindset. This result holds for the overall admission rate.

I didn't find a statistically significant relationship between the growth mindset scale and admission to a STEM field program compared to other fields.

These results support my hypothesis that a growth mindset is related to the pursuit of higher education after high school. These results remain consistent based on the responses from a phone follow-up survey (Appendix Table S1).

The share of students with a growth mindset increases from 22% among all students to 27% among those accepted to the university. Conversely, the share of students with a fixed mindset falls from 34% to 29%, while the share of students

with a growth mindset remains unchanged at 44%. This provides insight that the behavioral differences lie among students with pronounced fixed and growth mindsets, while the students with mixed mindsets seem to be equally likely to continue or stop education. The full breakdown of shares of growth, mixed, and fixed mindset students at every step of the application process can be seen at Appendix Fig. S1.

#### *Heterogeneity Analysis*

Next, in accordance with the pre-analysis plan, I investigate whether there is any significant heterogeneity by gender or wealth (Table 2). Interestingly, there is no significant correlation between gender and the growth mindset scale ( $r = 0.005$ ,  $p = 0.39$ ), and the wealth index and growth mindset scale are negatively related ( $r = -0.016$ ,  $p = 0.003$ ).

I estimated a regression with an interaction term between gender and growth mindset (Table 2, Panel A). I observed no evidence of heterogeneity by gender.

As for the wealth index, the interaction term between growth mindset and wealth index is significantly negative for participation in the university aptitude test and university admission (Table 2, Panel B). This pattern is similar to the one previously observed in the literature (10, 12). It suggests that students from lower-wealth households may benefit more from a growth mindset in their decision to apply to a university than students from higher-wealth households (or alternatively, that students from lower-wealth households are more likely to suffer from a fixed mindset). The result holds for the overall university acceptance rate, suggesting that this pattern applies not only to the decision to participate in the university aptitude test but also to the successful admission rates to the university. These results remain statistically significant after FDR multiple hypothesis correction (25), see Appendix Table S2. The robustness check on the phone survey remains in the same direction, but not statistically significantly different below 5% (Appendix Table S3).

Figure 1 further illustrates the relationship between external factors (mother's education, wealth, and school quality), growth mindset, and university admission in more detail. The first panel presents the relationship between university admission and growth mindset by maternal education, including four categories: secondary education or lower, baccalaureate (post-secondary two-year degree), bachelor's, and master's degrees. The fifth category, PhD, was excluded, as it comprises only 136 observations, or 0.4% of the sample. The second panel presents the results by wealth quantile, and the third by the school's average graduation score from the previous year - another proxy for income and school quality. Similarly to the previous analysis, the figure visually illustrates that there is no evidence to suggest that a growth mindset is significantly more beneficial for students from wealthier backgrounds. On the contrary, the first and second panels illustrate that students with a growth mindset with the lowest level of maternal education and family wealth quantile have higher university acceptance rates than students with a fixed mindset with the highest level of maternal education and wealth quantile. The third panel illustrates that the university admission rates of growth mindset students from schools with the lowest average graduation test quantile are close to the rates of students with a fixed mindset from the third average test quantile. This highlights the crucial role of institutional factors over household and individual factors in fostering the benefits of a growth mindset.

## **Discussion**

This study investigated the relationship between a growth mindset and university admission. To the best of my knowledge, this is the first study to link growth mindset in a nationwide sample of students to multiple-level administrative data on the university admission process. I find that students with a growth mindset tend to obtain higher grades on school graduation exams, which are relevant for the admission process, are more likely to participate in the university aptitude test, achieve higher university aptitude scores, and are overall more likely to be admitted to a university. Consequently, I show that the share of students with a growth mindset is higher and the share of students with a fixed mindset is lower among those who received a university placement. Similar to previous research (10, 12), I find evidence that a growth mindset is more beneficial for students from lower-income backgrounds. Moreover, students with a growth mindset from the lowest family wealth quantile have higher rates of university admissions than students from the highest family wealth with a fixed mindset.

Still, the results of this study should be interpreted with caution and rather descriptively. Large randomized controlled trials could establish a causal link between an increase in the growth mindset and the likelihood of obtaining higher education. Additionally, these results pertain only to students who apply to universities immediately after graduation.

Of course, as widely discussed in the literature (10, 11, 12), growth mindset interventions cannot be a substitute for structural changes allowing students from lower-income backgrounds to pursue higher education. Moreover, the role and the distribution of the growth mindset in the population might vary depending on the levels of inequality. For example, in the study among Chilean students (12), a growth mindset was positively related to income, while in this study, the relationship between growth mindset and wealth is negative. Still, the observed differences in post-graduation outcomes in this study and the above-mentioned study are comparable, with a 0.26 SD difference in math scores and 0.4 SD in language scores between students with a fixed and a growth mindset in the study among Chilean students. Further long-term studies with panel data from different countries with different income levels would help to shed light on the role of growth mindset in post-secondary education.

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## Figures and Tables

**Table 1.** The Relationship between Growth Mindset and Post-Secondary School Educational Outcomes.

		<i>Dependent variable:</i>					
		School Final Grade	Participation in the Aptitude Test	Score at the Aptitude Test	Accepted to University (Conditional)	Accepted to University (Unconditional)	STEM Study Field
		(1)	(2)	(3)	(4)	(5)	(6)
Growth Mindset		0.01**	0.01***	7.25***	0.01***	0.01***	0.01
		(0.01)	(0.003)	(0.90)	(0.004)	(0.003)	(0.004)
Constant		7.43***	0.44**	644.72***	0.57***	0.23***	0.59***
		(0.10)	(0.17)	(18.40)	(0.06)	(0.04)	(0.05)
Students		30300	35329	17581	17581	35329	12164
Schools		808	916	841	841	916	816
Fixed	Mindset	8.69	0.54	662.14	0.6	0.27	0.41
Average							
Growth	Mindset	8.78	0.61	720.17	0.66	0.39	0.42
Average							
Difference	between	0.09	0.28	0.43	0.12	0.26	0.02
	GM and FM (SD)						
Adjusted R <sup>2</sup>		0.28	0.18	0.3	0.1	0.13	0.17

*Note: Each regression includes a set of control variables selected using a double-lasso selection procedure from student-level and school-level variables.*

*\*p<0.1; \*\*p<0.05; \*\*\*p<0.01*

**Table 2.** Heterogeneity by wealth in the relationship between educational outcomes and growth mindset

		<i>Dependent variable:</i>					
		School Final Grade (1)	Participation in the Aptitude Test (2)	Score on the Aptitude Test (3)	Accepted to University (Conditional) (4)	Accepted to University (Unconditional) (5)	STEM Study Field (6)
<b>Panel A: Heterogeneity by Gender</b>							
Growth Mindset*	Female	0.01 (0.01)	0.002 (0.004)	2.48 (1.53)	-0.01 (0.01)	-0.001 (0.004)	-0.001 (0.01)
Growth Mindset	Female	0.01 (0.01)	0.01** (0.003)	5.92*** (1.20)	0.01** (0.005)	0.01*** (0.003)	0.01 (0.01)
		0.17*** (0.03)	0.04*** (0.01)	-11.21** (4.93)	-0.01 (0.02)	0.04*** (0.01)	-0.29*** (0.02)
<b>Panel B: Heterogeneity by Wealth Index</b>							
Growth Mindset *	Wealth Index	0.003 (0.003)	-0.004** (0.002)	-1.14* (0.60)	0.0004 (0.002)	-0.004*** (0.001)	-0.0002 (0.003)
Growth Mindset	Wealth Index	0.01** (0.01)	0.01*** (0.003)	7.27*** (0.90)	0.01*** (0.004)	0.01*** (0.003)	0.01 (0.004)
		-0.01 (0.01)	0.01*** (0.005)	5.41*** (1.87)	-0.01 (0.01)	0.01** (0.004)	-0.01 (0.01)
Students		30300	35329	17581	17581	35329	12164
Schools		808	916	841	841	916	816

Note: Each regression includes a set of control variables selected using a double-lasso selection procedure from student-level and school-level variables.

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

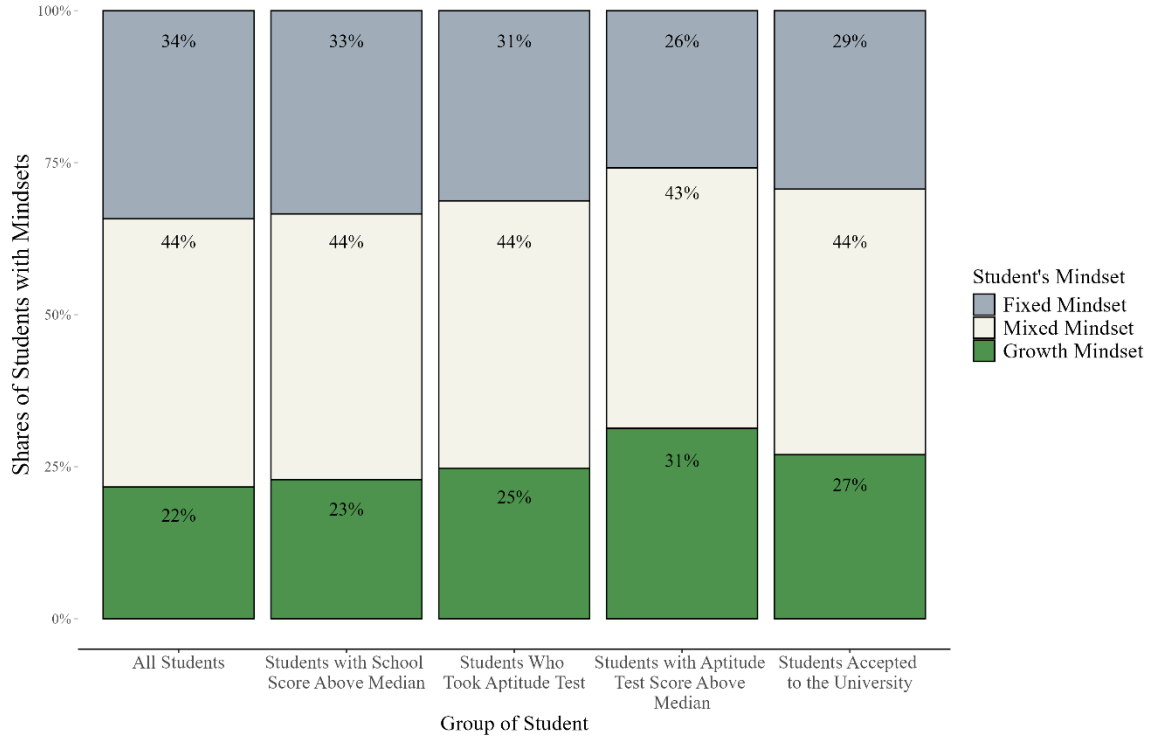


**Figure 1.** University acceptance rates among students with growth and fixed mindsets, by mother's education, family wealth index quantile, and quantile of the average graduation score at the school, retrieved from administrative data.

# Supplementary Information for Growth Mindset: A Predictor of Higher Education Attainment

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**Fig. S1.** Shares of students with growth, mixed and fixed mindset among all baccalaureate students, those who scored above median at the school graduation exam, took a university aptitude test, scored above median at the university aptitude test, and were accepted to the university.



**Table S1.** Robustness check of main results with phone-based survey outcomes.

	<i>Dependent variable:</i>				
	Participation in the Aptitude Test	Score on the Aptitude Test	Accepted to University (Conditional)	Accepted to University (Unconditional)	STEM Study Field
	(1)	(2)	(3)	(4)	(5)
Growth Mindset	0.01** (0.004)	8.20*** (2.44)	0.02* (0.01)	0.02*** (0.01)	0.01 (0.01)
Constant	1.02*** (0.12)	993.16*** (75.61)	0.56*** (0.08)	0.80*** (0.11)	0.73*** (0.08)
Students	11164	6614	3239	7447	3930
Schools	876	784	681	848	730
Fixed Mindset Average	0.58	705.55	0.65	0.24	0.75
Growth Mindset Average	0.7	748.5	0.71	0.39	0.77
Adjusted Rsq	0.15	0.04	0.04	0.15	0.04

*Note: Each regression includes a set of control variables selected using a double-lasso selection procedure from student-level and school-level variables. The number of observations may vary due to students not answering the question or stating that they don't know the answer.*

*\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$*

**Table S2.** Exploratory results with p-values and q-values of the interaction terms corrected for multiple hypothesis testing.

<i>Dependent variable:</i>						
	School Final Grade	Participation in the Aptitude Test	Score on the Aptitude Test	Accepted to University (Conditional)	Accepted to University (Unconditional)	STEM Study Field
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A: Heterogeneity by Wealth Index</b>						
Growth Mindset * Wealth Index	0.003 (0.003)	-0.004** (0.002)	-1.14* (0.60)	0.0004 (0.002)	-0.004*** (0.001)	-0.0002 (0.003)
	<i>p</i> = 0.40 <i>q</i> = 0.42	<i>p</i> = 0.02 <i>q</i> = 0.05	<i>p</i> = 0.06 <i>q</i> = 0.09	<i>p</i> = 0.85 <i>q</i> = 0.9	<i>p</i> = 0.004 <i>q</i> = 0.027	<i>p</i> = 0.95 <i>q</i> = 0.9
Growth Mindset Wealth Index	0.01** (0.01)	0.01*** (0.003)	7.27*** (0.90)	0.01*** (0.004)	0.01*** (0.003)	0.01 (0.004)
	-0.01 (0.01)	0.01*** (0.005)	5.41*** (1.87)	-0.01 (0.01)	0.01** (0.004)	-0.01 (0.01)
Students	30300	35329	17581	17581	35329	12164
Schools	808	916	841	841	916	816
<b>Panel B: Heterogeneity by Gender</b>						
Growth Mindset * Female	0.01 (0.01)	0.002 (0.004)	2.48 (1.53)	-0.01 (0.01)	-0.001 (0.004)	-0.001 (0.01)
	<i>p</i> = 0.43 <i>q</i> = 1	<i>p</i> = 0.61 <i>q</i> = 1	<i>p</i> = 0.11 <i>q</i> = 1	<i>p</i> = 0.41 <i>q</i> = 1	<i>p</i> = 0.88 <i>q</i> = 1	<i>p</i> = 0.90 <i>q</i> = 1
Growth Mindset Female	0.01 (0.01)	0.01** (0.003)	5.92*** (1.20)	0.01** (0.005)	0.01*** (0.003)	0.01 (0.01)
	0.17*** (0.03)	0.04*** (0.01)	-11.21** (4.93)	-0.01 (0.02)	0.04*** (0.01)	-0.29*** (0.02)
Students	30300	35329	17581	17581	35329	12164
Schools	808	916	841	841	916	816

Note: Each regression includes a set of control variables selected using a double-lasso selection procedure from student-level and school-level variables. P-values were corrected within the heterogeneity type.

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

**Table S3.** Robustness check of growth mindset wealth heterogeneity with phone-based survey outcomes.

	<i>Dependent variable:</i>				
	Participation in the Aptitude Test	Score on the Aptitude Test	Accepted to University (Conditional)	Accepted to University (Unconditional)	STEM Study Field
	(1)	(2)	(3)	(4)	(5)
Growth Mindset * Wealth	-0.01*	-0.84	-0.001	-0.002	-0.001
	(0.003)	(1.65)	(0.01)	(0.003)	(0.004)
Growth Mindset	0.01**	8.12***	0.02*	0.02***	0.01
	(0.004)	(2.44)	(0.01)	(0.01)	(0.01)
Wealth	0.02*	-0.60	0.01	0.01	0.002
	(0.01)	(5.26)	(0.02)	(0.01)	(0.01)
Constant	1.02***	997.24***	0.56***	0.79***	0.73***
	(0.12)	(75.71)	(0.08)	(0.11)	(0.08)
Students	11164	6614	3239	7447	3930
Schools	876	784	681	848	730

*Note: Each regression includes a set of control variables selected using a double-lasso selection procedure from student-level and school-level variables. The number of observations may vary due to students not answering the question or stating that they don't know the answer.*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

**Table S4.** Descriptive table of student samples from three experimental waves.

	Experiment 1	Experiment 2	Experiment 3
n	4617	14276	16436
Female	0.51 (0.50)	0.43 (0.50)	0.49 (0.50)
Age	16.97 (0.93)	18.07 (3.35)	17.32 (2.31)
Rural Area	0.19 (0.39)	0.25 (0.44)	0.14 (0.34)
Mother Works	0.60 (0.49)	0.60 (0.49)	0.44 (0.50)
Father Works	0.82 (0.38)	0.82 (0.39)	0.82 (0.38)
Wealth Index	0.14 (1.54)	-0.09 (1.47)	0.04 (1.57)
- Washing Machines Owned	0.82 (0.87)	1.10 (1.37)	1.19 (1.23)
- Air Conditioners and Dryers Owned	0.25 (0.62)	0.30 (0.69)	0.49 (0.78)
- Flat Screen TVs Owned	1.22 (1.09)	0.83 (0.98)	0.99 (0.94)
- Cars Owned	0.57 (0.84)	0.60 (0.83)	0.51 (0.83)
- Domestic Employees	0.19 (0.66)	0.19 (0.60)	0.17 (0.63)
- Number of Bathrooms	1.59 (0.98)	1.22 (0.96)	1.31 (0.97)
- Number of Rooms	3.09 (1.21)	2.67 (1.33)	2.44 (1.21)
Has Work Experience	0.34 (0.47)	0.36 (0.48)	0.28 (0.45)
Score in Statistics	0.03 (0.59)	0.00 (0.59)	-0.01 (0.57)
Score in Spanish	0.03 (0.30)	-0.01 (0.30)	-0.01 (0.31)
Score in English	0.09 (0.52)	-0.01 (0.52)	-0.01 (0.51)
Intends to Study at a University	0.70 (0.52)	0.69 (0.52)	0.75 (0.47)
Growth Mindset Scale	2.73 (1.06)	2.90 (1.13)	2.81 (1.11)