Remote delivery of STEM and entrepreneurship role models at scale changes college major choice

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Abstract

Youth often decide what to study with limited exposure to many high-paying careers. In-person visits from role models can change behavior, but are difficult to scale and typically expose youth to only one person in one career. We test the impact of exposing youth to multiple role models, in both STEM and entrepreneurship careers, using online video interviews to intervene at large-scale in a randomized trial with 29,243 students in 813 Ecuadorian high schools. Girls treated with role models increase their stereotypes about STEM, express less interest in studying and working in science, and reduce their likelihood of choosing a STEM major, increasing enrolment in business majors instead. Boys also express less interest in studying and working in science, and shift their major choice away from STEM and towards other majors like agriculture. The contrast between fields appears to shift youth away from what they see as the more challenging career.

Introduction

Historically youth have relied only on very local information for making decisions about careers, basing it on the experience of family, friends, and community members. But this means that if they have limited exposure to people in high-paying careers, they may not know what is involved nor consider alternative career choices[1-2]. A wider exposure may be particularly important for stimulating considerations of emerging careers in STEM (science, technology, engineering, and mathematics) and high-growth entrepreneurship, where few children may have parents in these fields. Yet these fields are crucial for innovation and job creation, and policymakers around the world are interested in boosting enrolment in these fields.

A popular approach to overcoming this lack of exposure to alternative career paths is to provide youth with short presentations by role models[3]. A role model can represent what is possible, provide information and behaviors that students can act on and copy, and provide inspiration to consider something new[4]. A common approach is to have a recent graduate or someone successful with a relatable background come and do an in-person presentation to a classroom of students. Multiple evaluations have found these personal visits to shift student educational aspirations and choices[3,5], especially when female role models are used to encourage female students to consider male-dominated careers such as those in STEM[6-8], entrepreneurship[9], and economics[10]. However, such in-person visits can be highly dependent on the personality of a single person and less effective for those who do not relate to the role model, may be difficult and expensive to scale while maintaining the quality of the role model used, and often give youth a view of only one career path.

Digital tools and technology offer the potential to enable youth to be exposed to a much broader variety of role models and for this to be done at scale. Youth may indirectly connect with role models through watching soap operas[11,12], reality shows[13], and movies[14]. A more direct approach has been to film video interviews with role models and then screen these in schools[15,16]. To date such approaches have typically focused on interviews with only a small number of role models, all of the same gender, with an emphasis on getting students to continue in school or work after graduation.

This study tests the effectiveness of remote delivery of role models at scale by providing high school students with online video interviews. We conduct an experiment in Ecuador with 29,243 students in 813 schools, and provide them with not just one career path, but with role models in both STEM and entrepreneurship careers. Students are exposed to both same gender and opposite gender role models. Promoting STEM and innovative entrepreneurship are both parts of

Ecuador's national strategy for improving productivity[17]. Given the range of possible interests among high school students, showing them multiple perspectives from both career paths is intended to inform and inspire them to consider one of these fields. We demonstrate the feasibility of online delivery at low cost (86 cents per student) in a developing country setting.

We find online delivery of role models does change both student beliefs and attitudes towards STEM and business, as well as college major choices, but in unexpected ways that differ from the majority of role model experiments. Both male and female students shift beliefs, study interest, and college major enrollment away from STEM, towards alternative career paths, irrespective of the gender mix of role models they were shown. We attribute these results in part due to presenting them with role models that also show an alternative career path (of entrepreneurship). We had students score the STEM and entrepreneurship role models on a variety of dimensions, and find large differences in how they compare in relative terms: with the STEM role models being seen as showing STEM careers to be harder and more male-dominated endeavors than entrepreneurship, and to involve more social stigma.

Reaching students when they are about to make a career-impacting choice of what to study is an intervention that can have lasting impacts[18,19]. However, since treatment may have such long-lasting career effects, a less paternalistic approach than simply using role models to nudge students towards one career path may be preferred. This may especially be the case when intervening at scale in high schools, with students who may have diverse career interests. Impacts of successful smaller scale interventions can diminish with scale due to difficulties maintaining treatment quality, and to the variety of participants increasing to include those who may benefit less[20]. Our online intervention enables quality to be maintained at scale and a wider variety of student interests to be catered to. We find that scaling up to present more choice options may reverse typically observed role model treatment effects.

Results

In March 2020, the coronavirus outbreak hit Ecuador, forcing it to call off regular classes. The school year started again on May 4, 2020, but remotely. To deal with learning disruptions, the Ministry of Education established the program "Aprendamos Juntos en Casa" (*Let's learn together at home*) to offer online education to students nationwide. Our intervention takes place as part of a larger project of collaboration with the Ministry called "Showing Life Opportunities", designed to promote learning in science and entrepreneurship. This content was inserted for technical students in their last year of high school.

A customized online learning platform was developed that had self-paced lessons for students to work through, with a combination of student, teacher, and system-level nudges used to encourage students accessed and completed the material[21]. We chose this platform as it allows students to work on multiple gadgets such as phones, tablets, or laptops. Indeed, a rapid response survey found that three-quarters of students could access the Internet from their homes, while some others were able to use hotspots or manage to visit their neighbors or teachers with an Internet connection[22]. This suggests a large heterogeneity in Internet speed. We anticipated such an issue and managed to reduce the differences in exposure by uploading the videos to a commercial platform that adapts the videos to the user's Internet speed. Video quality gets slightly reduced when students experience a low Internet speed and comes back to the regular quality when the speed improves. Since this material was part of the public policy during COVID-19, the Ministry of Education worked together with other public entities to improve Internet connection in remote areas by expanding the hotspots and financing mobile connectivity. Teachers organized students in such a way most of them manage to access the content. This study is then restricted to those who could get online.

Half (n=407) of the schools were assigned to the role model intervention, in which students were assigned to watch two 30-minute videos featuring randomly chosen segments from interviews with ten entrepreneurs and ten scientists from Ecuador, while students in the control schools instead viewed regular educational content from the Ministry of Education's EducaTV channel on unrelated topics such as "Love" and "Music". In these interviews the role models discuss what a typical day looks like in their work, why they chose this work, the skills needed for success, what inspires them, and their advice for those considering this career. Examples of STEM role models include an electrical engineer who had developed a device to help the blind, an environmental scientist who had received a patent for an invention that uses crab waste for environmental remediation, and a molecular biologist working on cancer. Examples of entrepreneurial role models include business owners running companies in sustainable coffee, tourism, and creative baby clothing. The Methods section provides more details on the selection and characteristics of these role models, who all had college education, and were all relatively young (aged 24-34) so that they would be relatable to students, and contained a mix of genders and ethnicities. The method of cutting up the interviews into segments and randomly showing a mix of twenty of those segments from different role models to a student guaranteed the student to observe a mix of presentational styles and personal views and experiences as compared to a visit from a single role model.

Using technology enabled us to deliver exposure to a wide variety of role models in both STEM and entrepreneurship careers at scale, reaching over 29,000 students throughout the country. Data from the platform suggest that all students watched at least one role model or placebo segment, and 94% of treated students watched between 19 and 20 segments (10 STEM professional segments and 10 entrepreneur segments) while 94.1% of placebo students watched the targeted four placebo videos. These high take-up rates reflect both efforts made to ensure access to the internet, as well as the content being required of students.

We examine how this first changed attitudes and beliefs around studying science and business, and then the subsequent choice of university major.

Impact on Beliefs and Attitudes towards STEM and Business

After watching the videos students were asked which occupations they were most interested in working in, which we use to code a preference for a STEM job (they were not directly asked whether they want to be an entrepreneur, so we do not have work preferences for entrepreneurship). A midline survey was administered to a sample of the students through the online platform 2 to 6 weeks after seeing the role model (or placebo) videos. This survey collected data on student beliefs about the income to be earned in STEM and entrepreneurship careers, and on their preferred choice of major if they were to attend college. An endline survey three months after the intervention (collected in the Coastal region only) also collected perceptions about gender stereotypes. Figure 1 shows the treatment impacts on these beliefs and attitudes, with panel A showing the full sample including those not intending to engage in further study, and panel B the sample who proceed to higher education (Tables S1 and S2 in the supplementary materials provide sample means, sharpened q-values, and tests of equality of means by gender for the full sample and conditional sample respectively).

Students in the control group believe that STEM occupations pay 50 to 60 percent more than entrepreneurship. The role model videos do not change this perception very much, although female students increase their perceived returns from entrepreneurship by 1.9 percentage points after exposure to the role models, with a slightly larger impact of 4.6 percentage points for those continuing to college. Although we include both female and male role models, the role model videos increased the extent to which female students agreed with stereotypes such as thinking men have more natural aptitude in these subjects than women, or have more chance to succeed than women. In contrast, watching the videos has a negative, but not statistically significant, impact on the extent to which male students agree with these stereotypes. Since male students

in the control group were more likely to agree with these stereotypes than female students, treatment therefore reduces the gender gap in agreement with stereotypes.

Being assigned to the role model videos reduces girls' preference for studying STEM by 1.3 percentage points relative to a control mean of 16.8 percentage points in the full sample, and by 2.4 percentage points relative to a control mean of 21 percent in the sample that continues to college, a 10 percent reduction. It also reduces their preference for working as a STEM professional by 2.4 (unconditional) to 3.2 (conditional) percentage points. Boys have a much higher preference for studying STEM in the control group, at 39 percent unconditionally, and 53 percent conditional on continuing to college. We find the role model videos result in a similar magnitude conditional impact of a reduction of 2.6 percentage points in preferences for studying STEM ($p=0.659$ for testing equality of impacts with girls), and 3.8 percentage point reduction in preferences for working in STEM ($p=0.370$ for testing equality of impacts with girls). However, the impacts for boys are not statistically significant in the full sample that does not condition on continuing to college.

Business is preferred more as a major among girls in the control group who continue to college (24%) than boys (10%). The role model videos increase this gap further. The reduction in interest in studying STEM among girls is largely offset by a 1.6 percentage point increase in a preference for studying business, whereas boys further reduce interest in studying business by 1.6 percentage points. The gender difference is statistically significant ($p=0.041$), even though the individual point estimates for female students are not, and the decline in interest among male students does not hold unconditionally, nor after correcting for multiple testing ($q=0.182$).

Impact on College Entry and Choice of College Major

We use administrative records from the Secretary of Higher Education (Senescyt) to track these students after graduation and see whether they enroll in university and their choice of major. 33% of students enroll in higher education, with this rate being slightly higher for girls (35%) than boys (32%). STEM majors such as engineering and information and computational technologies are heavily male-dominated, while business majors are female-dominated. In our control group, conditional on enrolling, 68.6% of male students chose a STEM major, 12.7% business, and 18.7% another subject, whereas only 28.5% of female students chose a STEM major, 30.2% business, and the plurality of 41.2% chose something other than STEM or business.

Being assigned to the role model treatment causes both male and female students to be less likely to choose STEM as a major. Figure 2 summarizes the treatment impacts, with the left panel showing results for the full sample including those who do not enroll in college (coding outcomes

as zero for those who do not enroll), and the right panel conditioning on enrollment.(Table S3 in the supplementary materials provides additional detail). There is suggestive evidence of a small negative impact on the likelihood of enrolling at all. The role model treatment causes a 1.7 percentage point reduction in the likelihood of entering college for female students (q-value = 0.100) and a 1.4 percentage point reduction for male students (q-value=0.126). Table S4 shows the subsample that chooses a major continues to be balanced on baseline characteristics, suggesting little differential selection into enrollment. Female students are 2.2 percentage points less likely to chose STEM as a major in the full sample (q-value=0.006), and 5.0 percentage point reduction conditional on entering college (q-value=0.013). This reduces further the low representation of women in this field by 18% relative to the control mean. Male students have a similar magnitude reduction of 3.4 percentage points (q-value=0.003) unconditional on entering college, and 4.9 percentage points (q-value=0.037) conditional on entering (p=0.968 for testing equality of impacts by gender), although this is a smaller proportional reduction of 7% relative to the control mean. In Table S5 we show that this reduction in STEM majors conditional on entry is robust to bounding approaches that assume all the reduction in college entry is either from STEM majors or alternatively from non-STEM majors.

The reduction in STEM is offset by a similar magnitude increase in enrolment in business programs for female students, with a .5.7 percentage point increase conditional on enrolling in college (q-value=0.009). In contrast we find a statistically insignificant 0.7 percentage point increase in business enrolment for males, which is for male students significantly less than the increase for female students (p=0.038). The result is that business majors become even more female-dominated. More of the male students switch to other majors apart from STEM or business, with a 3.7 percentage point increase conditional on enrolling (q-value=0.023). Looking in more detail within these other majors, the main increases appear to be in agriculture, and in humanities and arts, which have very low initial enrolment rates, and double the number of male students enrolling in them after the role model treatment.

The role models may have different impacts on college entry and major choice depending on students' initial attitudes and preferences for STEM. We test for heterogeneity in impacts in two ways. First, we interact treatment with baseline plans to study STEM (Table S6), beliefs in their ability to be successful in STEM (Table S7), and stereotypes about STEM (Table S8) and find no significant heterogeneity by any of these variables. Second, we use the generic machine learning approach[23] to examine whether there is detectable heterogeneity in the treatment effect on major choice by a wider variety of baseline characteristics that capture student academic ability,

socioeconomic status, motivation, initial beliefs and preferences towards STEM and business, and knowledge of people working in these fields. For both male and female students we are unable to reject the null hypothesis of no predictable heterogeneity in treatment impacts on major choice (Table S9) nor on beliefs and preferences (Table S10)

Does the gender mix of the role models matter?

Students in the treatment group watched 10 different video segments featuring STEM professionals, and 10 featuring entrepreneurs. We randomized at the individual level which role models they saw segments from, with each segment having an equal probability of featuring a male or female role model. This ensures that on average students were exposed to a balanced gender mix of role models. However, this design also enables us to examine whether impacts differ according to whether they were randomly assigned to view more female or male role models of a particular type. We then look only within the treatment group, and test whether outcomes differ for those exposed to a gender-imbalanced mix of role models compared to a balanced mix.

Figure 3 shows that the gender mix of the role models has a limited impact on the choice of major among those assigned to the role model treatment. The differential impact of having an imbalanced set of role models is typically small in magnitude and statistically insignificant. For example, 22.5% of female students select a STEM major when exposed to a balanced mix of STEM role models, and this is only 0.2 percentage points lower when the STEM role models are mostly male, and 0.4 percentage points higher when the STEM role models are mostly female. Table S11 in the supplementary materials shows that we can never reject that the effect on female students of having mostly female role models is the same as this effect on male students, and similarly for having male role models. The only significant difference occurs for male students, who are less likely to choose business majors when they see mostly male STEM role models, or mostly female STEM role models, with this effect not significant after correcting for multiple testing.

Do students perceive the STEM and business role models differently?

Given our results that seeing both STEM and business role models caused students to move away from STEM and towards business, we conducted an additional data collection exercise that had 110 students watch the videos and score role models on seven different dimensions: how passionate they were about their subject, their charisma, how similar the person was to them and their friends, the extent to which they felt the role model reinforced gender stereotypes about which occupations are suitable for women, the extent to which they made their subject seem more challenging than traditional occupations, the extent to which the role model provided new and

relevant information, and stigma (such as whether the role model suggests people in this profession are weird and lack social skills).

Figure 4 shows that students indeed view business role models more favorably on multiple dimensions than STEM role models. The largest difference between STEM and entrepreneurial role models is in how challenging they make the subject seem, with STEM seen as much more challenging and requiring more study and skills. Such a perception can reflect the reality of pursuing a career in science. Students also view the STEM role models as complying with stigmatized ideas of a scientist, seeing them as weirder and with poorer social skills than entrepreneurs. Despite having a balanced gender mix on average, they also see the STEM role models as more likely to reinforce stereotypes about STEM being a field where it is easier for men to succeed than women, relative to business. They also see the STEM role models as providing less relevant information, having less passion, less charisma, and being less similar to themselves than entrepreneurial role models. Table S12 in the supplementary materials shows these point estimates remain significant after adjustments for multiple hypothesis testing, while Table S13 show that these perceptions of the difference between STEM and entrepreneur role models do not vary with the gender of the student.

Discussion

Providing students with access to customized online video interviews with multiple scientists and entrepreneurs enabled the remote delivery of a role model intervention at scale. The cost of the video production, lesson development, electricity, internet, and platform-related costs such as hosting, customization and maintenance totaled US$0.86 per student. Unit costs would fall even further if extended to more students, and technology thereby provides a low cost way of enabling role models to reach many thousands of students while keeping quality constant.

In contrast to most of the existing literature on role models, this approach enabled us to provide students with multiple role models and for them to compare role models in two different broad career paths: STEM and entrepreneurship. Offering students exposure to role models in multiple fields is less paternalistic than emphasizing one field only, and enables them to compare and contrast different options.

We find that being assigned to watch two thirty-minute videos with twenty different randomly drawn segments that were block balanced on gender and STEM vs entrepreneurship backgrounds not only changes short-term survey responses on preferences for working in STEM and business, but also results in subsequent changes in behavior, changing choice of college

major. There is a large shift away from enrolling in STEM majors, with female students substituting into business majors, and male students into other subjects. More speculatively, the intervention may have also led a few students on the margin of entering college to view it as too difficult and not enrol at all. While on average students saw a gender-balanced mix of role models, impacts do not vary much when exposed to relatively more scientific role models of the same gender as the students. As a result, in contrast to the goal of encouraging more students into science and high-growth entrepreneurship careers, our role model intervention reduced the number studying science.

Why do we see a reduction in interest in STEM as a career, and less enrolment in STEM majors in university, when many other role model interventions find that exposure to role models (especially those of the same gender) lead to students following the path of the role model? Our results suggest that a key reason is the contrast between how students see the scientist and entrepreneur role models. Both groups were chosen to be successful examples of Ecuadorians who could demonstrate what is possible, with the scientists having registered a patent or having published multiple articles, and the entrepreneurs having businesses which earned at least US$300,000 in annual revenue. They were purposively chosen to be Ecuadorian examples of success in these sectors that would be relatable in age and background to the students. But comparing individuals in both groups, students viewed the career path for scientists to be more challenging, and the entrepreneurs to be more similar to them and to have better charisma and social skills. So even though both types of role models offered examples of successful career paths, the contrast of seeing both types at once may have both attracted students towards business careers, as well as pushed some students away from science. The fact that we see males moving out of science but into other majors like agriculture, rather than business, suggests the push away from science may be stronger than the pull towards business for them.

Seeing interview segments with multiple role models of each career type provided students with a broader, more realistic, view of a range of experiences and showed the possibility that students of both genders and of different regions and ethnicities could succeed. This also offers the possibility that when such content is delivered nationwide to a broad variety of students, that they see someone they can relate to. However, by seeing many role models, there is also the possibility that students get less inspired by a single compelling and salient individual story, and instead focus on the commonalities across role models, such as how hard they work, and their general appearance and presentational skills. Moreover, even if female students randomly get to see

mostly female STEM role models, even the appearance of one or two male role models amongst the mix may be enough to remind them that science is a male-dominated field.

Limitations

Our study demonstrates how students can be exposed to a broad variety of role models in a cost-effective and scalable way, and that this can change college major choice. However, there are three key limitations surrounding mechanisms, external validity, and welfare that are worth noting as areas for future work to build on. First, we exposed students to both science and entrepreneurial role models, and suggest that the comparison across fields is important. In a pilot we varied the proportion of role models of each type and do not find significant differences from seeing 75% scientists and 25% entrepreneurs compared to the reverse proportions (Table S14), but we are unable to say whether only showing one type of role model would have increased enrolment in that subject. It would be interesting to add a single-field only role model treatment arm in future experiments.

Second, our study took place nationwide in Ecuador with students in the technical specialization during the Covid-19 pandemic. The pandemic is what allowed the intervention to be carried out at such scale as part of the official school curriculum, ensuring high levels of take-up, and has been a laboratory for other studies on remote learning around the world[24-26]. However, this raises the question of whether impacts would differ with other types of students, or in other settings. Our pre-pandemic pilot included both science and technical track specialization students in Ecuador, and we do not find any evidence to support the idea that science role models had bigger impacts for students on this science track. The lack of job availability in the labor market prevents us from examining how the role models affected labor market outcomes, and may have induced more students to continue to college. But the role model videos were filmed pre-pandemic and did not discuss pandemic labor market conditions, and so it is less clear that the pandemic would have changed the effect of the role model intervention. Nevertheless, it would be useful for future work to test this intervention in a wider variety of countries and labor market settings.

Finally, while we have shown that providing access to role models through remote delivery can result in changes in student study preferences and enrolment behaviors, a limitation of our work is that we are unable to say whether or not this is welfare-enhancing. Under rational choice models of educational decision-making, providing diverse information should enable students to make more informed and accurate decisions[27,28]. Moreover, there is less risk of students being overly influenced by a single role model, and potentially having false expectations around the ease of

overcoming gender constraints that can arise with exposure only to a same-gender role model[29-31]. Yet it would only be after tracking students for a decade or more into their working lives that one could learn whether they do in fact end up more satisfied with their careers and earning more. Even then, individually optimal decisions may not be optimal for society given the externalities that can come from scientific innovation, and the role that today's graduates play in shaping the gender balance of occupations facing the next generation of students making career choices. Further experimentation with the optimal mix of role models in countries where administrative data would allow this long-term tracking of career outcomes would be a productive avenue for future work.

Methods

Ethics Approval

The project received human subjects approval from the Universidad San Francisco de Quito, Institutional review board (IRB) approval number 2018-208E and by the IRB Committee of Innovations for Poverty Action IRB-USA, IPA IRB Protocol #: 15629 with a waiver of consent.

Sample Context and Randomization

Public secondary schooling is free in Ecuador, and 75 percent of students attend public institutions. The last three years of upper secondary or high school (grades 10 through 12) are divided into two specializations: technical and science. Both specializations have a common core curriculum that includes STEM courses (math, physics, chemistry, and biology), and entrepreneurship is part of the common curriculum for both. Both tracks sit a national standardized examination to graduate and to gain admission to university. The difference is in the elective subjects offered, where technical specialization schools provide more elective classes geared towards the labor market, including a mandatory internship component. Our experiment takes place as a component in a larger online education project offered in these technical specialization schools, called Showing Life Opportunities, conducted in collaboration with the Ministry of Education in Ecuador. This project was pre-registered with the AEA RCT registry (https://www.socialscienceregistry.org/trials/5982) on June 9, 2020, with a pre-analysis plan for the role models component registered on 16 April, 2021. This plan specified that we would look at impacts on attitudes, beliefs, and stereotypes, as well as college education choice. At the time of registration we did not know we could measure college major choice with administrative data, which we use because it reflects actual rather than planned behavior, and has no attrition. The broader program also provides online courses in entrepreneurial skills, statistics, English and Spanish. The program replaced the mandatory internship in technical schools that was not

possible during the COVID-19 pandemic and was a mandatory part of the curriculum for final year students.(This is why we could not implement the study in science specialization classes, since they did not have the internship that this program replaced).

The elective classes that students in the technical specialization can choose among include many STEM related areas such as ecology, mechanics, electronics, computer science, and industrial production, as well as business related areas like accounting, marketing, foreign trade, and management. At baseline 29.2% of students say they plan to go on to major in STEM, and 13.5% in business (Table S4). There are large differences in actual major choice by gender conditional on enrolling. Among the control group, 68.6% of male students enroll in a STEM major, and 12.7% a business major, while 28.5% of female students enroll in STEM and 30.2% in business (Table S3).The education system in Ecuador splits the country into two separate regimes which operate on different school calendars. We work with 813 schools nationwide, which is the population of schools except for those used in a pilot phase. (This earlier pilot phase in one educational zone was done pre-pandemic on computer clusters in schools, and had some design differences in terms of study population and how the role models were assigned: see below for more discussion of this pilot). The sample size was therefore determined by the population of students in the technical tracks of these schools. It is larger than those in previous studies of role models in the literature[5,6,7,10]. We cross-randomize the role models intervention against another intervention taking place which randomized whether schools got entrepreneurial online courses, or statistics and languages. Schools were then stratified by regime, and formed into strata of 16 comparable schools based on matched Mahalanobis distance on educational zone, total number of students, number of students in the final year, and average performance on the national final year exam (SER Bachiller). Within each of these strata, schools were randomly assigned with equal probability to be part of the role model intervention, or to instead receive placebo videos. This gives an experimental sample of 407 treatment schools and 406 control schools, containing 29,243 students in total. Figure S2 in the supplementary materials shows this experimental design and Table S4 shows the treatment and control groups are balanced on student baseline characteristics, and that this is also true for the subsample who go on to enroll in higher education.

Role Model Intervention

The role model intervention in this study is part of a 26-lesson course, taking place in lessons 3 and 4. Students in the treatment group were assigned to watch treatment videos featuring successful Ecuadorian scientists and entrepreneurs, while those in the control group were assigned to watch the program “Teenagers XY” which is part of the Ministry of Education’s

EducaTV channel and covers unrelated topics such as “Love” and “Music”. Given the nature of the treatment, students were not blinded from their treatment status (they knew what they were watching), but treated students were blinded from knowing that they were in an experiment where a control group did not receive the role model content.

The role models were chosen through an open call and consist of 20 Ecuadorian professionals who exhibit outstanding success in either STEM or entrepreneurship at a young age (24 to 34). Entrepreneurs had to have a yearly revenue of at least US$300,000, while STEM professionals had to have an h-index of 5 or more, or have registered a patent. These metrics were chosen to be proxies for having achieved some success in their profession. Students were not told these criteria, but rather were shown the profession, sector, and main contribution (e.g. electrical engineer who had developed a device to help the blind; or business owner who had set up a company to sell sustainable coffee).

Literature on social identity suggests that individuals generally believe it is easier to become like someone who shares their social identity[4]. Individuals have multiple social identities, corresponding to their nationality, age, gender, ethnicity, region of origin, and interests and hobbies. We choose young Ecuadorians, but then expose students to a wide variety of role models with the idea that every student can then find commonalities in identity in different domains with several of these role models. The role models showcased were diverse, including Mestizo, Afro-Ecuadorian, Montubio, and indigenous individuals from various regions of Ecuador. By exposing students to multiple role models from both science and entrepreneurship, the goal was to provide them with a variety of perspectives and information on multiple career paths, thereby enabling them to make more informed career decisions. The supplementary material contains more information on how they were chosen and details of each role model. They were recorded through structured interviews that provided five video segments per role model, aimed at providing relatable, informative, and inspiring content for students. The role model interviews were intended to both inform students about what it means to do this job, as well as potentially inspire or motivate others who might consider this career. In these interviews the role models were told that we wanted them to describe their profession with enough energy and passion to engage a teenager between 15 and 17 years, as if they were talking to a younger sibling or nephew/niece who wanted to know what it is like to do their job. Each of the two treatment lessons included 30 minutes of video interviews, divided into segments addressing specific dimensions of the decision process and focusing on either entrepreneurship or STEM careers. The structure of each lesson had each student watching five segments on entrepreneurship and five on STEM, with the ordering of which

came first randomized. These segments were randomly chosen from the total pool of 100, ensuring an equal probability (50%) of featuring female role models, thus maintaining gender balance on average.

Each lesson involved a segment randomly chosen among the available ones in each of the five following categories:

1. What job they have: Describing their work position, a typical workday, and the main skills they use.
2. Why did they choose this job: Discussing reasons for choosing and staying in their profession and its impact on the community.
3. What is needed to be able to do this job: Highlighting additional preparation and addressing misconceptions about their careers.
4. What inspired or motivated them: Sharing sources of motivation and influential figures.
5. What advice do they have for those considering this job: Offering their views on whether anyone can do this job, and advice for aspiring professionals.

Across the two lessons the treatment group therefore watched 10 video segments from entrepreneurs and 10 from scientists. The random selection could result in multiple segments being chosen from the same role model (e.g. one on them describing their job, another on what advice they have), which is what enables us to have random variation in the share of segments in a category that are female. The proportion of segments which are female follows a normal distribution centered around 50%, with very few students seeing less than 20% of each gender. For our analysis we define “mainly female” role models to be cases where the share of female role models is above 55% (27% of the sample, with an average share of 65% female in this group); “balanced” role models to have the share of female role models between 45% and 55% (47% of the sample, with an average share of 50% female in this group); and “mainly male” where the share of female role models is less than 45% (26% of the sample, with an average female share of 36%).

Measurement and Analysis of Impacts

The role model videos were shown in May 2020 in treatment schools in the Highlands-Amazon region of the country, and in September 2020 in treatment schools in the Coastal region. We then measure changes in beliefs and preferences through surveys collected several weeks after watching the videos, and subsequent choice of major after graduating and enrolling in higher education by using administrative data from the Ministry of Higher Education. Figure S1 in the supplementary material provides a full timeline.

We have four measures of beliefs and preferences: (i) income perceptions, measured as the log of the monthly salary they think a STEM professional or entrepreneur earns; (ii) gender stereotypes, a standardized index of attitudes about women in science and in business (with components defined in the supplementary materials); (iii) study preferences, based on their first choice of major they would like to study if they enroll in college; and (iv) work preference for STEM, based on whether their preferred occupation is in STEM. (i), (iii) and (iv) were collected through a midline survey in both the Highlands-Amazon and Coastal regions. The gender stereotypes (ii), were collected in an endline survey that was only carried out in the Coastal region. Table S15 shows that while the Highlands and Coastal regions differ in average characteristics for many baseline variables, the differences are small relative to the standard deviations, showing substantial overlap, and the two regions have similar baseline attitudes towards STEM and entrepreneurship. The impacts on gender stereotypes in the Coastal region therefore may be likely to carry over to the Highlands-Amazon region. Table S16 shows impacts on the component questions of this stereotypes index, showing the main impacts come from questions that directly ask whether women could be as successful as men in STEM and business if they wanted to.

Table S17 shows that survey attrition rates were low, and not statistically different by treatment status. Attrition in the control group ranges from 2.7 to 8.9 percent depending on the outcome, and is typically less than 1 percentage point higher in the treatment group than control group. Table S18 shows that the two treatment groups remain balanced on baseline observables when we restrict to the subsamples answering the midline and endline surveys.

Since our data on enrolling in higher education come from administrative data, rather than survey data, we do not have attrition for this outcome. However, since individuals only choose majors conditional on enrolling in college, we consider two approaches for looking at college major choice. The first is *unconditional* major choice, which, for example, codes a STEM major as 1 if the individual enters college and enrols in STEM, and 0 if they enrol in another major or do not enter college at all. This measure has the advantage of not being subject to any concerns about selection bias arising from college entry, but dilutes the overall effect by including lots of zeros for individuals who do not enter college. We therefore also consider a second approach, which is to look at *conditional* major choice, which, for example, codes a STEM major as 1 if the individual enrols in STEM, 0 if they enrol in college in another major, and as missing if they do not enrol in college. Table S4, panel B, shows that the sample who enters college remains balanced on baseline characteristics.We classify choice of major as in STEM, business, or other. As a further robustness check, we construct Lee bounds for our conditional estimates by assuming the college

entry impact comes entirely through a reduction in one major, or entirely from other majors, and show the resulting bounds are narrow in Table S5.

Since we might expect the impact of the role models on study preferences and beliefs to also be much weaker for students who were never planning on continuing to study anyway, we likewise present our impacts on beliefs and attitudes for both the full unconditional sample, and for the sample conditional on continuing to college. The coefficients are smaller in magnitude for the unconditional compared to the conditional, which is consistent with the impacts being larger for the subset for whom making choices about what to study in university is a real decision.

Our main analysis then estimates the impact on outcome $Y_{i,s}$ for individual *i* in school *s* of being assigned to the role model treatment through estimating treatment effects in the following Ancova equation:

$$Y_{i,s} = \alpha_0 + \beta_{RM} RM_s + Strata_s + \pi Y_{i,0} + \delta M_{i,0} + Controls_{i,0} + \varepsilon_{i,s} \qquad (1)$$

Where, RM takes the value of 1 if student *i's* school is in the treatment group. The estimate β_{RM} captures the Intention-to-Treat (ITT) effect of the intervention. Estimation controls for randomization strata ($Strata_s$), the lagged outcome ($Y_{i,0}$) where available and a dummy variable for it being missing at baseline ($M_{i,0}$), and a set of baseline variables ($Controls_{i,0}$) selected by the post-double Lasso method[32]. For the control set that PDS Lasso selects from, we use a set of baseline variables that includes socioeconomic status, parental education and occupations, baseline beliefs, attitudes, and stereotypes about STEM and entrepreneurship, as well as baseline plans for entering college and planned choice of major. Standard errors are clustered at the school level. P-values are calculated using two-sided t-tests based on these standard errors. In addition, in the supplementary materials we also provide sharpened q-values that hold constant the false discovery rate when examining multiple outcomes[33]. We estimate this specification separately for male and female students.

We also use the individual-level random assignment of which role model segments students were shown to examine the impact on choice of major of watching mostly male (or mostly female) STEM and business role models compared to a gender-balanced set (defined as having between 45 and 55% of each gender). We estimate the following equation among the treated students, again separately by student gender, for student *i* in class *k*:

$$Y_{i,k} = \beta_0 + \beta_M Mostly\ Male\ RM_i + \beta_F Mostly\ Female\ RM_i + \pi Y_{i,0} + \delta M_{i,0} + Controls_{i0} + u_k + \varepsilon_{i,k} \qquad (2)$$

Where $Mostly\ Male\ RM$ is a binary variable that takes the value of 1 if most of the segments that the student *i* watched feature a male role model, and, $Mostly\ Female\ RM$ is a binary variable that takes the value of 1 if most of the segments that the student watched feature a female role model. The estimates $\beta_M \text{ and } \beta_F$ capture the treatment effect of gender concentration compared to a gender-balanced set of role models. Since we randomize the female segments at the individual level, we introduce class-fixed effects (u_l), and calculate robust standard errors without clustering.

Scoring of Student Perceptions of Role Models

Given the differential impacts we find of STEM and entrepreneurial mentors, in September and October 2023 we conducted a detailed scoring exercise to measure student perceptions of these different role models. We used a sample of 110 students aged 18 to 20 year olds in pre-college training at the Universidad Central, the largest public university in Ecuador. Each student was randomly assigned to watch three segments of a STEM role model, and three of an entrepreneurial role model, with the order of which shown first randomized for each student. Each video lasted 8 to 10 minutes, after which they completed a detailed scoring rubric (provided in the supplementary materials) which scores role models on multiple questions covering seven different dimensions: passion, charisma, similarity, stereotype, challenge, information, and stigma. For each measure we construct a standardized index, and then run a paired t-test to test for equality of scores. We also test whether the difference between STEM and entrepreneurship role models varies with gender by running unpaired t-tests which test whether the STEM score minus entrepreneur score difference is equal for male and female students. In addition, in Table S19, we test whether there is any difference in how female and male role models are perceived by female and male students. We find female students do rate the role models higher on charisma and passion, and lower on stigma, than male students. But we cannot reject that students rate female and male role models equally on six out of the seven dimensions (there is a marginally significant impact on female role models making the subject seem less challenging). Moreover, there are no significant interactions between the gender of the student and that of the role model. That is, matching female students with female role models does not yield higher ratings than matching them with male role models. This provides evidence for the view that relatability and similarity are multidimensional, and do not depend solely on a single factor like gender match.

Pilot Study

The broader project “Showing Life Opportunities” began in educational Zone 2 of the country, which includes the Municipality of Quito and the states of Pichincha, Napo, and Orellana. This is one zone in the Highlands-Amazon school regime. The pilot started in October 2019, and worked

with 110 schools. When the pandemic started, the government asked us to work with them to quickly scale-up the materials from this program to the remainder of the country. This pilot had several differences from our main study. First, it worked with students in both technical and science specializations, and with students in all three of the last years of upper secondary school. Second, it had students watch the role model videos in computer clusters in schools under teacher supervision during school time. Since students were watching together in classes, role models were randomized at the class, rather than individual, level. Third, in the first session students watched 5 science and 5 entrepreneurial role model segments, as in our main study. But classes were then randomized so that in the second session they either saw 5 of each type again, or just 10 science, or just 10 entrepreneurial role model segments. This induces variation in the proportion of the role models that they saw who were scientists versus entrepreneurs.

Table S20 shows the sample of 4,568 final year students from this pilot are balanced on baseline characteristics. Table S21 shows the equivalent of Table S3 for this pilot sample. We again see some marginally significant evidence of a reduction in college entry after receiving the role model treatment. This sample is much smaller than our main study, and none of the impacts on major choice are statistically significant after adjusting for multiple testing. Pooling these results with our main study does not change the conclusion of a move out of STEM (Table S22).

We use this pilot to examine two questions that are not possible to address in our main study. The first is whether the impacts of the role model treatment differ for students in the science track of high school, rather than the technical track. The administrative data only allowed us to determine which track students were on for approximately 60% of this sample. Table S23 then tests whether impacts of the role model treatment on college entry and major choice differ by track. For female students we see no significant difference in the effect of the role models by track, while for male students, the role model treatment seems to have a larger impact on reducing enrolment in STEM majors for those on the science track.

The second question this pilot enables us to examine is whether the role model treatment would have a different effect if students saw more role models in one specialization than the other, rather than a balanced mix. Students were assigned to watch either mostly scientists (15 scientists and 5 entrepreneurs), mostly entrepreneurs (15 entrepreneurs and 5 scientists), or a balanced mix (10 of each). Since some students did not watch the full 20 videos, we use 70% or more of one type as a threshold for determining whether they saw mostly one type. Table S24 then shows that there is no significant differences for female students by the proportion of role models they see of one type. For male students, the only significant difference after correcting for multiple testing is

a lower likelihood of choosing business from having an unbalanced set of role model types. But this effect is similar for whether they see mostly scientists or mostly entrepreneurs, and is only marginally significant (q=0.094). The data therefore do not provide any significant support for the idea that seeing more of one type of role model makes students more likely to go into that profession. However, we note that statistical power is limited here, and that even the unbalanced groups still see 5 segments of each type, which could be enough to enable them to compare and contrast the two occupations – so impacts could differ if students saw only one type of role model.

Inclusion and Ethics Statement:

The research team includes an Ecuadorian researcher, Francisco P Flores-Taipe, who was closely involved in all aspects of the research process. The research is locally relevant, and was designed in collaboration with the technical teams of the Ministry of Education of Ecuador, National Direction of Bachillerato. Roles and responsibilities were agreed amongst collaborators ahead of the research. The context of a remote intervention during the COVID-19 pandemic limited the extent of local capacity building activities, but the research did serve as one component of the doctoral work of Flores-Taipe, and the project helped the Ministry of Education to remotely deliver education quickly and at scale during the pandemic. This research would not have been severely restricted or prohibited in the setting of the researchers. We have cited multiple studies of role models in other developing country settings, but did not find any such studies to cite from Ecuador.

Data Availability

Data from the Highlands-Amazon region (https://microdata.worldbank.org/index.php/catalog/6112) and Coast region (https://microdata.worldbank.org/index.php/catalog/6111) are available in the World Bank's Open Data Library.

Code Availability

We will provide public replication code for the analysis done in this paper after seeing whether any changes in analysis are requested during the review process. It is available to the reviewers at:

https://www.dropbox.com/scl/fi/tuq07kli2hqd1uf53grh8/00_ReplicationPackage.zip?rlkey=bs2mdjlls1yi30nhwzw91ibl2&st=9ul4liwr&dl=0

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Author Contributions

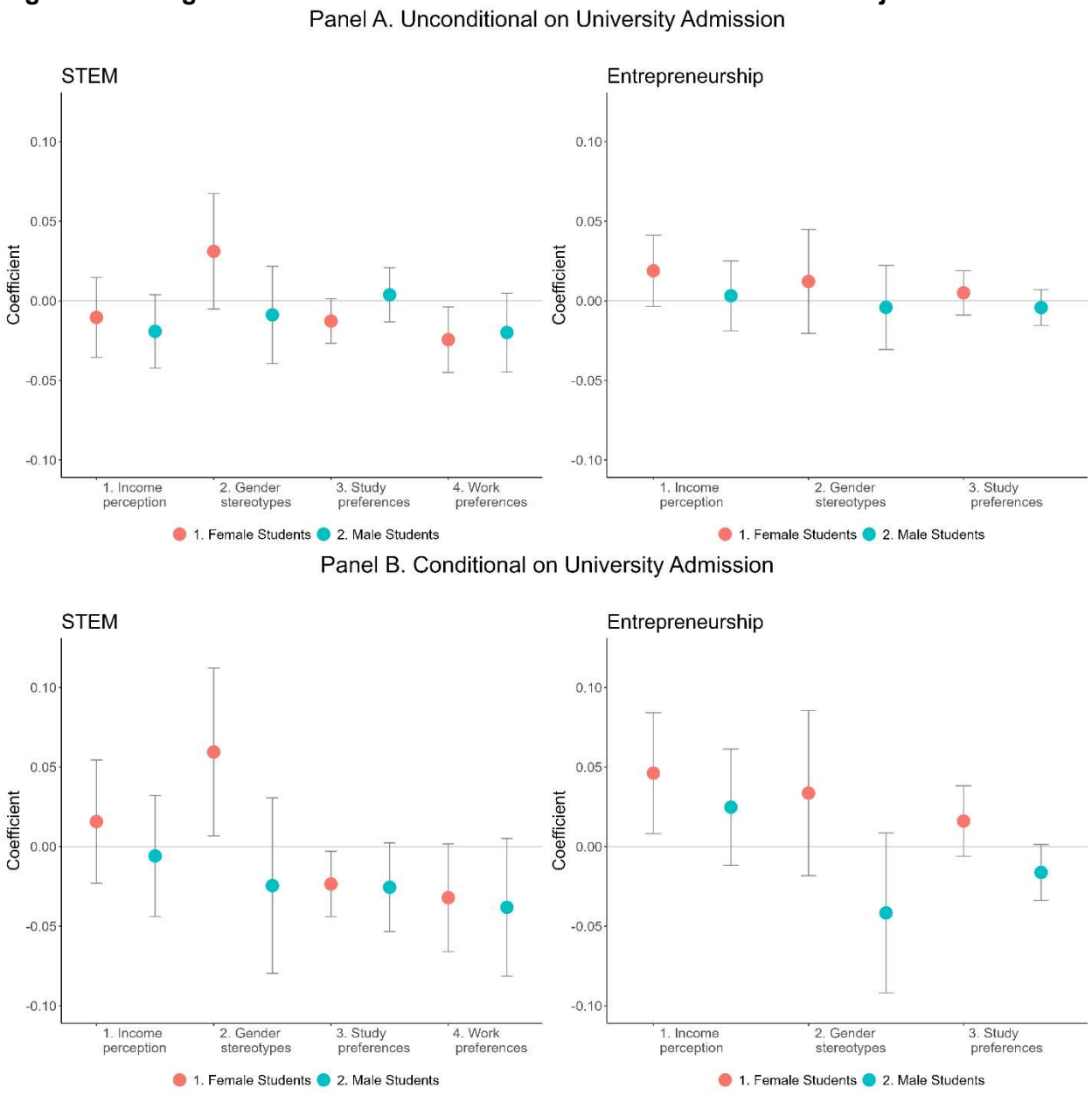
I.A., T.Å., G.B., B.C., F.P.F.T., D.M., M.M., M.S. designed research; I.A., F.P.F.T. performed research, I.A., F.P.F.T. analyzed data, T.Å., B.C., F.P.F.T., D.M. wrote the paper. , I.A., F.P.F.T., D.M. revised the paper.

Competing Interests

The authors declare no competing interests

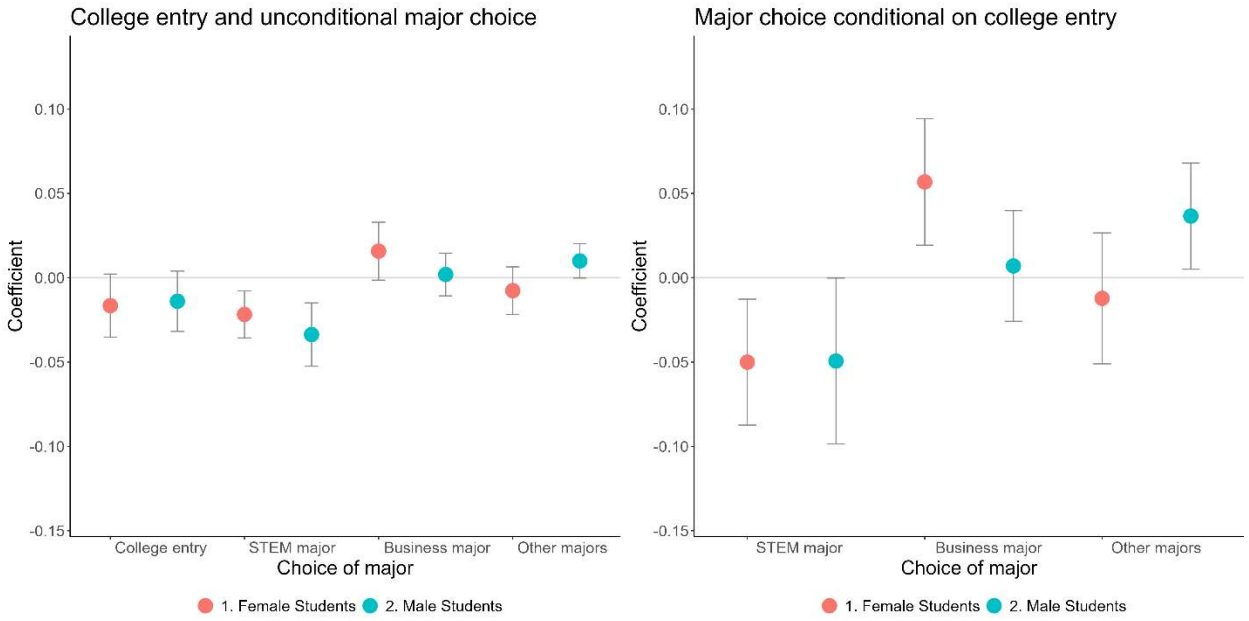
Figure Legends/Captions (note figures also shown here for reviewers)

Figure 1: Changes in beliefs and attitudes about STEM and business majors and careers



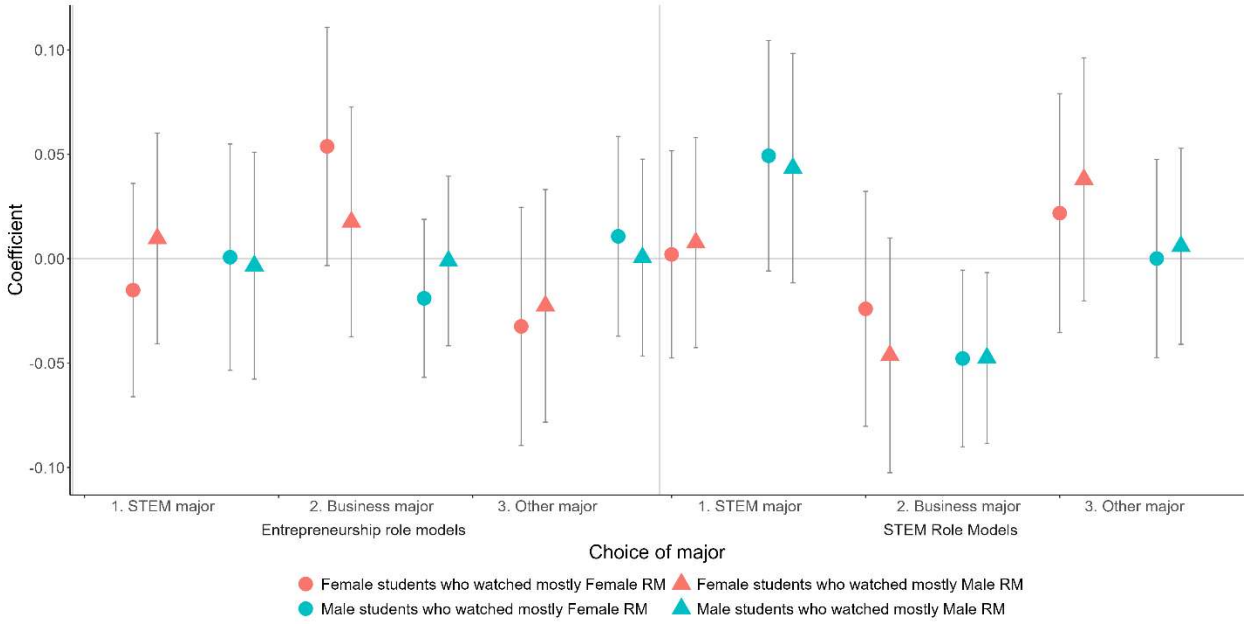
Note*:* Impacts are for the students continuing to higher education. The figure illustrates the treatment effects of watching Business and STEM role models, irrespective of their gender composition, on the preferences for study and work, income beliefs, and stereotype beliefs. It separately shows the impact of boys (blue dots) and girls (red dots), along with 95 percent confidence intervals based on standard errors clustered at the school level. We collect work preferences immediately after watching the treatment videos. Work preferences were only collected for STEM occupations, since Entrepreneurship can be cross-cutting across sectors. We gather data on study preferences and income beliefs from a mid-term survey two weeks (Highlands and Amazon) or six weeks (Coast) after watching the treatment videos. Finally, we collected gender stereotype beliefs three months after watching the intervention for students at the Coast regime (half of the sample). The solid grey line accounts for no effect. Table S1 provides adjusted q-values and tests of equality of impacts by gender, while Table S2 provides impacts conditional on continuing to further education.

Figure 2: Impact on College Entry and Actual Major Choices



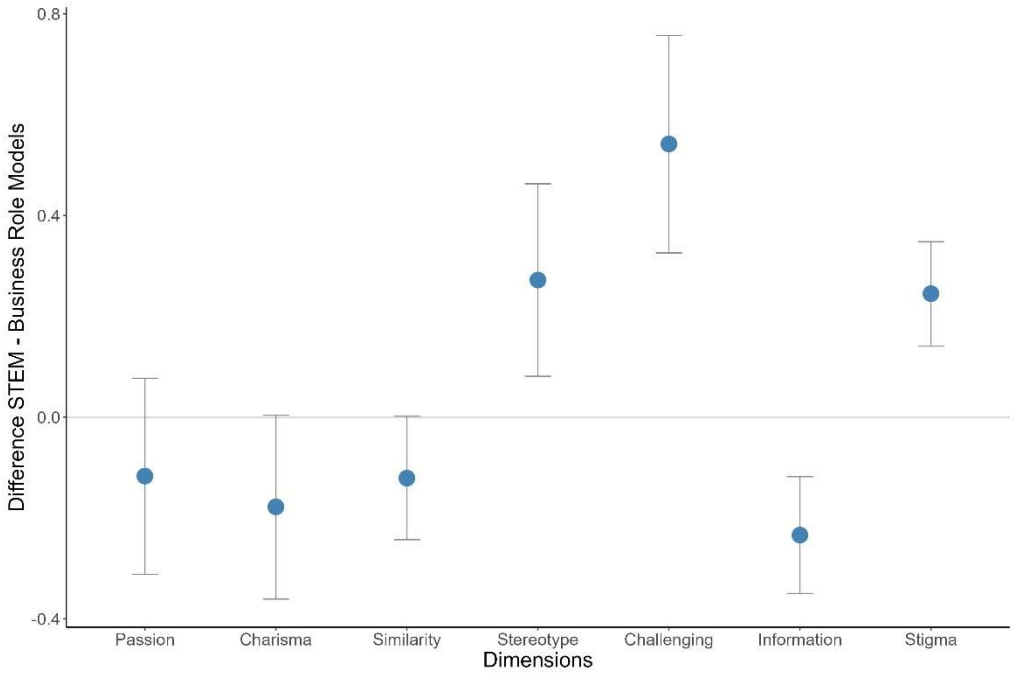
Note: The figure illustrates the treatment effects of watching Business and STEM role models, irrespective of gender composition, on the choice of major unconditional (Panel 1) and conditional (Panel 2) on entering college. It separately shows the impact of boys (blue dots) and girls (red dots), along with 95% confidence intervals. We collect students' choice of major by examining administrative records of the Ministry of Higher Education of Ecuador (Senescyt). Thus, it captures actual postsecondary academic decisions. The solid grey line accounts for null effects. Table S3 provides adjusted q-values and tests for equality of impacts by gender.

Figure 3: Choice of major does not vary much with the gender mix of the role models



Note: Analysis only for those assigned to treatment who enroll in college. The figure illustrates the difference in college major chosen conditional on entering college, among the treatment group for those randomly selected to see mostly entrepreneurial or STEM role models of one gender (circles for mostly female, triangles for mostly male) compared to those randomly selected to see a balanced gender mix, along with 95% confidence intervals. A balanced gender mix is defined as between 45 and 55% of each gender. Table S11 provides adjusted q-values and tests for equality of impacts.

Figure 4: Students view STEM and Business Role Models Differently



Note: Students scored STEM and business role models on seven different dimensions. Figure shows difference in the mean index score for each dimension, along with 95 percent confidence intervals. Positive differences indicate that STEM role models are scored higher in this dimension, while negative indicate that STEM role models are scored lower than business role models in this dimension. Table S12 in the supplementary materials provides means, p-values, and adjusted q-values.

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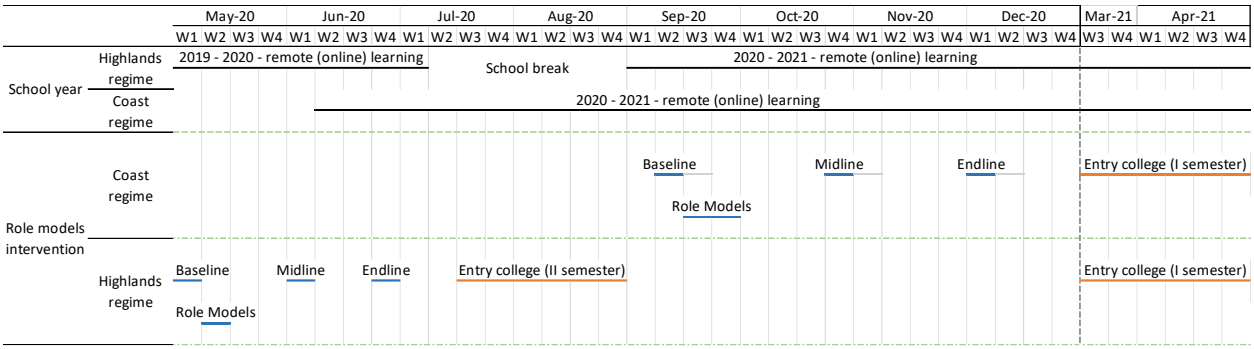
Supplementary Material

Timeline and Experimental Design

This study is part of a broader project called Showing Life Opportunities. This began in educational Zone 2, when students were attending school in-person, and as part of this first phase, students watched role model videos in classrooms. The format (in classrooms versus online), and implementation (timing of role models relative to measurement, gender allocation, and distribution of STEM and entrepreneurship role models) differed in this first phase. For this paper we focus on the nationwide expansion to remote delivery that occurred after the onset of the COVID-19 pandemic.

Ecuador has two different school year calendars depending on region: in the Highlands-Amazon region school runs from September through to July, while in the Coastal region classes are from April through to January. Figure S1 shows that the experiment first took place at the end of the 2019-2020 school year in the Highlands region, with the role model videos shown in May 2020, and then was introduced into the Coast region, with role model videos shown in September 2020.

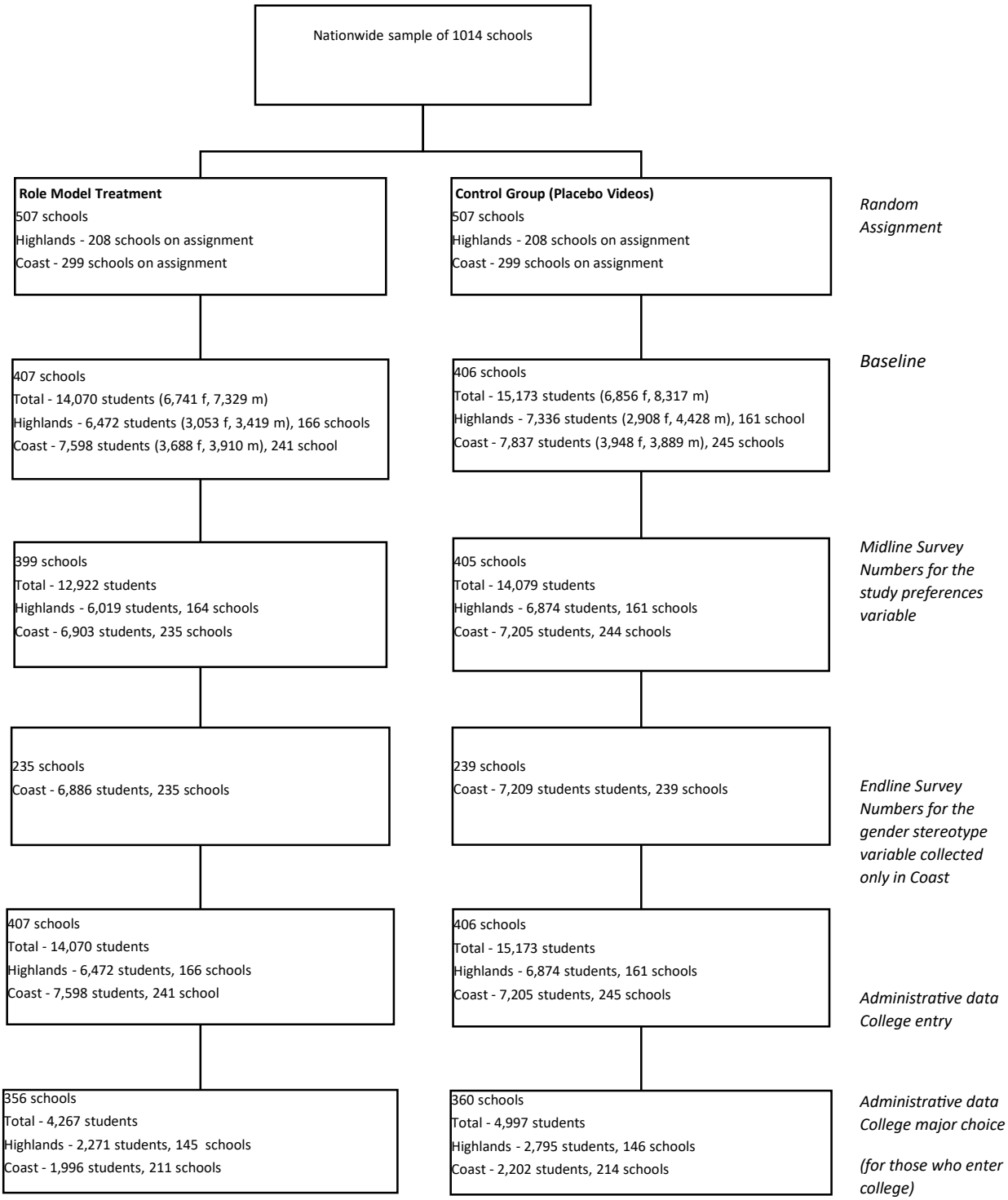
Figure S1: Timeline of the Experiment



Note: The black lines show the length of the school year in Highlands-Amazon and Coast regimes. The blue lines indicate the time we collect information (baseline, midline, and endline). Moreover, it shows the time when students receive the role model intervention. Since the school year depends on the regime, we deliver the role models in two phases. First, we introduce the component in Highlands-Amazon schools. Second, we offer the same material to Coast schools. The orange lines indicate the college entry period. The Higher Education Ministry (Senescyt) opens this process twice per year. We collected administrative records after the first 2021 call. Hence, we observed students from the Highlands and Amazon regimes twice since they could apply for the second call in 2020 and the first call in 2021. On the contrary, we observed students from the Coast regime only once. This is relevant as students who could not enter college in one of the calls can try again in the second one. They can apply to enter college for up to two years. The registration process to take the exam starts after the second week of July and March. Students took the exam the last week of August and April.

Our sample at baseline is 813 schools, 1043 classes with 29,243 students, 1014 schools were randomly assigned at the school level to treatment (role models) or control (placebo videos) with a 1:1 ratio. Some of these schools had no or few students in the final year technical track, resulting in 813 being the experimental sample. Figure S2 shows the experimental design and sample sizes available for measuring different key outcomes.

Figure S2: Experimental Design and Outcome Data Availability



Notes: *f* denotes female students, *m* male students. The nationwide sample includes students in the Highlands and Amazon region, as well as in the Coast region. Midline data on income beliefs and preferences for studying STEM and business, and Endline data on gender stereotypes (beliefs that men have a natural predisposition or are more likely to be successful) were collected through the online platform. The smaller endline sample is because gender stereotypes were only collected in the Coastal region. Administrative data on college entry, and major choice conditional on entry are available for all students from administrative data.

More details on Role Models

Our target role models were Ecuadorian professionals successful in STEM or entrepreneurship. All had completed a college degree. Entrepreneurs should have a yearly revenue of at least US$300,000, while STEM professionals should have an h-index of 5 or more, or have registered a patent. We worked with an external contractor to identify, screen, and recruit these role models through an open call through social networks, specialized newspapers and magazines, and business and scientific networks. We also desired role models of both genders, a range of ethnicities, and from different regions of the country. We ended up screening more than 70 individuals to select the 20 role models with the most relevant profiles. Summary details of these role models are as follows:

Sex	Age	City	State	Region	Reason for selection	Field
STEM Role Models						
Male	35	Quito	Pichincha	Highlands	Patent - Scientific advancements in medicine	Cell Biologist
Female	30	Guayaquil	Guayas	Coast	Contribution in the fight against cancer	Biological Engineer
Male	31	Puyo	Pastaza	Amazonia	Contribution in the sustainable agriculture	Industrial Engineer
Male	26	Loja	Loja	Highlands	Patent - Device for support blind individuals	Electronic Engineer
Male	24	La Maná	Cotopoxi	Highlands	Patent - Device for non-invasive medicine inoculation	Mechatronics Engineer
Male	34	Ibarra	Imbabura	Highlands	Patent - Device for restore life to polluted rivers	Mechanical Engineer
Female	24	Quito	Pichincha	Highlands	Patent - Multiple applicates for crab waste	Environmental Engineering
Female	25	Quito	Pichincha	Highlands	Contribution in the sustainable agriculture	Environmental Engineer
Female	37	Ambato	Cotopoxi	Highlands	Patent - Commercialization of biodegradable dishes	Business and Administration
Female	34	Quito	Pichincha	Highlands	Patent - Device for precise eye surgery	Electronic and Control Engineering
Entrepreneurship Role Models						
Female	27	Loreto	Orellana	Amazonia	CEO of an associative agricultural company	Agro-Industrial Engineering
Male	28	Tena	Napo	Amazonia	CEO of an associative chemical cleaning company	Chemical Engineering
Female	38	Pifo	Pichincha	Highlands	CEO of a organic food company	Agronomy Engineering
Male	33	San Miguel	Bolivar	Highlands	CEO of an IT for agriculture company	Electronic Engineering
Female	38	Quito	Pichincha	Highlands	CEO of a food company using native ingredients	Chemical Engineering
Female	30	Puyo	Pastaza	Amazonia	CEO of an innovative supplier for infants	Marketing and Business
Male	26	Machachi	Pichincha	Highlands	CEO of an online learning company	Electronic Engineering
Male	26	Lago Agrio	Sucumbios	Amazonia	CEO of a touristic company	Tourism and Hospitality
Male	28	Ibarra	Imbabura	Highlands	Patent - Device for supporting handicapped individuals	Mechanical Engineering
Female	29	Otavalo	Imbabura	Highlands	CEO of a fashion company based on native designs	Business and Administration

A video interview was conducted following a standardized Q&A format with each role model, where the role models were asked different questions around their studies and professional lives. These were divided into five segments, as follows:

Segment 1 (2 min.): What is the job they have?

- Could you describe your work position?
- How is your typical workday?
- What did you do to become a scientist/entrepreneur?
- What skills are particularly useful in your work?

Segment 2 (3 min.): Why did they choose this job and what makes it a desirable profession?

- Why did you choose this profession?
- What did you feel on your first day of work?

- Why did you decide to stay in this profession?
- Why is yours is a critical profession?
- How do you think your profession helps your community?

Segment 3 (3 min.): What is needed to be able to do this job?

- What kind of preparation in addition to what you learned in school did you need to start up your business/choose a career in science?
- Was there something you had to learn outside the classroom? What was that?
- Is there a particular topic/subject that a person should study to become an entrepreneur/scientist?
- What would you say to those who believe you must be a genius to study STEM sciences or careers? (for scientists)

Segment 4 (4 min.): What inspired or motivated them?

- Where did you get the idea or motivation to become an entrepreneur/scientist?
- Were there any people who encouraged/inspired you to follow the profession you have now? Who was?
- How did that person motivate you (did he mention something to you, did you like his way of being)?

Segment 5 (4 min.): What advice do they have for those considering this job?

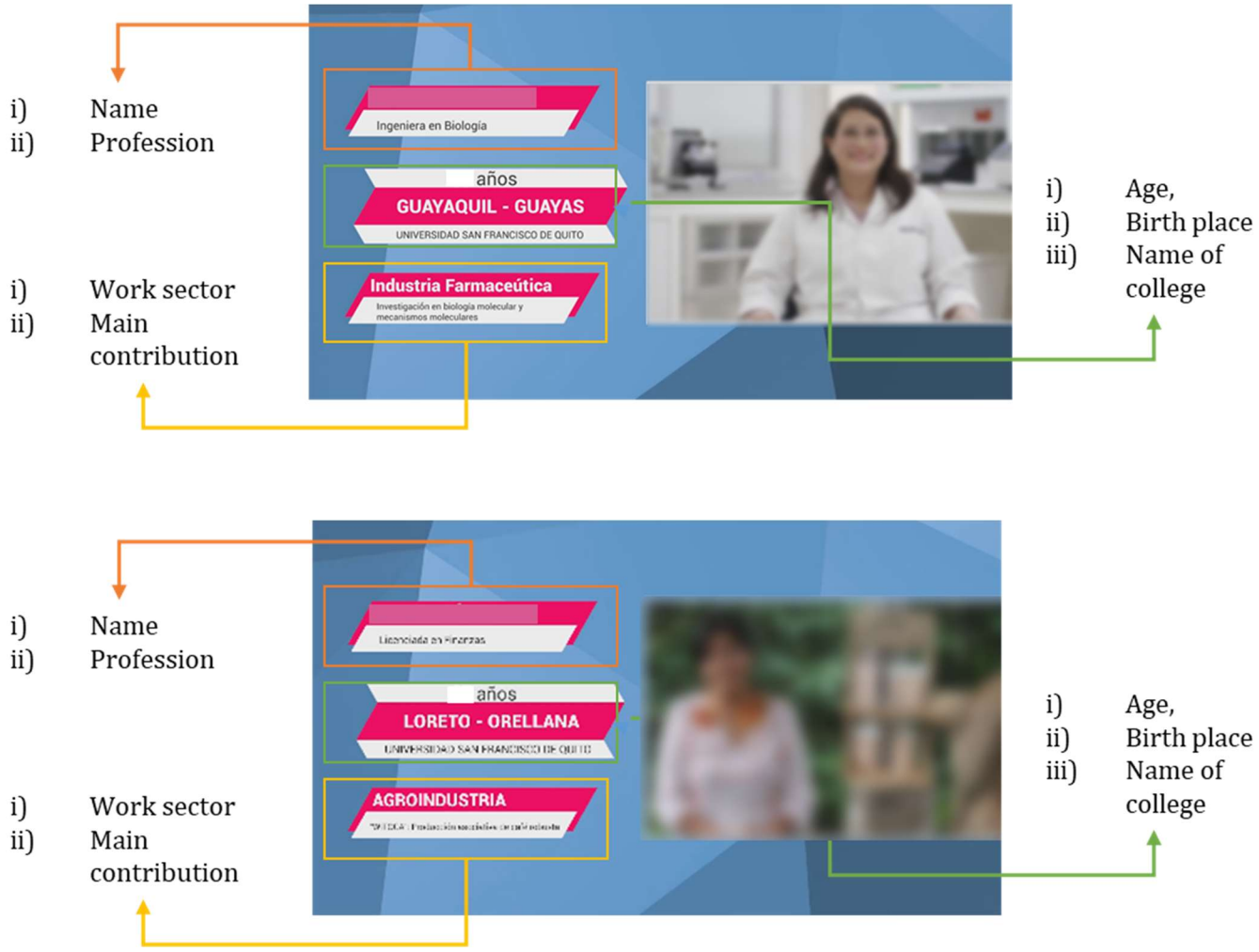
- Do you think that anyone can choose this profession?
- Do you think that everyone can become a scientist/entrepreneur?
- What should be expected if this profession is chosen?
- What would you say to the person who wants to choose this profession?

While these questions were structured to make sure each role model covered these topics, they were free to answer authentically to these questions, and did not have scripted answers.

Each student then watched 5 segments from STEM professionals and 5 segments from entrepreneurs in a first lesson, and then another 5 of each in a second lesson. The ordering of STEM versus entrepreneur was randomly assigned. For each one of the five segments, they were randomly allocated a segment from one of the 10 role models interviewed of the specific type. Since the role models were balanced by gender, this meant a 50% probability of seeing a female role model in any given segment. This random assignment was done at the student level, and the

segments were spliced together. At the start of each segment, students were shown a cover screen which highlighted key information such as profession, age, place of birth, and sector. An anonymized example appears below:

Figure S3: Anonymized examples of video segment cover screen



Outcome Definitions

Survey measures on beliefs and preferences

Data on student beliefs and study preferences were collected through the online platform.

STEM Earnings beliefs: The log of a student's answer to the question "What is the monthly salary of a STEM professional in Ecuador?". Before answering, students are reminded what types of jobs are STEM professionals. Collected in the midline.

STEM gender stereotypes: A standardized index that measures students' beliefs about women in science. It is the average of standardized z-scores of answers of the following questions answered on a Likert scale "men are more gifted than women in math", and "women are as

successful as men in STEM activities" (reverse coded). This was only collected in the Coastal region, during the endline.

Preferences for studying STEM: a binary variable indicating that the student plans to pursue a STEM major at college. Students are asked an open-ended question about their preferred major to study at college. We classify majors according to the ISCED (International Standard Classification of Education), and select 05 (natural sciences, mathematics and statistics), 06 (information and communication technologies), and 07 (engineering, manufacturing, and construction) as STEM majors. Collected in the midline survey.

Preference for working in STEM: a binary variable indicating that students plan to work as a STEM professional. Immediately after watching the videos, students are asked which ISCO-08 2-digit occupation they would want to work in the future. We code 21 (science and engineering professionals), 22 (health professionals), 25 (ICT professionals), 31 (science and engineering associate professionals), 32 (health associate professionals), and 35 (ICT associate professionals) as STEM professional careers.

Entrepreneurship Earnings beliefs: The log of a student's answer to the question "What is the monthly salary of an entrepreneur in Ecuador?". Before answering, students were reminded what an entrepreneur is. Collected in the midline.

Entrepreneurial gender stereotypes: A standardized index measuring beliefs about women in business. It is the average of standardized z-scores of answers of the following questions answered on a Likert scale "men have a natural capacity to be an entrepreneur", and "women are as successful as men in business activities" (reverse coded). This was only collected in the Coastal region, during the endline.

Preferences for studying business: a binary variable indicating that the student plans to pursue a business major at college. Students are asked an open-ended question about their preferred major to study at college. We classify majors according to the ISCED (International Standard Classification of Education), and select 04 (business administrative and law, except 042 (law)), and 0311 (economics) as business majors. Collected in the midline survey.

Administrative Data on College Entry and Major Choice

Administrative records from the Ministry of Higher Education of Ecuador (Senescyt) are used to observe whether students enroll in higher education, and their choice of major. These data were anonymized and are provided in the replication materials:

Entry into higher education: A binary variable taking the value 1 if a student enrolls in higher education.

Chooses STEM major: A binary variable taking the value 1 if a student is enrolled in a STEM major. We classify majors according to the ISCED (International Standard Classification of Education), and select 05 (natural sciences, mathematics and statistics), 06 (information and communication technologies), and 07 (engineering, manufacturing, and construction) as STEM majors

Chooses Business major: A binary variable taking the value 1 if a student is enrolled in a business major. We classify majors according to the ISCED (International Standard Classification of Education), and select 04 (business administrative and law, except 042 (law)), and 0311 (economics) as business majors.

Chooses Other Subject major: A binary variable taking the value 1 if a student is enrolled in a major other than STEM or business.

Scoring of Perceptions of Role Models

We create standardized indices for seven dimensions of student perceptions of the role models by constructing the average of z-scores of components as follows, where we create z-scores by standardizing by the mean and standard deviation of the STEM response, to enable comparison of STEM and business role models. Some items are reverse-coded to ensure all items align in the same direction when constructing the indices:

Passion:

- How passionate and enthusiastic is the speaker about their career?
- How happy do you think the speaker is with having chosen the career they work in?

Charisma: We measure three sub-dimensions, and then create a standardized index across all three:.

Subdimension 1. Please tell us to what extent you agree with the following statements on a scale of 1 (not at all) to 7 (very much)

Imagine you encounter the person in the video and accompany him in his day-to-day activities. Would you expect this person…

- …has a presence in a room (influence)
- … can influence people (influence)
- …is a good leader (influence)
- …has a magnetic persona (influence)
- …knows how to lead a group (influence)
- …makes people feel comfortable (affability)
- …smiles at people often (affability)
- …is approachable (affability)
- …projects positive energy (affability)
- …can get along with anyone (affability)

Subdimension 2. How charismatic did you find the speech? Please give your opinion on the level of charisma in the speech using a scale from 1 to 7, where 1 is 'Not charismatic at all' and 7 is 'Extremely charismatic'.

Subdimension 3. Please, rate the person's communication tone using the next scale:

Does the person in the video sound…

- (1) dominant / aggressive - submissive / passive (7)
- (1) consistent/performed - uniformly-inconsistent/performed erratically (7)
- (1) unexpressive/dull - expressive/lively (7)
- (1) fast/hurried - slow/unhurried;
- (1) calm/relaxed - anxious/tense (7);
- (1) natural/sounds spontaneous - stiff/ sounds like a script (7)
- (1) warm/ friendly - cold/unfriendly (7).

Similarity:

- How similar do you think this person is to you?
- Would you like this person to be your neighbor?
- Do you like this person?
- How likely is it that you would become friends with this person?
- Could you imagine yourself becoming this person?
- Do you want to learn more about this person?

Stereotype. We code the data as follows: S1=0 if they think equal, +1 if they think women face more challenges, and -1 if they think men face more challenges. Then, we subtract S3 from S2, which shows how much more students think the video attracts men to the career vs. women (S4). Then, we compute the average of the z-scores of items S1 and S4.

After watching the video, I believe that (S1)

- Men and women can be equally capable of succeeding in this career
- Women face more challenges than men in this career
- Men face more challenges than women in this career

Please tell us to what extent you agree with the following statements on a scale from 1 (not at all) to 7 (very much).

- The video made women want to pursue this career (S2)
- The video made men want to pursue this career (S3)

Challenge. We measure two subdimensions, and aggregate into a single index:

Subdimension 1. Now that you know more about this profession, please compare it with a traditional profession according to the following statements using a scale from (very low than a traditional profession) to 7 (very high than a traditional profession)

- The time needed to study this career is…
- The investment (expenditure) needs to study this career is…
- The difficulty in convincing parents to study this career is…
- The difficulty of getting accepted to study a major related to this career is…
- The materials needed to study this career (i.e., books, lab materials) are…

Subdimension 2. From the information you get watching the video, please tell us the following,

- Do you think it is necessary to have a college degree to pursue the same career path as the person in the video? Yes/No/IDK
- Do you think it is necessary to have a postgraduate education (i.e., a Master's or more) to be as successful in this career as the person in the video?
- Do you think it is necessary to go abroad to be as successful in this career as the person in the video?

Information:

- I found that the person in the video offered information relevant to my future decisions.
- The video made me understand something new.
- I did not find it easy to forget the information in the video.
- The information in the video gave me new ideas for the future.
- I think the profession of the person in the video is a common one.

Stigma:

When I think of the person in the video, I think of someone who

- …is attractive
- …does not have friends
- …has good social skills
- …has bad hygiene
- …spends all their time alone
- …is good athlete
- …is weird
- …finds it easy making friends

Table S1: Changes in beliefs and attitudes for the full sample of students

	STEM				Entrepreneurship		
	Beliefs		Preferences		Beliefs		Preferences
	Earnings	Stereotypes	Study	Work	Earnings	Stereotypes	Study
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel 1: Female students							
Role Model Treatment	-0.010	0.031*	-0.013*	-0.024**	0.019*	0.012	0.005
	(0.013)	(0.019)	(0.007)	(0.011)	(0.011)	(0.017)	(0.007)
q-values	0.480	0.172	0.172	0.142	0.172	0.480	0.480
Control mean	6.861	-0.17	0.168	0.305	6.253	-0.159	0.205
N. obs	13,162	7,020	12,768	12,815	13,162	7,020	12,768
N. clusters	779	459	777	782	779	459	777
Panel 2: Male students							
Role Model Treatment	-0.019	-0.009	0.004	-0.020	0.003	-0.004	-0.004
	(0.012)	(0.016)	(0.009)	(0.013)	(0.011)	(0.013)	(0.006)
q-values	0.399	0.776	0.776	0.399	0.776	0.776	0.776
Control Mean	6.953	0.176	0.387	0.384	6.413	0.165	0.094
N. obs	15,109	7,075	14,233	14,655	15,109	7,075	14,233
N. clusters	762	450	758	759	762	450	758
H0: Girls = Boys	0.849	0.167	0.059	0.055	0.358	0.631	0.076

Note: The table reports the treatment effects of a nationwide sample of students from the Coast, Highlands, and Amazon regions. Clustered at the school level standard errors in parenthesis. Each regression inludes strata dummies, a lagged outcome variable collected at the baseline, and covariates selected with a double-lasso selection procedure. The treatment is watching Business and STEM role models, irrespective of their gender composition, on students' beliefs and preferences. Columns 1 to 4 examine mechanisms that drive STEM choice of major; meanwhile, columns 5 to 7 report mechanisms that influence the choice of Business as a major. Due to the atypical organization of the country, we collect midline data between two (Highlands and Amazon region) to six weeks (Coast regime) after watching the treatment videos. Furthermore, we collected endline data six (Highlands and Amazon region) and 12 weeks (Coast regime) after beings exposed to the treatment. The survey instrument was embedded in the e-learning platform that hosts the treatment and placebo videos. The estimation controls for the difference in timing and the strata of random allocation. The table reports clustered standard errors at the school level in parenthesis. Moreover, it reports sharpened p-values (q-values) following the suggestions in Anderson (2008) for the False Discovery Rate (FDR). The q-values account for corrections by subject (Entrepreneurship and STEM) and gender (male and female). The bottom panel tests the null hypothesis that girls and boys exhibit equal treatment effects.

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

Table S2: Changes in beliefs and attitudes for the sample who continue to higher education

	STEM				Entrepreneurship		
	Beliefs		Preferences		Beliefs		Preferences
	Earnings	Stereotypes	Study	Work	Earnings	Stereotypes	Study
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel 1: Female students							
Role Model Treatment	0.016	0.059**	-0.024**	-0.032*	0.046**	0.034	0.016
	(0.020)	(0.027)	(0.010)	(0.017)	(0.019)	(0.026)	(0.011)
q-values	0.427	0.064	0.064	0.110	0.064	0.239	0.216
Control Mean	6.898	-0.299	0.211	0.34	6.261	-0.284	0.24
N. obs	4,522	2,187	4,450	4,428	4,522	2,187	4,450
N. clusters	643	375	637	644	643	375	637
Panel 2: Male students							
Role Model Treatment	-0.006	-0.025	-0.026*	-0.038*	0.025	-0.042	-0.016*
	(0.019)	(0.028)	(0.014)	(0.022)	(0.019)	(0.026)	(0.009)
q-values	0.762	0.447	0.182	0.182	0.257	0.182	0.182
Control Mean	6.981	0.059	0.526	0.471	6.424	0.063	0.102
N. obs	4,589	1,795	4,429	4,484	4,589	1,795	4,429
N. clusters	593	338	587	593	593	338	587
H0: Girls = Boys	0.726	0.058	0.659	0.370	0.405	0.052	0.041

Note: The table reports the treatment effects of a nationwide sample of students from the Coast, Highlands, and Amazon regions. Clustered at the school level standard errors in parenthesis. Each regression inludes strata dummies, a lagged outcome variable collected at the baseline, and covariates selected with a double-lasso selection procedure. The treatment is watching Business and STEM role models, irrespective of their gender composition, on students' beliefs and preferences conditional to entering higher education. Columns 1 to 4 examine mechanisms that drive STEM choice of major; meanwhile, columns 5 to 7 report mechanisms that influence the choice of Business as a major. Due to the atypical organization of the country, we collect midline data between two (Highlands and Amazon region) to six weeks (Coast regime) after watching the treatment videos. Furthermore, we collected endline data six (Highlands and Amazon region) and 12 weeks (Coast regime) after beings exposed to the treatment. The survey instrument was embedded in the e-learning platform that hosts the treatment and placebo videos. The estimation controls for the difference in timing and the strata of random allocation. The table reports clustered standard errors at the school level in parenthesis. Moreover, it reports sharpened p-values (q-values) following Anderson (2008) for the False Discovery Rate (FDR). The q-values account for corrections by subject (Entrepreneurship and STEM) and gender (male and female). The bottom panel tests the null hypothesis that girls and boys exhibit equal treatment effects. To select the control variables, we compute the post-Double Lasso selection approach.

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

Table S3: Impact on College Entry and Actual Major Choices (Behavior)

		Choice of academic majors					
	Entry into	STEM majors		Business majors		Other majors	
	College	Unconditional	Conditional	Unconditional	Conditional	Unconditional	Conditional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel 1: Female students							
Role Model Treatment	-0.017*	-0.022***	-0.050***	0.016*	0.057***	-0.008	-0.012
	(0.010)	(0.007)	(0.019)	(0.009)	(0.019)	(0.007)	(0.020)
q-values	0.100	0.006	0.013	0.100	0.009	0.245	0.268
Control Mean	0.347	0.108	0.285	0.113	0.302	0.159	0.412
N. obs	13,597	13,597	4,591	13,597	4,591	13,597	4,591
N. clusters	790	790	646	790	646	790	646
Panel 2: Male students							
Role Model Treatment	-0.014	-0.034***	-0.049**	0.002	0.007	0.010*	0.037**
	(0.009)	(0.010)	(0.025)	(0.006)	(0.017)	(0.005)	(0.016)
q-values	0.126	0.003	0.037	0.574	0.338	0.086	0.023
Control Mean	0.315	0.238	0.686	0.045	0.127	0.069	0.187
N. obs	15,646	15,646	4,673	15,646	4,673	15,646	4,673
N. clusters	771	771	597	771	597	771	597
H0: Girls = Boys	0.781	0.124	0.968	0.074	0.038	0.048	0.030

Note: The table reports the treatment effects of a nationwide sample of students from the Coast, Highlands, and Amazon regions. Clustered at the school level standard errors in parenthesis. Each regression inludes strata dummies, a lagged outcome variable collected at the baseline, and covariates selected with a double-lasso selection procedure. The treatment is watching Business and STEM role models, irrespective of their gender composition. Unconditional refers to the full sample; meanwhile, conditional indicates that results come from the subsample of students who got a place to attend college. The table reports a linear probability model testing the treatment effect on choosing STEM as a major (columns 1 and 2), Business as a major (columns 3 and 4) or choosing an alternative major other than STEM and Business (columns 5 and 6). We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). Since the timing of the intervention varies by region, we control for it in the estimation. We also account for the strata of random allocation. The table reports clustered standard errors at the school level in parenthesis. Moreover, it reports sharpened p-values (q-values) following Anderson (2008) for the False Discovery Rate (FDR). The q-values account for corrections by academic choice (conditional or unconditional and gender (male and female). The bottom panel tests the null hypothesis that girls and boys exhibit equal treatment effects. To select the control variables, we compute the post-Double Lasso selection approach.

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

Table S4: Summary Statistics and Balance

	Control Group		Treatment Group		Difference	p-values
	Mean	S.D.	Mean	S.D.	C - T	
Panel A: Full Sample (N=29,243)						
Female	0.452	0.498	0.479	0.5	-0.027	0.237
Plan to enter college	0.751	0.433	0.751	0.432	-0.001	0.874
Socioeconomic level (asset index)	0.001	1.561	-0.012	1.533	0.013	0.762
Mother employed	0.518	0.5	0.521	0.5	-0.003	0.317
Mother owns a business	0.513	0.5	0.522	0.5	-0.01	0.146
Mother has a college degree	0.092	0.289	0.084	0.277	0.008	0.25
Father employed	0.822	0.383	0.823	0.382	-0.001	0.399
Father owns a business	0.437	0.496	0.438	0.496	-0.001	0.809
Father has a college degree	0.073	0.26	0.067	0.25	0.006	0.375
Plan to choose STEM as a major	0.292	0.455	0.272	0.445	0.021	0.387
Beliefs about income of a STEM professional (log)	6.91	0.787	6.895	0.815	0.015	0.684
Gender stereotypes for STEM areas index	0.002	0.513	-0.002	0.528	0.004	0.626
STEM attitude index	0.005	0.863	0.018	0.856	-0.012	0.321
STEM Intentions index	0.004	0.905	0.006	0.9	-0.002	0.472
Believes they would be successful as a STEM professional	5.212	1.815	5.205	1.827	0.007	0.567
Plan to choose Business as a major	0.135	0.341	0.154	0.361	-0.019	0.314
Beliefs about income of an Entrepreneur (log)	6.243	0.702	6.238	0.715	0.005	0.678
Gender stereotypes for Entrepreneurship index	0.001	0.496	-0.001	0.499	0.001	0.501
Entrepreneurship attitude index	0.006	0.769	0.012	0.763	-0.006	0.709
Entrepreneurial intentions index	0.006	0.811	0.002	0.82	0.004	0.55
Believes they would be successful as an entrepreneur	5.685	1.468	5.673	1.478	0.013	0.167
Test of joint significance: F-stat (p-value)					**0.721**	**(0.816)**
Panel B: Conditional on Enrolling in Higher Education and Choosing a Major (N=9,246)						
Female	0.476	0.499	0.519	0.5	-0.043	0.359
Plan to enter college	0.88	0.325	0.893	0.309	-0.013	0.079
Socioeconomic level (asset index)	0.029	1.43	-0.045	1.341	0.074	0.198
Mother employed	0.551	0.497	0.543	0.498	0.007	0.861
Mother owns a business	0.535	0.499	0.539	0.499	-0.004	0.513
Mother has a college degree	0.118	0.323	0.102	0.303	0.016	0.148
Father employed	0.841	0.365	0.845	0.362	-0.004	0.388
Father owns a business	0.452	0.498	0.451	0.498	0.001	0.981
Father has a college degree	0.097	0.297	0.086	0.281	0.011	0.294
Plan to choose STEM as a major	0.374	0.484	0.331	0.471	0.042	0.095
Beliefs about income of a STEM professional (log)	6.958	0.726	6.958	0.726	0	0.614
Gender stereotypes for STEM areas index	-0.046	0.453	-0.058	0.465	0.012	0.983
STEM attitude index	0.142	0.764	0.159	0.756	-0.017	0.676
STEM Intentions index	0.141	0.853	0.137	0.86	0.004	0.626
Believes they would be successful as a STEM professional	5.565	1.592	5.564	1.619	0.001	0.734
Plan to choose Business as a major	0.159	0.365	0.191	0.394	-0.033	0.414
Beliefs about income of an Entrepreneur (log)	6.266	0.693	6.25	0.697	0.016	0.503
Gender stereotypes for Entrepreneurship index	-0.05	0.46	-0.063	0.453	0.013	0.855
Entrepreneurship attitude index	0.106	0.686	0.123	0.68	-0.017	0.555
Entrepreneurial intentions index	0.042	0.76	0.05	0.767	-0.008	0.989
Believes they would be successful as an entrepreneur	5.768	1.361	5.79	1.355	-0.022	0.486
Test of joint significance: F-stat(p-value)					**0.789**	**(0.737)**

Table S5: Lee Bounds for Impact on College Entry and Actual Major Choices (Behavior)

	STEM Major Conditional (1)		Business Major Conditional (2)		Other Majors Conditional (3)	
Panel 1: Female students						
Role Model Treatment	-0.050***		0.057***		-0.012	
	(0.019)		(0.019)		(0.020)	
q-values	0.013		0.009		0.268	
Lee bounds	-0.061***	-0.041**	0.048**	0.066***	-0.027	0
Lee bounds p-values	0.002	0.029	0.012	0	0.18	0.986
Control Mean	0.285		0.302		0.412	
N. obs	4,591		4,591		4,591	
N. clusters	646		646		646	
Panel 2: Male students						
Role Model Treatment	-0.049**		0.007		0.037**	
	(0.025)		(0.017)		(0.016)	
q-values	0.037		0.338		0.023	
Lee bounds	-0.057**	-0.037	0.002	0.014	0.03**	0.044***
Lee bounds p-values	0.023	0.135	0.898	0.383	0.062	0.003
Control Mean	0.686		0.127		0.187	
N. obs	4,673		4,673		4,673	
N. clusters	597		597		597	

Note: The table reports the treatment effects and Lee bounds of a nationwide sample of students from the Coast, Highlands, and Amazon regions conditional on entry to the university. Clustered at the school level standard errors in parenthesis. Each regression inludes strata dummies, a lagged outcome variable collected at the baseline, and covariates selected with a double-lasso selection procedure. 4.9% of control group among female and 4.4% among male students were trimmed to estimate Lee bounds considering the difference in college entry among these groups. The table reports clustered standard errors at the school level in parenthesis. Moreover, it reports sharpened p-values (q-values) following Anderson (2008) for the False Discovery Rate (FDR). The q-values account for corrections by academic choice (conditional or unconditional and gender (male and female).

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

Table S6: Interaction between the treatment assignment and students' plans to study in the STEM field on students' actual major choices

		Choice of academic majors			
	Entry into	STEM majors		Business majors	
	College	Unconditional	Conditional	Unconditional	Conditional
	(1)	(2)	(3)	(4)	(5)
Panel 1: Female students					
Treatment (RM) * Plan to Study STEM	-0.004	-0.05	-0.045	0.015	0.015
	(0.023)	(0.025)	(0.04)	(0.014)	(0.032)
q-values	0.873	0.45	0.545	0.545	0.873
Placebo mean	0.347	0.108	0.285	0.113	0.302
N.obs	13597	13597	4591	13597	4591
N.clusters	790	790	646	790	646
Panel 2: Male students					
Treatment (RM) * Plan to Study STEM	-0.015	-0.027	0.007	0.008	-0.006
	(0.016)	(0.016)	(0.027)	(0.007)	(0.02)
q-values	0.545	0.51	0.873	0.545	0.873
Placebo mean	0.315	0.238	0.686	0.045	0.127
N.obs	15646	15646	4673	15646	4673
N.clusters	771	771	597	771	597

Note:The table reports the treatment effects of a nationwide sample of students from the Coast, Highlands, and Amazon regions. Clustered at the school level standard errors in parenthesis. Each regression inludes strata dummies, a lagged outcome variable collected at the baseline, and covariates selected with a double-lasso selection procedure. The treatment is watching Business and STEM role models, irrespective of their gender composition. Unconditional refers to the full sample; meanwhile, conditional indicates that results come from the subsample of students who got a place to attend college. The table reports a linear probability model testing the treatment effect on choosing STEM as a major (columns 1 and 2), Business as a major (columns 3 and 4) or choosing an alternative major other than STEM and Business (columns 5 and 6). We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). The interaction term estimates treatment heterogeneity among students who reported planning to study STEM at the baseline

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

Table S7: Interaction between the treatment assignment and students' beliefs about their ability to be successful in STEM on students' actual major choices

		Choice of academic majors			
	Entry into	STEM majors		Business majors	
	College	Unconditional	Conditional	Unconditional	Conditional
	(1)	(2)	(3)	(4)	(5)
Panel 1: Female students					
Role Model Treatment * STEM Success Belief	0.006	-0.003	0.006	0.01	0.018
	(0.008)	(0.005)	(0.014)	(0.005)	(0.013)
q-values	0.687	0.687	0.687	0.33	0.423
Placebo mean	0.347	0.108	0.285	0.113	0.302
N.obs	13597	13597	4591	13597	4591
N.clusters	790	790	646	790	646
Panel 2: Male students					
Role Model Treatment * STEM Success Belief	-0.005	-0.012	-0.006	0.002	0.016
	(0.008)	(0.007)	(0.016)	(0.003)	(0.011)
q-values	0.687	0.33	0.678	0.687	0.423
Placebo mean	0.315	0.238	0.686	0.045	0.127
N.obs	15646	15646	4673	15646	4673
N.clusters	771	771	597	771	597

Note:The table reports the treatment effects of a nationwide sample of students from the Coast, Highlands, and Amazon regions. Clustered at the school level standard errors in parenthesis. Each regression inludes strata dummies, a lagged outcome variable collected at the baseline, and covariates selected with a double-lasso selection procedure. The treatment is watching Business and STEM role models, irrespective of their gender composition. Unconditional refers to the full sample; meanwhile, conditional indicates that results come from the subsample of students who got a place to attend college. The table reports a linear probability model testing the treatment effect on choosing STEM as a major (columns 1 and 2), Business as a major (columns 3 and 4) or choosing an alternative major other than STEM and Business (columns 5 and 6). We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). The interaction term estimates treatment heterogeneity among students who reported having high beliefs about being able to be successful in STEM at the baseline

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

Table S8: Interaction between the treatment assignment and students having STEM stereotypes above the median on students' actual major choices

		Choice of academic majors			
	Entry into	STEM majors		Business majors	
	College	Unconditional	Conditional	Unconditional	Conditional
	(1)	(2)	(3)	(4)	(5)
Panel 1: Female students					
Role Model Treatment * STEM Stereotype above Median	-0.031	-0.025	-0.067	0.017	0.078
	(0.019)	(0.012)	(0.038)	(0.013)	(0.038)
q-values	0.252	0.205	0.252	0.263	0.205
Placebo mean	0.313	0.085	0.245	0.111	0.332
N.obs	7590	7590	2290	7590	2290
N.clusters	474	474	382	474	382
Panel 2: Male students					
Role Model Treatment * STEM Stereotype above Median	0.005	0.013	0.061	0.013	0.034
	(0.019)	(0.017)	(0.04)	(0.009)	(0.032)
q-values	0.806	0.482	0.255	0.255	0.36
Placebo mean	0.25	0.172	0.604	0.042	0.155
N.obs	7744	7744	1890	7744	1890
N.clusters	457	457	343	457	343

Note:The table reports the treatment effects of a nationwide sample of students from the Coast, Highlands, and Amazon regions. Clustered at the school level standard errors in parenthesis. Each regression inludes strata dummies, a lagged outcome variable collected at the baseline, and covariates selected with a double-lasso selection procedure. The treatment is watching Business and STEM role models, irrespective of their gender composition. Unconditional refers to the full sample; meanwhile, conditional indicates that results come from the subsample of students who got a place to attend college. The table reports a linear probability model testing the treatment effect on choosing STEM as a major (columns 1 and 2), Business as a major (columns 3 and 4) or choosing an alternative major other than STEM and Business (columns 5 and 6). We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). The interaction term estimates treatment heterogeneity among students who had STEM gender stereotypes above the median at the baseline

Table S9: No Predictable heterogeneity in treatment effects

	Female students			Male students		
	Estimate	p-values	Cbounds	Estimate	p-values	Cbounds
Panel 1: Choosing STEM as a Major						
ATE	-0.02	0.03	[-0.03;0]	-0.03	0.00	[-0.06;-0.01]
BLP	0.18	0.27	[-0.15;0.54]	0.08	0.28	[-0.07;0.22]
Panel 2: Choosing Business as a Major						
ATE	0.01	0.26	[-0.01;0.03]	0.00	0.60	[-0.01;0.01]
BLP	0.01	0.93	[-0.38;0.41]	0.19	0.31	[-0.19;0.58]
Panel 3:Choosing Other subject as a Major						
ATE	0.00	0.58	[-0.02;0.01]	0.01	0.28	[-0.01;0.02]
BLP	0.04	0.81	[-0.32;0.41]	-0.26	0.28	[-0.7;0.2]

Note: The table reports estimates using the generic machine learning approach of Chernozhukov et al. (2023). The ATE is the fitted average treatment effect using this method, and the term BLP is the heterogeneity parameter. The following characteristics were used in fitting the model: *Academic ability* (students' intentions to enter college; students' expectation of school performance; actual academic performance in Statistics, Spanish, English, and overall; results in the Cognitive Reflexion test); *Socioeconomic characteristics* (income level, father, mother, and sibling level of education, and ethnicity); *Motivation* (GRIT, growth mentality, self-efficacy, time devoted to studying on the platform and autonomy as measured by self-concept); *STEM and Business interest and background* (whether students believe they can be successful in STEM or Entrepreneurship, parents' and siblings' work status and whether parents and siblings are entrepreneurs, whether students know adults working in STEM or Entrepreneurship, attitudes, intentions, and income beliefs toward STEM and Entrepreneurship).

Table S10: No Predictable heterogeneity in treatment effects on beliefs and preferences

	Female students			Male students		
	Estimate	p-values	Cbounds	Estimate	p-values	Cbounds
Panel 1: STEM Stereotype						
ATE	0.03	0.27	[-0.02;0.08]	-0.01	0.59	[-0.06;0.03]
BLP	0.04	0.36	[-0.05;0.13]	0.00	0.99	[-0.39;0.39]
Panel 2: STEM Study Preferences						
ATE	-0.01	0.14	[-0.03;0]	0.00	0.78	[-0.02;0.02]
BLP	0.13	0.31	[-0.13;0.4]	0.03	0.34	[-0.03;0.09]
Panel 3: STEM Work Preferences						
ATE	-0.02	0.04	[-0.05;0]	0.00	0.73	[-0.03;0.02]
BLP	-0.07	0.76	[-0.43;0.34]	0.09	0.56	[-0.24;0.42]
Panel 4: Entrepreneurship Stereotypes						
ATE	0.01	0.69	[-0.04;0.06]	-0.01	0.66	[-0.05;0.03]
BLP	-0.08	0.68	[-0.47;0.31]	0.03	0.85	[-0.34;0.41]
Panel 5: Entrepreneurship Study Preferences						
ATE	0.00	0.70	[-0.01;0.02]	-0.01	0.18	[-0.02;0]
BLP	0.13	0.31	[-0.13;0.39]	0.32	0.08	[-0.04;0.67]

Note: The table reports estimates using the generic machine learning approach of Chernozhukov et al. (2023). The ATE is the fitted average treatment effect using this method, and the term BLP is the heterogeneity parameter. The following characteristics were used in fitting the model: *Academic ability* (students' intentions to enter college; students' expectation of school performance; actual academic performance in Statistics, Spanish, English, and overall; results in the Cognitive Reflexion test); *Socioeconomic characteristics* (income level, father, mother, and sibling level of education, and ethnicity); *Motivation* (GRIT, growth mentality, self-efficacy, time devoted to studying on the platform and autonomy as measured by self-concept); *STEM and Business interest and background* (whether students believe they can be successful in STEM or Entrepreneurship, parents' and siblings' work status and whether parents and siblings are entrepreneurs, whether students know adults working in STEM or Entrepreneurship, attitudes, intentions, and income beliefs toward STEM and Entrepreneurship).

Table S11: Do impacts vary with the gender mix of role models?

	Choice of academic major		
	STEM	Business	Other subject
	(1)	(2)	(3)
Panel 1: STEM Science Role Models - Female students			
Watched Mostly Male STEM science Role Models	0.014	0.001	0.022
	(0.024)	(0.027)	(0.029)
q-values	0.87	1	0.79
Watched Mostly Female STEM science Role Models	0.018	-0.039	0.038
	(0.024)	(0.027)	(0.030)
q-values	0.87	1	0.79
Mean Watched Gender Balanced STEM science Role Models	0.225	0.384	0.391
N. obs	2,214	2,214	2,214
Panel 2: STEM Science Role Models - Male students			
Watched Mostly Male STEM science Role Models	0.054**	-0.050**	0.000
	(0.026)	(0.020)	(0.024)
q-values	0.31	0.31	1
Watched Mostly Female STEM science Role Models	0.041	-0.041**	0.006
	(0.026)	(0.020)	(0.024)
q-values	0.6	0.31	0.97
Mean Watched Gender Balanced science RM	0.608	0.176	0.217
N. obs	2,053	2,053	2,053
H0: Girls watched mostly male STEM scientists = Boys watched mostly male STEM scientists	0.32	0.13	0.75
H0: Girls watched mostly female STEM scientists = Boys watched mostly female STEM scientists	0.51	0.99	0.44
Panel 3: Entrepreneurial Role Models - Female students			
Watched Mostly Male Entrepreneurship Role Models	-0.024	0.053*	-0.032
	(0.025)	(0.027)	(0.029)
q-values	0.79	0.31	0.79
Watched Mostly Female entrepreneurship Role Models	0.010	0.016	-0.023
	(0.025)	(0.026)	(0.028)
q-values	0.93	0.86	0.79
Mean Watched Gender Balanced entrepreneurship Role Models	0.246	0.34	0.415
N. obs	2,214	2,214	2,214
Panel 4: Entrepreneurial Role Models - Male students			
Watched Mostly Male entrepreneurship Role Models	0.006	-0.019	0.011
	(0.026)	(0.018)	(0.024)
q-values	0.97	0.79	0.93
Watched Mostly Female entrepreneurship Role Models	0.003	-0.015	0.001
	(0.026)	(0.020)	(0.024)
q-values	1	0.79	1
Mean Watched Gender Balanced entrepreneurship Role Models	0.622	0.145	0.233
N. obs	2,053	2,053	2,053
H0: Girls watched mostly male entrepreneurs = Boys watched mostly male entrepreneurs	0.50	0.04	0.32
H0: Girls watched mostly female entrepreneurs = Boys watched mostly female entrepreneurs	0.87	0.76	0.73

Note: The table reports the treatment effects of a nationwide sample of students from the Coast, Highlands, and Amazon regions. The treatment is watching mostly male (female) STEM and business role models compared to students watching a gender-balanced set of business role models (omitted group). We test the treatment at the individual level. Thus, we report the results of the subset of students enrolled in treated schools (T.RM=1). We report results conditional on entering college education. Column 1 reports the likelihood of pursuing STEM education. Column 2 reports the likelihood of studying business. Column 3 reports the likelihood of choosing non-STEM and non-business majors. We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). Since the timing of the intervention varies by region, we control for the Coast regime in the estimation. The estimation also introduces class-fixed effects to account for environmental differences among students. We report robust standard errors at the individual level in parenthesis along with sharpened p-values (q-values) following Anderson (2008) for the False Discovery Rate (FDR). The q-values account for corrections by all 24 specifications. The bottom panel tests the null hypothesis that girls and boys exhibit equal treatment effects. To select the control variables, we compute the post-Double Lasso selection approach. * p < 0.1, ** p < 0.05, *** p < 0.01

Table S12: Students view STEM and Business Role Models Differently

	STEM		Business		Difference			
Variables	Mean	SD	Mean	SD	((1) - (3))	p-values	q-values	Sample size
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Similarity	0	0.758	0.121	0.648	-0.121	0.054	0.009	110
Charisma	0	1.000	0.178	0.811	-0.178	0.056	0.009	110
Stigma	0	0.614	-0.245	0.536	0.245	0.000	0.000	110
Stereotype	0	0.646	-0.272	0.797	0.272	0.006	0.002	110
Information	0	0.590	0.234	0.618	-0.234	0.000	0.000	110
Passion	0	0.943	0.117	0.786	-0.117	0.234	0.033	110
Challenging	0	1.000	-0.542	1.084	0.542	0.000	0.000	110

Note: the table shows the results of the aggregate index per dimension. We standardized the indexes concerning the STEM dimensions, so the mean in the STEM outcomes is close to 0 and the SD is close to 1. Column 5 accounts for the mean difference of STEM minus Business. Column 6 captures p-values from a paired t-test comparing students' perceptions of STEM scientists against entrepreneurs. Since the data rejects the normality assumption, we also compute the Wilcoxon rank sum test for paired samples in Column 7. This increases the consistency of results. We complement this approach by computing sharped p-values (q-values).

Table S13: Perceptions of Role Models do not vary with student gender

	Male students		Female students		Difference			
Variables	Mean	SD	Mean	SD	((1) - (3))	p-values	q-values	Sample size
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)
Similarity	-0.157	0.589	-0.070	0.727	-0.087	0.491	0.687	110
Charisma	-0.190	1.020	-0.162	0.897	-0.029	0.879	0.879	110
Stigma	0.199	0.562	0.308	0.530	-0.109	0.309	0.687	110
Stereotype	0.434	1.080	0.046	0.873	0.388	0.047	0.329	110
Information	-0.197	0.551	-0.285	0.695	0.088	0.460	0.687	110
Passion	-0.145	1.114	-0.079	0.906	-0.066	0.743	0.867	110
Challenging	0.471	1.148	0.640	1.136	-0.170	0.443	0.687	110

Note: The table shows the results of the differences in the aggregate index for STEM role models minus the aggregate index for business role models per dimension for male and female students. Column 5 accounts for the mean difference between boys' dimensions and girls' dimensions. Column 6 captures p-values from an unpaired t-test of the difference in Column 5. Since the data rejects the normality assumption, we also compute the Wilcoxon rank test for unpaired samples in Column 7. This increases the consistency of results. We complement this approach by computing sharpened p-values (q-values).

Table S14: Specialization Effect on the Choice of Major among Zone 2 students (K12) when the distribution is mostly Entrepreneurs (30% or fewer STEM role models were watched) and mostly STEM scientists (70% or more STEM role models were watched)

		Choice of academic majors					
	Entry into	STEM majors		Business majors		Other majors	
	College	Unconditional	Conditional	Unconditional	Conditional	Unconditional	Conditional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel 1: Female students							
Watched Mostly Entrepreneurs	0.012	-0.001	0.011	0.009	0.004	-0.002	-0.019
	(0.039)	(0.026)	(0.067)	(0.021)	(0.052)	(0.032)	(0.074)
q-values	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Watched Mostly STEM scientists	0.029	-0.017	-0.014	0.018	0.007	0.024	-0.006
	(0.034)	(0.022)	(0.052)	(0.019)	(0.046)	(0.028)	(0.059)
q-values	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Mean Balanced set of STEM and Business Role Models	0.349	0.112	0.271	0.063	0.166	0.196	0.563
H0: Girls watched mostly Entrepreneurs = Girls watched mostly STEM scientists	0.667	0.569	0.71	0.7	0.954	0.473	0.867
N. obs	1,086	1,086	387	1,086	387	1,086	387
Panel 2: Male students							
Watched Mostly Entrepreneurs	-0.035	-0.021	0.109	-0.030**	-0.069	-0.011	-0.032
	(0.034)	(0.030)	(0.096)	(0.012)	(0.055)	(0.023)	(0.096)
q-values	0.427	0.567	0.402	0.094	0.391	0.67	0.742
Watched Mostly STEM scientists	-0.036	0.024	0.135*	-0.028**	-0.064	-0.034**	-0.088
	(0.030)	(0.027)	(0.073)	(0.011)	(0.043)	(0.017)	(0.066)
q-values	0.391	0.463	0.233	0.094	0.383	0.198	0.391
Mean Balanced set of STEM and Business Role Models	0.265	0.162	0.549	0.045	0.141	0.082	0.31
H0: Boys watched mostly Entrepreneurs = Boys watched mostly STEM scientists	0.973	0.171	0.791	0.892	0.927	0.285	0.561
N. obs	1,010	1,010	240	1,010	240	1,010	240
H0: Girls watched mostly Entrepreneurs = Boys watched mostly Entrepreneurs	0.436	0.553	0.415	0.121	0.313	0.0982	0.909
H0: Girls watched mostly STEM scientists = Boys watched mostly STEM scientists	0.180	0.270	0.101	0.030	0.182	0.165	0.343

Note: The table reports the treatment effects of a "pilot" sample comprising schools in Zone 2 and the Municipality of Quito. The treatment is watching mostly entrepreneurs or STEM scientists compared to students watching a specialization-balanced set of role models (omitted group). We test the treatment at the individual level. Thus, we report the results of the subset of students enrolled in treated schools (T.RM=1). We report results conditional and unconditional upon entering college. Column 1 reports the likelihood of entering college, and columns 2 and 3 show the likelihood of pursuing STEM education. Columns 4 and 5 report the likelihood of studying business. Finally, Columns 6 and 7 report the likelihood of choosing non-STEM and non-business majors. We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). Since the timing of the intervention varies by class, we control for order effects as half of the classes watched the intervention at the very beginning of the Showing Life Opportunities project and the other half at the very end. We report robust standard errors at the individual level in parenthesis along with sharpened p-values (q-values) following Anderson (2008) for the False Discovery Rate (FDR). The q-values account for

corrections for the family of choice of major variables by gender. The H0 within each panel tests whether there is a substantial difference between specializations. In other words, it tests whether watching mostly STEM role models is significantly different than watching mostly business role models. The bottom panel of the table tests the null hypothesis that girls and boys exhibit equal treatment effects. To select the control variables, we compute the post-Double Lasso selection approach.

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

Table S15: Summary Statistics on Highland and Coastal Regimes

	1. Highland Regime		2. Coastal Regime		Difference	p-values
	Mean	S.D.	Mean	S.D.	–(1)-(3)	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Full Sample (N=29,243)						
Female	0.43	0.50	0.50	0.50	-0.06	0.16
Plan to enter college	0.72	0.45	0.78	0.41	-0.07	0.00
Socioeconomic level (asset index)	0.00	1.51	-0.01	1.58	0.01	0.75
Mother employed	0.60	0.49	0.44	0.50	0.16	0.00
Mother owns a business	0.51	0.50	0.52	0.50	-0.01	0.00
Mother has a college degree	0.07	0.26	0.10	0.30	-0.03	0.00
Father employed	0.82	0.38	0.82	0.38	0.00	0.46
Father owns a business	0.42	0.49	0.45	0.50	-0.03	0.00
Father has a college degree	0.06	0.24	0.08	0.27	-0.01	0.10
Plan to choose STEM as a major	0.29	0.45	0.28	0.45	0.01	0.49
Beliefs about income of a STEM professional (log)	7.02	0.63	6.80	0.92	0.21	0.00
STEM attitude index	0.00	0.86	0.02	0.85	-0.02	0.36
STEM Intentions index	0.00	0.90	0.01	0.90	-0.01	0.24
Beliefs they would be successful as a STEM professional	5.15	1.79	5.26	1.85	-0.11	0.09
Plan to choose Business as a major	0.12	0.33	0.16	0.37	-0.04	0.08
Beliefs about income of an Entrepreneur (log)	6.36	0.68	6.13	0.72	0.23	0.00
Entrepreneurship attitude index	0.00	0.77	0.02	0.76	-0.02	0.78
Entrepreneurial intentions index	0.00	0.81	0.01	0.82	-0.01	0.06
Beliefs they would be successful as an entrepreneur	5.60	1.44	5.75	1.50	-0.14	0.00
Panel B: Conditional on Enrolling in Higher Education and Choosing a Major (N=9,246)						
Female	0.45	0.50	0.55	0.50	-0.09	0.00
Plan to enter college	0.87	0.34	0.91	0.29	-0.04	0.00
Socioeconomic level (asset index)	0.03	1.36	-0.05	1.42	0.07	0.43
Mother employed	0.63	0.48	0.44	0.50	0.19	0.00
Mother owns a business	0.54	0.50	0.54	0.50	0.00	0.51
Mother has a college degree	0.09	0.29	0.13	0.34	-0.04	0.08
Father employed	0.84	0.36	0.84	0.36	0.00	0.01
Father owns a business	0.44	0.50	0.46	0.50	-0.02	0.04
Father has a college degree	0.09	0.28	0.10	0.30	-0.02	0.26
Plan to choose STEM as a major	0.37	0.48	0.34	0.47	0.03	0.11
Beliefs about income of a STEM professional (log)	7.04	0.61	6.86	0.83	0.18	0.01
STEM attitude index	0.15	0.77	0.15	0.75	0.00	0.88
STEM Intentions index	0.15	0.86	0.12	0.85	0.03	0.14
Beliefs they would be successful as a STEM professional	5.54	1.59	5.60	1.62	-0.06	0.05
Plan to choose Business as a major	0.15	0.36	0.20	0.40	-0.05	0.75
Beliefs about income of an Entrepreneur (log)	6.37	0.67	6.12	0.70	0.25	0.60
Entrepreneurship attitude index	0.10	0.69	0.13	0.67	-0.02	0.20
Entrepreneurial intentions index	0.05	0.76	0.04	0.77	0.01	0.36
Beliefs they would be successful as an entrepreneur	5.70	1.34	5.87	1.38	-0.17	0.35

Table S16: Treatment effects on individual items of gender stereotype scales

	Men are more gifted in math	Men have a natural predisposition to be entrepreneurs	If a girl wanted to, she could be as successful in STEM as men	If a girl wanted to, she could be as successful in business as men
Panel 1: Female students				
Role Model Treatment	0.024	-0.027	-0.037*	-0.034*
	(0.037)	(0.031)	(0.019)	(0.019)
p-values	0.513	0.391	0.055	0.076
Control Mean	2.901	3.155	4.517	4.543
N.obs	7020	7020	7020	7020
N.clusters	459	459	459	459
Panel 2: Male students				
Role Model Treatment	0.009	0.009	0.019	0.017
	(0.028)	(0.025)	(0.022)	(0.021)
p-values	0.754	0.726	0.375	0.406
Control Mean	3.453	3.623	4.267	4.294
N.obs	7075	7075	7075	7075
N.clusters	450	450	450	450

Note: The table reports the treatment effect on each item of the STEM and Entrepreneurship Stereotype Scales at the endline of the Coastal educational regime. Clustered on the school level, standard errors are included in parentheses. Each regression includes strata dummies, lagged item value (collected at the baseline), and covariates selected by the post-double selection procedure.

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

Table S17: Attrition table

	STEM				Entrepreneurship		
	Beliefs		Preferences		Beliefs		Preferences
	Earnings Miss	Stereotypes Miss	Study Miss	Work Miss	Earnings Miss	Stereotypes Miss	Study Miss
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel 1: Female students							
Role Model Treatment	0.009	0.019	0.009	0.008	0.009	0.019	0.009
	(0.004)	(0.012)	(0.005)	(0.005)	(0.004)	(0.012)	(0.005)
q-values	0.152	0.152	0.152	0.152	0.152	0.152	0.152
Control Mean Attrition	0.027	0.071	0.056	0.053	0.027	0.071	0.056
N.obs	13597	7636	13597	13597	13597	7636	13597
N.clusters	790	475	790	790	790	475	790
Panel 2: Male students							
Role Model Treatment	0.007	0.013	0.009	0.007	0.007	0.013	0.009
	(0.004)	(0.012)	(0.006)	(0.005)	(0.004)	(0.012)	(0.006)
q-values	0.152	0.304	0.152	0.152	0.152	0.304	0.152
Control Mean Attrition	0.031	0.089	0.085	0.059	0.031	0.089	0.085
N.obs	15646	7799	15646	15646	15646	7799	15646
N.clusters	771	459	771	771	771	459	771

Note: The table shows the attrition rate (missing outcome) for key outcomes measured through the midline and endline surveys. Gender stereotypes are only measured in the Coastal region endline, and attrition rates for this outcome are conditional on being in the Coastal region. The table reports clustered standard errors at the school level in parenthesis. Moreover, it reports sharpened p-values (q-values) following Anderson (2008) for the False Discovery Rate (FDR). The q-values account for corrections across outcomes

Table S18: Summary Statistics and Balance on students in Midline and students who reported gender stereotypes in the Endline of Coastal Regime

	Control Group		Treatment Group		Difference	p-values
	Mean	S.D.	Mean	S.D.	C - T	
Panel A: Participated in Midline and provided study preferences (N=27,001)						
Female	0.46	0.498	0.487	0.5	-0.027	0.255
Plan to enter college	0.769	0.422	0.77	0.421	-0.001	0.885
Socioeconomic level (asset index)	-0.01	1.538	-0.023	1.498	0.014	0.879
Mother employed	0.52	0.5	0.523	0.499	-0.003	0.349
Mother owns a business	0.512	0.5	0.523	0.499	-0.011	0.134
Mother has a college degree	0.094	0.292	0.084	0.278	0.01	0.188
Father employed	0.823	0.382	0.823	0.381	0	0.574
Father owns a business	0.437	0.496	0.438	0.496	-0.001	0.817
Father has a college degree	0.074	0.262	0.067	0.25	0.007	0.3
Plan to choose STEM as a major	0.3	0.458	0.278	0.448	0.022	0.402
Beliefs about income of a STEM professional (log)	6.914	0.782	6.902	0.798	0.012	0.893
Gender stereotypes for STEM areas index	-0.003	0.508	-0.01	0.521	0.006	0.392
STEM attitude index	0.029	0.843	0.041	0.84	-0.012	0.307
STEM Intentions index	0.029	0.889	0.026	0.891	0.003	0.961
Believes they would be successful as a STEM professional	5.265	1.779	5.26	1.788	0.004	0.817
Plan to choose Business as a major	0.139	0.346	0.16	0.367	-0.021	0.255
Beliefs about income of an Entrepreneur (log)	6.243	0.697	6.24	0.701	0.003	0.607
Gender stereotypes for Entrepreneurship index	-0.006	0.491	-0.008	0.492	0.002	0.413
Entrepreneurship attitude index	0.02	0.76	0.03	0.752	-0.01	0.601
Entrepreneurial intentions index	0.016	0.802	0.015	0.808	0.001	0.519
Believes they would be successful as an entrepreneur	5.703	1.448	5.706	1.444	-0.003	0.474
Test of joint significance: F-stat (p-value)					**0.585**	**(0.931)**
Panel B: STEM and entrepreneurship stereotypes available (N=13,457)						
Female	0.515	0.5	0.495	0.5	0.02	0.805
Plan to enter college	0.805	0.396	0.797	0.402	0.008	0.166
Socioeconomic level (asset index)	-0.036	1.584	-0.012	1.497	-0.024	0.672
Mother employed	0.429	0.495	0.464	0.499	-0.035	0.011
Mother owns a business	0.513	0.5	0.535	0.499	-0.022	0.314
Mother has a college degree	0.11	0.313	0.104	0.305	0.006	0.309
Father employed	0.82	0.384	0.832	0.374	-0.012	0.211
Father owns a business	0.446	0.497	0.458	0.498	-0.011	0.549
Father has a college degree	0.081	0.273	0.077	0.267	0.004	0.565
Plan to choose STEM as a major	0.271	0.445	0.3	0.458	-0.029	0.131
Beliefs about income of a STEM professional (log)	6.807	0.894	6.812	0.901	-0.005	0.922
Gender stereotypes for STEM areas index	-0.008	0.708	-0.019	0.713	0.011	0.17
STEM attitude index	0.036	0.841	0.065	0.824	-0.029	0.307
STEM Intentions index	0.023	0.89	0.049	0.887	-0.027	0.436
Believes they would be successful as a STEM professional	5.327	1.788	5.336	1.806	-0.009	0.455
Plan to choose Business as a major	0.173	0.379	0.16	0.367	0.013	0.596
Beliefs about income of an Entrepreneur (log)	6.121	0.691	6.142	0.712	-0.021	0.339
Gender stereotypes for Entrepreneurship index	-0.013	0.687	-0.016	0.673	0.003	0.724
Entrepreneurship attitude index	0.035	0.751	0.051	0.74	-0.016	0.953
Entrepreneurial intentions index	0.018	0.798	0.036	0.801	-0.018	0.344
Believes they would be successful as an entrepreneur	5.79	1.453	5.777	1.473	0.013	0.288
Test of joint significance: F-stat(p-value)					**1.358**	**(0.126)**

Table S19: Perceptions of Role Models do not vary depending on student and role model gender

	Perception of Role Models:						
	Similarity	Charisma	Stigma	Stereotype	Information	Passion	Challenging
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female Role Model * Female Student	-0.048	-0.247	0.122	-0.224	-0.109	-0.154	0.139
	(0.176)	(0.215)	(0.139)	(0.212)	(0.173)	(0.194)	(0.296)
Female Role Model	-0.078	0.085	-0.101	-0.209	-0.139	-0.137	-0.355*
	(0.136)	(0.168)	(0.112)	(0.141)	(0.114)	(0.154)	(0.201)
Female Student	0.126	0.378**	-0.259**	0.136	0.078	0.331**	0.026
	(0.137)	(0.160)	(0.110)	(0.147)	(0.128)	(0.131)	(0.222)
Constant	0.057	-0.056	0.009	-0.038	0.178**	0.023	-0.135
	(0.106)	(0.125)	(0.086)	(0.078)	(0.079)	(0.107)	(0.127)
Average Female Role Model	0.01	0.09	-0.15	-0.29	0.03	-0.04	-0.42
Average Male Role Model	0.11	0.09	-0.09	0.01	0.21	0.15	-0.12
Observations	220	220	220	220	220	220	220
Students	110	110	110	110	110	110	110

Note: The table reports the results of a regression analysis on students' evaluation of role models on various dimensions. The regression assesses how the perception of role models differs for female students by interacting dummies for a female role model and a female student. Clustered standard errors on student level in parenthesis (each student evaluated two role models). *p**p***p<0.01

Table S20: Summary Statistics and Balance on students in Zone 2

	0. Control Group		1. Treatment Group		Difference	p-values
	Mean	S.D.	Mean	S.D.	C - T	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Full Zone 2 Sample final year students (N=4,568)						
Female	0.515	0.5	0.512	0.5	0.003	0.618
Plan to enter college	0.738	0.44	0.72	0.449	0.018	0.354
Socioeconomic level (asset index)	-0.013	1.519	-0.129	1.62	0.116	0.366
Mother employed	0.595	0.491	0.604	0.489	-0.009	0.356
Mother owns a business	0.516	0.5	0.497	0.5	0.019	0.61
Mother has a college degree	0.129	0.335	0.108	0.311	0.021	0.458
Father employed	0.828	0.377	0.815	0.388	0.014	0.583
Father owns a business	0.422	0.494	0.398	0.49	0.023	0.625
Father has a college degree	0.123	0.329	0.094	0.292	0.029	0.188
Plan to choose STEM as a major	0.231	0.422	0.259	0.438	-0.027	0.076
Beliefs about income of a STEM professional (log)	6.816	1.15	6.839	1.167	-0.024	0.65
STEM attitude index	0.054	0.814	0.039	0.838	0.015	0.871
STEM Intentions index	0.004	0.893	0.001	0.902	0.003	0.7
Beliefs they would be successful as a STEM professional	0.044	0.959	0.039	0.964	0.005	0.437
Plan to choose Business as a major	0.071	0.256	0.066	0.249	0.004	0.968
Beliefs about income of an Entrepreneur (log)	6.194	0.966	6.28	0.954	-0.086	0.073
Entrepreneurship attitude index	0.078	0.744	0.051	0.777	0.027	0.673
Entrepreneurial intentions index	0.044	0.771	0.029	0.775	0.015	0.649
Beliefs they would be successful as an entrepreneur	0.1	0.887	0.058	0.922	0.042	0.196
Test of joint significance: F-stat(p-value)					**0.878**	**(0.612)**
Panel B: Conditional on Enrolling in Higher Education and Choosing a Major (N=1,479)						
Female	0.584	0.493	0.596	0.491	-0.012	0.387
Plan to enter college	0.888	0.315	0.866	0.341	0.022	0.305
Socioeconomic level (asset index)	0.046	1.303	-0.157	1.239	0.202	0.082
Mother employed	0.647	0.478	0.628	0.484	0.019	0.896
Mother owns a business	0.569	0.496	0.513	0.5	0.056	0.236
Mother has a college degree	0.17	0.376	0.145	0.352	0.025	0.783
Father employed	0.842	0.365	0.843	0.364	0	0.639
Father owns a business	0.445	0.497	0.398	0.49	0.047	0.433
Father has a college degree	0.151	0.358	0.109	0.312	0.041	0.241
Plan to choose STEM as a major	0.271	0.445	0.302	0.46	-0.032	0.176
Beliefs about income of a STEM professional (log)	6.797	1.212	6.779	1.241	0.019	0.632
STEM attitude index	0.157	0.771	0.181	0.757	-0.024	0.886
STEM Intentions index	0.072	0.885	0.125	0.861	-0.053	0.336
Beliefs they would be successful as a STEM professional	0.213	0.891	0.221	0.872	-0.008	0.63
Plan to choose Business as a major	0.078	0.269	0.079	0.27	-0.001	0.822
Beliefs about income of an Entrepreneur (log)	6.148	0.902	6.218	0.869	-0.07	0.207
Entrepreneurship attitude index	0.179	0.654	0.198	0.669	-0.019	0.594
Entrepreneurial intentions index	0.077	0.714	0.067	0.728	0.01	0.799
Beliefs they would be successful as an entrepreneur	0.15	0.817	0.14	0.826	0.01	0.839
Test of joint significance: F-stat(p-value)					**0.735**	**(0.785)**

Table S21: Zone 2 - Treatment Effect on the Choice of Major among Zone 2 students (K12)

		Choice of academic majors					
	Entry into	STEM majors		Business majors		Other majors	
	College	Unconditional	Conditional	Unconditional	Conditional	Unconditional	Conditional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel 1: Female students							
Role Model Treatment	-0.051*	-0.015	-0.008	0.004	0.005	-0.03	-0.002
	(0.029)	(0.014)	(0.03)	(0.012)	(0.027)	(0.022)	(0.04)
q-values	0.518	0.663	0.964	0.964	0.964	0.63	0.964
Control mean	0.41	0.117	0.267	0.075	0.174	0.229	0.558
N. obs	2301	2301	855	2301	855	2301	855
N. clusters	178	178	150	178	150	178	150
Panel 2: Male students							
Role Model Treatment	-0.045	-0.017	0.06	-0.019**	-0.047*	-0.021	-0.017
	(0.028)	(0.02)	(0.041)	(0.009)	(0.028)	(0.015)	(0.042)
q-values	0.217	0.469	0.217	0.217	0.217	0.217	0.69
Control mean	0.306	0.188	0.537	0.053	0.161	0.092	0.302
N. obs	2201	2201	593	2201	593	2201	593
N. clusters	179	179	141	179	141	179	141

Note: Note for 66 students are not discovered in the data.

Note: Standard errors clustered at the class level in parentheses. The table reports the treatment effects of a "pilot" sample comprising schools in Zone 2 and the Municipality of Quito. The treatment is watching Business and STEM role models, irrespective of their gender composition. Unconditional refers to the full sample; meanwhile, conditional indicates that results come from the subsample of students who got a place to attend college. The table reports a linear probability model testing the treatment effect on the probability of entering college (Column 1), choosing STEM as a major (columns 2 and 3), choosing Business as a major (columns 4 and 5) or choosing an alternative major other than STEM and Business (Columns 6 and 7). We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). Since the timing of the intervention varies by class, we control for order effects as half of the classes watched the intervention at the very beginning of the Showing Life Opportunities project and the other half at the very end. The table reports clustered standard errors at the class level in parenthesis. Moreover, it reports sharpened p-values (q-values) following the suggestions in Anderson (2008) for the False

Discovery Rate (FDR). The q-values account for corrections by gender (male and female). To select the control variables, we use the post-Double Lasso selection approach.

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

Table S22: Treatment Effect on the Choice of Major for the pooled sample of K12 students

		Choice of academic majors					
	Entry into	STEM majors		Business majors		Other majors	
	College	Unconditional	Conditional	Unconditional	Conditional	Unconditional	Conditional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel 1: Female students							
Role Model Treatment	-0.022**	-0.020***	-0.042***	0.014*	0.048***	-0.001	-0.007
	(0.009)	(0.006)	(0.016)	(0.008)	(0.016)	(0.007)	(0.015)
q-values	0.015	0.002	0.018	0.038	0.009	0.332	0.514
Control Mean	0.355	0.109	0.283	0.108	0.283	0.243	0.434
N. obs	15,898	15,898	5,446	15,898	5,446	15,898	5,446
N. clusters	813	813	732	813	732	813	733
Panel 2: Male students							
Role Model Treatment	-0.020**	-0.031***	-0.028	-0.002	0.000	0.013**	0.027**
	(0.009)	(0.009)	(0.019)	(0.006)	(0.015)	(0.006)	(0.013)
q-values	0.015	0.001	0.135	0.332	0.653	0.015	0.057
Control Mean	0.314	0.233	0.671	0.046	0.131	0.141	0.199
N. obs	17,847	17,847	5,266	17,847	5,266	17,847	5,266
N. clusters	813	813	732	813	732	813	733
H0: Girls = Boys	0.600	0.063	0.900	0.071	0.034	0.044	0.071

Note: The table reports the treatment effects of a pooled sample comprising schools from the Coast and Highlands-Amazon regimes, plus schools from Zone 2 and the Municipality of Quito (henceforth, Zone2). The treatment is watching Business and STEM role models, irrespective of their gender composition. Unconditional refers to the full sample; meanwhile, conditional indicates that results come from the subsample of students who got a place to attend college. The table reports a linear probability model testing the treatment effect on the probability of entering college (Column 1), choosing STEM as a major (columns 2 and 3), choosing Business as a major (columns 4 and 5) or choosing an alternative major other than STEM and Business (Columns 6 and 7). We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). We account for the strata of random allocation. We introduce a singe strata for all Zone 2 schools, as we randomized at the class instead of school level. This way, each school is its own strata. In parentheses, the table reports clustered standard errors at the school level for the sample gathering the Coast and Highlands-Amazon regimes; meanwhile, it reports clustered standard errors at the class level in Zone 2 schools. Moreover, it reports sharpened p-values (q-values) following the suggestions in Anderson (2008) for the False Discovery Rate (FDR). The q-values account for corrections by gender (male and female). The bottom panel tests the null hypothesis that girls and boys exhibit equal treatment effects. To select the control variables, we compute the post-Double Lasso selection approach.

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

Table S23: Zone 2 - Impact on Actual Major Choices (Behavior) – science vs. technical track

		Choice of academic majors					
	Entry into	STEM majors		Business majors		Other majors	
	College	Unconditional	Conditional	Unconditional	Conditional	Unconditional	Conditional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel 1: Female students							
Role Model Treatment	0.466	-0.059	-0.116	0.014	0.152	-0.011	0.087
	(0.447)	(0.066)	(0.213)	(0.028)	(0.122)	(0.047)	(0.232)
Role Model Treatment * science track	0.051	0.032	0.102	-0.007	-0.052	-0.006	-0.103
	(0.076)	(0.050)	(0.142)	(0.035)	(0.107)	(0.048)	(0.204)
q-values	0.899	0.899	0.524	0.899	0.524	0.899	0.524
Science track Control Mean	0.421	0.129	0.283	0.06	0.137	0.244	0.58
Technical track Control Mean	0.268	0.102	0.353	0.071	0.265	0.102	0.382
H0: Role Model Treatment + Role Model Treatment *science = 0	0.277	0.591	0.92	0.751	0.29	0.676	0.907
N. obs	1,415	1,415	517	1,415	517	1,415	517
N. clusters	110	110	92	110	92	110	93
Panel 2: Male students							
Role Model	-0.604	0.034	0.100	-0.009	-0.091	-0.015	0.004
	(0.471)	(0.066)	(0.234)	(0.015)	(0.088)	(0.024)	(0.150)
Role Model Treatment * science track	-0.074	-0.116**	-0.369***	0.007	0.118	0.014	0.200
	(0.064)	(0.053)	(0.117)	(0.022)	(0.077)	(0.031)	(0.124)
q-values	0.899	0.230	0.009	0.899	0.209	0.899	0.209
Science track Control Mean	0.352	0.201	0.534	0.066	0.174	0.103	0.292
Technical track Control Mean	0.15	0.098	0.522	0.033	0.217	0.039	0.261
H0: Role Model Treatment + Role Model Treatment *science = 0	0.087	0.183	0.249	0.823	0.719	0.951	0.145
N. obs	1,333	1,333	350	1,333	350	1,333	350
N. clusters	110	110	89	110	89	110	90
H0: Girls science track = Boys technical track	0.106	0.086	0.027	0.193	0.054	0.305	0.507

Note: The table reports the treatment effects of a "pilot" sample comprising schools in Zone 2 and the Municipality of Quito. The treatment is watching Business and STEM role models, irrespective of their gender composition. Unconditional refers to the full sample; meanwhile, conditional indicates that results come from the subsample of students who got a place to attend college. The table reports a linear probability model testing the treatment effect on the probability of entering college (Column 1), choosing STEM as a major (columns 2 and 3), choosing Business as a major (columns 4 and 5) or choosing an alternative major other than STEM and Business (Columns 6 and 7). The interaction effect estimates the difference between science and technical tracks. We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). Since the timing of the intervention varies by class, we control for order effects as half of the classes watched the intervention at the very beginning of the Showing Life Opportunities project and the other half at the very end. The table reports clustered standard errors at the class level in parenthesis. Moreover, it reports sharpened p-values (q-values) following the suggestions in Anderson (2008) for the False Discovery Rate (FDR). The q-values account for corrections by gender (male and female). The bottom panel tests the null

hypothesis that girls and boys exhibit equal treatment effects. To select the control variables, we use post-double Lasso selection approach.

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

Table S24: Specialization Effect on the Choice of Major among Zone 2 students (K12) when the distribution is mostly Entrepreneurs (30% or fewer STEM role models were watched) and mostly STEM scientists (70% or more STEM role models were watched)

		Choice of academic majors					
	Entry into	STEM majors		Business majors		Other majors	
	College	Unconditional	Conditional	Unconditional	Conditional	Unconditional	Conditional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel 1: Female students							
Watched Mostly Entrepreneurs	0.012	-0.001	0.011	0.009	0.004	-0.002	-0.019
	(0.039)	(0.026)	(0.067)	(0.021)	(0.052)	(0.032)	(0.074)
q-values	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Watched Mostly STEM scientists	0.029	-0.017	-0.014	0.018	0.007	0.024	-0.006
	(0.034)	(0.022)	(0.052)	(0.019)	(0.046)	(0.028)	(0.059)
q-values	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Mean Balanced set of STEM and Business Role ModelsM	0.349	0.112	0.271	0.063	0.166	0.196	0.563
H0: Girls watched mostly Entrepreneurs = Girls watched mostly STEM scientists	0.667	0.569	0.71	0.7	0.954	0.473	0.867
N. obs	1,086	1,086	387	1,086	387	1,086	387
Panel 2: Male students							
Watched Mostly Entrepreneurs	-0.035	-0.021	0.109	-0.030**	-0.069	-0.011	-0.032
	(0.034)	(0.030)	(0.096)	(0.012)	(0.055)	(0.023)	(0.096)
q-values	0.427	0.567	0.402	0.094	0.391	0.67	0.742
Watched Mostly STEM scientists	-0.036	0.024	0.135*	-0.028**	-0.064	-0.034**	-0.088
	(0.030)	(0.027)	(0.073)	(0.011)	(0.043)	(0.017)	(0.066)
q-values	0.391	0.463	0.233	0.094	0.383	0.198	0.391
Mean Balanced set of STEM and Business Role ModelsRM	0.265	0.162	0.549	0.045	0.141	0.082	0.31
H0: Boys watched mostly Entrepreneurs = Boys watched mostly STEM scientists	0.973	0.171	0.791	0.892	0.927	0.285	0.561
N. obs	1,010	1,010	240	1,010	240	1,010	240
H0: Girls watched mostly Entrepreneurs = Boys watched mostly Entrepreneurs	0.436	0.553	0.415	0.121	0.313	0.0982	0.909
H0: Girls watched mostly STEM scientists = Boys watched mostly STEM scientists	0.180	0.270	0.101	0.030	0.182	0.165	0.343

Note: The table reports the treatment effects of a "pilot" sample comprising schools in Zone 2 and the Municipality of Quito. The treatment is watching mostly entrepreneurs or STEM scientists compared to students watching a specialization-balanced set of role models (omitted group). We test the treatment at the individual level. Thus, we report the results of the subset of students enrolled in treated schools (T.RM=1). We report results conditional and unconditional upon entering college. Column 1 reports

the likelihood of entering college, and columns 2 and 3 show the likelihood of pursuing STEM education. Columns 4 and 5 report the likelihood of studying business. Finally, Columns 6 and 7 report the likelihood of choosing non-STEM and non-business majors. We assess administrative records from the Ministry of Higher Education of Ecuador (Senescyt). Since the timing of the intervention varies by class, we control for order effects as half of the classes watched the intervention at the very beginning of the Showing Life Opportunities project and the other half at the very end. We report robust standard errors at the individual level in parenthesis along with sharpened p-values (q-values) following Anderson (2008) for the False Discovery Rate (FDR). The q-values account for corrections for the family of choice of major variables by gender. The H0 within each panel tests whether there is a substantial difference between specializations. In other words, it tests whether watching mostly STEM role models is significantly different than watching mostly business role models. The bottom panel of the table tests the null hypothesis that girls and boys exhibit equal treatment effects. To select the control variables, we compute the post-Double Lasso selection approach.

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