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Abstract

Gender segregation in the field of study is still a pervasive phenomenon in many countries. In this paper, we highlight the crucial role of parents and peers in adolescents' decision making on their educational choices, leading to a mismatch of talents. We design a lab-in-the-field experiment that exposes 2,500 middle school students in Italy to different information treatments before they choose between a female-typed task (literature) and a male-typed task (math). We find that students choose a more gender-stereotypical subject (girls choose more literature and boys choose more math) when they are induced to think about the recommendation of same-gender parents. The effect is driven by girls who expect literature as a recommendation from their mothers and boys who expect math as a recommendation from their fathers. The field choice of male and female students is not affected when they expect their peers to observe their decision. However, we show that girls shy away from math to avoid interactions in male-dominated contexts.

JEL Classification: I24, I25, O10

Keywords: gender stereotypes, Parents, Peers, Field of study

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Parents and Peers: Gender Stereotypes in the Field of Study *

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September 2021

Abstract

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1 Introduction

Educational choices are still highly segregated along the gender dimension in most countries around the world (Altonji et al., 2012; Blau and Kahn, 2017), with women persistently underrepresented in highly profitable fields, such as science, technology, engineering, and mathematics (STEM), and men unlikely to specialize in typically female-dominated areas such as humanities, education, and health (Delfino, 2019).[1] This gender gap in educational choices appears early on in the life of students (UNESCO, 2017) and generates long-lasting consequences for women and for men, thus affecting their opportunities, well-being and economic development (Kirkeboen et al., 2016).[2] Which is the role of parents and peers in shaping gender-stereotypical choices of children in the field of study? Parents affect children either by imposing direct restrictions on their choice sets or by indirectly influencing their behavior through recommendations, transmission of cultural traits, and role modelling (Doepke and Zilibotti, 2017; Bisin and Verdier, 2011). Simultaneously, peer pressure may shape adolescents' choices through the willingness to reveal only some desirable traits to friends and to conform to others' choices and behaviors (Bursztyn et al., 2019; Carrell and Hoekstra, 2010; Carrell et al., 2009). This implies that, if parents and peers hold gender stereotypical influences over adolescents, these may cause beliefs distortion and perpetuate gender segregation in the field of study (Bordalo et al., 2019; Coffman, 2014). Understanding the role of parents and peers in creating early gender barriers in the field's choices is therefore crucial to enhance productivity and equality.

In this paper, we test the causal impact of parents and peers on children's choice of the field of study using a lab-in-the-field experiment. First, we focus on the indirect influence of mothers and fathers through their school track recommendation as perceived by their children. Specifically, we investigate whether adolescents internalize their parents' beliefs and behave in the direction predicted by gender stereotypical views, associating more boys with scientific fields and girls with humanistic fields. Second, we study the influence of peers disentangling the role of concerns about public disclosure of their own track choice to classmates (Bursztyn et al., 2017) from the role of interactions with students choosing the same field (Robnett and Leaper, 2013). By choosing math, girls may signal "undesirable" traits to their classmates, such as a preference for competi-

[1] In Appendix Figure B.I we report the share of female and male graduates across OECD countries. There is a substantial over-representation of men in STEM majors and women in non-STEM majors.

[2] Gender differences in education are present at all levels of education and becomes worst as the level of education increases. In lower post-secondary education, when students make the choice on the subjects to study, data from the Trends in International Mathematics and Science Study (TIMSS) Advanced 2015 show that students taking advanced courses in physics were boys in all the countries analyzed (Portugal, Russia, USA, France, Italy, Sweden, Norway, Lebanon, Slovenia).

tiveness and ambition, while boys, by choosing literature, may signal traits that do not conform with the gender stereotypical view. However, when students choose the field of study, they jointly pick the subjects of their educational effort but also the peers they will interact with. By choosing a scientific area, a student will spend more time studying math but also probably more time with male peers, given the gender segregation of the field. Similarly, by choosing a humanistic subject, the student is likely to spend more time with a higher share of female peers. In this paper, we investigate whether public disclosure may influence students in the choice of the field and whether women shy away from math and men from literature to avoid interactions with peers from the opposite gender, perpetuating gender segregation in the field of study as a self-fulfilling prophecy.

We collect unique data among 2,500 Italian middle school children and we simulate the actual high school track choice by forcing students to choose between a traditionally male-typed field (math) and a traditionally female-typed field (literature) in class. Before choosing among the two types of tasks (math versus literature), students were randomly assigned to 5 treatment arms. To test the influence of parents, i) we asked students to think about what their mother would recommend them to choose between math and literature (*Treatment 1*); ii) we asked students to think about what their father would recommend them to choose between math and literature (*Treatment 2*); and iii) we told them that their choice may be revealed to their parents (*Treatment 3*). The rationale of these treatments is to study the indirect influence of parents and test whether the effect was driven by the students' belief of the parental recommendation or by the observability of their choice from parents. To study the influence of peers, iv) we informed students that their choice will be observed by their classmates (*Treatment 4*) or that v) they will also have to collaborate in an additional task with the classmates that choose their same subject (*Treatment 5*). The purpose of these treatments is to investigate whether girls and boys are influenced by public disclosure of their own choice during adolescence or whether the desire to avoid opposite gender peers is contributing to gender segregation in the field of study. In addition to the experiment, we also collect survey data among students and their parents, eliciting information on implicit gender stereotypes (through a Gender-Science Implicit Association Tests), explicit gender stereotypes, high school track interests, friendship network and socio-economic background.

Middle schools in Italy are an interesting setting to study these questions as children are about to choose their high-school track in a highly gender-stratified context.[3] The

[3]Girls represent only around 30% of students in the applied sciences track and 20% in the technical technological track. On the other hand, boys are less than 30% in the classic track and around 10% in the

field choice in our lab-in-the-field experiment is highly segregated along the gender dimension. On average 63% of boys and 43% of girls choose the scientific task, while the remaining students choose the humanistic task. The gender gap is independent of the comparative advantage in the two fields of students, with a higher probability of choosing math for boys even when they are better at literature and a higher probability of choosing literature for girls even when they are better at math. The field decision of the math versus the humanistic task in the experiment is correlated with several real-life outcomes, such as the interests in high-school tracks: students willing to attend the scientific track are more likely to choose math and students willing to attend the classic/humanistic track are more likely to choose literature. We also find that more overconfidence in one's own ability in a subject, as measured by a higher number of expected correct answers on a multiple choice test compared to the actual performance, is positively correlated with the choice of each field. Furthermore, implicit stereotypes are systematically correlated with the choice of the field: boys that associate more math with their own gender in the Gender-Science Implicit Association Test (IAT) are also more likely to choose math, while girls that associate more boys with math are less likely to choose math. The same pattern is not found with the measure of explicit stereotypes and it could be due to social desirability bias in the answers as shown in other similar contexts (Carlana, 2019; Nosek et al., 2002). Furthermore, we also find correlational evidence of parents' and peers' influence on the choice of the field: girls whose mother works are more likely to choose the math task and students are more likely to choose math if more close friends or classmates do so. However, these effects may be confounded by several issues, including the reflection problem for peers (Manski, 1993).

In our main results, we exploit a lab-in-the-field experiment to identify the causal effect of parents and peers. First, we show that students conform more to the gender stereotypical choice (girls choose literature and boys choose math) when they are induced to think about the recommendation of same-gender parents, especially when they believe their parents would suggest a gender-stereotypical choice. On average, thinking about mothers decreases the probability that girls choose the male-typed task (math) by 20% compared to the control group. The effect is entirely driven by girls who believe their mother would recommend literature to them with a decrease by 53% on their probability of choosing math compared to girls with the same belief in the control group. While boys' decision on the task is not influenced by reflection on mothers' recommendation, it is influenced by fathers': when boys believe their father would recommend them math, they increase their probability of choosing math by 16% compared to simi-

human sciences track (Source: aggregate data from the Italian Ministry of Education).

lar students in the control group. Second, we do not find evidence that students, neither boys nor girls, change their decision when they expect their classmates to observe their choice. During adolescence, neither girls nor boys are concerned about public disclosure of their own field interests to classmates, differently from what happens at higher educational levels, closer to the marriage age, when women avoid signaling ambition to single male classmates by "acting wife" (Bursztyn et al., 2017). However, peers interaction matters for girls: the probability of choosing math for female students decreases by 9 percentage points when they are aware they will have to interact with classmates choosing the same subject. The effect is driven by girls that expect to be a gender minority among students choosing math, with a decrease by 41% in their probability of choosing math (19 percentage points). Our experiment highlights the crucial role of parents and interaction with peers in adolescents' decision making regarding the choice of field.

Our work relates to three strands of literature. The first is the theoretical and empirical literature on the influence of parents on children's preferences and decisions (Doepke et al., 2019; Lizzeri and Siniscalchi, 2008; Giustinelli, 2016; Bergman, 2015). Parents may directly or indirectly influence children choices and induce them to behave in a direction congruent with their transmission effort (Bisin and Verdier, 2011). Among the studies able to empirically identify the role of mothers and fathers on the field of study, Dahl et al. (2020) examine the role of parents and sibling on academic track choice using a Regression Discontinuity Design and data from Sweden where admission to different tracks is based on GPA. If the father or the mother graduates in a field, their son is more likely to follow their track, while these effects are muted for daughters.[4] These results are consistent with correlational evidence from Italy on the intergenerational transmission of STEM education (Chise et al., 2019). Attanasio and Kaufmann (2014) provides evidence that mothers' expectations have a strong influence on their daughters' schooling decision, while it is less relevant for boys. Another recent paper by Tungodden (2019) looks at the effect of parents in shaping the willingness to compete of their children, showing that parents choose more competition for boys than for girls in an experiment in Norway. Finally, Cheng et al. (2017) test the extent to which the mindsets of a student's parents regarding math ability influence the student's mindset in math ability and longer-term STEM-related outcomes. Compared to these papers, we design a lab-in-the-field experiment to investigate the causal effect of indirect parental influence through their recommendation. We can also disentangle whether

[4]Dahl et al. (2020) found that younger brothers (sisters) are more likely to choose the subject of the older brothers (sisters), especially in male-dominated (female-dominated) fields. Further evidence on the role of siblings on college choice across different countries has been recently provided by Altmejd et al. (2021), while Brenøe (2021) focuses in particular on the influence of brothers on the gender norms.

the effect is driven by activation of mothers' or fathers' perceived suggestion or by the observability of students' choice from parents.

Second, our work is related to the growing literature looking at the effect of peers and horizontal socialization on educational outcomes and, more specifically on track choices (De Giorgi et al., 2010; Born et al., 2020; Hill, 2015; Zölitz and Feld, 2020; Anelli and Peri, 2019; Zölitz and Feld, 2020). While most of the previous papers focus on examining how the gender composition of the class affects future academic decisions, we attempt to investigate two mechanisms through which peers might influence high-school track choices: i) conformity to prevailing norms: students may care about how they are perceived by their peer group and avoid unconventional choices to signal desirable traits in societies characterized by strong gender roles (Bernheim, 1994; Bursztyn and Jensen, 2015; Bursztyn et al., 2019) and ii) unwillingness to interact with the opposite gender because of social identity or desire to avoid feeling a minority in the field (Shan, 2020). On the first channel, Bursztyn et al. (2017) show that public disclosure to peers has a negative effect on the willingness to report interest in a demanding career among a sample of single female MBA students. Single women reported lower desired salaries, lower willingness to travel and work long hours when they expected their classmates to see their preferences, given that the latter can be viewed as undesirable traits by potential husbands. With our experiment, we contribute by shedding lights on whether the same mechanism is at play during adolescence or it is something relevant only when individuals are getting closer to the marriage market. Related to the second mechanism, psychological literature (Robnett and Leaper, 2013; Robnett, 2016) argues that choices may be driven by the awareness of interactions with people of the opposite gender. Some evidence in economics suggests that women shy away from male-dominated fields when they experience minority status (Shan, 2020; Booth et al., 2018). In our paper, we are able to disentangle which of the two mechanisms - public disclosure versus interactions - may affect adolescents' choice of the field of study.

Third, we are contributing to a better understanding of the determinants of gender stereotypical choices in the field of study. One of the most long-lasting decisions adolescents and young adults have to make is related to the educational track, as it affects college majors and future job prospects (Kirkeboen et al., 2016; Anelli and Peri, 2019). The debate on whether the gender gap in track choice comes from innate differences in brain functioning or ability between boys and girls as opposed to culture and social conditioning seems to move towards the latter idea (Baron-Cohen, 2003; Guiso et al., 2008; Nollenberger et al., 2016). Gender differences in competitiveness (Buser et al., 2014; Almås et al., 2016), self-confidence (Kamas and Preston, 2012), or interests (Bian et al., 2017) may induce girls to avoid scientific fields. However, culture and exposure to

stereotypes since early childhood may affect the development of preferences, interests, and association between gender and fields. Tungodden (2019) shows that taste for competitiveness is influenced by parents, while Carlana (2019) and Lavy (2008) provides evidence that teachers' stereotypes induce girls to underperform in math, develop lower self-confidence, and self-select into less demanding high schools. Breda et al. (2020) and Porter and Serra (2019) conduct a field experiment to increase exposure to female role models working in scientific fields and show its impact on students' perceptions and academic choices. We contribute to this literature by showing that the field choice in our lab-in-the-field experiment is correlated with the stereotypes of students associating gender with subjects in the Implicit Association Test. We also show that exposure to gender stereotypical influences at home and at schools may lead to the exacerbation of gender gaps in educational decisions.

The remainder of the paper is organized as follows: Section 2 describes the data and the experimental design; Section 3 shows some descriptive statistics and correlations of students' probability of choosing math in our lab-in-the-field experiment; in Section 4 we present our empirical strategy and the main results; Section 5 concludes and discuss policy implications.

2 Data and Experimental Design

2.1 Students' Data collection

The data collection was conducted in 14 middle schools (grades 6, 7 and 8; age 11-14) across 163 different classes and 7 provinces in Italy (Milan, Como, Perugia, Ancona, Reggio Calabria, Bari, Palermo). Middle schools is compulsory for all pupils and it lasts for three years after which students have to make decision related to high school. Figure 1 shows the geographic distribution of our sample, including schools in the North, Centre, and South of the country.

[Insert Figure 1]

The students' survey was administered between November and December 2019 by enumerators using one tablet for each student in the class during regular school hours. Parents were informed that their children were invited to participate in a research project aimed at analyzing students' school interests, goals and aspirations. Among all students, around 85% were present in class during the day of the data collection and were allowed to participate in the research as they provided signed consent from their parents. During the data collection, the class was supervised by enumerators who did their best to ensure

no communication between students. The time to complete the survey was about 45 minutes. Although we did not provide a participation incentive, almost all students in the selected classes completed the survey. Our final sample includes 2511 students of grade 6 (39.88%), grade 7 (33.03%), and grade 8 (27.08%).[5]

The survey was divided into two main sections: i) the experiment and ii) the questionnaire. We will now describe each of the two survey's sections, reported in details in Appendix C.

2.1.1 The Experiment

The main goal of our experiment was to study whether field choices of students are affected in a gender-stereotypical way by their parents and peers. We focus on the choice between math, a male-typed area, and literature, a female-typed area (Coffman, 2014). We experimentally activate in a field setting the influence of parents by inducing a random set of students to think about their parental recommendation (mothers and fathers, separately) and the influence of peers by randomly informing students about the observability of their field choice from their classmates or the interactions with those making the same choice in a task related to the chosen field.

We proceed as follows. We inform students that they will be asked to complete six multiple-choice questions: three in math and three in literature, equally difficult for each subject. Students who completed these questions in the past were on average equally likely to provide correct answers in math and in literature. We selected these questions from past national standardized tests administered to middle school children and their answers can represent a rough proxy for students' ability.[6] Before answering to the multiple-choice questions, students had to choose one of the two fields by selecting the subject they expect to give a higher number of correct questions. They were incentivized to pick the area as they would gain two points for each correct answer in the chosen field and one in the other field. For example, if a student chose math, she would get two points for each correct question in math and one point for each correct question in literature. The choice of the task therefore reflects where students feel better at, either math or Italian and represents the key outcome of interest in the experiment. More precisely we asked: *"In which subject do you want to get double points? To get a higher score, we suggest you to choose the subject where you think you are better.*

[5] We dropped 35 students who could not speak Italian and 225 with severe disabilities that may have affected their understanding of the experiment and questionnaire. The results are qualitatively and quantitatively unaffected when we keep also these students in the analysis.

[6] We selected questions from past INVALSI, the national standardized test scores for students in grade 6 and 8. For students in grade 7, we prepared equally difficult questions with the support of middle school teachers.

Which subject do you choose?". The detailed script of the experiment is reported in Appendix C.1.

Before taking this decision, students were randomly exposed to the different treatments described below.

- **Treatment 1: Mothers' Recommendation.** We asked students to think about what their mother would recommend them to choose between math or literature before making their own choice.
- **Treatment 2: Fathers' Recommendation.** We asked students to think about what their father would recommend them to choose between math or literature before making their own choice.[7]
- **Treatment 3: Disclosure to Parents.** We told students that their choice may be revealed to their parents.[8]
- **Treatment 4: Disclosure to Peers.** We informed students that their choice will be observable by their peers. [9]
- **Treatment 5: Interaction with Peers.** We informed students that their choice will be observable by their peers and that they would have to collaborate in an additional task with the classmates who choose their same subject.[10]

Students are not allowed to change their mind after the initial choice of the field. At the end of the questionnaire, the last screen of each student's tablet shows in capital letters the decision they made at the beginning (either math or literature). All students, independently from the treatment assignment, were instructed to stand up with their tablet and move to the right (left) part of the room if they chose math (literature). They had to work with the other students who chose their same subject to discuss the answers to the multiple choice questions in the chosen field.

[7]More precisely, to students in Treatments 1 and 2 we asked: *"Think about your mother/father. Which subject she/he would advice you to choose?"*

[8]To students in Treatment 3 we asked: *"After the questionnaire your parents may be informed on the subject you decided to choose."* In practice, their choice was not revealed to parents.

[9]More specifically, to students in Treatment 4 we gave the following information: "*After the questionnaire, we will form two groups of students. All the students who choose math will stand up and move to the right part of the classroom, while those who chose literature will stand up and move to the left"*.

[10]Students in Treatment 5 received the following information: "*After the questionnaire, we will form two groups of students. All the students who chose math will stand up and move to the right part of the classroom, while those who chose Italian will stand up and move to the left. The two groups will discuss and comment together the answers they provided in the multiple choice questions"*.

Next, we elicit information on their belief about their mother's and father's recommendation. Indeed, we expect heterogeneous treatment effects depending on the perceived recommendation from parents, with an increase in the probability of choosing a subject when the parental recommendation in the same field is activated. We also elicit students' beliefs on the choice of their male and female classmates, to better understand whether their perception of minority status in a field may have driven their choice. Finally, we ask students to select whether they would expect to be better at a math/logic task or at a task that requires communication and organizational skills.

[Insert Table I]

We report the main summary statistics of the data collected from students in Table I. The summary statistics divided by gender are available in Appendix Table B.I. Around 50% of the students in our sample are female. In our experiment, 53% of the students choose math (63% of boys and 43% of girls), while 47% (65%) of students perceive their mother (father) would recommend them to choose math. Overall, 49% of students believe that more boys in class will choose math than girls, while 15% and 36% think that the share will be equal or more girls will choose math, respectively. The number of correct multiple choice questions in math and literature is pretty similar, with on average slightly less than 50% of correct answers. Girls and boys are performing on average equally well in our three multiple choice questions in math, but girls overperform boys in literature. We also collect students' expectation on the number of correct answers per subject and we calculate their overconfidence by comparing the number of actual correct answers with students' belief. 60% of students believe they have answered correctly to more questions than they actually did in literature and 46% of them believe they have answered correctly to more questions than they actually did in math. Consistently with the previous literature, boys are on average more overconfident than girls, especially in math (Kamas and Preston, 2012). We will dig deeper into the gender dynamic of these differences in Section 3.

2.1.2 Students' Questionnaire

The second part of the survey includes information on gender stereotypes, preferences for high school track choice, and friendship's network.

Gender-Science Implicit Association Test. To capture gender stereotypes, we administer an Implicit Association Tests (IAT). The IAT is an experimental method introduced by Greenwald and Banaji (1995) and Greenwald et al. (1998), based on the idea that reaction times in a rapid categorization task may reveal how strongly an individual associates two concepts. In our case, we are interested in the association between

sex (male/female) and subjects (scientific/humanistic) and we implement the Gender-Science IAT. Slower speed in associating certain pairs (e.g., scientific subjects and female names) denotes mental processes that tend to perceive those pairs as more difficult to associate. IATs are particularly useful in contexts where individuals are uncomfortable to reveal or are not aware to have certain attitudes or stereotypes. The first set of stimuli included female names (e.g., Lucia) and male names (e.g., Paolo), and the second set included subjects related to scientific (e.g., physics) and humanities fields (e.g., literature). Names and subjects appear one at a time at the center of the screen, and respondents are instructed to categorize them as fast as possible to the left or the right according to different labels displayed on the bottom of the screen (for instance, on the right the label "Female" and on the left the label "Male"). Two types of tasks are used to calculate the IAT score: in one task, individuals are instructed to categorize male (female) names and scientific (humanistic) subjects to the left (right) side of the screen, while in the second task individuals are instructed to categorize female (male) names and scientific (humanistic) subjects to the left (right) side of the screen. The idea behind the IAT is that if individuals have implicit associations between men and scientific fields, it should be easier and quicker to do the task when they categorize these words on the same side of the screen. A detailed explanation of the IAT is reported in Appendix C.2.1.

Despite being a noisy measure surrounded by a lively debate (Blanton et al., 2009; Oswald et al., 2013; Olson and Fazio, 2004), this tool has been widely employed in social psychology (Kiefer and Sekaquaptewa, 2007) and economics (Carlana, 2019; Corno et al., 2019) to understand implicit cognition, that is, cognitive processes of which an individual may not be aware and that include among others perception and stereotyping. In our analysis, we use the IAT score mainly as a control and to ease the interpretation of coefficients we standardize this variable to have mean 0 and standard deviation 1 in our sample of students.

Explicit Gender Stereotypes. In addition to the IAT, we elicit beliefs about explicit gender norms by asking them to agree or disagree with seven statements on gender differences.[11] For the empirical analysis, we create an index of explicit gender stereotypes by extracting one factor using principal component analysis and standardizing the variable to have mean 0 and standard deviation 1 in our sample of students.

High-school track interest. Next, we elicit students' interest for high-school tracks.

[11]The statements included were i) There are biological differences in men's and women's innate math abilities; ii) Earning money to support the family is a father's responsibility; iii) Taking care of the house and children is a mother's responsibility; iii) Psychologist is not a job suitable for women; iv) Computer programmer is not a job suitable for women; v) Even if they word hard, women cannot be good at football; v) Even if they work hard, men cannot be good at cooking.

In the Italian schooling system, at the end of grade 8 (at 13-14 years), students need to select a specific track and sub-tracks. This choice is crucial for students as it will affect the subjects they will study during the subsequent five years of high-school and the peers they will interact with as each track is usually located in a separate school building. There are three main high-school choices: 1) academic high-school, which include the sub-tracks classic, applied sciences, scientific, linguistic, artistic, human sciences; 2) the technical high-school, which includes the sub-tracks focusing on economics and technology; and 3) the vocational school, including several sub-tracks such as mechanics, hospitality, beauty centers. In Table I, we report the summary statistics with the interest of students for the classic/humanist and applied sciences field in a scale from 1 (”Not at all interested”) to 4 (”Very interested”). Appendix Table B.I shows that girls are more interested than boys in the classic/humanistic high-school track, while the opposite is true for applied sciences.[12]

Friendship Networks. We collect information on the friendship network of each student, asking the name and surname of their five best friends in the classroom.

Family background. We conclude the survey by collecting information on socio-economic characteristics and family background. The summary statistics of student and family characteristics that are used as additional controls in our main regressions are reported in Table I. Mothers are more likely to be college graduates than fathers (17% vs. 13%), but they are less likely to work (71% vs. 96%). These figures are similar to the education and occupation levels by gender and age groups in the general Italian population.

2.1.3 Balance Tables

Appendix Table B.II reports average baseline characteristics of each of the five treatment groups and control group. Students were randomly assigned at the individual level to the different treatment arms and they were exposed to the different information in the questionnaire on their own tablets. We distinguish between individual students' characteristics (Panel A) and family background (Panel B). Given the number of treatment arms and tests performed in the balance table, we find some small differences in the baseline characteristics that are consistent with random chance. In our empirical analysis, we will further control for all baseline characteristics to provide evidence that the results are not driven by these slight unbalances.

[12]This gender segregation is reflected in the overall Italian context. In Appendix Figure B.II we report the gender composition of each high school tracks and show that the most scientific track (Scientific Lyceum-Applied Science) enrolled 90% of boys and about 20% of girls. On the contrary, the humanistic tracks (i.e. Classic Lyceum and Lyceum Human Science) enrolled a great majority of girls.

2.2 Parents' questionnaire

After the students' data collection, enumerators distributed a flyer to children with a QR code and a link to the parents' questionnaire. Parents were supposed to receive the flyer from their children and complete the questionnaire on their own device (phone, tablet, or computer). Schools were incentivized to promote the questionnaire among parents. We offered a 750 euro Amazon voucher to all schools with a parents' response rate of at least 50% and 3000 euro to the school that received the highest fraction of completed questionnaires (compared to the number of students enrolled in the project). The time to complete the parents' questionnaire was around 30 minutes. Unfortunately, our final sample includes only 542 parents of 484 children, out of 2511 students in our sample, with a response rate from guardians below 20%. In Appendix Table B.III we report statistics for the sample of parents who completed the survey showing that is systematically different from those who did not. Parents from an immigrant background, those with low level of education or occupation are less likely to complete the survey. The children of parents who completed the survey report lower level of explicit gender stereotypes, but similar level of implicit stereotypes. Given the limitations due to the sample size and selection on the parents' questionnaire, in this paper we focus on the students' survey and we exploit the information on the actual parental recommendation to students to show some suggestive evidence.

3 Descriptive Evidence: Field Choice and Gender Gaps

Gender gaps in field choices are widespread across the world. Women are systematically underrepresented in STEM fields, while men are underrepresented in humanistic fields (OECD, 2014; Delfino, 2019). This pattern is consistent with the descriptive evidence from our experiment. Indeed, 63% of boys in our sample select math, while the share for girls is as low as 43%.

[Insert Table II]

In Table II, we provide evidence that the choice of math in the experiment is correlated with crucial outcomes for the individual. First, the field choice of students in our experiment is positively associated with their reported interest for applied sciences high-school track and negatively correlated with their interest with the classic high-school which focuses on humanistic subjects (Panel A, column 2 and 3). Indeed, students with higher interest in classical studies are more likely to select literature in our experiment. There results are reassuring as they suggest students were accurate and consistent when

completing the survey. Second, in line with the previous literature (Kamas and Preston, 2012), students who are overconfident in their own skills over a particular subject are more likely to choose it, given that they believe they are better in the related multiple choice questions (Panel A, columns 4 and 5).[13] Furthermore, during our questionnaire, we ask students their preferences between a logic and a communication task. We find that the choice of math is consistently positively correlated with the preferences for the logic task compared to the communication task (Panel A, column 6). These correlations suggest that students took seriously the task that was assigned during the experiment. Interestingly, for all these variables, there is no systematic gender difference in the correlation with the choice of the field.

Panel B of Table II focuses on the correlation between the choice of field and other factors, such as exposure to gender stereotypes in society, at home, and in school. Implicit stereotypes, as measured by the IAT score (Panel B, column 1), are correlated with the choice of the field: one standard deviation increase in the association between males and scientific subjects raises the probability to select math by 5.3 percentage points for boys and decreases the probability of selecting math by 2.9 percentage points for girls. Our measure of explicit gender stereotypes correlates neither with the math choice (Panel B, column 2) nor with the implicit stereotypes. This result is not uncommon in the literature as explicit stereotypes may measure different mental constructs or because of social desirability bias in the explicit answers (Greenwald et al., 2009; Carlana, 2019). As shown among others by Campa et al. (2011), the gender norms tend to be more conservative in the South of Italy compared to the North. Hence, in column 3, we explore the geographic pattern in students' choice. While boys are equally likely to choose math in the different parts of the country, girls tend to be 6 percentage points less likely to choose math if they live in the South, although this difference is not statistically significant at conventional levels (Panel B, column 3). Furthermore, the role modeling example of working mothers seems to be associated with a decrease in the gender gaps in the choice of the field, even if the impact is imprecisely estimated and statistically significant at 10 (Panel B, column 4).[14] Finally, we collected information on the friendship network of students by asking them to nominate their five best friends in the classroom. As suggested by Appendix Figure B.III, networks tend to be

[13]The overconfidence is a dummy variable which assumes value 1 if the student perceives she/he answered to more correct questions compared to the actual number of right answers in our multiple choice test score. In our sample, 51% of boys and 40% of girls are overconfident in math, while 63% of boys and 58% of girls are overconfident in literature. Overconfidence in own math and Italian abilities is probably a better driver of the choice of the task compared to actual ability (which is also correlated with the choice of the task).

[14]We do not have precise information on the field of study of parents, nor whether their occupation is in STEM related sectors.

characterized by high gender and field homophily, with students being more likely to mention classmates of the same gender and who choose the same subject. As shown in the last two columns of Panel B, for both genders, a higher share of friends and classmates choosing math is endogenously correlated with a higher probability of choosing math themselves. However, girls mention 47 percent of their closer friends choosing that field, while for boys the share is equal to 58 percent.

In Appendix Table B.IV, we provide further evidence consistent with what discussed above. The inclusion of class fixed effects does not significantly affect the gender gap in the choice of the field (column 2), and the findings are substantially unaffected by the simultaneous inclusion of all controls, even when we split the sample by gender (columns 3-5).

Another interesting descriptive fact emerges when looking at students with different performance in the task. In our experiment, we ask six multiple choice questions to students and we can divide the sample among top achievers - those who answered correctly to at least 50% of the questions and bottom achievers - those who answered correctly to less than 50% of the questions. Among high and low achieving students, we can further look at those who answers to more correct answers in math, in literature or equally in the two subjects. Despite being a noisy measure, due to the limited number of questions, students' performance in the multiple choices is a rough proxy of the optimal choice in our experiment. In Appendix Figure A.I, we divide the sample among top achievers (left panel) and bottom achievers (right panel) and look at their optimal choice. The gender gap in the choice of the field is persistently around 20 percentage points in both groups. Among top achievers with a better performance in math, 76% of boys take the decision to maximize their payoff, while only 51% of girls do so. On the other hand, among top achievers with a better performance in literature, 56% of girls choose literature and only 38% of boys. Appendix Figure A.I shows that gender stereotypical choices, i.e. math for boys and literature for girls, generate a cost for students of both genders who are talented in counter-stereotypical fields.

To sum up, in this section, we have provided evidence that there is a strong gender pattern in the field choice in our lab-in-the-field experiment. Gender stereotypical choices generate a "cost" for girls by inducing them to select less math even when it would be the optimal choice and similarly for boys by inducing them to select less literature, even when they do have a comparative advantage. The field choice is associated with some relevant real-world variables, including track choice and interests, abilities, and exposure to stereotypes, parents and peers. These correlations clearly do not imply a causal effect. We will next investigate the causal influence of parents and peers by presenting our experimental evidence.

4 Main Results

In this section, we report the results from the experimental evidence by focusing first on the role of parents (Section 4.2) and then on the role of peers (Section 4.3) in affecting gender stereotypical choices of students.

4.1 Empirical strategy

To assess the impact of parents and peers on students' choice, we estimate the following OLS regression, separately for boys and girls as we may expect stereotypical influences in opposite directions for each gender:

$$Y_{ic} = \beta_0 + \beta_1 Treat1_{ic} + \beta_2 Treat2_{ic} + \beta_3 Treat3_{ic} + \beta_4 Treat4_{ic} + \beta_5 Treat5_{ic} + \gamma_c + \varepsilon_{ic} \quad (1)$$

where Y_{ic} is a dummy variable which assumes value 1 if the student i attending class c chooses math and 0 otherwise; $TreatX_{ic}$ is an indicator for whether the student was assigned to the treatment X; γ_c denotes class fixed effects (which coincides with the section of our experiment); ε_{ic} is an error term. We estimate robust standard errors clustered at the class level.

In the robustness, we report the results also adding student's controls (immigrant indicator, implicit and explicit stereotypes) and family's controls (mother's and father's level of education and employment and presence of siblings).

4.2 The influence of parents

Parents can *directly* influence the field of study of their children by forcing them to choose a specific subject. Given that this scenario is unlikely in industrialized countries (Giustinelli, 2016)[15], we are interested in digging deeper into the *indirect* effect of parental influence on children's choice (Doepke and Zilibotti, 2017; Bisin and Verdier, 2011). We want to explore whether activating students' perceived parental recommendation influences the choice between math and literature.

[15] Giustinelli (2016) collected survey data from parents and children in Italian middle schools and shows that the actual high-school choice is aligned with child's stated preferred alternative in the great majority of cases.

4.2.1 Correlations: Students' Beliefs on parental recommendation

Are girls and boys perceiving a gender stereotypical recommendation from their parents? Is the belief of students correlated with the actual parental recommendation? Before moving to the experimental results, we address these questions, which are important for the interpretation of our results and for understanding what our treatments activate by inducing the students to think about their parental recommendation.

[Insert Figure 2 and Table III]

The left panel of Figure 2 plots the raw data of students' belief on mother advice (top panel) and father advice (bottom panel) by gender. It shows two interesting descriptive facts. First, when thinking about mothers' compared to fathers' recommendation, students are less likely to think about math. The difference for both boys and girls is approximately 17 percentage points comparing the top panel with the bottom one. Second, on average when thinking about their mothers' recommendation, girls are less likely to think about math (compared to literature) than boys (44% vs. 50%). The same pattern holds for fathers' recommendation (62% of girls believe he would recommend math instead of literature vs. 67% of boys). Overall boys perceive a stronger push toward math and girls toward literature when thinking about their parents. The result is robust even when we control for the performance in multiple-choice questions, student characteristics, family background, and class fixed effects (columns 1-4, Table III). In our most complete specification (Panels A-B, column 4), compared to boys, girls have a 6.4 percentage points (5.8 percentage points) lower probability of perceiving math as advice from their mother (father), which corresponds to a 13% decrease in mothers' recommendation compared to boys (and a 9% decrease in fathers' recommendation compared to boys). In Table III, we show also the coefficient on the correlation between the Implicit Association Test score and the perceived recommendation from parents. The point estimate suggests that boys who associate more math with their own gender are more likely to perceive a parental recommendation toward the scientific area, while girls who associate more math with boys are less likely to perceive a parental recommendation in math. The coefficients are statistically insignificant for mothers' recommendation, but double the size and are precisely estimated for the father recommendation.

We also investigate students' belief on parental recommendation when we restrict the sample to children of parents who completed the survey (matched sample). The sample of parents who completed the survey is systematically different from those who did not: they tend to have a higher level of education, they are less likely to be from an immigrant background, and mothers are more likely to work (see Appendix Table

B.III). These differences are in part reflected in the perceived recommendations from parents. In Figure 2, we observe that in the matched sample both boys and girls systematically perceive higher math recommendation from their parents, while only boys perceive higher math recommendation from their mothers leading to a higher gender gap of 14 percentage points (Table III, Panel A, column 5 and 6). This pattern mirrors the parental recommendation reported directly by the sample of parents who completed the survey. As shown in the right panel of Figure 2. The perception of students seems to be pretty accurate when they think about their mothers' recommendation (mothers do recommend to choose math more to boys compared to girls) while for fathers the perception is more skewed toward math compared to what fathers actually report (but again father recommend to choose math more to boys compared to girls). For the matched sample, we can provide evidence that there is a fairly strong correlation between actual parental advice and perceived advice from students (Table III, column 7 and 8).

Finally, in Appendix Tables B.V and B.VI, we report the mean of the characteristics of students who perceived a recommendation in literature and math from their mother and father, respectively. The overall pattern suggests that highly educated parents and those in high wage jobs are slightly more likely to recommend math, but, surprisingly, there are no stark differences in parental background depending on perceived recommendation.[16] However, we do find that the perceived recommendation is correlated with the high-school interest, choice of field, and choice between logic and communication tasks in the expected direction.

To sum up, Table III provides direct evidence of the gender gap in perceived parental recommendation, the robustness of such correlation to the inclusion of controls such as students' performance and the IAT score, and the strong correlation between parental advice and perception of students. These gender stereotypical associations may induce girls to choose less math and boys to choose less literature compared to what they would have done without parental pressure, potentially leading to a mismatch of talents. If this was the case, we would expect the effect of our experimental treatments to depend on whether the parents recommend a gender stereotypical subject.

4.2.2 Experimental Evidence: Do parents influence their children's decision?

[Insert Figure 3]

The main results of our experiment are presented in Figure 3. To examine the role of parents, following equation 1, we plot the mean of the outcome (the probability of

[16] Unfortunately, we do not have information on whether the parents work in STEM or has a STEM degree. Especially among mothers, most highly educated mothers are expected to have a degree in another field, confounding the effect.

choosing math) for the control group and for each treatment separately. In the control group, 47% of girls and 59% of boys choose math. We find evidence that simply thinking about their mother (Treatment 1: Mother) before selecting their own choice decreases the probability that girls choose math by 9.4 percentage points, a decrease of 20% compared to the control group. Interestingly, we do not find a statistically significant effect on girls from thinking about their father (Treatment 2: Father). On the other hand, when we inform students that their choice may be revealed to their parents (Treatment 3: Parents), girls decrease their probability of choosing math by 8 percentage points, but the effect is not statistically significant at conventional levels. On average, the effect of these treatments on boys is small in magnitude and statistically indistinguishable from zero. The revelation to mothers and fathers may not be sufficient to lead to a change in students' choice as students may already know that their parents have a good prior on their decision even if it does not coincide with their recommendation (Giustinelli, 2016).

[Insert Table IV]

In Table IV, we report the coefficients plotted in Figure 3, including also the results without the class/experimental session fixed effects and including student and family controls. The results are quantitatively and qualitatively unaffected by the specification chosen.

Thinking about mother's and father's recommendation activate different gender stereotypical associations on boys and girls as clearly emerges from the descriptive evidence in the previous section. However, if stereotypical associations are the key driver of our results, we should expect different effects depending on the perceived parental recommendation (math or literature) and the gender of the child.

[Insert Figure 4 and Figure 5]

In order to test for this channel, we analyze the heterogeneous treatment effects depending on the perceived recommendation from mothers and fathers. In the control group, students who are better in a specific area are more likely both to choose and receive a parental recommendation in that field. As shown by Figure 4, 58% (78%) of girls (boys) decide to choose math when they believe this would be consistent with their mother's recommendation, while this share is only 39% (43%) among those who believe their mother would recommend them choosing the literature track. This mean difference in the control group reflects actual differences in performance, skills in each subject, or knowledge of own competitive advantage.

When looking at the effect of Treatment 1 (Mother), we find that students assigned to think about their mother recommendation before choosing the field react by aligning their choice toward their mother's. However, the effect is economically and statistically significant only for girls when they perceive a push toward the gender stereotypical subject. Indeed, among girls who perceive their mother would recommend them literature, the probability of choosing math decreases by 53% (from 39% to 18%) (Figure 4, top right panel).

Interestingly, as shown in Figure 5, we find a symmetric pattern for boys. The point estimate suggests an alignment of students' choice to fathers' perceive recommendation, statistically significant only for boys whose fathers recommend a gender stereotypical subject. Indeed, when boys believe their father would recommend them math, they increase their probability of choosing math by 16% (from 72% to 84%) if they are induced to think about their father's recommendation before choosing. In Appendix Table B.VII (Panel A and B), we report the coefficients plotted in Figure 4 and Figure 5, considering additional control variables and correcting for multiple hypothesis testing using the Westfall-Young step-down adjusted p-values, which also control for the family-wise error rate (FWER) and allow for dependence amongst the p-values. The results are not qualitatively not quantitatively different from the main specification.

Finally, we examine the probability of choosing math for students in each treatment group, by their ability. Focusing on the effect of Treatment 1 (Mothers' recommendation) for girls, we show, in the top panel of Appendix Figure A.II, that our results are driven by top achievers (defined as those who answered correctly to at least 50% of the multiple choice questions). These results suggest that high ability girls are pushed away from math after thinking about mother's suggestion.

Even when parents do not directly impose their choices on children, our results show that they can indirectly influence their children's decision, leading to an exacerbation of gender stereotypes in the choice of the field. If students perceive counter-stereotypical recommendations from parents, they are not influenced in their decision of math versus literature. However, gender stereotypical recommendation of same-gender parents induce children to segregate in different fields, pushing more girls into literature and more boys into math. This may activate stereotypes associating gender and field of study that are deeply rooted in the exposure since early childhood (Ambady et al., 2001; Banse et al., 2010).

4.3 The influence of Peers

Friendship networks and social norms among school peers can influence the choices and interests of students, including the field of study. For example, exposure to same-gender peers has been shown to exacerbate gender segregation in the choice of the field of study, with women increasing their likelihood of choosing a female-dominated fields (Zölitz and Feld, 2020) and men increasing their likelihood of choosing male-dominated fields (Anelli and Peri, 2019).

In our experiment, we investigate two channels through which peers may affect behavior, going beyond exposure to peers of a specific gender. First, we study whether students increase reporting stereotypical choices when observed by their peers to signal desirable traits and increase conformity. Treatment 4 is designed to activate this mechanism. As shown by Bursztyn et al. (2017), female single MBA students avoid signaling traits such as ambition in the labor market - viewed as an undesirable traits for potential husbands - when their classmates may observe their preferences. All other groups of students are unaffected by peers observability. In this paper, we investigate whether observability by peers can at least partially explain the emergence of the gender gap in the field of choice during adolescence. Second, we study whether the gender gap in preferences for different fields is exacerbated by the awareness of interacting with the same peers that choose the own field. Indeed, when choosing a specific field, students are aware they will select a package of aspects, including subjects and peers they will socialize with. In the context of our experiment, students are about to choose the high-school track: when they select the track they jointly pick the gender composition of their classmates for the next five years at high school. As shown in Appendix Figure B.II, most tracks are highly gender segregated with a share of females going from less than 20% to almost 90%. Treatment 5 in our lab-in-the-field experiment is designed to activate this mechanism by informing students they will have to interact with the same set of peers that select their own choice.

4.3.1 Correlations: Students' Beliefs on peers' choice

Before moving to the experimental results on the role of peers, we provide some descriptive evidence on the correlation between the classmates' choice between math and literature and the beliefs of students on classmates' choice. This belief plays a crucial role in our experiment as it may affect the perception of being a minority among the students who select a specific subject. In our survey, we ask to the students their belief regarding the choice of their classmates: 49% of girls (48% of boys) expect that more boys will choose math and 14% of girls (16% of boys) believe that the composition will

be equal, while the rest believes boys will be a minority among those who choose math.

[Insert Table V]

In Table V we report the correlation between classmates' choice, defined as a dummy equal to one if there are more boys than girls choosing math in the class, and students' beliefs on classmates choice. In all the specification, we note a positive and statistically significant correlation between the belief of the students and the classmates' actual choice. This association does not differ across gender (column 2) and holds also when we control for the performance of classmates (Table V, column 3) and student's characteristics (Table V, column 4). This result suggests that students' beliefs reflect the true composition of the class in term of choice of field.

4.3.2 Experimental Evidence: Do peers influence students' decision?

[Insert Figure 6]

Figure 6 shows the key result from the peer treatments. Although the point estimate suggests a slight change in the gender stereotypical direction (i.e. females have lower and males have higher probability to choose math), both boys and girls do not significantly change their behavior when they are aware their peers will observe their choice (Treatment 4: Peer Public). The result suggests that during adolescence the decision of the subject does not necessarily signal undesirable traits to peers and it does not induce to change the reported choice. However, we do find evidence that girls shy away from male-dominated fields when they are aware they will have to interact with peers who choose the same field (Treatment 5: Peer public+ Interaction). On average, female students decrease their probability of choosing math by 9.1 percentage points when assigned to Treatment 5 compared to the control group, a statistically and economically significant decrease by 19.4%. Boys do not seem to be affected by this channel. As before, in Table IV, we show the coefficients plotted in Figure 6, adding controls for student and family characteristics. As expected, given the randomization, the results are not significantly affected by the specification chosen.

[Insert Figure 7]

Next, we provide evidence that the effect is driven by girls' avoidance of being a minority in a male-dominated field. Figure 7 shows that the average effect of the impact of Treatment 5 (Peers+Interaction) is driven by girls who believe classmates make gender stereotypical choices, with a higher share of male peers choosing math and female peers

choosing literature. Among girls who believe more male classmates will choose math, their probability of opting in the male-dominated field decreases from 45% to 27% if they know they would have to interact with classmates who choose the same subject. Girls' choice is not affected compared to the relevant control group if they believe they are at least equally represented among students choosing math.[17] The effect may be driven by the expectation of a more competitive environment when there is a higher share of boys in the male-typed field, but not in other fields (Coffman, 2014). There is no statistically significant effect for boys, neither for those who believe more male classmates choose math nor for those with the opposite belief. In Appendix Table B.VIII, we report the coefficients plotted in Figure 7, considering also additional controls and corrected for multiple hypothesis testing using the Westfall-Young step-down adjusted p-values. The results are not affected by the use of different specifications. Furthermore, in Appendix Figure B.IV, we test whether friends' actual choice influence these treatment effects. As suggested by Appendix Figure B.III, the friendship network has a high degree of gender homophily and students are more likely to be friends with other students of the same gender. As a consequence of gender stereotypical choices, girls are more likely to be friend of students selecting literature in our experiment. We find evidence that girls having more friends in literature are also more likely to be affected by Treatment 5 (Peers+Interaction) and substantially increase their probability of choosing literature, while there are no statistically significant effects for other groups. This results is consistent with an alternative mechanism suggesting that girls with more friends choosing literature try to conform to the gender stereotype to interact with their closest friends in the additional activity.

Finally, as for Treatment 1, when looking at the differential influence of peers by students' ability (Appendix Figure A.II), we found that our results are, once again, driven by top achiever girls.

5 Conclusions and Policy Implications

Gender segregation in the field of study - with men underrepresented in health and education and women underrepresented in science, technology and finance - remains a relevant problem in many areas of the world, generating inequality and affecting productivity due to the mismatch of talents. In countries characterized by early high-school tracking, segregation strongly emerges during adolescence and influences further edu-

[17] Only 14% of girls and 16% of boys expect that more boys will choose math in our lab-in-the-field experiment. The sample is very small and we find similar effects compared to those who expect an equal gender representation in the choice of math. Hence, we report the results jointly for the two groups.

cational trajectories and occupational attainment. In this paper, we design a lab-in-the-field experiment that randomly exposes 2,500 middle school students to different treatments to understand whether students' gender stereotypical choices of the field of study are at least partially induced by exposure to parents and peers.

We provide evidence that there are substantial gender differences in the choice of the field in our setting with more than 60% of boys and 40% of girls who do prefer a task in math (vs. a task in literature), reflecting different interests across gender for high-schools in the real world, as well as self-confidence and implicit stereotypes. Furthermore, we show that among students with a better performance in math, 76% of boys chose math versus only 51% of the girls; on the contrary, among students with a better performance in literature, 56% of the girls chose math and only 38% of the boys. This suggests that gender stereotypical choices generate a cost for talented students in a counter-stereotypical field. In our experiment, we found that same-gender parents influence children in the stereotypical domain (i.e. fathers influence boys in choosing math and mothers influence girls in choosing literature). The effect is driven by the activation of parental recommendation inducing children to think about the stereotypical choice and not necessarily from the fear of disappointing parents because of an unexpected choice. We also found that public disclosure to peers does not affect students' choice between female-typed tasks versus male-typed tasks but what matters is the potential interactions with peers of a different gender: while boys are not affected by peers, girls shy away from math when they believe they will be a minority, leading to a self-fulfilling prophecy with a lower share of female students who end up choosing the male-typed field. This experiment highlights the important role of parents and interaction with peers in adolescents' decision making regarding the choice of field, potentially leading to a mismatch of talents.

To better understand some potential policy implications of our study, we conducted a small follow-up experiment with the parents in our sample. The main goal of this experiment was to test whether an increase in parents' awareness of their influence on children' field choices could change their recommendation and beliefs on ability of both gender. The experiment was conducted in May 2020 during the first wave of the Covid-19 lockdown with a limited sample. We randomize a two-minute video that we sent via mail to half of the parents in our sample who provided their email addresses. The video described, in a very simple graphical way, the results of the experiment we conducted in November 2019 with their children in the school, separately for parents who had a girl or a boy participating in the baseline survey. Appendix Figure B.V presents two screenshots of the video. In the first screenshot, we report the average probability of choosing math for a girl in the control group and how the same probability decreases

when the girl thinks about her mother's suggestion. In the second screenshot, we report similar information showing the results for boys: how the probability of choosing math increases if they think their fathers would recommend them to choose math. Two weeks after showing the video, we run a short survey asking perceptions about the ability of boys versus girls in math and Italian and their high school recommendation.[18]

The main findings are shown in Appendix Figure A.III. We report IV estimates, where we instrumented the probability of being in the treatment group with the actual probability of having watched the video, of four main outcomes: i) self-reported probability that parents think that girls are better or equal to boys in math (89% in the control group); ii) self-reported probability that parents think that boys are better or equal girls in Italian (80% in the control group); iii) a dummy indicating whether they strongly or very strongly recommend a scientific high school (21% in the control group) and iv) a dummy indicating whether they strongly or very strongly recommend a humanistic high school (63% in the control group).[19] Despite the small sample size, we show that raising awareness about parents' stereotypical view - a very low-cost intervention - might change their perceptions towards girls' and boys' abilities in math and literature and their high school recommendation. Parents who watched the video are more likely to think that girls are equally good or better than boys in math and that boys are equally good or better than girls in Italian. However, the effect is statistically significant only for parents with a daughter.[20] Treated parents with a daughter are also more likely to recommend a highly scientific track (Applied Science High School) and less likely to recommend a humanistic high school (Classic high school), although the former coefficient is not statistically significant at conventional level. There are no significant effects for parents with a son. Awareness campaign may help parents to counteract gender stereotypes, even if they may not be sufficiently strong to lead to an actual change in the recommendation.

Finally, also our results on the effects of peers have deep implications for high-school track choice. We show that, when choosing between scientific and humanistic track, students choose a package composed by the subject they want to study and with which peers they want to interact. In several countries characterized by high-school tracking, students are separated in different school buildings depending on the field they choose limiting the interaction with peers that choose a different area. Potential policies might

[18] We received a response from 157 parents, 77% mothers and 23% fathers. The sample is very limited and the evidence should be considered as suggestive.

[19] The first stage F-stat of these four regressions is always greater than 30.

[20] A potential interpretation of this finding is that mothers, the great majority of parents in our sample, are updating at a higher degree expectation toward girls, consistently with our previous findings on the important role of same-gender parent.

include the design of different high school tracks within the same school building to mitigate the role of the interaction channels that prevents girls from entering into the scientific field. This setting could foster interactions across students choosing different fields (i.e. girls who prefer a scientific track can always interact with girls choosing a literature track during daily school breaks).

Although more evidence is necessary, public policies in the directions described above might be potentially efficient in changing the gender pattern in the field of study.

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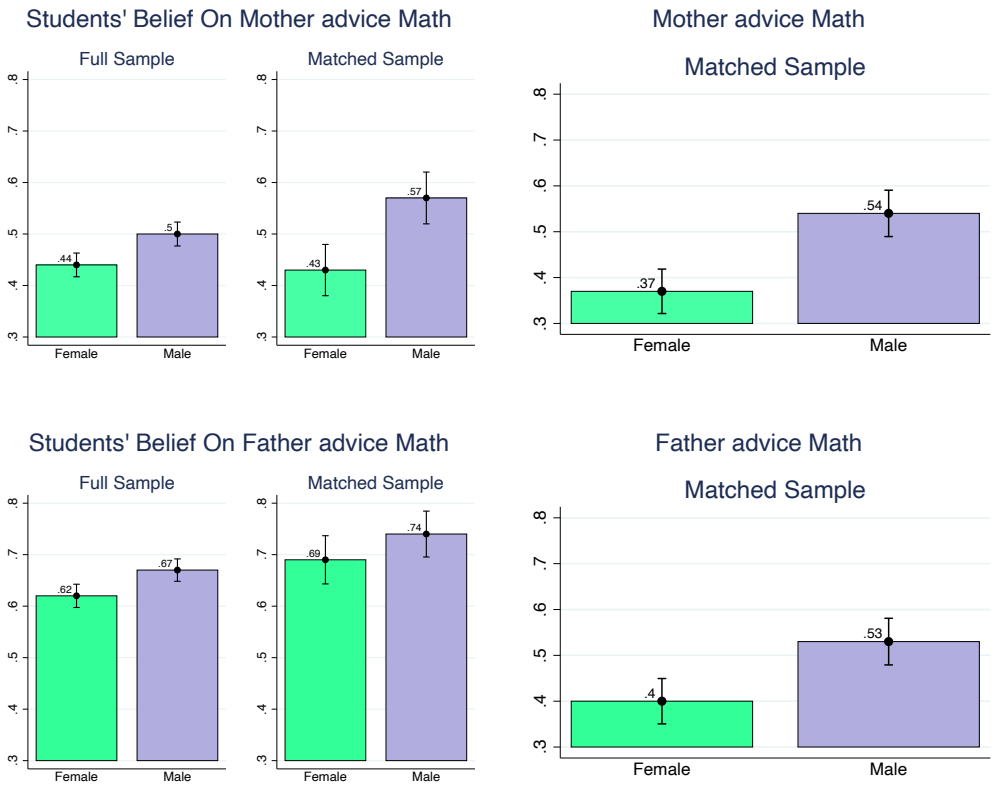
Figures and Tables

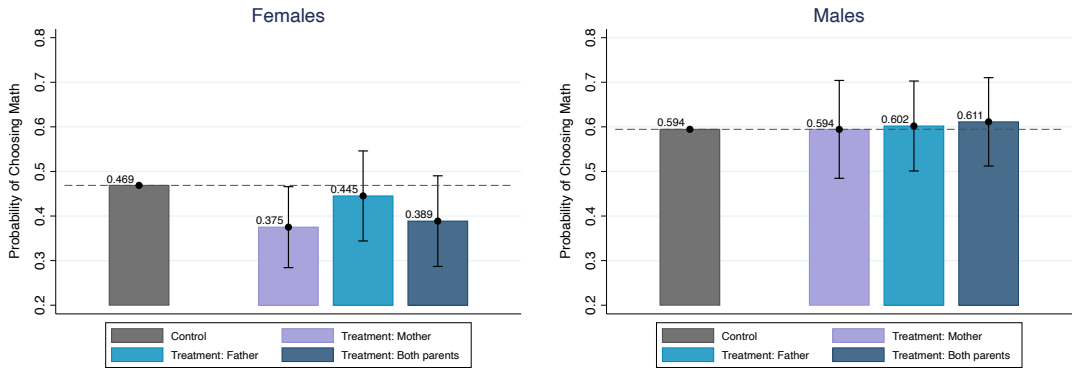
Figure 1. Geographic Distribution of Participating Schools

Figure 2. Descriptive Statistics: Students' beliefs and parental recommendation



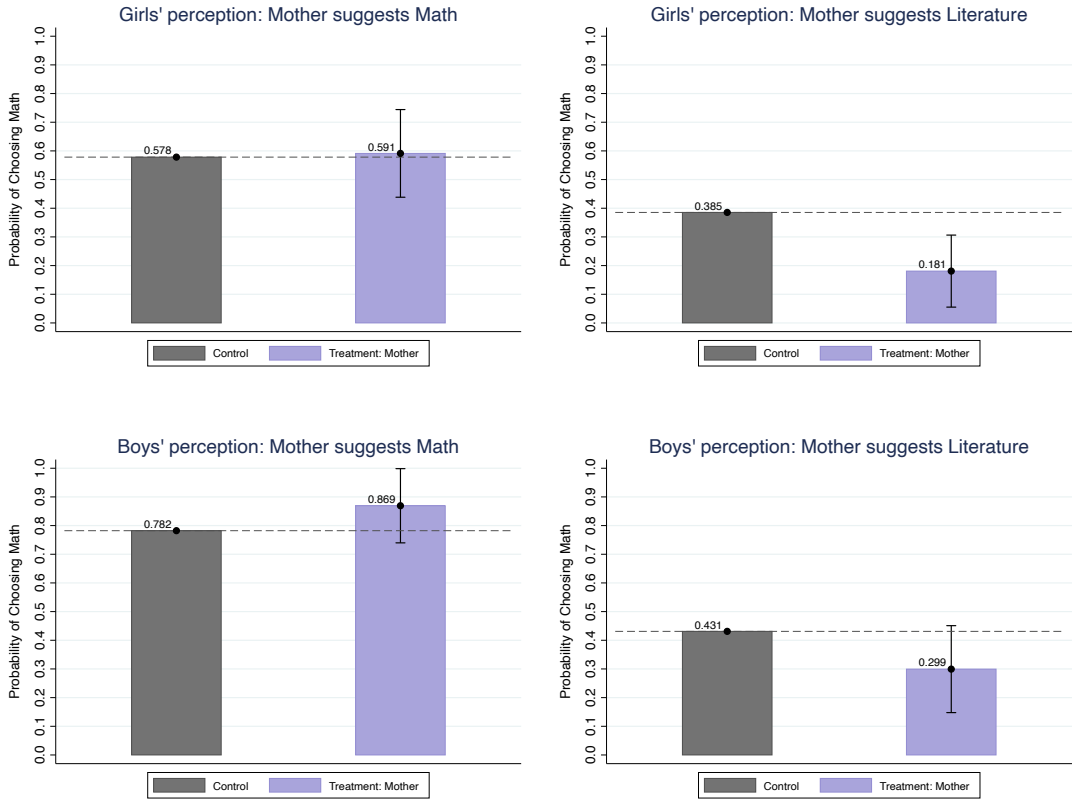
Notes: These graphs plot the probability that mothers and fathers recommend math to their children and the belief of their children about parental recommendation. The full sample includes 2511 observations from the students' questionnaire. The matched sample includes only observations in which parents and children completed both the endline survey: 537 students and parents (409 mothers and 128 fathers).

Figure 3. Treatment Effect - Parents' Treatment



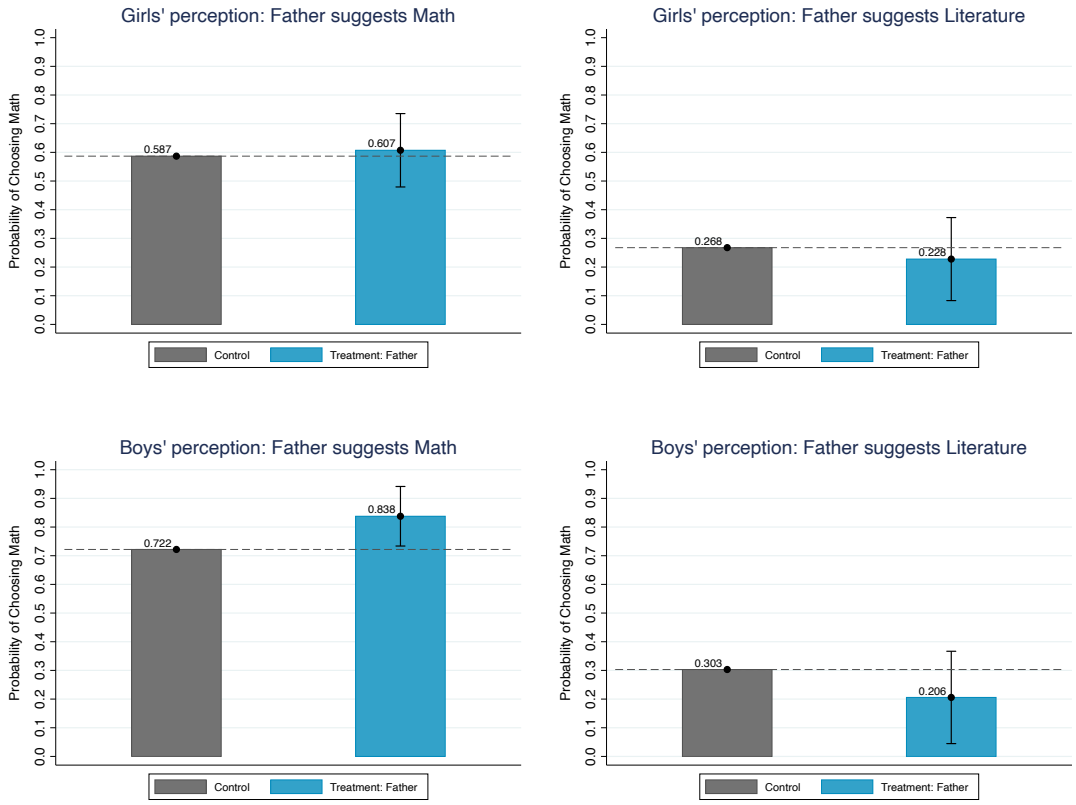
Notes: This figure shows the mean of the probability of choosing math for students in the control group, treatment group 1 (Mother), treatment group 2 (Father), and treatment group 3 (Both Patents). The coefficients are obtained from a regression including class and section fixed effects (as in columns 2 and 4 of Table IV). We also report the 95% confidence intervals for each estimate.

Figure 4. Heterogeneous Treatment Effects by child's perception of mother's suggestion



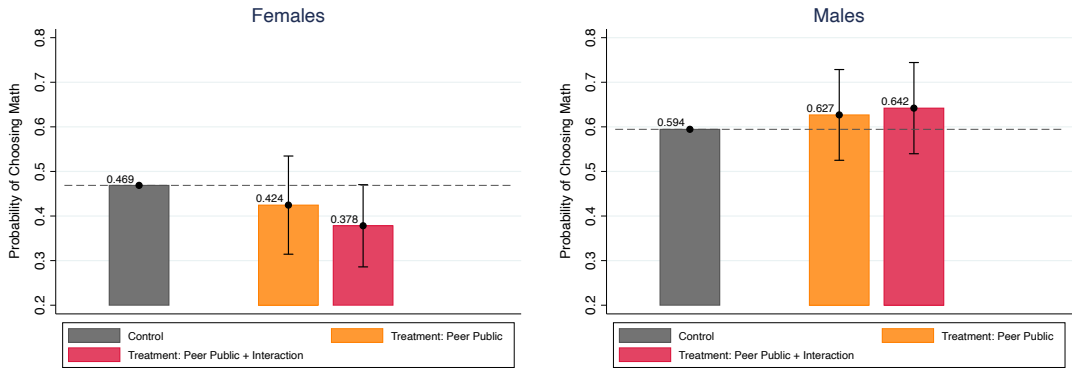
Notes: This figure shows the mean of the probability of choosing math for students in the control group, treatment group 1 (Mother), treatment group 2 (Father), and treatment group 3 (Both Patents), divided by child's perception of mother's suggestion (Math or Literature). The coefficients are obtained from a regression including class and section fixed effects (as in columns 2 and 4 of Table IV). We also report the 95% confidence intervals for each estimate.

Figure 5. Heterogeneous Treatment Effects by child's perception of father's suggestion



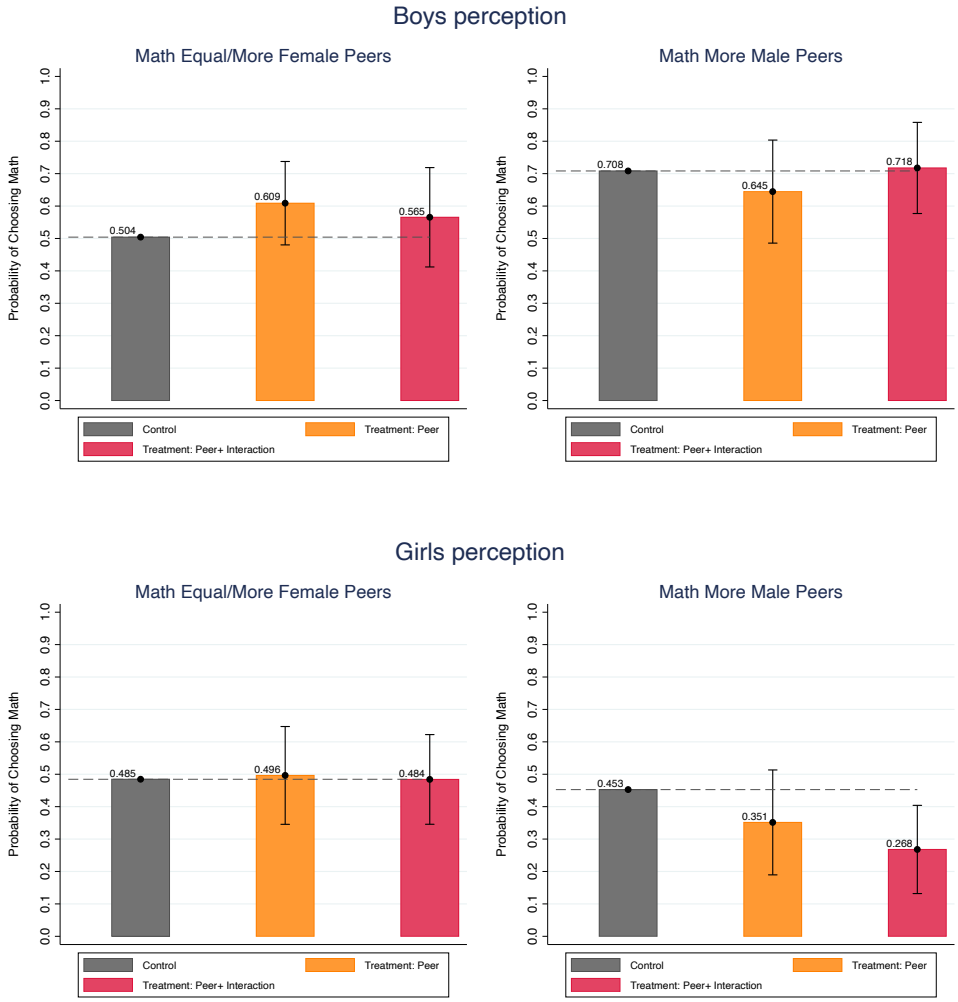
Notes: This figure shows the mean of the probability of choosing math for students in the control group, treatment group 1 (Mother), treatment group 2 (Father), and treatment group 3 (Both Patents), divided by child's perception of father's suggestion (Math or Literature). The coefficients are obtained from a regression including class and section fixed effects (as in columns 2 and 4 of Table IV). We also report the 95% confidence intervals for each estimate.

Figure 6. Treatment Effect - Peers Treatment



Notes: This figure shows the mean of the probability of choosing math for students in the control group, treatment group 4 (Peer), and treatment group 5 (Peer Public+Interaction). The coefficients are obtained from a regression including class and section fixed effects (as in columns 2 and 4 of Table IV). We also report the 95% confidence intervals for each estimate.

Figure 7. Heterogeneous Treatment Effects by child's perception of classmates' choice



Notes: This figure shows the mean of the probability of choosing math for students in the control group, treatment group 4 (Peer), and treatment group 5 (Peer Public+Interaction), divided by gender and child's perception of peers choice. The coefficients are obtained from a regression including class and section fixed effects (as in columns 2 and 4 of Table IV). We also report the 95% confidence intervals for each estimate.

Table I. Summary statistics from the students' Questionnaire

	Count	Mean	Std. dev.	Min	Max
Student Characteristics					
Female	2,511	0.499	0.500	0.00	1.00
Immigrant	2,511	0.141	0.348	0.00	1.00
IAT	2,511	-0.000	0.984	-3.68	7.69
Index of explicit stereotypes	2,511	-0.000	0.994	-0.93	3.32
School in South/Island	2,511	0.486	0.500	0.00	1.00
Family Characteristics					
Education level of mum: primary or junior sec.	2,444	0.206	0.404	0.00	1.00
Education level of mum: high school	2,444	0.379	0.485	0.00	1.00
Education level of mum: university	2,444	0.167	0.373	0.00	1.00
Education level of dad: primary or junior sec.	2,443	0.234	0.423	0.00	1.00
Education level of dad: high school	2,443	0.370	0.483	0.00	1.00
Education level of dad: university	2,443	0.127	0.333	0.00	1.00
Lives with both parents	2,443	0.845	0.362	0.00	1.00
Mother works	2,355	0.711	0.453	0.00	1.00
Father works	2,079	0.957	0.202	0.00	1.00
Low wage job - mum	1,653	0.382	0.486	0.00	1.00
Medium or high wage job - mum	1,653	0.327	0.469	0.00	1.00
Low wage job - dad	1,964	0.318	0.466	0.00	1.00
Medium or high wage job - dad	1,964	0.314	0.464	0.00	1.00
Has sister(s)	2,073	0.618	0.486	0.00	1.00
Has brother(s)	2,023	0.639	0.481	0.00	1.00
Aspirations					
High-School Interest: Classic/Humanistic	2,511	2.012	1.081	0.00	4.00
High-School Interest: Applied Sciences	2,511	2.345	1.194	0.00	4.00
Outcome and Other Experimental Variables					
Student chose Math	2,511	0.526	0.499	0.00	1.00
Student thinks mother would recommend Math	2,511	0.468	0.499	0.00	1.00
Student thinks father would recommend Math	2,511	0.646	0.478	0.00	1.00
Student thinks: More Boys Choosing Math in Class	2,511	0.485	0.500	0.00	1.00
Performance in Math	2,511	1.368	0.849	0.00	3.00
Performance in Italian	2,511	1.345	0.930	0.00	3.00
Overconfidence in Math	2,511	0.456	0.498	0.00	1.00
Overconfidence in Italian	2,511	0.603	0.489	0.00	1.00
Student would choose logic task	2,511	0.446	0.497	0.00	1.00

Notes: Missing variables are not included in this table. Hence, the number of observations vary as described in the first column. The index of explicit stereotypes is constructed using the first principal component from the following seven questions: i) "There are biological differences in men's and women's innate math abilities"; ii) Earning money to support the family is a father's responsibility; iii) Taking care of the house and children is a mother's responsibility; iv) Psychologist is not a job suitable for women; v) Computer programmer is not a job suitable for women; vi) Even if they word hard, women cannot be good at football; vii) Even if they work hard, men cannot be good at cooking. A low wage job is considered as in the construction sector, salesman, hairdresser, cook or similar type of job for both mothers and fathers. The occupation skill level of the mum is also set to one if they are living with someone employed in a job of that skill level. Overconfidence in Math and Italian is a dummy variable which assumes value 1 if the student perceives she/he answered questions more correctly compared to the actual number of right answers in our multiple choice test score.

Table II. Correlation between students' choice of math and other relevant variables

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Dep. Variable Students' Choice "Math"					
Variable X		**Interest High-school**		**Overconfidence**		**Logic**
		STEM	**Classic**	**Literature**	**Math**	**Task**
Girl	-0.201***	-0.214***	-0.153***	-0.197***	-0.185***	-0.128***
	(0.021)	(0.052)	(0.044)	(0.033)	(0.028)	(0.028)
X		0.097***	-0.043***	-0.109***	0.126***	0.421***
		(0.013)	(0.015)	(0.029)	(0.026)	(0.027)
X*Girl		0.018	-0.020	-0.017	-0.003	0.010
		(0.020)	(0.018)	(0.039)	(0.040)	(0.037)
Constant	0.627***	0.376***	0.716***	0.695***	0.562***	0.401***
	(0.016)	(0.039)	(0.034)	(0.023)	(0.021)	(0.023)
Observations	2,511	2,511	2,511	2,511	2,511	2,511
Mean X var – Boys		2.46	1.93	.63	.51	.54
Mean X var – Girls		2.23	2.09	.58	.4	.36

	Panel B: Dep. Variable Students' Choice "Math"					
Variable X	**Gender Stereotypes**		**South**	**Work**	**Share Math**	
	Implicit	**Explicit**		**Mother**	**Friends**	**Classmates**
Girl	-0.205***	-0.201***	-0.173***	-0.257***	-0.169***	-0.269***
	(0.022)	(0.022)	(0.029)	(0.039)	(0.044)	(0.069)
X	0.053***	-0.017	-0.004	-0.010	0.253***	0.385***
	(0.014)	(0.012)	(0.032)	(0.030)	(0.050)	(0.076)
X*Girl	-0.082***	0.016	-0.056	0.079*	-0.007	0.135
	(0.020)	(0.020)	(0.042)	(0.047)	(0.073)	(0.122)
Constant	0.635***	0.628***	0.629***	0.634***	0.477***	0.423***
	(0.016)	(0.016)	(0.022)	(0.027)	(0.033)	(0.044)
Observations	2,511	2,511	2,511	2,511	2,412	2,511
Mean X var – Boys	-.17	.16	.48	.68	.58	.53
Mean X var – Girls	.17	-.16	.49	.67	.47	.52

Notes: The dependent variable indicates whether the student chose math vs. literature in our lab-in-the-field experiment, i.e. if she/he believes she/he is better in math compared to literature. For each of the control variables, an indicator controlling for when the answer is missing is included and interacted by the female variable. Robust standard errors, clustered at class level, in parenthesis. Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

Table III. Correlation between students' choice of math and other relevant variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A – Dep. Var. Students' Belief of Mother Advice "Math"							
	Full Sample				**Matched Sample**			
Girl	-0.063***	-0.064***	-0.071***	-0.064***	-0.140**	-0.138**	-0.090	-0.087
	(0.022)	(0.022)	(0.022)	(0.024)	(0.060)	(0.059)	(0.056)	(0.063)
IAT		0.007	0.012	0.015		0.030	0.042	0.038
		(0.015)	(0.015)	(0.016)		(0.042)	(0.042)	(0.043)
IAT*Girl		-0.034	-0.032	-0.027		-0.121*	-0.125**	-0.129**
		(0.021)	(0.022)	(0.023)		(0.062)	(0.059)	(0.060)
Mother Advice: Math							0.266***	0.258***
							(0.053)	(0.057)
Observations	2,511	2,511	2,511	2,511	409	409	409	409
R-squared	0.008	0.010	0.036	0.122	0.019	0.040	0.105	0.176
Mean dep var – Boys	.5	.5	.5	.5	.57	.57	.57	.57
Mean dep var – Girls	.44	.44	.44	.44	.43	.43	.43	.43
	Panel B – Dep. Var. Students' Belief of Father Advice "Math"'							
	Full Sample				**Matched Sample**			
Girl	-0.064***	-0.060***	-0.062***	-0.058**	-0.083	-0.077	-0.037	-0.016
	(0.022)	(0.022)	(0.021)	(0.023)	(0.072)	(0.074)	(0.071)	(0.072)
IAT		0.029**	0.032**	0.036**		0.062	0.053	0.053
		(0.014)	(0.014)	(0.015)		(0.039)	(0.043)	(0.056)
IAT*Girl		-0.069***	-0.068***	-0.065***		-0.169**	-0.131*	-0.127
		(0.018)	(0.019)	(0.020)		(0.073)	(0.071)	(0.088)
Father Advice: Math							0.287***	0.293***
							(0.080)	(0.078)
Observations	2,511	2,511	2,511	2,511	128	128	128	128
R-squared	0.013	0.020	0.047	0.128	0.027	0.069	0.161	0.354
Mean dep var – Boys	.67	.67	.67	.67	.74	.74	.74	.74
Mean dep var – Girls	.62	.62	.62	.62	.69	.69	.69	.69
Performance	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Controls	No	No	Yes	Yes	No	No	No	Yes
Class FE	No	No	No	Yes	No	No	No	No

Notes: The dependent variable indicates whether the student believes the parents (Mother in Panel A, Father in Panel B) would recommend him/her to chose math vs. literature in our lab-in-the-field experiment. Controls include: an indicator for the students being immigrant, the IAT score, an indicator of explicit stereotypes, if the student lives with both parents and the presence of siblings, dummy variables indicating mother's and father's level of education, employment and job skill category as described in the footnote of Table I. For each of these variables, an indicator controlling for when the answer is missing is included. Robust standard errors, clustered at class level, in parenthesis. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1. We include class fixed effects and all controls jointly in Appendix Table B.IV

Table IV. Treatment Effect

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep. Variable: Students' Choice "Math"							
	Female				Male			
Treatment 1 - Mother	-0.071*	-0.094**	-0.092**	-0.100**	-0.002	-0.000	0.007	-0.002
	(0.042)	(0.046)	(0.046)	(0.046)	(0.048)	(0.056)	(0.056)	(0.057)
Treatment 2 - Father	-0.033	-0.024	-0.025	-0.029	0.048	0.007	0.019	0.020
	(0.048)	(0.051)	(0.052)	(0.051)	(0.047)	(0.051)	(0.051)	(0.052)
Treatment 3 - Both Parents	-0.064	-0.080	-0.081	-0.094*	0.045	0.017	0.020	0.032
	(0.047)	(0.052)	(0.052)	(0.051)	(0.047)	(0.051)	(0.049)	(0.051)
Treatment 4 - Peer Public	-0.001	-0.044	-0.043	-0.043	0.047	0.032	0.039	0.048
	(0.051)	(0.056)	(0.056)	(0.055)	(0.046)	(0.052)	(0.051)	(0.051)
Treatment 5 - Peer Public+Interaction	-0.079*	-0.091*	-0.088*	-0.083*	0.056	0.048	0.039	0.032
	(0.042)	(0.047)	(0.047)	(0.046)	(0.047)	(0.052)	(0.052)	(0.051)
Constant	0.469***	0.418***	0.389***	-0.121	0.594***	0.436***	0.422***	0.427**
	(0.032)	(0.035)	(0.039)	(0.230)	(0.035)	(0.023)	(0.024)	(0.214)
Observations	1,254	1,254	1,254	1,254	1,257	1,257	1,257	1,257
R-squared	0.004	0.209	0.213	0.238	0.002	0.180	0.194	0.212
Class FE	n	y	y	y	n	y	y	y
Student Controls	n	n	y	y	n	n	y	y
Family controls	n	n	n	y	n	n	n	y

Notes: The dependent variable indicates if the student chose math vs. literature in our lab-in-the-field experiment. The sample used in Columns 1 to 4 includes only female students, while in Columns 5 to 8 the sample is restricted to male students. Columns 2 to 4 and Columns 6 to 8 control for class fixed effects. Columns 3 to 4 and 7 to 8 add controls for the student: an indicator for whether the student is an immigrant, the IAT score and a indicator of explicit stereotypes as described in the footnote of Table I. Specification in Column 4 and Column 8 further adds a set of family controls that include: if the student lives with both parents and the presence of siblings, dummy variables indicating mother's and father's level of education, employment and job skill category as described in the footnote of Table I. For each of these variables, an indicator controlling for when the answer is missing is included. Robust standard errors, clustered at class level, in parenthesis. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

Table V. Correlation between classmates' choice of math and perception of students

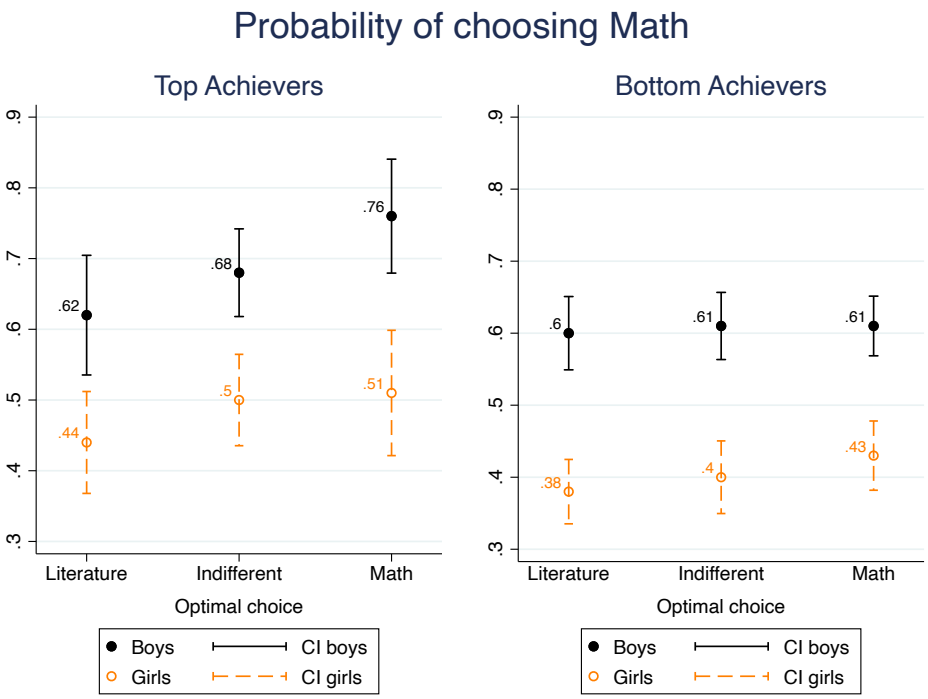
	(1)	(2)	(3)	(4)
Dep. Var.: Students' Belief on Classmates Choice (More Boys Math)				
Classmates' Choice (More Boys Math)	0.392***	0.359***	0.343***	0.340***
	(0.033)	(0.040)	(0.040)	(0.041)
Female		-0.033	-0.033	-0.039
		(0.033)	(0.033)	(0.033)
Classmates' Choice (More Boys Math)*Female		0.066	0.074	0.076
		(0.049)	(0.048)	(0.048)
Constant	0.232***	0.248***	0.030	0.015
	(0.022)	(0.024)	(0.086)	(0.090)
Observations	2,511	2,511	2,511	2,511
R-squared	0.141	0.142	0.155	0.156
Performance peers	No	No	Yes	Yes
Student controls	No	No	No	Yes

Notes: The dependent variable indicates whether the student believes that more male classmates will choose math. "Performance peers" includes the performance in math, separately for male and female peers. "Student controls" include the performance, an indicator for the students being immigrant, the IAT score, an indicator of explicit stereotypes, if the student lives with both parents and the presence of siblings, dummy variables indicating mother's and father's level of education, employment and job skill category as described in the footnote of Table I. For each of these variables, an indicator controlling for when the answer is missing is included. Robust standard errors, clustered at class level, in parenthesis. Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

Appendix

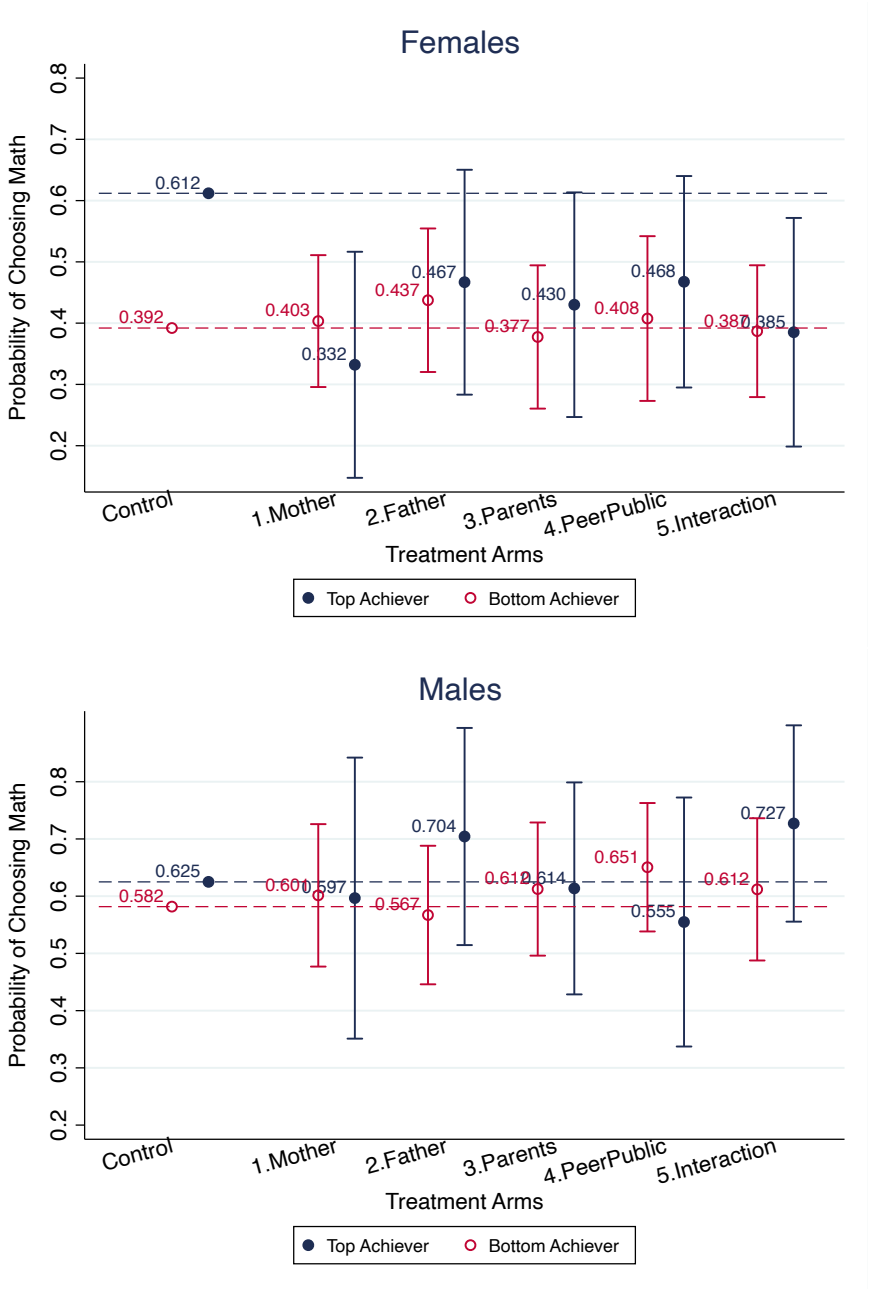
A Appendix figures and tables

Figure A.I. Student choice by gender and performance



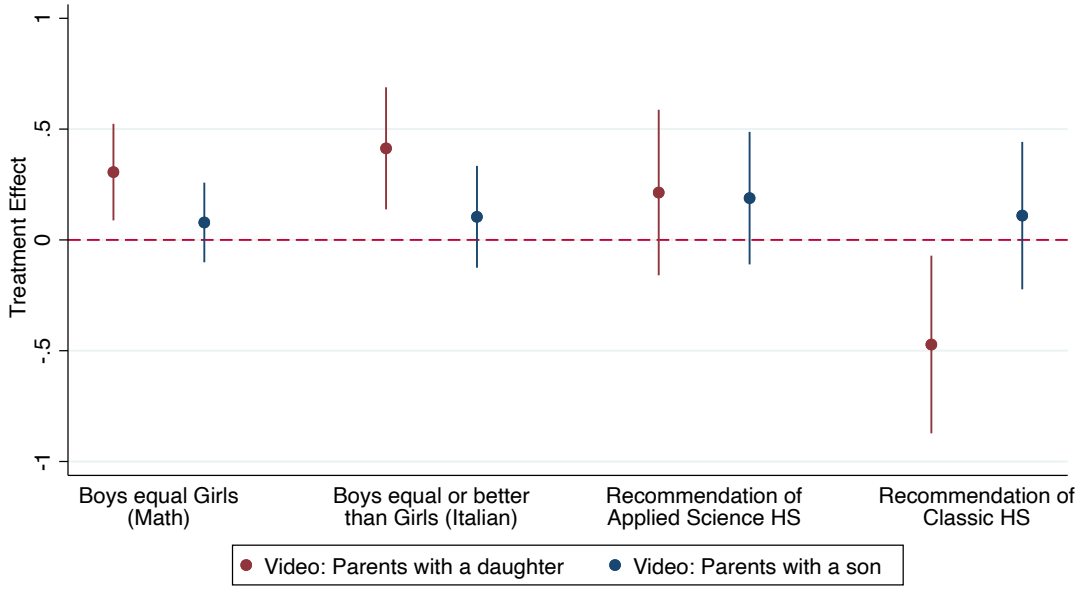
Notes: This figure shows the probability that the student chooses math splitting the sample by gender and performance. In the graph on the left, we report the mean for the high performing students, i.e. those who replied correctly to at least 50% of the questions (30% of the sample), while on the right we report the mean for the low performing students. For each group, we report the mean between those who did more correct answers in math than literature (Optimal choice: Math), same performance in the two subjects (Optimal choice: Indifferent), and for those who did more correct answers in literature (Optimal choice: Literature).

Figure A.II. Treatment Effect by Ability



Notes: This figure shows the mean of the probability of choosing math for students in each treatment group, divided by ability. The dark dots shows the value for top achievers (students who answered correctly to more than 50% of questions). The red dots shows the value for bottom achievers (students who answered correctly to 50% or less of the questions). The coefficients are obtained from a regression including class and section fixed effects (as in columns 2 and 4 of Table IV. We also report the 95% confidence intervals for each estimate.

Figure A.III. Effect of the video-treatment on parents

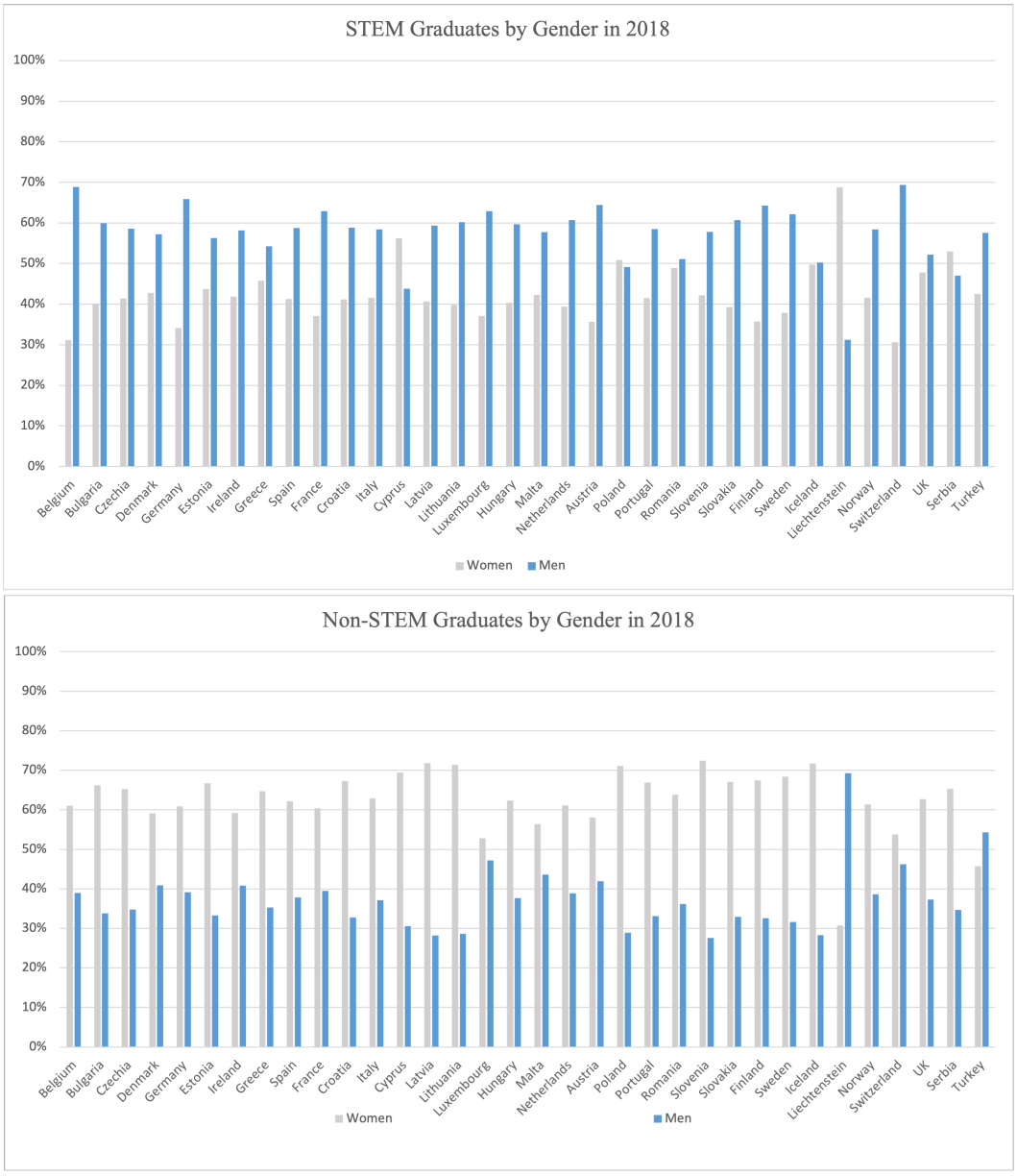


Notes: This figure shows IV estimates of 4 different regressions using as outcomes: i) the probability that parents think that boys are equally as capable as girls in math; ii) the probability that parents think that boys are better or equal girls in Italian; iii) a dummy indicating whether they strongly or very strongly recommend a scientific high school and iv) whether they strongly or very strongly recommend a humanistic high school. The treatment allocation has been instrumented with an indicator for having watched the video. Controls include dummy variables indicating mother's and father's level of education, employment and job skill category.

Online Appendix

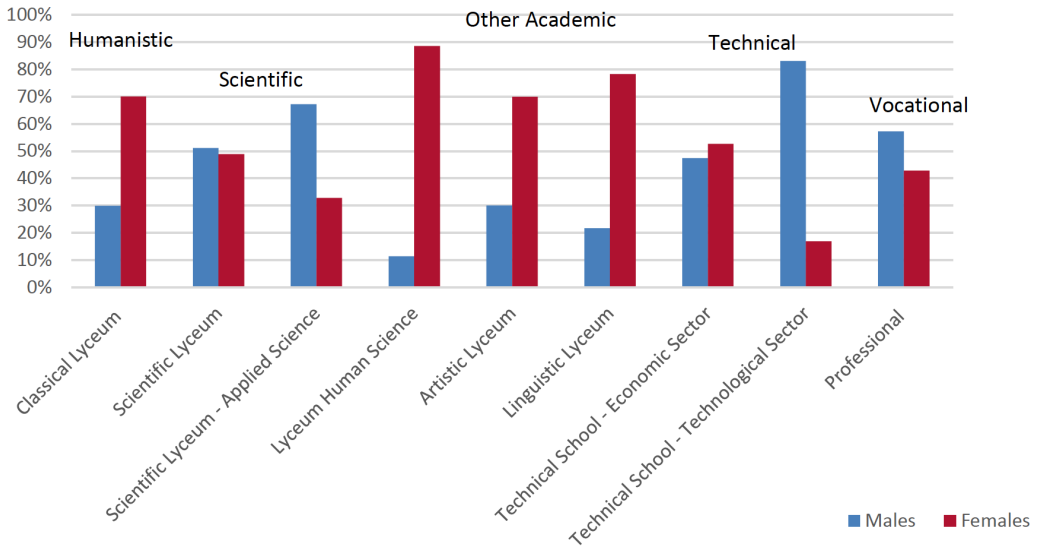
B Online Appendix figures and tables

Figure B.I. Gender Segregation in STEM and Non-STEM field



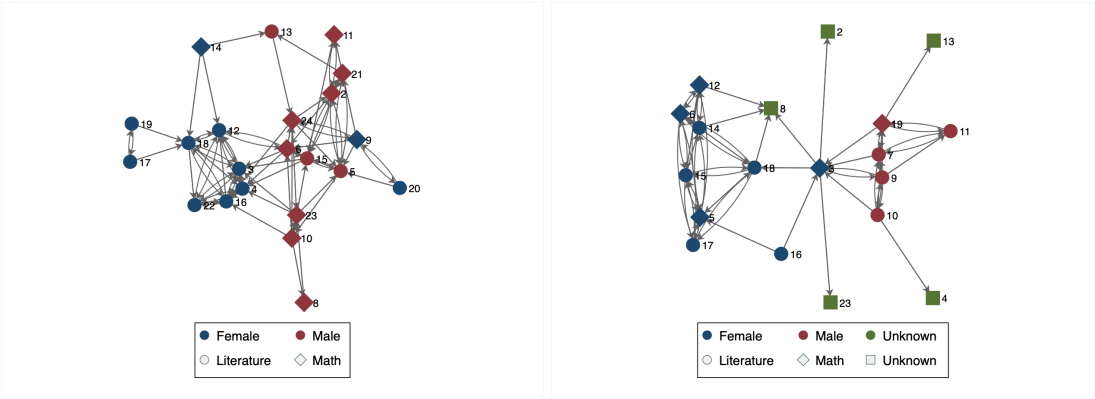
Notes: STEM = Natural Sciences, Mathematics, Statistics; Engineering, Manufacturing and Construction; Non-STEM = Education, Arts, Social Sciences, Journalism, Information, Business, Administration and Law, Information and Communication Technologies, Agriculture, Forestry, Fisheries and Veterinary, Health and Welfare, Services. Source: http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

Figure B.II. Gender Composition of High-School Tracks in Italy



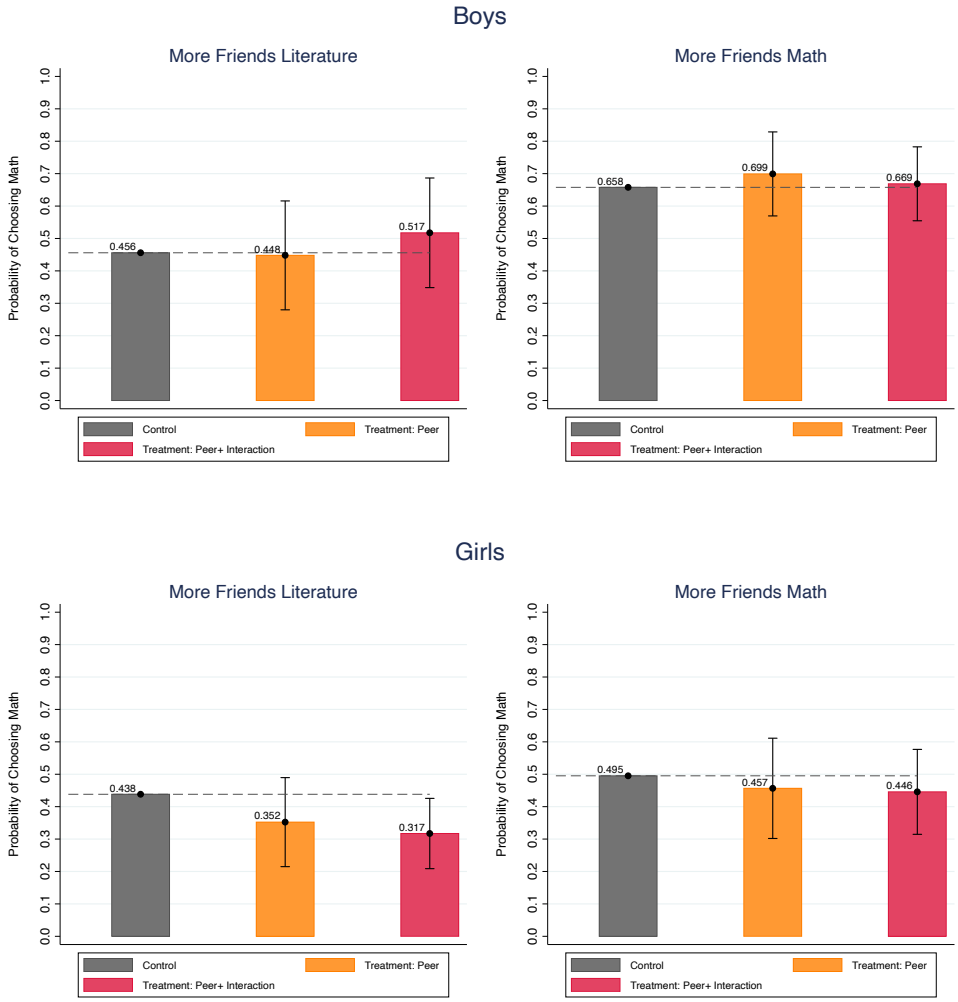
Notes: This figure shows the gender composition of each sub-track of high-school in Italy. Source: Authors' elaboration on data from the Italian Ministry of Education.

Figure B.III. Example of students' network



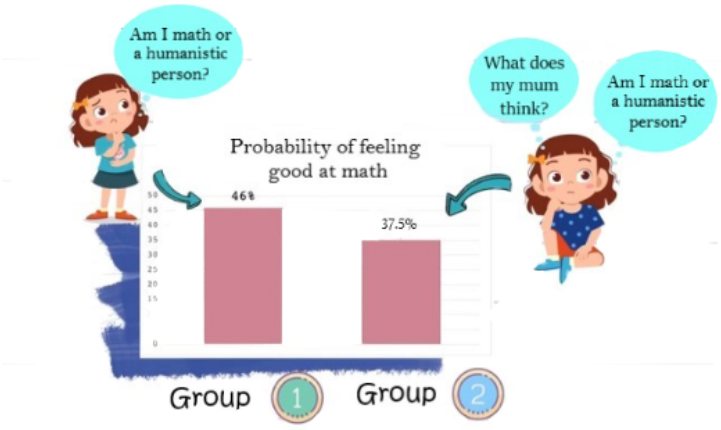
Notes: This figure shows one example of within classroom network of students. The color of the node represents the gender (blue for girls, red for boys, green for missing), while the shape represents the choice in the lab-in-the-field experiment (diamond for math, circle for literature, square for missing).

Figure B.IV. Heterogeneous Treatment Effects by the choice of child's friend

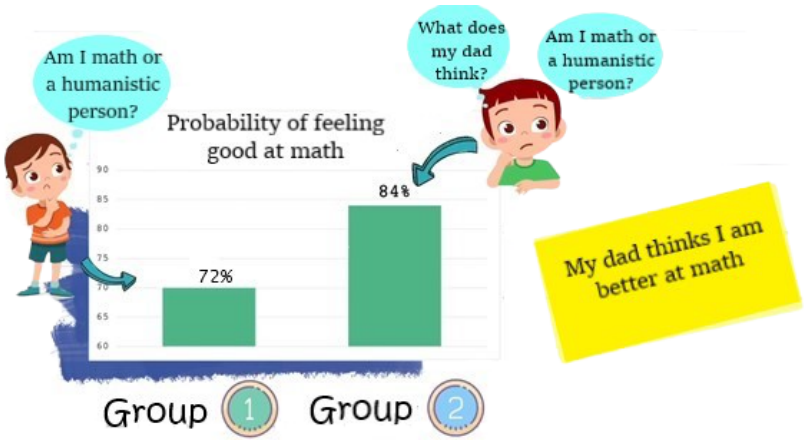


Notes: This figure shows the mean of the probability of choosing math for students in the control group, treatment group 4 (Peer), and treatment group 5 (Peer Public+Interaction), divided by gender and the choice of child closest friend. The coefficients are obtained from a regression including class and section fixed effects (as in columns 2 and 4 of Table IV). We also report the 95% confidence intervals for each estimate.

Figure B.V. Screenshots of the Video treatment



Treatment for parents with a daughter



Treatment for parents with a son

Table B.I. Summary statistics, by gender

	Females	Males	Difference
Student Characteristics			
Immigrant	0.148	0.134	0.015
	(0.356)	(0.340)	[0.291]
School in South/Island	0.490	0.481	0.009
	(0.500)	(0.500)	[0.647]
Family Characteristics			
Education level of mum: primary or junior sec.	0.221	0.191	0.030*
	(0.415)	(0.393)	[0.070]
Education level of mum: high school	0.401	0.357	0.045**
	(0.490)	(0.479)	[0.023]
Education level of mum: university	0.173	0.161	0.013
	(0.379)	(0.367)	[0.406]
Education level of dad: primary or junior sec.	0.251	0.216	0.035**
	(0.434)	(0.412)	[0.043]
Education level of dad: high school	0.379	0.361	0.017
	(0.485)	(0.481)	[0.382]
Education level of dad: university	0.132	0.121	0.011
	(0.339)	(0.327)	[0.408]
Lives with both parents	0.841	0.850	-0.009
	(0.366)	(0.357)	[0.519]
Mother works	0.704	0.718	-0.014
	(0.457)	(0.450)	[0.442]
Father works	0.949	0.965	-0.017*
	(0.220)	(0.183)	[0.062]
Low wage job - mum	0.379	0.385	-0.006
	(0.485)	(0.487)	[0.797]
Medium or high wage job - mum	0.330	0.323	0.007
	(0.471)	(0.468)	[0.768]
Other job - mum	0.295	0.293	0.002
	(0.456)	(0.455)	[0.937]
Low wage job - dad	0.307	0.329	-0.022
	(0.461)	(0.470)	[0.285]
Medium or high wage job - dad	0.323	0.305	0.018
	(0.468)	(0.461)	[0.387]
Other job - dad	0.370	0.365	0.004
	(0.483)	(0.482)	[0.841]
Has sister(s)	0.613	0.623	-0.011
	(0.487)	(0.485)	[0.618]
Has brother(s)	0.646	0.631	0.014
	(0.479)	(0.483)	[0.506]
Aspirations			
High-School Interest: Classic/Humanistic	2.092	1.933	0.159***
	(1.093)	(1.063)	[0.000]
High-School Interest: Applied Sciences	2.226	2.464	-0.237***
	(1.125)	(1.248)	[0.000]
Outcome			
Student chose Math	0.426	0.627	-0.201***
	(0.495)	(0.484)	[0.000]
Student thinks mother would recommend Math	0.435	0.500	-0.065**
	(0.496)	(0.500)	[0.001]
Student thinks father would recommend Math	0.617	0.674	-0.057**
	(0.486)	(0.469)	[0.003]
Student thinks: More Boys Choosing Math in Class	0.488	0.482	0.006
	(0.500)	(0.500)	[0.766]
Performance in Math	1.367	1.369	-0.002
	(0.869)	(0.829)	[0.946]
Performance in Italian	1.463	1.228	0.234***
	(0.929)	(0.916)	[0.000]
Overconfidence in Math	0.399	0.513	-0.114***
	(0.490)	(0.500)	[0.000]
Overconfidence in Italian	0.577	0.629	-0.052**
	(0.494)	(0.483)	[0.008]

Notes: In the first and second column we report the mean and standard deviation in brackets for the sample of girls and boys, respectively. In the third column, we report the gender difference and p-value of the difference in square brackets. Missing variables are not included in this table. A low wage job is considered as construction, salesman, hairdresser, cook or similar type of job for both the mum and dad. Overconfidence in math and literature is a dummy variable which assumes value 1 if the student perceives she/he answered questions more correctly compared to the actual number of right answers in our multiple choice test score.

Table B.II. Balance Table

Panel A: Student Characteristics						
Female	0.469	0.064*	0.024	0.040	0.003	0.042
	(0.500)	[0.089]	[0.533]	[0.261]	[0.943]	[0.228]
Immigrant	0.144	-0.030	-0.004	-0.014	-0.009	0.003
	(0.352)	[0.169]	[0.871]	[0.531]	[0.656]	[0.909]
IAT	-0.043	-0.024	0.012	0.042	-0.006	0.173**
	(1.013)	[0.729]	[0.876]	[0.566]	[0.941]	[0.027]
Index of explicit stereotypes	-0.027	0.044	0.114	0.009	0.119*	-0.011
	(1.007)	[0.543]	[0.125]	[0.901]	[0.085]	[0.883]
Panel B: Family Characteristics						
Education level of mum: primary or junior sec.	0.193	-0.024	0.020	0.006	0.016	0.010
	(0.395)	[0.423]	[0.417]	[0.844]	[0.470]	[0.697]
Education level of mum: high school	0.393	0.006	-0.020	-0.007	-0.057	-0.006
	(0.489)	[0.883]	[0.597]	[0.846]	[0.136]	[0.856]
Education level of mum: university	0.201	-0.044	-0.048	-0.004	-0.023	-0.042
	(0.401)	[0.125]	[0.113]	[0.865]	[0.383]	[0.126]
Education level of dad: primary or junior sec.	0.203	0.025	0.025	0.018	0.042	0.033
	(0.403)	[0.402]	[0.359]	[0.538]	[0.143]	[0.245]
Education level of dad: high school	0.398	-0.027	0.009	-0.004	-0.024	-0.037
	(0.490)	[0.447]	[0.769]	[0.913]	[0.440]	[0.266]
Education level of dad: university	0.168	-0.056**	-0.039	-0.056**	-0.055**	-0.043*
	(0.374)	[0.032]	[0.162]	[0.042]	[0.038]	[0.084]
Lives with both parents	0.835	-0.002	0.016	0.001	-0.000	0.006
	(0.372)	[0.930]	[0.519]	[0.972]	[0.989]	[0.800]
Mother works	0.686	-0.015	0.081**	0.045	0.075**	0.008
	(0.465)	[0.683]	[0.015]	[0.174]	[0.010]	[0.814]
Father works	0.958	0.004	-0.006	-0.021	0.007	0.015
	(0.200)	[0.803]	[0.714]	[0.246]	[0.651]	[0.271]
Low skill job - mum	0.373	0.006	0.052	0.018	0.012	-0.044
	(0.485)	[0.890]	[0.221]	[0.700]	[0.787]	[0.301]
Medium or high skill job - mum	0.335	-0.038	-0.013	0.006	-0.002	0.030
	(0.473)	[0.400]	[0.713]	[0.882]	[0.954]	[0.453]
Low skill job - dad	0.314	-0.023	0.021	0.046	0.015	-0.042
	(0.465)	[0.505]	[0.585]	[0.220]	[0.719]	[0.216]
Medium or high skill job - dad	0.351	-0.026	-0.034	-0.068*	-0.072*	-0.022
	(0.478)	[0.527]	[0.396]	[0.090]	[0.051]	[0.577]

Table B.III. Balance Table comparing characteristics of students and families who completed/did not complete the parents' survey

Variable	(1) Unmatched	(2) Matched	(3) Diff.	(4) Norm. Diff.
Immigrant	0.153	0.091	-0.062	-0.135
	(0.360)	(0.288)	(0.018)***	
IAT	-0.000	0.001	0.001	0.001
	(0.996)	(1.015)	(0.051)	
Index of explicit stereotypes	0.024	-0.098	-0.122	-0.086
	(0.995)	(1.017)	(0.051)**	
Education level of mum: primary or junior sec.	0.219	0.122	-0.097	-0.184
	(0.414)	(0.328)	(0.020)***	
Education level of mum: high school	0.364	0.388	0.024	0.036
	(0.481)	(0.488)	(0.024)	
Education level of mum: university	0.138	0.264	0.126	0.225
	(0.345)	(0.442)	(0.018)***	
Education level of dad: primary or junior sec.	0.244	0.157	-0.087	-0.155
	(0.430)	(0.364)	(0.021)***	
Education level of dad: high school	0.350	0.403	0.053	0.078
	(0.477)	(0.491)	(0.024)**	
Education level of dad: university	0.108	0.188	0.080	0.160
	(0.311)	(0.391)	(0.017)***	
Lives with both parents	0.817	0.845	0.028	0.053
	(0.387)	(0.362)	(0.019)	
Father works	0.785	0.822	0.037	0.066
	(0.411)	(0.383)	(0.021)*	
Mother works	0.666	0.731	0.066	0.102
	(0.472)	(0.444)	(0.024)***	
Low wage job - dad	0.255	0.225	-0.029	-0.049
	(0.436)	(0.418)	(0.022)	
Medium or high wage job - dad	0.229	0.314	0.085	0.135
	(0.421)	(0.465)	(0.022)***	
Low wage job - mum	0.269	0.207	-0.063	-0.104
	(0.444)	(0.405)	(0.022)***	
Medium or high wage job - mum	0.196	0.304	0.107	0.177
	(0.397)	(0.460)	(0.021)***	
Has sister(s)	0.518	0.479	-0.038	-0.054
	(0.500)	(0.500)	(0.025)	
Has brother(s)	0.529	0.455	-0.074	-0.105
	(0.499)	(0.498)	(0.025)***	
Observations	2,027	484	2,511	

Notes: For some students, both parents completed the survey. Hence, the number of students for whom at least one parent completed the survey is smaller than the number of parents' questionnaire. In the last column, we report the normalized difference following (Imbens and Wooldridge, 2009). Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

Table B.IV. Correlation between students' choice of math and other relevant variables

	(1)	(2)	(3)	(4)	(5)
	Dep. Variable: Students' Choice "Math"				
Sample	**All**	**All**	**All**	**Girls**	**Boys**
Female	-0.201***	-0.193***	-0.159***		
	(0.021)	(0.022)	(0.024)		
Overconfidence in Italian			-0.125***	-0.126***	-0.117***
			(0.021)	(0.030)	(0.032)
Overconfidence in Math			0.114***	0.114***	0.095***
			(0.019)	(0.032)	(0.029)
Interest STEM High-school			0.108***	0.117***	0.097***
			(0.010)	(0.017)	(0.015)
Interest Classic High-school			-0.062***	-0.070***	-0.054***
			(0.010)	(0.013)	(0.018)
Std IAT			0.013	-0.011	0.032**
			(0.010)	(0.016)	(0.016)
Std Explicit Gender Index			-0.014	-0.007	-0.026*
			(0.012)	(0.018)	(0.015)
Mother Works			0.027	0.070**	-0.017
			(0.021)	(0.033)	(0.035)
Share Friends Choosing "Math"			-0.070	-0.299***	-0.264***
			(0.047)	(0.066)	(0.075)
Constant	0.627***	0.623***	0.508***	0.425***	0.681***
	(0.016)	(0.011)	(0.051)	(0.068)	(0.080)
Observations	2,511	2,511	2,412	1,206	1,206
R-squared	0.041	0.153	0.241	0.325	0.268
Mean dep var – Boys	.63	.63	.63		.63
Mean dep var – Girls	.43	.43	.43	.43	
Class FE	No	Yes	Yes	Yes	Yes

Notes: The dependent variable indicates whether the student chooses math, i.e. if she/he believes she/he is better in math compared to literature. For each of the control variables, an indicator controlling for when the answer is missing is included and interacted by the female variable. Robust standard errors, clustered at the section - class level, in parenthesis. Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

Table B.V. Balance Table for perceived reccomendation from mother

	Girls			Boys		
	Choice Lit.	Choice Math	Diff	Choice Lit.	Choice Math	Diff
	(1)	(2)	(3)	(4)	(5)	(6)
Education level of mother: primary or junior sec.	0.223	0.205	-0.018	0.198	0.173	-0.025
			(0.026)			(0.023)
Education level of mother: high school	0.412	0.366	-0.045	0.331	0.361	0.030
			(0.030)			(0.027)
Education level of mother: university	0.167	0.170	0.003	0.147	0.164	0.017
			(0.021)			(0.023)
Education level of father: primary or junior sec.	0.262	0.223	-0.038	0.229	0.192	-0.036
			(0.026)			(0.024)
Education level of father: high school	0.383	0.350	-0.033	0.349	0.351	0.003
			(0.030)			(0.026)
Education level of father: university	0.129	0.130	0.001	0.112	0.122	0.010
			(0.020)			(0.017)
Lives with both parents	0.818	0.822	0.005	0.824	0.827	0.003
			(0.022)			(0.022)
Mother works	0.682	0.663	-0.019	0.715	0.649	-0.067**
			(0.027)			(0.026)
Father works	0.784	0.786	0.002	0.802	0.800	-0.002
			(0.022)			(0.026)
Low wage job - mother	0.248	0.262	0.014	0.286	0.235	-0.051**
			(0.024)			(0.025)
Medium or high wage job - mother	0.225	0.205	-0.020	0.222	0.210	-0.013
			(0.024)			(0.024)
Other job - mother	0.204	0.190	-0.013	0.202	0.199	-0.003
			(0.020)			(0.022)
Low wage job - father	0.222	0.256	0.034	0.261	0.262	0.002
			(0.022)			(0.026)
Medium or high wage job - father	0.252	0.245	-0.006	0.227	0.254	0.027
			(0.026)			(0.024)
Other job - father	0.301	0.266	-0.036	0.306	0.275	-0.031
			(0.026)			(0.026)
Has sister(s)	0.515	0.502	-0.013	0.541	0.482	-0.059**
			(0.030)			(0.029)
Has brother(s)	0.528	0.533	0.005	0.504	0.494	-0.010
			(0.054)			(0.054)
High-School Interest: Classic/Humanistic	2.207	1.945	-0.261***	1.984	1.886	-0.098
			(0.059)			(0.063)
High-School Interest: Applied Sciences	2.116	2.372	0.256***	2.269	2.652	0.383***
			(0.070)			(0.064)
Student chose Math	0.279	0.617	0.339***	0.472	0.781	0.309***
			(0.028)			(0.024)
Performance in Math	1.335	1.407	0.071	1.302	1.436	0.133***
			(0.052)			(0.048)
Performance in Italian	1.502	1.414	-0.088*	1.187	1.273	0.086
			(0.030)			(0.026)
Student would choose logic task	0.266	0.473	0.207***	0.434	0.639	0.206***
			(0.027)			(0.026)

Notes: In columns 1 and 4, we report the mean of each characteristic for the sample of girls and boys, respectively, who perceive their mother would recommend them literature. In columns 2 and 5, we report the mean of each characteristic for the sample of girls and boys, respectively, who perceive their mother would recommend them math. In the third column, we report the difference of the previous two columns and the standard errors of the difference in brackets. Missing variables are not included in this table. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

Table B.VI. Balance Table for perceived reccomendation from father

	Girls			Boys		
	Choice Lit. (1)	Choice Math (2)	Diff (3)	Choice Lit. (4)	Choice Math (5)	Diff (6)
Education level of mother: primary or junior sec.	0.238	0.202	-0.036 (0.024)	0.218	0.170	-0.048** (0.024)
Education level of mother: high school	0.392	0.391	-0.001 (0.029)	0.309	0.365	0.056* (0.031)
Education level of mother: university	0.152	0.178	0.026 (0.023)	0.132	0.166	0.034 (0.022)
Education level of father: primary or junior sec.	0.307	0.207	-0.100*** (0.024)	0.248	0.192	-0.055** (0.027)
Education level of father: high school	0.349	0.381	0.032 (0.027)	0.299	0.377	0.078** (0.030)
Education level of father: university	0.100	0.147	0.047** (0.019)	0.096	0.128	0.032* (0.019)
Lives with both parents	0.812	0.824	0.012 (0.023)	0.824	0.825	0.002 (0.027)
Mother works	0.666	0.678	0.012 (0.026)	0.676	0.686	0.009 (0.032)
Father works	0.781	0.787	0.006 (0.024)	0.775	0.812	0.038 (0.029)
Low wage job - mother	0.276	0.240	-0.035 (0.026)	0.304	0.241	-0.063** (0.028)
Medium or high wage job - mother	0.213	0.218	0.005 (0.025)	0.162	0.244	0.083*** (0.026)
Other job - mother	0.171	0.214	0.043* (0.022)	0.201	0.198	-0.003 (0.025)
Low wage job - father	0.236	0.238	0.002 (0.022)	0.228	0.276	0.048* (0.026)
Medium or high wage job - father	0.238	0.256	0.018 (0.027)	0.199	0.262	0.064** (0.024)
Other job - father	0.296	0.279	-0.017 (0.028)	0.338	0.267	-0.071** (0.028)
Has sister(s)	0.530	0.496	-0.034 (0.031)	0.561	0.486	-0.075** (0.032)
Has brother(s)	0.541	0.523	-0.017 (0.053)	0.471	0.512	0.042 (0.067)
High-School Interest: Classic/Humanistic	2.136	2.066	-0.070 (0.062)	2.015	1.895	-0.120* (0.070)
High-School Interest: Applied Sciences	2.006	2.364	0.358*** (0.066)	2.260	2.558	0.299*** (0.073)
Student chose Math	0.205	0.563	0.359*** (0.027)	0.336	0.766	0.430*** (0.027)
Performance in Math	1.307	1.403	0.096* (0.050)	1.238	1.432	0.194*** (0.049)
Performance in Italian	1.401	1.503	0.102* (0.028)	1.100	1.289	0.189*** (0.031)
Student would choose logic task	0.236	0.430	0.194*** (0.025)	0.365	0.620	0.255*** (0.029)

Notes: In columns 1 and 4, we report the mean of each characteristic for the sample of girls and boys, respectively, who perceive their father would recommend them literature. In columns 2 and 5, we report the mean of each characteristic for the sample of girls and boys, respectively, who perceive their father would recommend them math. In the third column, we report the difference of the previous two columns and the standard errors of the difference in brackets. Missing variables are not included in this table. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

Table B.VII. Heterogeneous treatment effects by perception of parental recommendation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep. Variable: Students' Choice "Math"							
	Female				Male			
Panel A: Belief of Mother's Advice								
Treatment 1: Mother	-0.214***	-0.205***	-0.205***	-0.213***	-0.148**	-0.132*	-0.126	-0.124
	(0.054)	(0.064)	(0.064)	(0.066)	(0.070)	(0.077)	(0.077)	(0.079)
	{0.001}***	{0.004}***	{0.004}***	{0.004}***	{0.040}**	{0.075}*	{0.092}*	{0.100}
Treatm. 1 × Mother suggests math	0.270***	0.218**	0.216**	0.220**	0.219**	0.219**	0.218**	0.201**
	(0.092)	(0.108)	(0.108)	(0.110)	(0.086)	(0.098)	(0.099)	(0.102)
	{0.012}**	{0.066}*	{0.071}*	{0.094}*	{0.020}**	{0.052}*	{0.059}*	{0.094}*
Mother suggests math	0.193***	0.176**	0.180**	0.169**	0.351***	0.337***	0.322***	0.326***
	(0.071)	(0.085)	(0.085)	(0.085)	(0.058)	(0.064)	(0.065)	(0.065)
Panel B: Belief of Father's Advice								
Treatment 2: Father	-0.081	-0.040	-0.046	-0.030	-0.085	-0.097	-0.095	-0.101
	(0.064)	(0.074)	(0.075)	(0.074)	(0.073)	(0.082)	(0.082)	(0.085)
	{0.397}	{0.700}	{0.647}	{0.837}	{0.397}	{0.441}	{0.469}	{0.438}
Treatm. 2 × Father suggests math	0.119	0.060	0.069	0.035	0.242***	0.213**	0.222**	0.229**
	(0.089)	(0.103)	(0.105)	(0.105)	(0.085)	(0.099)	(0.099)	(0.101)
	{0.397}	{0.700}	{0.647}	{0.837}	{0.014}**	{0.068}*	{0.056}*	{0.049}**
Father suggests math	0.319***	0.299***	0.291***	0.295***	0.419***	0.424***	0.410***	0.398***
	(0.067)	(0.081)	(0.082)	(0.080)	(0.061)	(0.068)	(0.069)	(0.068)
Class FE	n	y	y	y	n	y	y	y
Student Controls	n	n	y	y	n	n	y	y
Family controls	n	n	n	y	n	n	n	y

Notes: Std. errors in parentheses clustered at the class level. FWER p-values displayed in braces underneath standard errors. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

Table B.VIII. Heterogenous treatment effects by perception of peers' choice

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep. Variable: Students' Choice "Math"							
	Female				Male			
Treatment 4: Peer Public	0.006	0.012	0.023	0.022	0.086	0.105	0.107	0.105
	(0.070)	(0.077)	(0.076)	(0.073)	(0.063)	(0.066)	(0.066)	(0.067)
	{0.994}	{0.978}	{0.985}	{0.986}	{0.678}	{0.422}	{0.404}	{0.441}
Treatment 5: Peer Public+Interaction	-0.044	-0.001	0.006	0.000	0.038	0.061	0.045	0.029
	(0.066)	(0.071)	(0.069)	(0.066)	(0.072)	(0.078)	(0.079)	(0.078)
	{0.957}	{0.993}	{0.985}	{0.994}	{0.957}	{0.834}	{0.943}	{0.986}
Treatm. 4 × More Boys Choosing Math	-0.018	-0.113	-0.131	-0.130	-0.104	-0.168	-0.160	-0.137
	(0.106)	(0.113)	(0.113)	(0.113)	(0.100)	(0.106)	(0.107)	(0.106)
	{0.994}	{0.745}	{0.634}	{0.644}	{0.855}	{0.422}	{0.451}	{0.606}
Treatm. 5 × More Boys Choosing Math	-0.069	-0.184*	-0.192*	-0.172	0.018	-0.052	-0.033	-0.011
	(0.100)	(0.105)	(0.105)	(0.106)	(0.099)	(0.110)	(0.112)	(0.111)
	{0.957}	{0.342}	{0.298}	{0.436}	{0.994}	{0.938}	{0.985}	{0.993}
More Boys Choosing Math in Class	-0.032	0.036	0.048	0.036	0.204***	0.279***	0.262***	0.242***
	(0.075)	(0.087)	(0.086)	(0.085)	(0.066)	(0.069)	(0.070)	(0.070)
Class FE	n	y	y	y	n	y	y	y
Student Controls	n	n	y	y	n	n	y	y
Family controls	n	n	n	y	n	n	n	y

Notes: Std. errors in parentheses clustered at the class level. FWER p-values displayed in braces underneath standard errors. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

C Appendix: Students survey

In this section, we report the exact "wording" and questions elicited in the experiment (B.1, Part I: Experiment) and in the questionnaire (B.2, Part II: Experiment).

C.1 Part I: Experiment

You will now be asked to complete 6 multiple-choice questions, 3 in math and 3 in Italian. You can choose to gain 2 points for each correct question instead of 1 in either math or Italian. In the other subject, you will gain one point only for each correct question. In the past, students who completed these questions were on average equally likely to provide correct answers in math and in Italian.

At this point, students were randomly assigned into 6 different groups. Each group received a different type of information before choosing between math or Italian questions (see Table C.I).

1. Do you want to get 2 points for each correct question in math or Italian? You can choose one subject only. To get the highest possible total score, you should choose to get two points in the subject where you think you can do better.

2. In which subject do you think your MALE classmates (who are in the classroom at the moment) have chosen to gain 2 points for each correct answer? Options: (a) All of them chose math; (b) All of them chose math except for one or 2; (c) All of them chose math except for 3 or 4; (d) Half chose math and half chose Italian; (e) All of them chose Italian except for 3 or 4; (f) All of them chose Italian except for one or 2 (g) All of them chose Italian.

3. In which subject do you think your FEMALE classmates (who are in the classroom at the moment) have chosen to gain 2 points for each correct answer? Options: (a) All of them chose math; (b) All of them chose math except for one or 2; (c) All of them chose math except for 3 or 4; (d) Half chose math and half chose Italian; (e) All of them chose Italian except for 3 or 4; (f) All of them chose Italian except for one or 2 (g) All of them chose Italian.

4. Assume you are asked to complete one of the following two tasks. On which of these tasks do you expect to be better at? You can choose one task only, even if you think you will do equally well in both. Options: (a) A task that requires math and logic skills (b) A task that requires communication and organizational skills (e.g., present a summary to the class).

5. **Now answer the math and literature questions** *[The order of the questions was randomized at the individual level].*

C.2 Part II: Questionnaire

C.2.1 Implicit Association Test

The concept behind IAT is that the easier the mental task, the faster the response production and the fewer the errors made in the process.

Table C.I. Treatment Groups

Treatment Arm	Information Shared with Students
Control	No information
Treatment 1	Think about your mother. Which subject would he recommend you to choose?
Treatment 2	Think about your father. Which subject would she recommend you to choose?
Treatment 3	After the questionnaire, we will tell your parents which subject you choose. You can choose one subject only. To get the highest possible total score, you should choose to get 2 points in the subject where you think you can do better.
Treatment 4	After the questionnaire, we will create two groups of students: all the students in your class who will choose to get 2 points for each correct question in math will stand up and move to the right side of the room, while all the students in your class who will choose to get 2 points for each correct question in Italian will stand up and move to the left side of the room to hand the tablets to the researchers.
Treatment 5	After the questionnaire, we will create two groups of students: all the students in your class who will choose to get 2 points for each correct question in math will stand up and move to the right side of the room, while all the students in your class who will choose to get 2 points for each correct question in Italian will stand up and move to the left side of the room to hand the tablets to the researchers. Before the end of the class, the two groups will work together in a task related to the subject chosen.

We invite students to complete a seven-block IAT following the schematic overview presented in Table C.II. Half of the students completed the IAT as presented in Table C.II, while the other half completed the IAT with the blocks in the following order: 1, 5, 6, 7, 2, 3, 4 (”order incompatible” IAT). The order of the two schemes is randomly selected at the individual level. The blocks used to calculate the IAT score are blocks 3, 4, 6, and 7. The number of words that need to be categorized is 20 in blocks 3 and 6, and 40 in blocks 4 and 7, as in the standard IAT 7-blocks. The measure of implicit stereotypes is calculated as the difference in reaction time between the task in which scientific fields and male names are on the same side of the screen and the task in which scientific fields and female names are on the same side of the screen. The scoring procedure follows the guidelines of the improved scoring algorithm defined by Greenwald et al. (2003).

Table C.II. IAT - Blocks

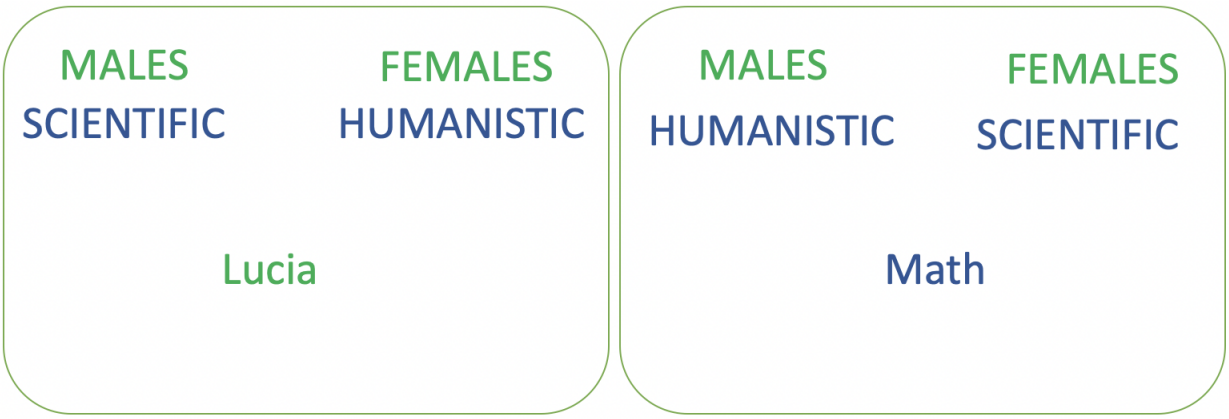
Blocks	Left Categories	Right Categories
1	Maschio (Male)	Femmina (Female)
2	Scientifico (Scientific)	Umanistico (Humanistic)
3	Maschio (Male) and Scientifico (Scientific)	Femmina (Female) and Umanistico (Humanistic)
4	Maschio (Male) and Scientifico (Scientific)	Femmina (Female) and Umanistico (Humanistic)
5	Umanistico (Humanistic)	Scientifico (Scientific)
6	Maschio (Male) and Umanistico (Humanistic)	Femmina (Female) and Scientifico (Scientific)
7	Maschio (Male) and Umanistico (Humanistic)	Femmina (Female) and Scientifico (Scientific)

Stimuli presented within each category are summarized in Table C.III, while a screenshot of the tablet is shown in Figure C.I.

Table C.III. IAT - Categories

Categories	Stimuli
Maschio (Male)	Luca, Federico, Matteo, Alberto, Davide, Alessandro
Femmina (Female)	Anna, Martina, Laura, Giulia, Chiara, Alessia
Scientifico (Scientific)	Matematica (Math), Fisica (Physics), Scienze (Science), Chimica (Chemistry), Ingegneria (Engineering), Calcolo (Calculus)
Humanistic (Umanistico)	Lettere (Literature), Italiano (Italian), Filosofia (Philosophy), Letteratura (Literature), Storia (History), Lingue (Languages)

Figure C.I. Screenshot of the IAT



C.2.2 Self-reported answers and background

You are almost done! Only a few questions left!

1. Below you will find a list of some types of high schools. How interested would you be to continue your studies in each of these schools? *[Select from answer choices: "Not at all interested", "Not very interested", "Somewhat interested," "Very interested", "I don't know this school"]*
   - Vocational high-school
   - Technical high-school (economic sub-track)
   - Technical high-school (technological sub-track)
   - Academic High School: scientific with applied sciences
   - Academic High School: scientific

- Academic High School: classic
- Academic High School: languages
- Academic High School: artistic
- Academic High School: human sciences

2. You said you are "Somewhat interested" or "Very interested" in the Scientific High School (with applied sciences). Why? You can select more than one option.
   - I like math and/or technology
   - I think it creates good opportunity (university/jobs)
   - My parents think I should choose this school
   - My teachers think I should choose this school
   - I want the majority of my classmates to be male
   - I want to be in class/school with my friends
   - None of the reasons above
3. You said you are "Not very interested" or "Not at all interested" in the Scientific High School (with applied sciences). Why? You can select more than one option.
   - I don't like math and/or technology
   - I think the opportunities (university/jobs) it creates are not interesting
   - My parents think I shouldn't choose this school
   - My teachers think I shouldn't choose this school
   - I'm concerned I might fail my class
   - I don't want the majority of my classmates to be male
   - I want to be in class/school with my friends
   - None of the reasons above

C.2.3 Gender Differences

State how much you agree with the following statements.
[Select from answer choices "Strongly disagree", 'Disagree", "Agree", "Strongly agree"]

4. There are biological differences in men's and women's innate mathematical and scientific abilities.
5. Earning money to support the family is a father's responsibility.
6. Taking care of the house and children is a mother's responsibility.
7. Psychologist is not a job suitable for men.
8. Computer programmer is not a job suitable for women.
9. Even if they work hard, women cannot be good at football.
10. Even if they work hard, men cannot be good at cooking.

C.2.4 Friendship

11. Who are your 5 best friends in this class? Select the number that corresponds to their position in the class list. *[Multiple choice question.]*

12. You have to choose two good classmates to solve with you a complicated math problem. You can indicate up to two students and also you can include yourself. Select the number that corresponds to their position in the class list. *[Multiple choice question.]*

13. You have to choose two good classmates to solve with you a complicated Italian/grammar exercise.
    You can indicate up to two students and also you can include yourself. Select the number that corresponds to their position in the class list. *[Multiple choice question.]*

C.2.5 Background

Finally, we asked students a set of questions designed to obtain information on their socioeconomic background. We collected information on students' gender, place of birth, and age. We also elicit information on students' siblings and parents, including information on their parents' level of education and occupation.

D Appendix: Parents questionnaire

D.1 Math/Literature task

1. We will ask students taking part in this research to complete 3 multiple-choice questions in math and 3 multiple-choice questions in Italian/grammar. They will gain 2 points for each correct answer in the subject they choose between math and Italian. In the other subject, they will gain one point for each correct answer. They should choose the subject they think they are better at.

   Which subject would you recommend your child to choose?

   Note: in the past, students have done equally well in math and Italian. His/her answers will be graded by a computer. Which subject do you think your child is going to choose? In which subject does he/she believe to be better at?

2. Compared to his/her classmates, how well do you think he/she has done in answering the questions? Choose a number between 1 (worst 10% of the class) and 10 (best 10% of the class).

   1. MATH questions *[Select a number from 0 to 10]*
   2. ITALIAN questions *[Select a number from 0 to 10]*

3. If we asked you to answer 6 multiple-choice questions, 3 in math and 3 in Italian/grammar, in which subject do you think you would do better? You can choose only one subject, even if you think you are good at both.

   - MATH

- ITALIAN

4. Assume your child is asked to complete one of the following tasks. On which of these tasks do you expect him/her to be better at?

   You can only choose one task, even if you think he/she would do equally well in both.

   - A task that requires math and logic skills
   - A task that requires communication and organizational skills (e.g., present a summary to the class).