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Shaping gender-stereotypical beliefs: the role of parents and peers

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Shaping Gender-Stereotypical Beliefs: The Role of Parents and Peers*

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Abstract

We use a lab-in-the-field experiment to explore the influence of parents and peers in shaping adolescents' beliefs on whether they are better in male-typed fields (math) versus female-typed fields (literature). We find that thinking about parental recommendation affects students' beliefs on their comparative advantage in math with respect to literature in a gender-stereotypical way: conditional on ability, girls are 33% more likely to think they are better in literature when they expect their mothers to recommend it, and boys are 15% more likely to think they are better in math when they expect their fathers to recommend it. Our results also show that while peers do not influence boys' beliefs on their comparative advantage, girls are less confident in their relative ability in math compared to literature when they must interact with male students in areas outside their gender's domain.

Keywords: gender stereotypes, parents, peers, comparative advantage, math, literature.

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1 Introduction

Educational choices are still highly segregated by gender in most countries around the world (Altonji et al., 2012; Blau and Kahn, 2017), with women persistently underrepresented in highly remunerated fields, such as science, technology, engineering, and mathematics (STEM), and men underrepresented in areas such as the humanities, education, and health (Delfino, 2019).[1] The gender gap in the field of study appears early on in students' lives and generates long-lasting consequences, affecting labor market opportunities, well-being, and overall economic development (Kirkeboen et al., 2016; UNESCO, 2017; Black et al., 2021). Skills, comparative advantage, and self-confidence in different fields are important predictors of educational choices but are likely to be influenced by norms and interactions with others, such as parents and peers (Breda and Napp, 2019; Carlana, 2019; Eble and Hu, 2022). Parents can affect children's beliefs and behavior through making recommendations, transmitting cultural traits, investments, and role modeling (Giustinelli, 2016; Doepke and Zilibotti, 2017; Dizon-Ross, 2019; Attanasio et al., 2022). Simultaneously, peer pressure may shape adolescents' choices through exposure, interaction, and willingness to conform to others' behaviors (Brenøe and Zölitz, 2020; Bursztyn et al., 2019). This implies that if parents and peers hold gender-stereotypical beliefs, they may cause beliefs distortion on the perceived ability of children, perpetuating gender segregation in the field of study (Bordalo et al., 2019; Coffman, 2014).

In this paper, we design a lab-in-the-field experiment and collect unique data among 2,511 Italian middle school children to investigate how parents and peers shape adolescents' beliefs on their comparative advantage between math and literature. We elicit students' subjective beliefs by asking them to choose the subject they expect to give a higher number of correct answers in a test including questions in both domains. Importantly, students' choices between the two subjects is positively correlated with their ability, as measured by administrative grades and their actual decision of the high school track. However, both genders systematically overestimate their comparative advantage in the gender-stereotypical field; i.e., boys are more likely than girls to choose math even if they have a comparative advantage in literature, and girls are more likely than boys to choose literature even when they are better in math.

Before reporting the subject in which they believed to be better, students were randomly assigned to five treatment arms. To test the influence of parents, we asked them to think about whether their mother would recommend them to choose math or litera-

[1] Appendix Figure A.I reports the share of female and male graduates across OECD countries. Men are substantially overrepresented in STEM majors and women in non-STEM majors.

ture (*Treatment 1: Mothers' Recommendation*); asked students to think about whether their father would recommend them to choose math or literature (*Treatment 2: Fathers' Recommendation*); and told them that their choice may be revealed to their parents (*Treatment 3: Disclosure to Parents*). The rationale for these treatments is to study the influence of mothers and fathers on their child's choice. Plausibly, parents have daily interactions and discussions with their children, and, in general, it is therefore very difficult to identify their role on their children's educational choices. With these treatments, we can isolate parents' influence by increasing the salience of perceived parental recommendations. With Treatment 3, we test whether there is an additional effect induced by the observability of their choice by the parents.

To study the influence of peers, we informed students that their choice would be observed by their classmates (*Treatment 4: Disclosure to Peers*) or that they would also have to collaborate in an additional task with the classmates who chose the same subject, either math or literature (*Treatment 5: Interactions with Peers*). The purpose of Treatment 4 is to investigate whether students are concerned about the public disclosure of their own choice to classmates (Bursztyn et al., 2017): by choosing math, for example, girls may signal unconventional or even undesirable traits to their male classmates, such as a preference for competitiveness and ambition (Buser et al., 2017), while boys, by choosing literature, may signal "soft" traits that do not conform with gender-stereotypical views (Makarova et al., 2019). The purpose of Treatment 5 is to investigate whether the desire to avoid interactions with opposite-gender peers is contributing to gender segregation in the chosen field of study (Robnett and Leaper, 2013): when students choose it, they jointly pick the subjects and the peers they will interact with during high school. For example, by choosing a scientific area, a student will study more math but also will likely spend more time with male peers given the field's gender segregation. Similarly, by choosing a humanistic subject, the student is likely to spend more time with female peers.

In addition to the experiment, we also collect survey data on students and their parents, eliciting information on implicit gender stereotypes (through a gender-science implicit association test (IAT)), explicit gender stereotypes, high school track interests, friendship networks, socio-economic background, and actual parental recommendations. Finally, we assemble administrative data from the Italian Ministry of Education on teacher-assigned grades in math and literature *before* the experiment and students' high school choice *after* the experiment. Administrative data are important to test whether the perceived comparative advantage in math versus literature in the experiment reflects students' actual ability and their future high school track choice. However, given the short-term nature of our treatments, it would not be realistic to expect

long-term treatment effects on actual high school choices. After the experiment, students from all treatment arms were equally exposed to parental recommendations and peer pressure.

Our first result shows that simply thinking about mothers' recommendations (Treatment 1) exacerbates the gender gap: it decreases the probability that girls choose math by around 10 percentage points but does not influence the perceived comparative advantage of boys in math with respect to literature. Thinking about fathers' recommendations (Treatment 2) negatively influences the probability to choose math for girls and positively for boys, but the impact is not statistically significant at conventional level. However, we expect different treatment effects depending on what students perceive as recommendations from their mothers and fathers. We found that, on average, when girls believe their mother would recommend literature, the probability of them choosing math decreases by 53% compared to girls with the same belief in the control group. While boys' perceived comparative advantage in math compared to literature is not influenced by reflecting on their mother's recommendation, it is influenced by their father's: when boys believe their fathers would recommend math, their probability of choosing it increases by 15% compared to similar students in the control group. These findings suggest that increasing the salience of parents' perceived recommendation influences children's perceived comparative advantage between math and literature. Consistent with the literature, we find that mothers have a stronger influence on their daughters' schooling decisions and fathers have a stronger influence on their sons' decisions (Attanasio and Kaufmann, 2014). Our results highlight the crucial role of parents in shaping children's self-confidence in different fields: gender-stereotypical recommendations of parents who are the same gender as their child induce equally able children to segregate into different fields, pushing more girls into literature and more boys into math, thus exacerbating gender stereotypes in the choice of field. The treatment effect of the potential disclosure of students' comparative advantage to parents (Treatment 3) is not statistically significant at conventional level.

Our second set of results shows that students do not change their decision when they expect their classmates to observe their choice. Adolescents in our sample, both girls and boys, are not concerned about the public disclosure of their own field of interests to classmates, in contrast to what happens at higher educational levels, when they are closer to marriage age and avoid signaling ambition to single male classmates by "acting wife" (Bursztyn et al., 2017). Although observability is not an issue for girls, interaction with peers matters for them: the probability of choosing math for female students decreases by 9 percentage points when they must collaborate with classmates choosing the same subject. The effect is driven by girls who expect to be a gender

minority among students choosing math, with a 35% decrease in their probability of choosing math (16 percentage points).

This paper contributes to three strands of literature. First, it contributes to a better understanding of the determinants of gender-stereotypical choices in students' field of study. High school track choice has long-lasting consequences on college majors and future job prospects (Kirkeboen et al., 2016; Anelli and Peri, 2019). There is still a vivid 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 (Baron-Cohen, 2005; Guiso et al., 2008; Nollenberger et al., 2016). Gender differences in competitiveness (Buser et al., 2014; Almås et al., 2016), comparative advantage in reading with respect to math (Breda and Napp, 2019), self-confidence (Kamas and Preston, 2012), or interests (Bian et al., 2017) may induce girls to avoid scientific fields. However, culture, exposure to stereotypes, and role models since early childhood affect the development of preferences, interests, and the association between gender and fields (Tungodden, 2022; Carlana, 2019; Lavy, 2008; Breda et al., 2020; Porter and Serra, 2019; Canaan and Mouganie, 2021). Compared to these papers, we develop a creative measure of perceived comparative advantage in different fields and show that it is highly correlated with actual high school track decision. We then focus on understanding the role of crucial actors in the life of adolescents (parents and peers) and how exposure to gender-stereotypical influences at home and at school may lead to the exacerbation of gender gaps in educational decisions.

Second, the paper contributes to the theoretical and empirical literature on the influence of parents and older siblings on children's preferences and decisions (Doepke et al., 2019; Lizzeri and Siniscalchi, 2008; Giustinelli, 2016; Bergman, 2015; Altmejd et al., 2021; Brenøe, 2021). Parents may directly or indirectly influence children's 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 parents on the field of study, Dahl et al. (2020) find that if the father or the mother graduates in a certain field, their son is more likely to follow their track, while these effects are muted for daughters. Another recent paper by Tungodden (2022) studies the effect of parents in shaping their children's willingness to compete, showing that parents choose more competition for boys than for girls. Finally, Cheng et al. (2017) test the extent to which the mindsets of a student's parents regarding math ability influence their mindset on math ability and longer-term STEM-related outcomes. Unlike these studies, we design a lab-in-the-field experiment to investigate the causal effect of parental influence on students' perceived comparative advantage in different fields and disentangle whether the effect is driven by the activation of mothers' or fathers' perceived recommendation or

by parents' observability of students' choices.

Third, we contribute to the growing literature looking at the effect of peer and horizontal socialization on educational outcomes and, more specifically, on track choices (De Giorgi et al., 2010; Black et al., 2013; Hill, 2015; Anelli and Peri, 2019; Zölitz and Feld, 2020; Born et al., 2020; Zölitz and Feld, 2020). While most of the previous papers examine how classes' gender composition affects future academic decisions, we attempt to investigate two mechanisms through which peers might influence high school track choices: i) conformity to prevailing norms, where 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 a desire to avoid being a minority in the field (Shan, 2020). With respect to 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. These women reported lower desired salaries and 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. We contribute to the literature by shedding light on whether the same mechanism is at play during adolescence, when individuals must make irreversible decisions on their field of study, or if it is relevant only when individuals are getting closer to the marriage age. With respect to the second channel, the 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 can disentangle which of the two mechanisms -public disclosure versus interactions- may affect adolescents' choice of the field of study.

The remainder of the paper is organized as follows. Section 2 describes the data and the experimental design. Section 3 provides descriptive statistics and correlations of students' perceived comparative advantage in math versus literature with real-world outcomes, such as track choice and ability. Section 4 presents the empirical strategy and the main results, and Section 5 concludes and discusses policy implications.

2 Data and Experimental Design

We collected data among students enrolled in 14 middle schools (grades 6, 7, and 8, ages 11–14) across 163 different classes and 7 provinces in Italy (Milan, Como, Perugia,

Ancona, Reggio Calabria, Bari, and Palermo).[2] Middle school is compulsory for all pupils and lasts for three years, after which students must decide which field to study in high school. Appendix Figure A.II shows the geographic distribution of our sample, including schools in the north, center, and south of the country.

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 investigating students' school interests, goals, and aspirations. Among all students, around 85% were present in class during the day of the survey 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 2,511 students in grade 6 (39.88%), grade 7 (33.03%), and grade 8 (27.08%).[3]

The data collection was divided into two main sections: the experiment and the questionnaire. We will now describe each of the two sections, reported in detail in the Appendix B.

2.1 The Experiment

Our ultimate goal is to study whether parents and peers affect students' perceived comparative advantage in math with respect to humanities. Given the challenges related to causal estimates -due to endogenous exposure to parents and peers- we implement a lab-in-the-field experiment. To mimic gender-segregated track choices within the experiment, we incentivize students to choose the task they think they are better at between a male-stereotypical field (math) and a female-stereotypical field (literature) (Coffman, 2014).[4]

We informed students that they must complete six multiple-choice questions: three in math and three in literature, equally difficult for each subject.[5] Before answering

[2]The schools in the sample have been selected by our implementing partners, CIAI and Action Aid, as a part of a broader intervention to reduce dropout in disadvantaged schools in Italy.

[3]We dropped students who could not complete the survey: 35 students who did 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 also keep these students in the analysis.

[4]In Section 3, we delve deeper into the correlation between the perceived comparative advantage in our experiment and real-world outcomes from administrative data, such as high school tracks.

[5]We selected questions from past national standardized tests (INVALSI) administered to middle school children in Italy. Their answers can therefore represent a rough proxy of students' ability. Given

the multiple-choice questions, students had to choose one of the two fields by selecting the subject for which they expected to give a higher number of correct questions: they gained 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 is the key outcome of interest in the experiment and reflects the subject in which students believe they are better, either math or literature. For ethical reasons, the schools in our sample did not allow us to provide monetary or in-kind gifts to children to incentivize their choice and performance in the task.

Before deciding, students were randomly divided among the five different treatments, described below, and a control group:

- *Treatment 1: Mothers' Recommendation*. We asked students to think about whether their mother would recommend them to choose math or literature before making they made their own choice.
- *Treatment 2: Fathers' Recommendation*. We asked students to think about whether their father would recommend them to choose math or literature before they made their own choice.
- *Treatment 3: Disclosure to Parents*. We told students that their choice may be revealed to their parents.
- *Treatment 4: Disclosure to Peers*. We told students that their peers would see their choice.
- *Treatment 5: Interactions with Peers*. We told students that their peers would see their choice and that they would have to collaborate in an additional task with the classmates who choose the same subject.

The randomization was done at the individual level using computer software, and all the instructions regarding each treatment were written on the screen of each tablet to prevent students from getting information on other treatment arms. After treatment allocation, students had to choose the subject they thought they were better at. Students were not allowed to change their minds after the initial elicitation of their perceived comparative advantage in math with respect to reading. At the end of the questionnaire, the last screen of each student's tablets showed in capital letters the decision they made at the beginning (either math or literature).

that INVALSI has been administered only in grades 6 and 8, for students in grade 7, we prepared equally difficult questions with the support of middle school teachers.

Appendix Figure B.I shows the experimental design and the exact questions asked to students assigned to each treatment or control group. After the random allocation and the subjects were chosen, we elicited students' beliefs about their parents' recommendations independently of the treatment assignment. 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 elicited students' beliefs on the choice of their male and female classmates to understand whether their perception of minority status in a field may have driven their choice. Finally, we asked 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.

2.2 Students' Questionnaire and Administrative Data

The second part of the survey elicited information on gender stereotypes, friendship networks, and socio-demographic characteristics. As described at the end of this section, we also collected administrative data from the Italian Ministry of Education.[6]

Gender-Science IAT. To capture gender stereotypes, we administered an 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). A 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 revealing, or are unaware of having, certain attitudes or stereotypes. A detailed explanation of the IAT is reported in Appendix B.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., 2022) 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 zero and

[6]We also collected information on preferences for high school track choices. However, in the empirical analysis, we focus on actual high school choice and not on students' self-reported interest in high school tracks given the availability of administrative data. The type of high school chosen and the self-reported track of interest in our survey are, nevertheless, strongly correlated.

standard deviation one in our sample of students.

Explicit Gender Stereotypes. In addition to the IAT, we elicited beliefs about explicit gender norms by asking them to agree or disagree with seven statements on gender differences.[7] 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 zero and standard deviation one in our sample of students.

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

Socio-Demographic Characteristics. We concluded the survey by collecting information on socio-economic characteristics of students and their family.

Administrative Data. We match our experimental and survey data at the individual level with administrative data from the Italian Ministry of Education. Administrative data include information on the teacher-assigned grade in math and literature in June 2019 (before the experiment) for students in grades 7 and 8 in our sample.[8] We also obtain data on the type of high school track students attended in the 2021–22 academic year (after the experiment). In the Italian schooling system, at the end of grade 8 (at 13–14 years), students must select a specific high school track and sub-tracks. This choice affects the subjects that students 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. In Italy, there are three main high school choices: 1) academic high school, which includes sub-tracks focusing on classic, scientific, linguistic, artistic, and human sciences; 2) technical high school, which includes sub-tracks focusing on technology and economics; and 3) vocational school, including several sub-tracks such as mechanics, hospitality, and beauty centers.

2.3 Students' Characteristics: Summary Statistics and Balance

[Insert Table I]

Table I reports summary statistics of the data we collected among students. Around 50% of the students in our sample are females. Column 1 reports the means in the overall sample and shows that 14% of students are immigrants and 49% live in the

[7] 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) a psychologist is not a job suitable for women; iv) a computer programmer is not a job suitable for women; v) even if they work hard, women cannot be good at football; and v) even if they work hard, men cannot be good at cooking.

[8] Information on grades was not collected for elementary school students and therefore is not available for grade 6 students of our experiment who were in elementary school in June 2019.

south of Italy. Mothers are more likely to be college graduates than fathers (17% versus 13%), but they are less likely to work (71% versus 96%) (Panel A). These figures are similar to the education and occupation levels by gender and age groups in the general Italian population. Looking at the data from our experiment (Panel B), we find that 53% of the students choose the task in math (43% of girls and 63% of boys), 47% think their mothers would recommend the task in math (43% of girls and 50% of boys), and 63% think their fathers would recommend the task in math (61% of girls and 67% of boys). In the next section we dig deeper into the gender gap in students' perceptions.

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). Our context is not an exception. Panel C of Table I reports the summary statistics on grades and track choice coming from administrative data: boys have a probability of choosing the STEM oriented high school tracks (scientific or technological) more than double that of girls, with symmetric gaps of the same magnitude (around 30 percentage points) in the humanistic tracks (classic, linguistic and human sciences).[9] Furthermore, girls have higher teacher-assigned grades than boys, and the gap is larger for humanistic compared to scientific subjects. This is consistent with the evidence from (Breda and Napp, 2019), suggesting that girls have a comparative advantage in reading that may explain part of the gender gap in the chosen field of study.

Appendix Table A.I reports the mean difference in baseline characteristics of each of the five treatment groups and control group. Given the number of treatment arms and tests performed in the balance table, for a few variables we find small differences that are consistent with random chance. In our empirical analysis, we nevertheless control for all baseline characteristics to provide evidence that the results are not driven by these slight imbalances.

2.4 Parents' Data

At the end of the students' survey, enumerators distributed a flyer to children with a QR code and a link to the parents' questionnaire. Parents were supposed to complete the questionnaire on their own device (i.e., phone, tablet, or computer).[10] Unfortunately,

[9]This gender segregation is representative of the national Italian context. Appendix Figure A.III reports the gender composition of each high school track and shows that the most scientific track (i.e., scientific lyceum) enrolled 70% of boys and only about 30% of girls. On the contrary, the humanistic tracks (i.e., classic lyceum, human science lyceum) enrolled a great majority of girls.

[10]Schools were in charge of encouraging parents to complete the questionnaire: we offered a 750 euro Amazon voucher to all schools with a parent response rate of at least 50% and 3,000 euros to the school that received the highest fraction of completed questionnaires. The time to complete the parent

our final sample includes only 542 parents of 484 children, out of 2,511 students in our sample, with a response rate below 20%. However, we use parents' data to provide suggestive evidence on the correlation between students' perceived recommendations and parents' actual recommendations.

3 Descriptive Evidence

3.1 Gender Gap and Field Choice

In this section, we explore the gender gap in field choice that emerged in our experiment and the correlation between the choice of the subject in which students believe they are better (i.e., their perceived comparative advantage) and relevant real-world outcomes (e.g., grades, high school track). First, as expected, Figure I shows that students who receive higher grades in math compared to literature are more likely to select math, while the opposite is true for students who have higher grades in literature compared to math.

[Insert Figure I]

Second, and most importantly, the gender gap is statistically significant for all three sub-groups, with girls being less likely to choose math, independently from their relative grades in the two subjects. Among the students who have higher grades in literature compared to math, 82% of girls perceive they are better in literature compared to math, while only 63% of boys believe so. Among the students who have higher grades in math than in literature, 79% of boys believe they have a comparative advantage in math, while only 67% believe so. The gap is also 10 percentage points among students who receive the same grade in math and literature (44% of girls believe they have a comparative advantage in math versus 54% of boys). These results are confirmed by the regression analysis reported in columns 1 and 2 of Table II: girls are systematically less likely to think they are better in math (column 1), and students, both boys and girls, with a higher grade in math compared to literature are more likely to choose math (column 2). 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.

[Insert Table II]

In the following columns of Table II, we provide evidence on the correlation between the choice of math in the experiment and important life outcomes for the individual.

questionnaire was around 30 minutes.

Columns 3 and 4 of the table show that students who attend a STEM high school after middle school are more likely to perceive a comparative advantage in math in our experiment, while students who attend a humanistic high school are more likely to perceive a comparative advantage in literature. Thus, although we mainly exploit a belief collected during an experiment in class as our main outcome, it is reassuring to observe that it is a good proxy for high school track choices, a highly relevant decision for their overall educational path. Column 5 focuses on the correlation between the perception of the comparative advantage in math compared to literature and implicit stereotypes, as measured by the IAT score. The IAT is strongly correlated with the perceived comparative advantage: a one standard deviation increase in the association between males and scientific subjects raises boys' probability to select math by 5.3 percentage points boys and decreases the probability of girls selecting math by 2.9 percentage points.

Appendix Tables A.III further report correlations between the choice of the task in math and additional outcomes. In line with the previous literature (Kamas and Preston, 2012), students who are overconfident in their own skills in a particular subject are more likely to choose it (columns 1 and 2).[11] Furthermore, when looking at students' preferences between a logic and a communication task, we find that a perceived comparative advantage in math is consistently positively correlated with the preferences for the logic task compared to the communication task (column 3).

As shown, among others, by Campa et al. (2011), gender norms tend to be more conservative in the south of Italy compared to the north. Hence, in column 4 we explore the geographic pattern in students' choices. While boys are equally likely to believe they are better in math in the different parts of the country, girls tend to be 6 percentage points less likely to believe they are better in math if they live in the south, although this difference is not statistically significant at conventional levels. The role modeling example of working mothers seems to be associated with a decrease in gender gaps in the perceived comparative advantage, even if the impact is imprecisely estimated and statistically significant only at the 10% level (column 5).[12]

Last, we collected information on the friendship network of students by asking them to nominate their five best friends in the classroom. The last two columns of the table show that, for both genders, a higher share of friends or classmates choosing math is correlated with a higher probability of choosing math themselves.[13] To summarize,

[11] The overconfidence is a dummy variable equal to one if the student perceives they answered 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.

[12] Unfortunately, we do not have precise information on parents' field of study, nor whether their occupations are in STEM-related sectors.

[13] Appendix Table A.IV provides further evidence consistent with the above discussion. Including class

gender-stereotypical perceptions on the comparative advantage generate a "cost" for girls by inducing them to believe they are not good at math even when it would be their optimal choice and, for boys, by inducing them to select "less literature," even when they do have a comparative advantage in reading. The field choice is associated with many 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. In Section 4 we investigate the causal influence of parents and peers by presenting our experimental evidence.

3.2 Parents and Gender-Stereotypical Recommendations

[Insert Table III]

We next examine if students perceive a gender-stereotypical recommendation from their parents. Appendix Figure A.IV plots the raw data of students' beliefs on their mothers' advice (left panel) and their fathers' advice (right panel) by gender. When thinking about mothers' advice, 44% of girls and 50% of boys believe math would be recommended to them. When thinking about fathers' advice, 62% of girls and 67% of boys believe math would be recommended to them. Students believe that mothers are, on average, more likely to recommend literature than fathers, but overall the gender gap in students' beliefs is similar for both parents (around 6 percentage points).

Indeed, Table III shows that girls are 5.7 and 6.5 percentage points less likely than boys to believe that their mother (Panel A) and their father (Panel B) will recommend them math, respectively. Crucially, the gender gap in math-perceived recommendations is only marginally affected when controlling for students' comparative advantage in math with respect to literature in the baseline grades (column 2) and for other baseline characteristics including family background and class fixed effects (column 3). Restricting the analysis to the sample of students whose parents completed the survey, we find that the perception of students is highly correlated with actual parental recommendation of both mothers and fathers, even when controlling for the comparative advantage in the subject and other students' controls (columns 5 and 6).[14]

fixed effects does not significantly affect the gender gap in the field choice (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).

[14]The sample of parents who completed the survey is systematically different from those who did not. Parents from an immigrant background and those with a low level of education or unskilled occupation are less likely to complete the survey. Children of parents who completed the survey report lower levels of explicit gender stereotypes but report similar levels of implicit stereotypes (see Appendix Table A.II). The gender gap in the perceived recommendation from fathers is similar compared to the full sample but is larger for mothers (column 4, Table III). Appendix Tables A.V and A.VI report the mean of the

These gender-stereotypical associations may reduce girls' perceived comparative advantage in math and boys' perceived comparative advantage in literature compared to what they would have done without thinking about their parents' recommendations, potentially leading to a mismatch of talents. If this were the case, we would expect the effect of our experimental treatments to depend on parental recommendation.

3.3 Students' Beliefs About Peers' Choice

Students' beliefs about their classmates' choice of the task play a crucial role for Treatment 5 (Interactions with Peers) in our experiment as they may affect the perception of being a minority among the students who select a specific subject. In our survey, we elicit the beliefs of students regarding the choice of the task of their classmates: 49% of girls (48% of boys) expect that more boys will choose math as their comparative advantage and 14% of girls (16% of boys) believe that the composition will be equal, while the rest (37% of girls and 36% of boys) believes that boys will be a minority among those who choose math as their comparative advantage.

[Insert Table IV]

Table IV reports 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' choices. In all the specifications, we note a positive and statistically significant correlation between the belief of the students and the classmates' actual choices of their comparative advantage. This association does not differ across gender (column 2) and also holds when we control for the performance of classmates (column 3) and student's characteristics (column 4).

4 Results

4.1 Empirical Strategy

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

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 the perceived recommendation. Unfortunately, we do not have information on whether the parents work in STEM or have a STEM degree.

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

where Y_{ic} is a dummy variable equal to one if the student i attending class c chooses the task in math and equal to zero if in literature. $TreatX_{ic}$ is an indicator for whether the student was assigned to the treatment X, γ_c denotes class fixed effects, andε_{ic} is an error term. We estimate robust standard errors clustered at the class level and report results by also adding student controls (baseline grade in math and literature, an indicator for being an immigrant, implicit and explicit stereotypes) and family controls (parents' level of education, their employment, and presence of siblings). When we analyze the mechanisms in the heterogeneity analysis, we correct p-values for multiple hypothesis testing using the Westfall-Young step-down-adjusted p-values, which also control the family-wise error rate (FWER) and allow for dependence among p-values.

4.2 Influence of Parents

The main results of our experiment are presented in Figure II and Table V, following equation 1. In the control group, 47% of girls and 59% of boys believe they have a comparative advantage in math compared to literature, reflecting a substantial gender-stereotypical gap that cannot be explained by observed ability. Table V shows the impact of the five treatments compared to the control group by gender (girls in columns 1–4 and boys in columns 5–8), including class fixed effects and adding students and family controls in the subsequent columns. The results are quantitatively and qualitatively unaffected by the specification chosen.[15]

[Insert Figure II and Table V]

Our experimental results suggests that simply thinking about their mothers' recommendation (Treatment 1: Mothers' Recommendation) exacerbates the gender gaps: it decreases the probability that girls choose math as their comparative advantage by around 10 percentage points, a decrease of 21% compared to the control group, while it does not affect the perceived comparative advantage of boys in math with respect to literature. Although the point estimates suggest a gender-stereotypical effect with negative impacts on girls' probability, and positive impacts on boys' probability, of choosing math, we do not find a statistically significant effect on both genders from thinking about their fathers' recommendation (Treatment 2: Fathers' Recommendation).

[15] Students in each class completed the experiment at the same time. Including class fixed effects also controls for experimenter and experimental session fixed effects.

Furthermore, to understand whether students' perceived comparative advantage is affected by the activation of parental recommendation or by the fear of disappointing parents with their choice, we include a third treatment arm with explicit information to students that their choice may be revealed to their parents (Treatment 3: Disclosure to Parents). When exposed to this information, girls decrease their probability of choosing math by around 7 percentage points, and boys increase their probability of choosing it by 3 percentage points: the effects are qualitatively smaller than Treatment 1 and are not statistically significant at conventional levels.

The results for Treatment 3 suggest that the revelation of students' choices to parents is not sufficient to lead to a change in students' perceived comparative advantage: families may openly discuss preferences and perceived ability (even if with biased information on actual ability driven by stereotypes), and therefore students may not be concerned by the disclosure of information to parents (Giustinelli, 2016; Dizon-Ross, 2019). However, parents, in their interaction with children, help them build their self-confidence in different domains. Thinking about one's mother's and father's recommendation (as in Treatment 1 and 2) may directly influence the perception of one's comparative advantage as it potentially activates a gender-stereotypical recommendation.

[Insert Figure III and Figure IV]

To test for this channel, we analyze the heterogeneous treatment effects depending on the perceived recommendation of students from mothers and fathers. In the control group, students who are better in a specific subject are more likely to both choose and receive a parental recommendation in that field. As shown in Figure III, in the control group 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 the literature track. This mean difference in the control group partly reflects actual differences in performance or knowledge of one's own comparative advantage.

When looking at the effect of Treatment 1 (Mothers' Recommendation), we find that students assigned to think about their mother's recommendation react by aligning their choice with 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 literature to them, the probability of choosing math decreases by 53% (from 39% to 18%; Figure III, top right panel).

Interestingly, as shown in Figure IV, we find a symmetric pattern for boys. The

point estimate suggests an alignment of students' choices to fathers' perceived recommendation, statistically significant at the 5% level only for boys who expect a gender-stereotypical recommendation from their fathers. Indeed, when boys believe their father would recommend math, they increase their probability of choosing math by 15% (from 72% to 83%) if they are induced to think about their father's recommendation before choosing. Appendix Table A.VII (Panels A and B) reports the coefficients plotted in Figures III and IV, correcting for multiple hypothesis testing using the Westfall-Young step-down-adjusted p-values, which also control for the FWER and allow for dependence among the p-values. The results are neither qualitatively nor quantitatively different from the main specification.

Even when parents do not directly impose their choices on children, the results show that they can indirectly influence their children's perceived comparative advantage, leading to an exacerbation of gender stereotypes in the choice of field. If students perceive counter-stereotypical recommendations from parents, they are not influenced in their decision of math versus literature. However, gender-stereotypical recommendations 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 exposure since early childhood (Ambady et al., 2001; Banse et al., 2010).

4.3 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 field (Zölitz and Feld, 2020) and men increasing their likelihood of choosing a male-dominated field (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), single female MBA students avoid signaling traits such as ambition in the labor market—viewed as an undesirable trait 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 perceived comparative advantage is exacerbated by the awareness of interacting with the same peers who choose their own field. Indeed, when choosing a specific field such as in their high school track choice, students are aware they will select a package of aspects, including the subjects and peers they will socialize with. 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 set of peers who select the same subject.

Table V shows the basic results from the peer treatments. Both boys and girls do not significantly change their behavior when they are aware that their peers will observe their choice (Treatment 4: Disclosure to Peers), although the point estimate suggests a slight change in the gender-stereotypical direction (i.e., girls have a lower, and boys a higher, probability to choose math as their comparative advantage). The result suggests that during adolescence, revealing to peers whether one perceives to be better in math or literature does not necessarily signal undesirable traits and does not induce a change in 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, i.e., boys choosing math (Treatment 5: Interactions with Peers). On average, female students decrease their probability of choosing math by 9.4 percentage points when assigned to Treatment 5 compared to the control group, a statistically and economically significant decrease of 20%. Boys do not seem to be affected by this channel. As expected, given randomization, the results are not significantly affected by the specification chosen.

[Insert Figure V]

Next, we provide evidence that the effect is driven by girls' avoidance of being a minority in a male-dominated field. Figure V shows that the average effect of the impact of Treatment 5 (Interactions with Peers) 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 for the male-dominated field decreases from 45% to 29% if they know they would have to interact with classmates who choose the same subject (Figure V, bottom right). Interestingly, there is a negative impact of the "Treatment 4: Disclosure to Peers" for girls who perceive to be in classes in which boys are a majority in math, but the effect is not statistically different compared to the control group. Girls' choice is not affected compared to the relevant control group if they believe they are at least equally represented among students choosing math (Figure

V, bottom left).[16] 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 (Figure V, top panel). Appendix Table A.VIII reports the coefficients plotted in Figure V, correcting 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 A.V, we test whether friends' actual choices (unobserved by students when making their own decision) influence these treatment effects. Actual friends were elicited during the survey by asking each student the name and surname of their five best friends. The friendship network has a high degree of gender homophily; students are more likely to be friends with other students of the same gender. As a consequence of gender homophily, girls are more likely to be friend of students selecting literature in our experiment. We find evidence that girls who have more friends in literature are also more likely to be affected by Treatment 5 (Interactions with Peers) and substantially increase their probability of choosing literature, while there are no statistically significant effects for other groups. This result 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 when choosing the field track.

4.4 Robustness

We provide additional robustness tests of our results. First, we check whether the perceived recommendation from parents as reported by students in our lab-in-the-field experiment is affected by the treatment assignment. Appendix Figure A.VI shows that neither girls nor boys report a statistically different recommendation from mothers (Panel A) or fathers (Panel B) when exposed to different treatment arms. This finding is important to ensure that our results in Section 4.2 are driven by the activation of parental recommendation and not by changes in the perceived recommendation between the treated and control students.

Second, all students in all conditions by the end of the experiment are exposed to the same information, and therefore we would not expect a treatment effect on addi-

[16] Only 14% of girls and 16% of boys expect that more girls will choose math compared to boys 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.

tional outcomes other than the perceived comparative advantage in math with respect to literature revealed within the experiment. Indeed, all of them think about both parents' recommendations and report them in the survey, know their parents may receive feedback on their actual choice (even if we do not implement that in practice), observe the choice of their peers, and interact with the classmates who select the same subject. Hence, as a placebo check, we estimate the impact of our treatments on the actual track choice of students observed after the lab-in-the-field experiments. As expected, for both the scientific tracks (Panel C) and the humanistic tracks (Panel D), we do not detect any statistically significant differences across treatment arms in the actual choice for both boys and girls.

5 Conclusions and Policy Implications

Gender segregation in fields of study—with men underrepresented in fields such as health and education and women underrepresented in subjects such as STEM—remains a relevant issue 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 educational trajectories and occupational attainments. In this paper, we design a lab-in-the-field experiment that randomly exposes 2,511 middle school students to different treatments to understand whether students' gender-stereotypical perceptions on their comparative advantage in math with respect to literature are at least partially influenced by parents and peers.

We provide evidence that there are substantial gender differences in perceived comparative advantage in our setting that are correlated with future educational investments: more than 60% of boys and only 40% of girls believe they are better in math versus literature. We show that this perception of students' comparative advantage between the two subjects reflects different implicit gender-science stereotypes and, most importantly, different high school track decisions, as observed using administrative outcomes that follow students up to high school, even when controlling for ability. We also show that among students with a better performance in math, 79% of boys believe to be better in math versus only 67% of girls; on the contrary, among students with a better performance in literature, 37% of boys believe to be better in math and only 18% of girls. This finding suggests that gender-stereotypical choices generate a cost for talented students in a counter-stereotypical field.

The results from our lab-in-the-field experiment suggest that parents who are the same gender as their child influence children in the stereotypical domain (i.e., fathers

influence boys in choosing more math, and mothers influence girls in choosing more literature): conditional on ability, girls are 33% more likely to think they are better in literature when they expect their mothers to recommend it, and boys are 15% more likely to think they are better in math when they expect their fathers to recommend it. 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 with their choice. We also find that public disclosure to peers does not affect students' perception of their comparative advantage in math with respect to literature. Instead, what matters for girls is the potential interactions with peers of the opposite gender: 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 interactions with peers in shaping adolescents' choice of field and potential talent mismatches.

Our results are important from a policy perspective. First, interventions that can raise awareness among parents on the influence of their gender stereotypes may help mitigate gender gaps in their children's choice of the field of study. Second, our results on the effects of peers have deep implications for high school track choices. In several countries with high school tracking, students are separated into different school buildings depending on the field, thus limiting their interactions with peers who choose a different area of specialization. When choosing between scientific and humanistic tracks, students choose both the subject they want to study and the peers with whom they want to interact, inducing girls to shy away from STEM. Potential policies that may help to close the gender gap in STEM fields might include the design of different high school tracks within the same school building to mitigate the role of the interaction channels that prevent girls from entering into scientific fields. 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 needed, public policies in the directions described above might help to reduce gender gaps in students' field of study.

References

Almås, I., Cappelen, A. W., Salvanes, K. G., Sørensen, E. Ø., and Tungodden, B. (2016). Willingness to compete: Family matters. *Management Science*, 62(8):2149–2162.

Altmejd, A., Barrios Fernández, A., Drlje, M., Hurwitz, M., Kovac, D., Mulhern, C., Neilson, C., Smith, J., and Goodman, J. (2021). O brother, where start thou? sibling spillovers on college and major choice in four countries. *The Quarterly Journal of Economics*.

Altonji, J. G., Blom, E., and Meghir, C. (2012). Heterogeneity in Human Capital Investments: High School Curriculum, College Major, and Careers. *Annual Review of Economics*, 4(1):185–223.

Ambady, N., Shih, M., Kim, A., and Pittinsky, T. L. (2001). Stereotype susceptibility in children: Effects of identity activation on quantitative performance. *Psychological science*, 12(5):385–390.

Anelli, M. and Peri, G. (2019). The effects of high school peers' gender on college major, college performance and income. *The Economic Journal*, 129(618):553–602.

Attanasio, O., Boneva, T., and Rauh, C. (2022). Parental beliefs about returns to different types of investments in school children. *Journal of Human Resources*, 57(6):1789–1825.

Attanasio, O. and Kaufmann, K. (2014). Education choices and returns to schooling: Intrahousehold decision making, gender and subjective expectations. *Journal of Development Economics*, 109:203–216.

Banse, R., Gawronski, B., Rebetez, C., Gutt, H., and Bruce Morton, J. (2010). The development of spontaneous gender stereotyping in childhood: Relations to stereotype knowledge and stereotype flexibility. *Developmental Science*, 13(2):298–306.

Baron-Cohen, S. (2005). The essential difference: The male and female brain. In *Phi Kappa Phi Forum*, volume 85, pages 23–26.

Bergman, P. (2015). Parent-child information frictions and human capital investment: Evidence from a field experiment.

Bernheim, B. D. (1994). A theory of conformity. *Journal of Political Economy*, 102(5):841–877.

Bian, L., Leslie, S.-J., and Cimpian, A. (2017). Gender stereotypes about intellectual ability emerge early and influence children's interests. *Science*, 355(6323):389–391.

Bisin, A. and Verdier, T. (2011). The economics of cultural transmission and socialization. In *Handbook of social economics*, volume 1, pages 339–416. Elsevier.

Black, S. E., Devereux, P. J., and Salvanes, K. G. (2013). Under pressure? the effect of peers on outcomes of young adults. *Journal of Labor Economics*, 31(1):119–153.

Black, S. E., Muller, C., Spitz-Oener, A., He, Z., Hung, K., and Warren, J. R. (2021). The importance of stem: High school knowledge, skills and occupations in an era of growing inequality. *Research Policy*, 50(7):104249.

Blanton, H., Jaccard, J., Klick, J., Mellers, B., Mitchell, G., and Tetlock, P. E. (2009). Strong claims and weak evidence: Reassessing the predictive validity of the iat. *Journal of applied Psychology*, 94(3):567.

Blau, F. D. and Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature*, 55(3):789–865.

Booth, A. L., Cardona-Sosa, L., and Nolen, P. (2018). Do single-sex classes affect academic achievement? an experiment in a coeducational university. *Journal of Public Economics*, 168(109–126).

Bordalo, P., Coffman, K., Gennaioli, N., and Shleifer, A. (2019). Beliefs about gender. *American Economic Review*, 109(3):739–73.

Born, A., Ranehill, E., and Sandberg, A. (2020). Gender and willingness to lead: Does the gender composition of teams matter? *Review of Economics and Statistics*, pages 1–46.

Breda, T., Jouini, E., Napp, C., and Thebault, G. (2020). Gender stereotypes can explain the gender-equality paradox. *Proceedings of the National Academy of Sciences*, 117(49):31063–31069.

Breda, T. and Napp, C. (2019). Girls' comparative advantage in reading can largely explain the gender gap in math-related fields. *Proceedings of the National Academy of Sciences*, 116(31):15435–15440.

Brenøe, A. A. (2021). Brothers increase women's gender conformity. *Journal of Population Economics*.

Brenøe, A. A. and Zölitz, U. (2020). Exposure to more female peers widens the gender gap in stem participation. *Journal of Labor Economics*, 38(4):1009–1054.

Bursztyn, L., Egorov, G., and Jensen, R. (2019). Cool to be smart or smart to be cool? understanding peer pressure in education. *The Review of Economic Studies*, 86(4):1487–1526.

Bursztyn, L., Fujiwara, T., and Pallais, A. (2017). Acting Wife: Marriage Market Incentives and Labor Market Investments. *American Economic Review*, 107(11):3288–3319.

Bursztyn, L. and Jensen, R. (2015). How does peer pressure affect educational investments? *The quarterly journal of economics*, 130(3):1329–1367.

Buser, T., Niederle, M., and Oosterbeek, H. (2014). Gender, competitiveness, and career choices. *The Quarterly Journal of Economics*, 129(3):1409–1447.

Buser, T., Peter, N., and Wolter, S. C. (2017). Gender, competitiveness, and study choices in high school: Evidence from switzerland. *American economic review*, 107(5):125–30.

Campa, P., Casarico, A., and Profeta, P. (2011). Gender culture and gender gap in employment. *CESifo Economic Studies*, 57(1):156–182.

Canaan, S. and Mouganie, P. (2021). The impact of advisor gender on female students' stem enrollment and persistence. *Journal of Human Resources*, pages 0320–10796R2.

Carlana, M. (2019). Implicit stereotypes: Evidence from teachers' gender bias. *The Quarterly Journal of Economics*, 134(3):1163–1224.

Cheng, A., Kopotic, K., and Zamarro, G. (2017). Can parents' growth mindset and role modelling address stem gender gaps?

Coffman, K. B. (2014). Evidence on self-stereotyping and the contribution of ideas. *The Quarterly Journal of Economics*, 129(4):1625–1660.

Corno, L., La Ferrara, E., and Burns, J. (2022). Interaction, stereotypes and performance: Evidence from south africa.

Dahl, G. B., Rooth, D.-O., and Stenberg, A. (2020). Family Spillovers in Field of Study. NBER Working Papers 27618, National Bureau of Economic Research, Inc.

De Giorgi, G., Pellizzari, M., and Redaelli, S. (2010). Identification of Social Interactions through Partially Overlapping Peer Groups. *American economic journal. Applied economics*, 2(2):241–275.

Delfino, A. (2019). Breaking gender barriers: Bringing men into the pink-collar jobs of the future. *Working Paper*.

Dizon-Ross, R. (2019). Parents' beliefs about their children's academic ability: Implications for educational investments. *American Economic Review*, 109(8):2728–65.

Doepke, M., Sorrenti, G., and Zilibotti, F. (2019). The economics of parenting. *Annual Review of Economics*, 11:55–84.

Doepke, M. and Zilibotti, F. (2017). Parenting with style: Altruism and paternalism in intergenerational preference transmission. *Econometrica*, 85(5):1331–1371.

Eble, A. and Hu, F. (2022). Gendered beliefs about mathematics ability transmit across generations through children's peers. *Nature Human Behaviour*, pages 1–12.

Giustinelli, P. (2016). Group decision making with uncertain outcomes: Unpacking child–parent choice of the high school track. *International Economic Review*, 57(2):573–602.

Greenwald, A. G. and Banaji, M. R. (1995). Implicit social cognition: attitudes, self-esteem, and stereotypes. *Psychological review*, 102(1):4.

Greenwald, A. G., McGhee, D. E., and Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: the implicit association test. *Journal of personality and social psychology*, 74(6):1464.

Greenwald, A. G., Nosek, B. A., and Banaji, M. R. (2003). Understanding and using the implicit association test: I. an improved scoring algorithm. *Journal of personality and social psychology*, 85(2):197.

Guiso, L., Monte, F., Sapienza, P., and Zingales, L. (2008). Culture, gender, and math. *Science*, 320(5880):1164.

Hill, A. J. (2015). The girl next door: The effect of opposite gender friends on high school achievement. *American Economic Journal: Applied Economics*, 7(3):147–77.

Imbens, G. W. and Wooldridge, J. M. (2009). Recent developments in the econometrics of program evaluation. *Journal of economic literature*, 47(1):5–86.

Kamas, L. and Preston, A. (2012). The importance of being confident; gender, career choice, and willingness to compete. *Journal of Economic Behavior & Organization*, 83(1):82–97.

Kiefer, A. K. and Sekaquaptewa, D. (2007). Implicit stereotypes, gender identification, and math-related outcomes: A prospective study of female college students. *Psychological Science*, 18(1):13–18. PMID: 17362371.

Kirkeboen, L. J., Leuven, E., and Mogstad, M. (2016). Field of Study, Earnings, and Self-Selection*. *The Quarterly Journal of Economics*, 131(3):1057–1111.

Lavy, V. (2008). Do gender stereotypes reduce girls' or boys' human capital outcomes? evidence from a natural experiment. *Journal of public Economics*, 92(10-11):2083–2105.

Lizzeri, A. and Siniscalchi, M. (2008). Parental guidance and supervised learning. *The Quarterly Journal of Economics*, 123(3):1161–1195.

Makarova, E., Aeschlimann, B., and Herzog, W. (2019). The gender gap in stem fields: The impact of the gender stereotype of math and science on secondary students' career aspirations. In *Frontiers in Education*, volume 4, page 60. Frontiers Media SA.

Nollenberger, N., Rodríguez-Planas, N., and Sevilla, A. (2016). The math gender gap: The role of culture. *American Economic Review*, 106(5):257–61.

OECD (2014). Are boys and girls equally prepared for life?

Olson, M. A. and Fazio, R. H. (2004). Reducing the influence of extrapersonal associations on the implicit association test: personalizing the iat. *Journal of personality and social psychology*, 86(5):653.

Oswald, F. L., Mitchell, G., Blanton, H., Jaccard, J., and Tetlock, P. E. (2013). Predicting ethnic and racial discrimination: a meta-analysis of iat criterion studies. *Journal of personality and social psychology*, 105(2):171.

Porter, C. and Serra, D. (2019). Gender differences in the choice of major: The importance of female role models. *American Economic Journal: Applied Economics*.

Robnett, R. D. (2016). Gender Bias in STEM Fields: Variation in Prevalence and Links to STEM Self-Concept. *Psychology of women quarterly*, 40(1):65–79.

Robnett, R. D. and Leaper, C. (2013). Friendship groups, personal motivation, and gender in relation to high school students' STEM career interest. 23(4):652–664.

Shan, X. (2020). Does minority status drive women out of male-dominated fields. *Working Paper*.

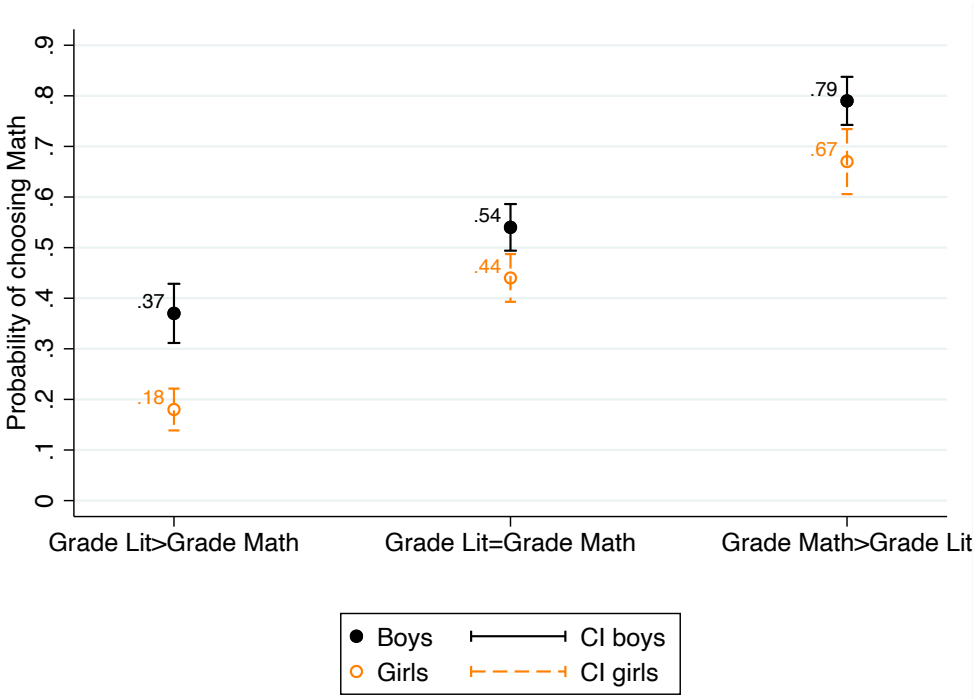
Tungodden, J. (2022). When parents decide: Gender differences in competitiveness. *Journal of Political Economy*.

UNESCO (2017). Cracking the code: Girls' and women's education in science, technology, engineering and mathematics (stem). *United Nations Educational, Scientific and Cultural Organization*.

Zölitz, U. and Feld, J. (2020). The effect of peer gender on major choice in business school. *Management Science*.

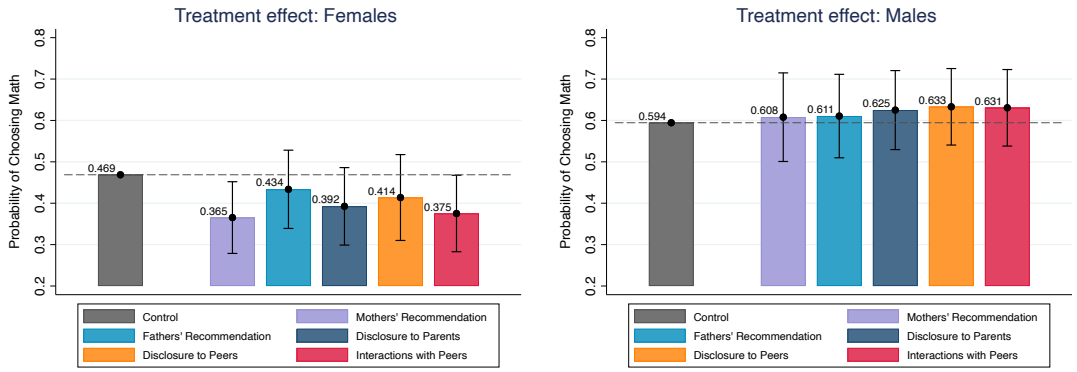
Figures and Tables

Figure I. Student Choice by Gender and Performance



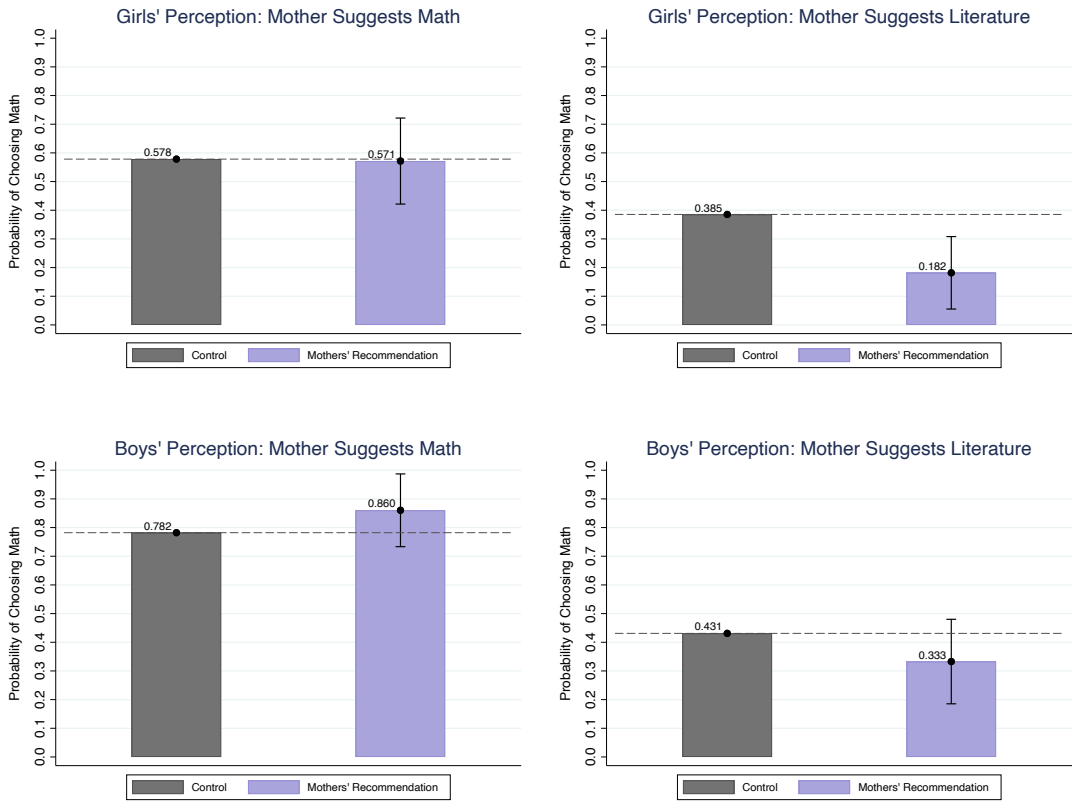
Notes: This figure shows the probability that the student chooses math after splitting the sample by gender. The optimal choice is considered math (literature) if their last end-of-semester grade was higher in math compared to Italian (Italian compared to math). The optimal choice is indifferent if they got the same score in both subjects. The sample is restricted to students in grades 7 and 8 with available baseline grades in math and literature in the administrative test.

Figure II. Treatment Effect



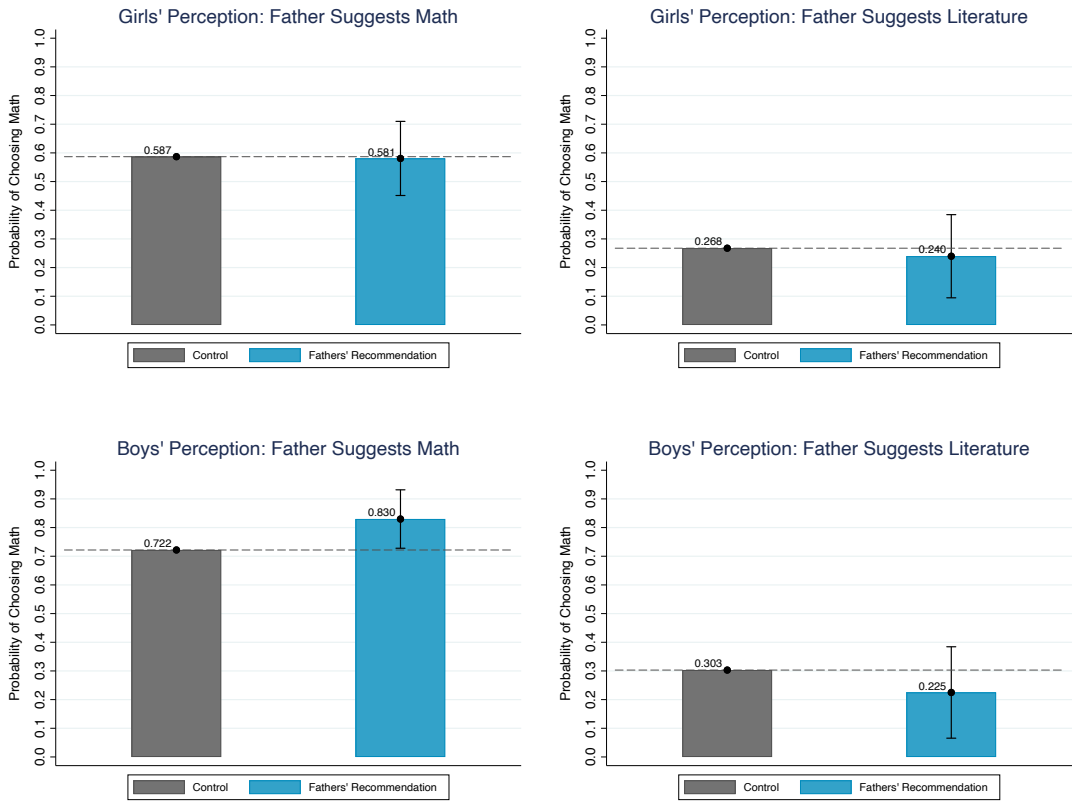
Notes: This figure shows the mean of the probability of choosing math for students in the control group, treatment group 1 (Mothers' Recommendation), treatment group 2 (Fathers' Recommendation), treatment group 3 (Disclosure to Parents), treatment 4 (Disclosure to Peers), and treatment 5 (Interaction with Peers). The coefficients are obtained from a regression including class fixed effects and all controls (as in columns 4 and 8 of Table V). We also report the 95% confidence intervals for each estimate.

Figure III. Heterogeneous Treatment Effects by Child's Perception of Mother's Suggestion



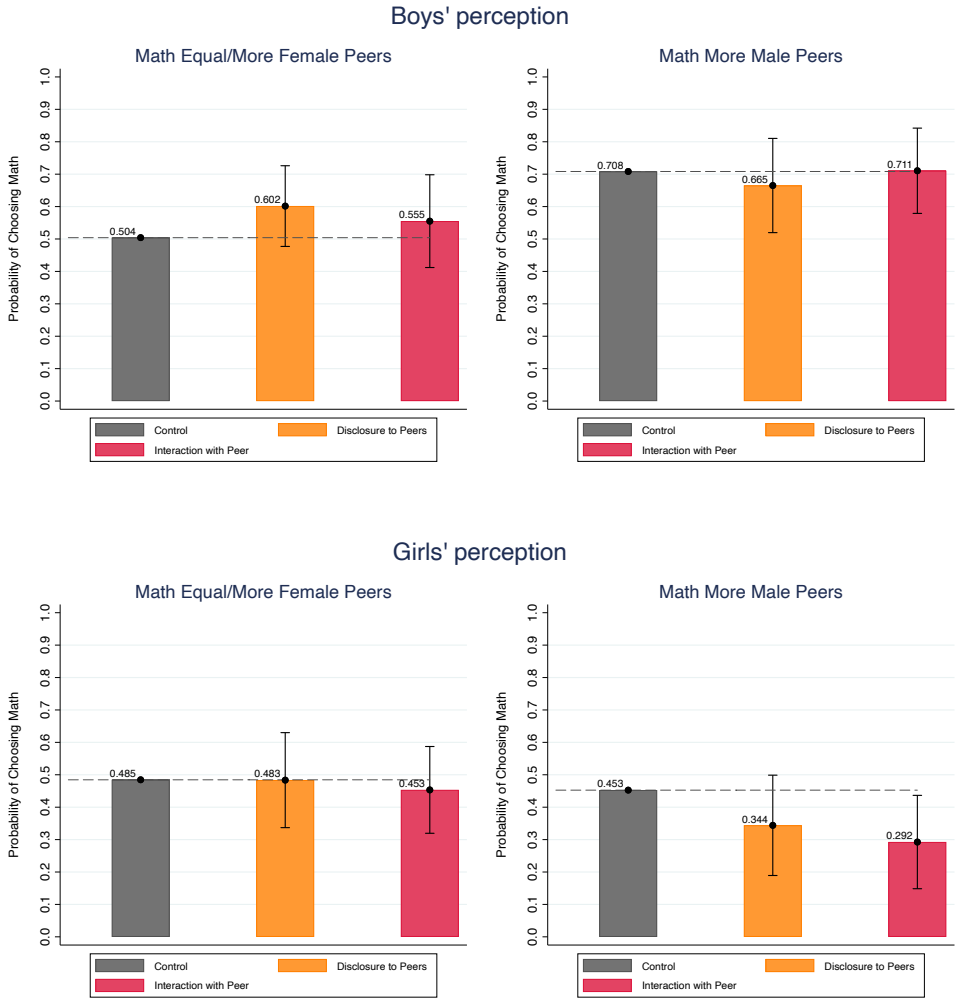
Notes: This figure shows the mean of the probability of choosing math for students in the control group, treatment group 1 (Mothers' Recommendation), and treatment group 2 (Fathers' Recommendation), divided by the child's perception of their mother's suggestion (math or literature). The coefficients are obtained from a regression including class fixed effects and all controls (as in columns 4 and 8 of Table V). We also report the 95% confidence intervals for each estimate.

Figure IV. 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 (Mothers' Recommendation), and treatment group 2 (Fathers' Recommendation), divided by the child's perception of their father's suggestion (math or literature). The coefficients are obtained from a regression including class fixed effects and all controls (as in columns 4 and 8 of Table V). We also report the 95% confidence intervals for each estimate.

Figure V. 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 (Disclosure to Peers), and treatment group 5 (Interaction with Peer), divided by gender and the child's perception of peers' choice. The coefficients are obtained from a regression including class fixed effects and all controls (as in columns 4 and 8 of Table V). We also report the 95% confidence intervals for each estimate.

Table I. Summary Statistics

	(1) Obs	(2) All	(3) Females	(4) Males	(5) Difference
Panel A: Background Characteristics					
Immigrant	2,511	0.141	0.148	0.134	0.015
		(0.348)	(0.356)	(0.340)	[0.291]
South	2,511	0.486	0.490	0.481	0.009
		(0.500)	(0.500)	(0.500)	[0.647]
Education level of mother: Primary or junior sec.	2,444	0.206	0.221	0.191	0.030*
		(0.404)	(0.415)	(0.393)	[0.070]
Education level of mother: High school	2,444	0.379	0.401	0.357	0.045**
		(0.485)	(0.490)	(0.479)	[0.023]
Education level of mother: University	2,444	0.167	0.173	0.161	0.013
		(0.373)	(0.379)	(0.367)	[0.406]
Education level of father: Primary or junior sec.	2,443	0.234	0.251	0.216	0.035**
		(0.423)	(0.434)	(0.412)	[0.043]
Education level of father: High school	2,443	0.370	0.379	0.361	0.017
		(0.483)	(0.485)	(0.481)	[0.382]
Education level of father: University	2,443	0.127	0.132	0.121	0.011
		(0.333)	(0.339)	(0.327)	[0.408]
Lives with both parents	2,443	0.845	0.841	0.850	-0.009
		(0.362)	(0.366)	(0.357)	[0.519]
Mother works	2,355	0.711	0.704	0.718	-0.014
		(0.453)	(0.457)	(0.450)	[0.442]
Father works	2,079	0.957	0.949	0.965	-0.017*
		(0.202)	(0.220)	(0.183)	[0.062]
Low-wage job: Mother	1,653	0.382	0.379	0.385	-0.006
		(0.486)	(0.485)	(0.487)	[0.797]
Medium- or high-wage job: Mother	1,653	0.327	0.330	0.323	0.007
		(0.469)	(0.471)	(0.468)	[0.768]
Low-wage job: Father	1,964	0.318	0.307	0.329	-0.022
		(0.466)	(0.461)	(0.470)	[0.285]
Medium- or high-wage job: Father	1,964	0.314	0.323	0.305	0.018
		(0.464)	(0.468)	(0.461)	[0.387]
Panel B: Outcome					
Student chose math	2,511	0.526	0.426	0.627	-0.201***
		(0.499)	(0.495)	(0.484)	[0.000]
Student thinks mother would recommend math	2,511	0.468	0.435	0.500	-0.065**
		(0.499)	(0.496)	(0.500)	[0.001]
Student thinks father would recommend math	2,511	0.646	0.617	0.674	-0.057**
		(0.478)	(0.486)	(0.469)	[0.003]
Student thinks more boys chose math in class	2,511	0.485	0.488	0.482	0.006
		(0.500)	(0.500)	(0.500)	[0.766]
Panel C: Administrative Data					
Math grade (Pre-experiment)	1,397	7.079	7.199	6.963	0.236**
		(1.453)	(1.495)	(1.403)	[0.002]
Italian grade (Pre-experiment)	1,398	7.180	7.430	6.935	0.495***
		(1.146)	(1.193)	(1.043)	[0.000]
STEM high school	1,224	0.489	0.321	0.656	-0.335***
		(0.500)	(0.467)	(0.475)	[0.000]
Humanities high school	1,224	0.236	0.384	0.090	0.294***
		(0.425)	(0.487)	(0.286)	[0.000]

Notes: In columns 2–4 we report the mean and standard deviation in brackets for the entire sample sample, for girls and for boys, respectively. In the last column, we report the gender difference and *p*-value of the difference in square brackets. Missing variables are not included in this table, and 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) a computer programmer is not a job suitable for women; vi) even if they work hard, women cannot be good at football; and vii) even if they work hard, men cannot be good at cooking. A low-wage job is considered as being a construction worker, sales person, hairdresser, cook, or similar type of job for both mothers and fathers. The mother's occupation skill level is also set to one if she is living with someone employed in a job of that skill level.

Table II. Correlation between Students' Choice of Math in the Experiment and Actual Outcomes

	(1)	(2)	(3)	(4)	(5)
	Dep. Var.= Student Chose Math				
Girl	-0.201***	-0.134***	-0.172***	-0.090**	-0.205***
	(0.021)	(0.033)	(0.034)	(0.036)	(0.022)
Grade math-Grade lit		0.168***			
		(0.017)			
Grade math-Grade lit *Girl		0.014			
		(0.022)			
High school STEM			0.191***		
			(0.039)		
High school STEM*Girl			0.165***		
			(0.061)		
High school humanistic				-0.134**	
				(0.067)	
High school humanistic*Girl				-0.139*	
				(0.077)	
Gender-science IAT					0.053***
					(0.014)
Gender-science IAT*Girl					-0.082***
					(0.020)
Constant	0.627***	0.579***	0.469***	0.606***	0.635***
	(0.016)	(0.022)	(0.031)	(0.023)	(0.016)
Observations	2,511	2,511	2,511	2,511	2,511
R-squared	0.041	0.110	0.078	0.061	0.047
Mean X var: Boys		0.03	0.66	0.09	-0.17
Mean X var: Girls		-0.23	0.32	0.38	0.17

Notes: The dependent variable indicates whether the student chose math versus literature in our lab-in-the-field experiment, i.e., if they believe they are better in math than 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 class level, are in parentheses. Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

Table III. Students' Belief of Parental Advice

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Mother's Advice					
	Full Sample			**Parents' Sample**		
Dep. Var.: Students' Belief Mother Would Advise Math						
Girl	-0.065***	-0.054**	-0.059***	-0.134**	-0.089*	-0.072
	(0.021)	(0.021)	(0.022)	(0.057)	(0.053)	(0.061)
Grade math-Grade lit		0.079***	0.077***			0.097***
		(0.014)	(0.014)			(0.035)
Mother advice: Math					0.258***	0.216***
					(0.051)	(0.056)
Observations	2,511	2,511	2,511	409	409	409
R-squared	0.004	0.018	0.045	0.018	0.082	0.175
Mean dep var: Boys	0.5	0.5	0.5	0.57	0.57	0.57
Mean dep var: Girls	0.44	0.44	0.44	0.43	0.43	0.43
Controls	No	No	Yes	No	No	Yes
	Panel B: Father's Advice					
	Full Sample			**Parents' Sample**		
Dep. Var.: Students' Belief Father Would Advise Math						
Girl	-0.057**	-0.049**	-0.057***	-0.053	-0.013	0.001
	(0.022)	(0.022)	(0.021)	(0.075)	(0.073)	(0.079)
Grade math-Grade lit		0.054***	0.050***			0.026
		(0.013)	(0.013)			(0.070)
Father advice: Math					0.308***	0.322***
					(0.073)	(0.085)
Observations	2,511	2,511	2,511	128	128	128
R-squared	0.004	0.010	0.043	0.003	0.118	0.341
Mean dep var: Boys	0.67	0.67	0.67	0.74	0.74	0.74
Mean dep var: Girls	0.62	0.62	0.62	0.69	0.69	0.69
Controls	No	No	Yes	No	No	Yes

Notes: The dependent variable indicates whether the student believes the parents (mother in Panel A, father in Panel B) would recommend that they choose math versus literature in our lab-in-the-field experiment. Controls include baseline grades in math and literature, an indicator for the students being an immigrant, the IAT score, an indicator of explicit stereotypes, if the student lives with both parents and the presence of siblings, dummy variables indicating parents' level of education, and employment and job skill category as described in the footnote of Table I. For each variable, we include an indicator controlling for when the answer is missing. Robust standard errors, clustered at the class level, are in parentheses. Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

Table IV. Correlation between Classmates' Choice of Math and Perception of Students

	(1)	(2)	(3)	(4)
Dep. Var.: Students' Belief on Classmates' Choice (More Boys Chose Math)				
Peers' choice (More boys chose math)	0.392***	0.359***	0.351***	0.347***
	(0.033)	(0.040)	(0.040)	(0.040)
Female		-0.033	-0.037	-0.043
		(0.033)	(0.033)	(0.035)
Peers' choice (More boys chose math)*Female		0.066	0.063	0.061
		(0.049)	(0.049)	(0.048)
Constant	0.232***	0.248***	-0.044	0.067
	(0.022)	(0.024)	(0.296)	(0.345)
Observations	2,511	2,511	2,511	2,511
R-squared	0.141	0.142	0.146	0.157
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 chose math. "Performance peers" includes the average grade in math, separately for male and female peers. "Student controls" include the grades, an indicator for the students being an immigrant, the IAT score, an indicator of explicit stereotypes, if the student lives with both parents and the presence of siblings, dummy variables indicating the parents' level of education, and employment and job skill category as described in the footnote of Table I. For each variable, we include an indicator controlling for when the answer is missing. Robust standard errors, clustered at the class level, are in parentheses. Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

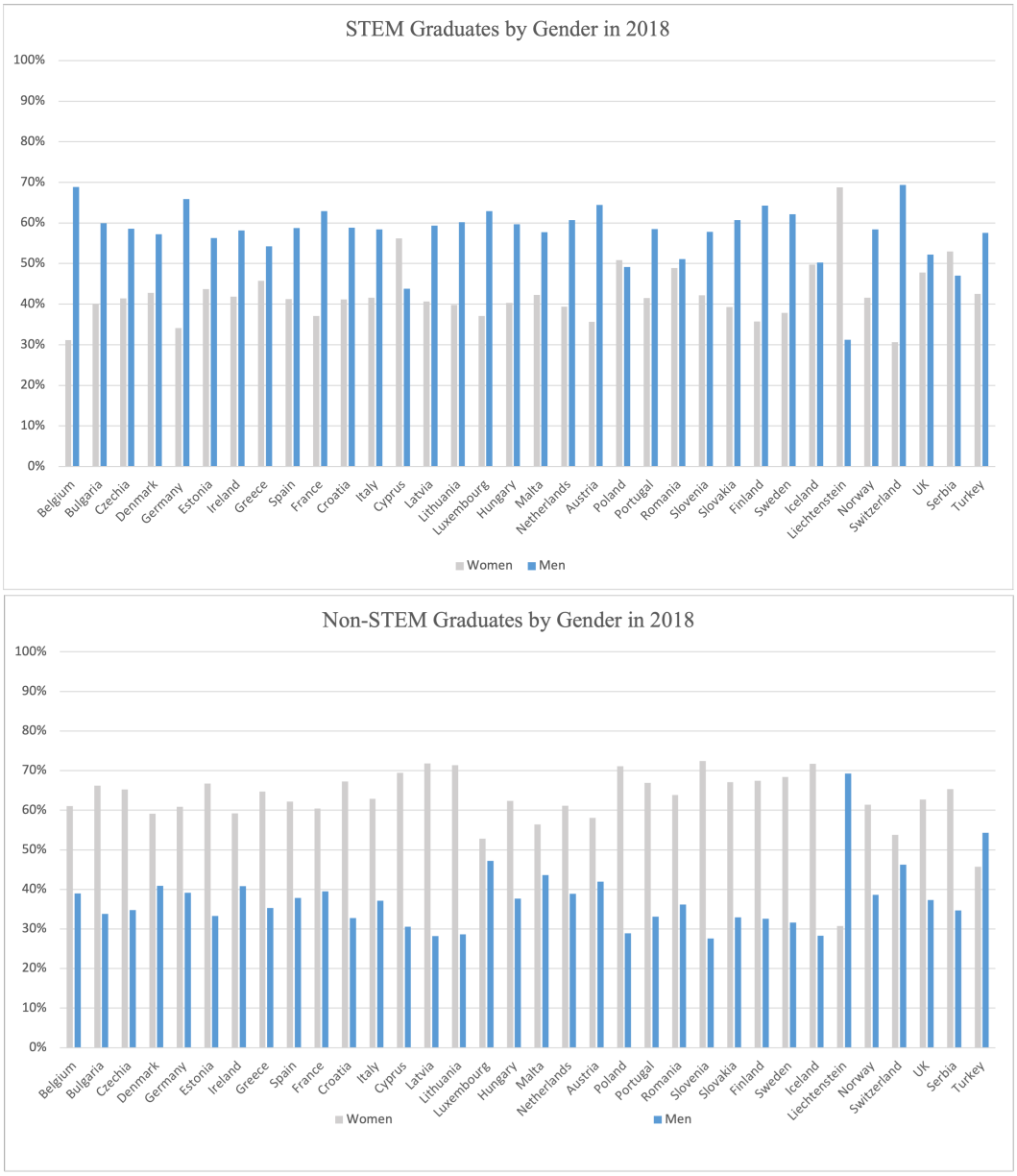
Table V. Treatment Effect

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep. Variable: Student Chose Math							
	Female				Male			
Treatment 1: Mothers' Recommendation	-0.071*	-0.094**	-0.096**	-0.103**	-0.002	-0.000	0.025	0.013
	(0.042)	(0.046)	(0.043)	(0.044)	(0.048)	(0.056)	(0.052)	(0.055)
Treatment 2: Fathers' Recommendation	-0.033	-0.024	-0.032	-0.035	0.048	0.007	0.018	0.016
	(0.048)	(0.051)	(0.049)	(0.048)	(0.047)	(0.051)	(0.050)	(0.051)
Treatment 3: Disclosure to Parents	-0.064	-0.080	-0.062	-0.076	0.045	0.017	0.019	0.031
	(0.047)	(0.052)	(0.048)	(0.048)	(0.047)	(0.051)	(0.046)	(0.049)
Treatment 4: Disclosure to Peers	-0.001	-0.044	-0.055	-0.055	0.047	0.032	0.032	0.038
	(0.051)	(0.056)	(0.054)	(0.053)	(0.046)	(0.052)	(0.047)	(0.047)
Treatment 5: Interaction with Peers	-0.079*	-0.091*	-0.096**	-0.094**	0.056	0.048	0.042	0.036
	(0.042)	(0.047)	(0.047)	(0.047)	(0.047)	(0.052)	(0.047)	(0.047)
Constant	0.469***	0.418***	-0.068	-0.299	0.594***	0.436***	-0.144	-0.126
	(0.032)	(0.035)	(0.146)	(0.246)	(0.035)	(0.023)	(0.154)	(0.251)
Observations	1,254	1,254	1,254	1,254	1,257	1,257	1,257	1,257
R-squared	0.004	0.209	0.283	0.300	0.002	0.180	0.265	0.283
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 versus literature in our lab-in-the-field experiment. Columns 2–4 control for class fixed effects. Columns 3–4 add controls for the student: baseline grades in math and literature (for students in grades 7 and 8 of our experiment), an indicator for whether the student is an immigrant, the IAT score, and an indicator of explicit stereotypes as described in the footnote of Table I. The specification in column 4 further adds a set of family controls that include the following: if the student lives with both parents and the presence of siblings, dummy variables indicating the parents' level of education, and employment and job skill category as described in the footnote of Table I. For each variable, we include an indicator controlling for when the answer is missing. Robust standard errors, clustered at the class level, are in parentheses. Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

A Appendix Figures and Tables

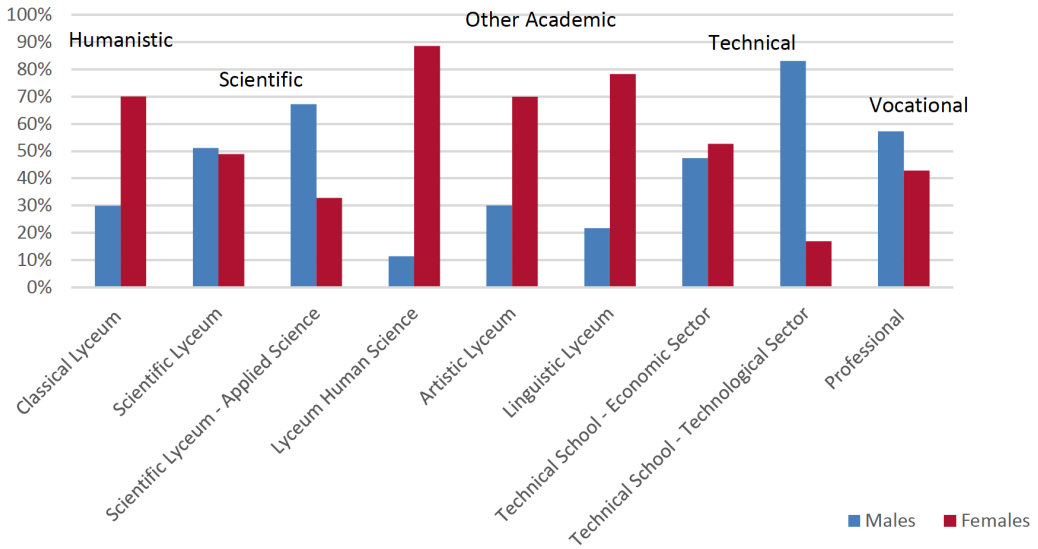
Figure A.I. Gender Segregation in STEM and Non-STEM Fields



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, and services. Source: http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

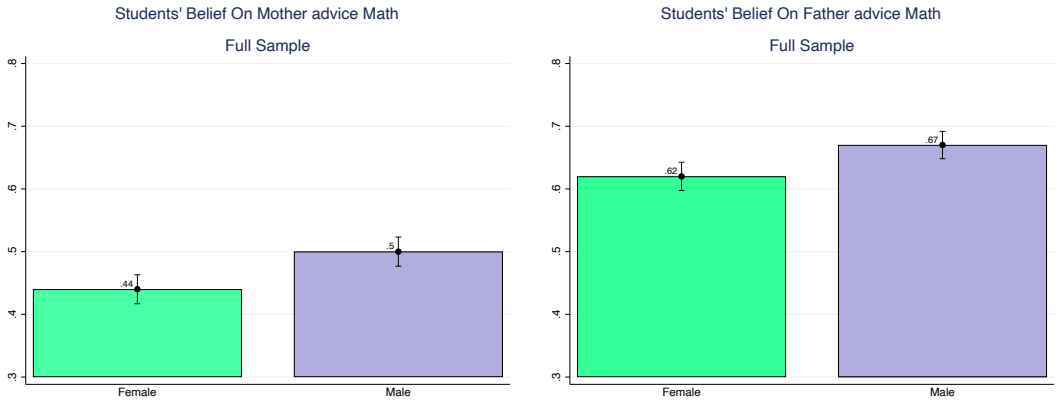
Figure A.II. Geographic Distribution of Participating Schools

Figure A.III. Gender Composition of High School Tracks in Italy



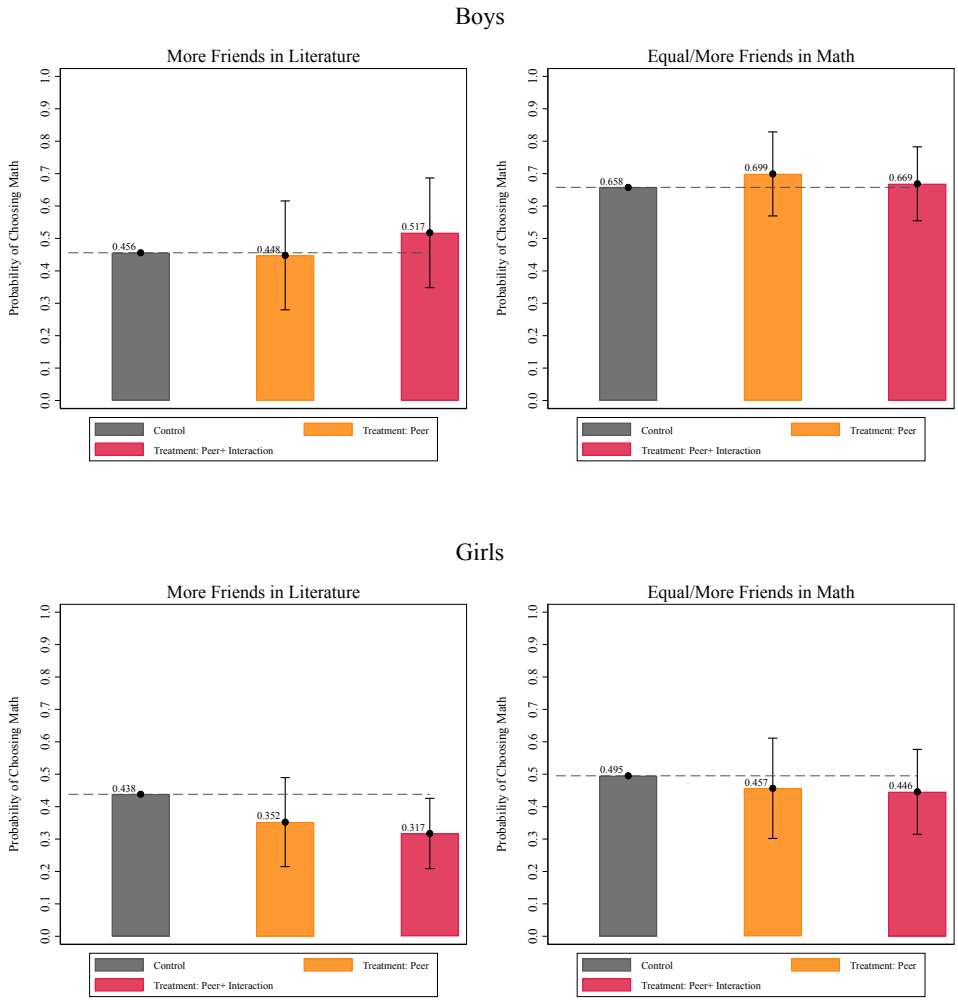
Notes: This figure shows the gender composition of each sub-track of high school in Italy. Source: Authors' elaboration on data from the Italian Ministry of Education.

Figure A.IV. Descriptive Statistics: Students' Beliefs and Parents' Recommendation



Notes: These graphs plot the probability that mothers and fathers recommend math to their children and the belief of their children about their recommendation. The full sample includes 2,511 observations from the students' questionnaire.

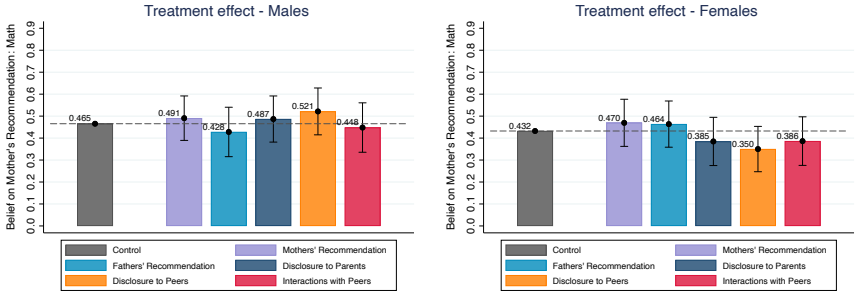
Figure A.V. Heterogeneous Treatment Effects by the Choice of Child's Friend



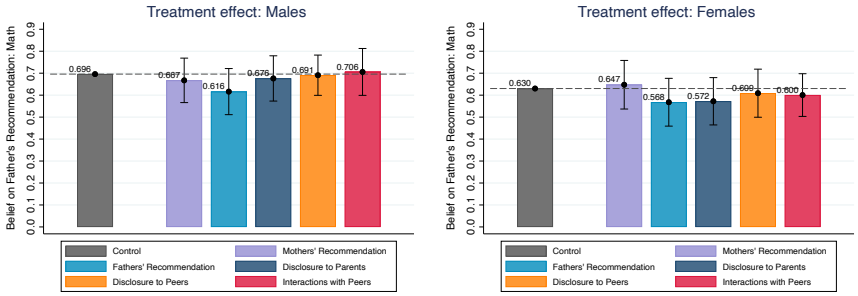
Notes: This figure shows the mean of the probability of choosing math for students in the control group, treatment group 4 (Peer), and treatment group 5 (Peer Public + Interaction), divided by gender and the choice of the child's closest friend. The coefficients are obtained from a regression including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

Figure A.VI. Placebo and Additional Tests

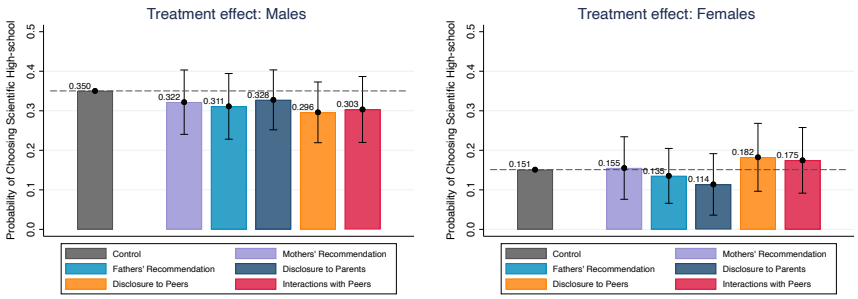
(a) Belief on Mother's Recommendation: Math



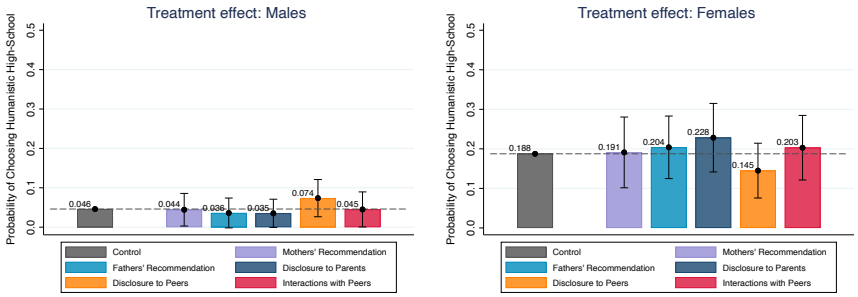
(b) Belief on Father's Recommendation: Math



(c) Scientific Track Choice



(d) Humanistic Track Choice



Notes: This figure shows the effect of the assignment to the treatment on outcomes that are not expected to be affected by treatment assignment as the belief on parental recommendation (Panels a and b) and the actual track choice (Panels c and d). The regression includes class fixed effects, and the standard errors are clustered at the class level. We report the 95% confidence intervals for each estimate.

Table A.I. Balance Table

	Control (1)	Diff. Treat. 1 (2)	Diff. Treat. 2 (3)	Diff. Treat. 3 (4)	Diff. Treat. 4 (5)	Diff. Treat. 5 (6)
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]
Std 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]
Std explicit gender index	-0.027	0.044	0.114	0.009	0.119*	-0.011
	(1.007)	[0.543]	[0.125]	[0.901]	[0.085]	[0.883]
Math grade (Pre-experiment)	7.196	-0.089	-0.032	-0.158	0.045	-0.098
	(1.493)	[0.531]	[0.852]	[0.264]	[0.753]	[0.491]
Italian grade (Pre-experiment)	7.221	-0.081	-0.052	-0.109	-0.053	-0.119
	(1.101)	[0.417]	[0.647]	[0.190]	[0.630]	[0.226]
Family Characteristics						
Education level of mother: 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 mother: 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 mother: 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 father: 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 father: 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 father: 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-wage job: Mother	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-wage job: Mother	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-wage job: Father	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-wage job: Father	0.351	-0.026	-0.034	-0.068*	-0.072*	-0.022
	(0.478)	[0.527]	[0.396]	[0.090]	[0.051]	[0.577]

Notes: Column 1 presents the mean of the variable for the control group with respective standard deviation in parentheses. Columns 2–6 present the difference between the mean by treatment arm and the control group. Treatment 1 is Mothers' Recommendation, Treatment 2 is Fathers' Recommendation, Treatment 3 is Disclosure to Parents, Treatment 4 is Disclosure to Peers, and Treatment 5 is Interactions with Peers. *P*-values for the two-sided test of equivalence in means are in square brackets. All columns include fixed effects for the experimental session (class), and standard errors are clustered at the same level. In contrast to Table **??**, we create a category for missing variables. For brevity, the balance on the missing variable is omitted. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

Table A.II. 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)	
Std IAT	-0.000	0.001	0.001	0.001
	(0.996)	(1.015)	(0.051)	
Std explicit gender Index	0.024	-0.098	-0.122**	-0.086
	(0.995)	(1.017)	(0.051)	
Math grade (Pre-experiment)	7.003	7.457	0.454***	0.220
	(1.435)	(1.488)	(0.103)	
Italian grade (Pre-experiment)	7.100	7.577	0.477***	0.297
	(1.132)	(1.137)	(0.081)	
Education level of mother: Primary or junior sec.	0.225	0.124	-0.101***	-0.190
	(0.418)	(0.330)	(0.021)	
Education level of mother: High school	0.375	0.396	0.021	0.030
	(0.484)	(0.490)	(0.025)	
Education level of mother: University	0.142	0.269	0.127***	0.225
	(0.349)	(0.444)	(0.019)	
Education level of father: Primary or junior sec.	0.252	0.160	-0.092***	-0.161
	(0.434)	(0.367)	(0.022)	
Education level of father: High school	0.360	0.411	0.050**	0.073
	(0.480)	(0.492)	(0.025)	
Education level of father: University	0.111	0.192	0.080***	0.159
	(0.315)	(0.394)	(0.017)	
Lives with both parents	0.841	0.861	0.020	0.039
	(0.365)	(0.346)	(0.018)	
Father works	0.954	0.971	0.017	0.063
	(0.210)	(0.169)	(0.011)	
Mother works	0.699	0.760	0.062***	0.098
	(0.459)	(0.427)	(0.024)	
Low-wage job: Father	0.328	0.277	-0.051*	-0.079
	(0.470)	(0.448)	(0.026)	
Medium- or high-wage job: Father	0.296	0.387	0.091***	0.136
	(0.457)	(0.488)	(0.026)	
Low-wage Job: Mother	0.409	0.280	-0.128***	-0.192
	(0.492)	(0.450)	(0.029)	
Medium- or high-wage job: Mother	0.302	0.419	0.117***	0.173
	(0.459)	(0.494)	(0.028)	
Has sister(s)	0.620	0.607	-0.013	-0.019
	(0.485)	(0.489)	(0.028)	
Has brother(s)	0.653	0.577	-0.075***	-0.110
	(0.476)	(0.495)	(0.027)	
Observations	2,027	484	2,511	

Notes: This table shows the mean and standard deviation of students' characteristics for the sample of students whose parents completed the survey (column 1) and whose parents did not complete the survey (column 2). For some students, both parents completed the survey. The third column reports the difference and the standard errors of the difference between columns 1 and 2. The last column reports the normalized difference following Imbens and Wooldridge (2009). Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

Table A.III. Correlation between Students' Choice of Math and Other Relevant Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep. Var. = Student Chose Math						
Variable X	**Overconfidence**		**Logic**	**South**	**Work**	**Share Math**	
	Math	**Literature**	**Task**		**Mother**	**Friends**	**Classmates**
Girl	-0.197***	-0.185***	-0.128***	-0.173***	-0.257***	-0.169***	-0.269***
	(0.033)	(0.028)	(0.028)	(0.029)	(0.039)	(0.044)	(0.069)
X	-0.109***	0.126***	0.421***	-0.004	-0.010	0.253***	0.385***
	(0.029)	(0.026)	(0.027)	(0.032)	(0.030)	(0.050)	(0.076)
X*Girl	-0.017	-0.003	0.010	-0.056	0.079*	-0.007	0.135
	(0.061)	(0.040)	(0.037)	(0.042)	(0.047)	(0.073)	(0.122)
Constant	0.695***	0.562***	0.401***	0.629***	0.634***	0.477***	0.423***
	(0.023)	(0.021)	(0.023)	(0.022)	(0.027)	(0.033)	(0.044)
Observations	2,511	2,511	2,511	2,511	2,511	2,511	2,511
Mean X var: Boys	0.63	0.51	0.54	0.48	0.68	0.58	0.53
Mean X var: Girls	0.58	0.4	0.36	0.49	.67	0.47	0.52

Notes: The dependent variable indicates whether the student chose math versus literature in our lab-in-the-field experiment; i.e., if they believe they are better in math than literature. For each of the control variables, an indicator controlling for whether the answer is missing is included and interacted with the female variable. Robust standard errors, clustered at the class level, are in parentheses. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

Table A.IV. Correlation between Students' Choice of Math and Other Relevant Variables

	(1)	(2)	(3)	(4)	(5)
	Dep. Variable: Student Chose Math				
Sample	**All**	**All**	**All**	**Girls**	**Boys**
Girls	-0.201***	-0.193***	-0.168***		
	(0.021)	(0.022)	(0.025)		
Humanities high school			-0.112***	-0.125**	-0.032
			(0.037)	(0.053)	(0.073)
STEM high school			0.130***	0.179***	0.075
			(0.044)	(0.065)	(0.065)
Math grade (Pre-experiment)			0.164***	0.166***	0.168***
			(0.014)	(0.020)	(0.020)
Italian grade (Pre-experiment)			-0.123***	-0.128***	-0.135***
			(0.018)	(0.027)	(0.029)
Overconfidence in Italian			-0.108***	-0.095***	-0.111***
			(0.021)	(0.031)	(0.033)
Overconfidence in math			0.113***	0.115***	0.094***
			(0.018)	(0.030)	(0.028)
Std IAT			0.016	0.001	0.028*
			(0.010)	(0.016)	(0.016)
Std explicit gender index			-0.009	-0.014	-0.014
			(0.012)	(0.018)	(0.015)
Mother works			0.020	0.063*	-0.032
			(0.021)	(0.033)	(0.035)
Share friends who chose math			-0.066	-0.298***	-0.241***
			(0.046)	(0.063)	(0.076)
Constant	0.627***	0.623***	0.309***	0.256*	0.514***
	(0.016)	(0.011)	(0.096)	(0.138)	(0.185)
Observations	2,511	2,511	2,412	1,206	1,206
R-squared	0.041	0.153	0.264	0.347	0.295
Mean dep var: Boys	0.63	0.63	0.63	0.63	0.63
Mean dep var: Girls	0.43	0.43	0.43	0.43	0.43
Class FE	No	Yes	Yes	Yes	Yes

Notes: The dependent variable indicates whether the student chose math; i.e., if they believe they are better in math than literature. For each of the control variables, an indicator controlling for whether the answer is missing is included and interacted with the female variable. Robust standard errors, clustered at the class level, are in parentheses. Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

Table A.V. Balance Table for Perceived Recommendation from Mother

	Girls			Boys		
	Chose Lit.	Chose Math	Diff	Chose Lit.	Chose 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 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 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 the table. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

Table A.VI. Balance Table for Perceived Recommendation from Father

	Girls			Boys		
	Chose Lit.	Chose Math	Diff	Chose Lit.	Chose Math	Diff
	(1)	(2)	(3)	(4)	(5)	(6)
Education level of mother: Primary or junior sec.	0.238	0.202	-0.036	0.218	0.170	-0.048**
			(0.024)			(0.024)
Education level of mother: High school	0.392	0.391	-0.001	0.309	0.365	0.056*
			(0.029)			(0.031)
Education level of mother: University	0.152	0.178	0.026	0.132	0.166	0.034
			(0.023)			(0.022)
Education level of father: Primary or junior sec.	0.307	0.207	-0.100***	0.248	0.192	-0.055**
			(0.024)			(0.027)
Education level of father: High school	0.349	0.381	0.032	0.299	0.377	0.078**
			(0.027)			(0.030)
Education level of father: University	0.100	0.147	0.047**	0.096	0.128	0.032*
			(0.019)			(0.019)
Lives with both parents	0.812	0.824	0.012	0.824	0.825	0.002
			(0.023)			(0.027)
Mother works	0.666	0.678	0.012	0.676	0.686	0.009
			(0.026)			(0.032)
Father works	0.781	0.787	0.006	0.775	0.812	0.038
			(0.024)			(0.029)
Low-wage job: Mother	0.276	0.240	-0.035	0.304	0.241	-0.063**
			(0.026)			(0.028)
Medium- or high-wage job: Mother	0.213	0.218	0.005	0.162	0.244	0.083***
			(0.025)			(0.026)
Other job: Mother	0.171	0.214	0.043*	0.201	0.198	-0.003
			(0.022)			(0.025)
Low-wage job: Father	0.236	0.238	0.002	0.228	0.276	0.048*
			(0.022)			(0.026)
Medium- or high-wage job: Father	0.238	0.256	0.018	0.199	0.262	0.064**
			(0.027)			(0.024)
Other job: Father	0.296	0.279	-0.017	0.338	0.267	-0.071**
			(0.028)			(0.028)
Has sister(s)	0.530	0.496	-0.034	0.561	0.486	-0.075**
			(0.031)			(0.032)
Has brother(s)	0.541	0.523	-0.017	0.471	0.512	0.042
			(0.053)			(0.067)
High school interest: Classic/humanistic	2.136	2.066	-0.070	2.015	1.895	-0.120*
			(0.062)			(0.070)
High school interest: Applied sciences	2.006	2.364	0.358***	2.260	2.558	0.299***
			(0.066)			(0.073)
Student chose math	0.205	0.563	0.359***	0.336	0.766	0.430***
			(0.027)			(0.027)
Performance in math	1.307	1.403	0.096*	1.238	1.432	0.194***
			(0.050)			(0.049)
Performance in Italian	1.401	1.503	0.102*	1.100	1.289	0.189***
			(0.028)			(0.031)
Student would choose logic task	0.236	0.430	0.194***	0.365	0.620	0.255***
			(0.025)			(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 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 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 the table. Significance levels: *** $p< 0.01$, ** $p< 0.05$, * $p< 0.1$.

Table A.VII. Heterogeneous Treatment Effects by Perception of Parental Recommendation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep. Variable: Student Chose Math							
	Female				Male			
Panel A: Belief of Mother's Advice								
Treatment 1: Mothers' Recommendation	-0.214***	-0.205***	-0.193***	-0.204***	-0.148**	-0.132*	-0.096	-0.098
	(0.054)	(0.064)	(0.062)	(0.064)	(0.070)	(0.077)	(0.074)	(0.075)
	{0.001}***	{0.004}***	{0.006}***	{0.004}***	{0.040}**	{0.075}*	{0.169}	{0.170}
Treatm. 1 × Mother suggests math	0.270***	0.218**	0.188*	0.197*	0.219**	0.219**	0.191**	0.176*
	(0.092)	(0.108)	(0.108)	(0.110)	(0.086)	(0.098)	(0.094)	(0.096)
	{0.012}**	{0.066}*	{0.127}	{0.132}	{0.020}**	{0.052}*	{0.085}*	{0.132}
Mother suggests math	0.193***	0.176**	0.160*	0.150*	0.351***	0.337***	0.311***	0.316***
	(0.071)	(0.085)	(0.085)	(0.085)	(0.058)	(0.064)	(0.062)	(0.062)
Panel B: Belief of Father's Advice								
Treatment 2: Fathers' Recommendation	-0.081	-0.040	-0.041	-0.028	-0.085	-0.097	-0.069	-0.078
	(0.064)	(0.074)	(0.075)	(0.074)	(0.073)	(0.082)	(0.079)	(0.081)
	{0.397}	{0.700}	{0.733}	{0.852}	{0.397}	{0.441}	{0.660}	{0.601}
Treatm. 2 × Father suggests math	0.119	0.060	0.049	0.022	0.242***	0.213**	0.176*	0.186*
	(0.089)	(0.103)	(0.107)	(0.107)	(0.085)	(0.099)	(0.095)	(0.097)
	{0.397}	{0.700}	{0.733}	{0.852}	{0.014}**	{0.068}*	{0.138}	{0.126}
Father suggests math	0.319***	0.299***	0.279***	0.288***	0.419***	0.424***	0.411***	0.400***
	(0.067)	(0.081)	(0.080)	(0.080)	(0.061)	(0.068)	(0.064)	(0.064)
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: Standard errors in parentheses are clustered at the class level. FWER p-values are displayed in braces underneath standard errors. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

Table A.VIII. Heterogeneous Treatment Effects by Perception of Peers' Choice

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep. Variable: Student Chose Math							
	Female				Male			
Treatment 4: Disclosure to Peers	-0.012	-0.101	-0.101	-0.101	-0.017	-0.064	-0.064	-0.064
	(0.077)	(0.083)	(0.083)	(0.083)	(0.072)	(0.081)	(0.081)	(0.081)
	{ 0.998}	{ 0.578}	{ 0.578}	{ 0.578}	{ 0.998}	{ 0.722}	{ 0.722}	{ 0.722}
Treatment 5: Interactions with Peers	-0.113*	-0.185***	-0.185***	-0.185***	0.056	0.009	0.009	0.009
	(0.064)	(0.069)	(0.069)	(0.069)	(0.062)	(0.072)	(0.072)	(0.072)
	{ 0.390}	{ 0.040}**	{ 0.040}**	{ 0.040}**	{ 0.892}	{ 0.895}	{ 0.895}	{ 0.895}
Treatm. 4 × "Math equal/More females"	0.018	0.113	0.113	0.113	0.104	0.168	0.168	0.168
	(0.106)	(0.113)	(0.113)	(0.113)	(0.100)	(0.106)	(0.106)	(0.106)
	{ 0.998}	{ 0.687}	{ 0.687}	{ 0.687}	{ 0.848}	{ 0.357}	{ 0.357}	{ 0.357}
Treatm. 5 × "Math equal/More females"	0.069	0.184*	0.184*	0.184*	-0.018	0.052	0.052	0.052
	(0.100)	(0.105)	(0.105)	(0.105)	(0.099)	(0.110)	(0.110)	(0.110)
	{ 0.945}	{ 0.302}	{ 0.302}	{ 0.302}	{ 0.998}	{ 0.812}	{ 0.812}	{ 0.812}
"Math equal/More females"	0.032	-0.036	-0.036	-0.036	-0.204***	-0.279***	-0.279***	-0.279***
	(0.075)	(0.087)	(0.087)	(0.087)	(0.066)	(0.069)	(0.069)	(0.069)
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: Standard errors in parentheses are clustered at the class level. FWER *p*-values are displayed in braces underneath standard errors. Significance levels: *** p< 0.01, ** p< 0.05, * p< 0.1.

B Appendix: Students' Survey

In this section, we report the most relevant questions asked in the experiment (C.1, Part I: Experiment) and in the questionnaire (C.2, Part II: Questionnaire).

B.1 Part I: Experiment

After eliciting information on socio-demographic characteristics (i.e., place and date of birth, name of the school, grade in which they were enrolled, etc.), we told students the following:

- "You will now be asked to complete 6 multiple-choice questions, 3 in math and 3 in Italian. You will gain two points for each correct question instead of one in the subject you choose, either math or Italian. In the other subject, you will gain only one point 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 five different treatment groups and a control group using a computer program. Each treatment group received a different type of information before reporting their perceived comparative advantage in math compared to literature. Figure B.I reports the questions asked to each group.

Then, we elicited the following information:

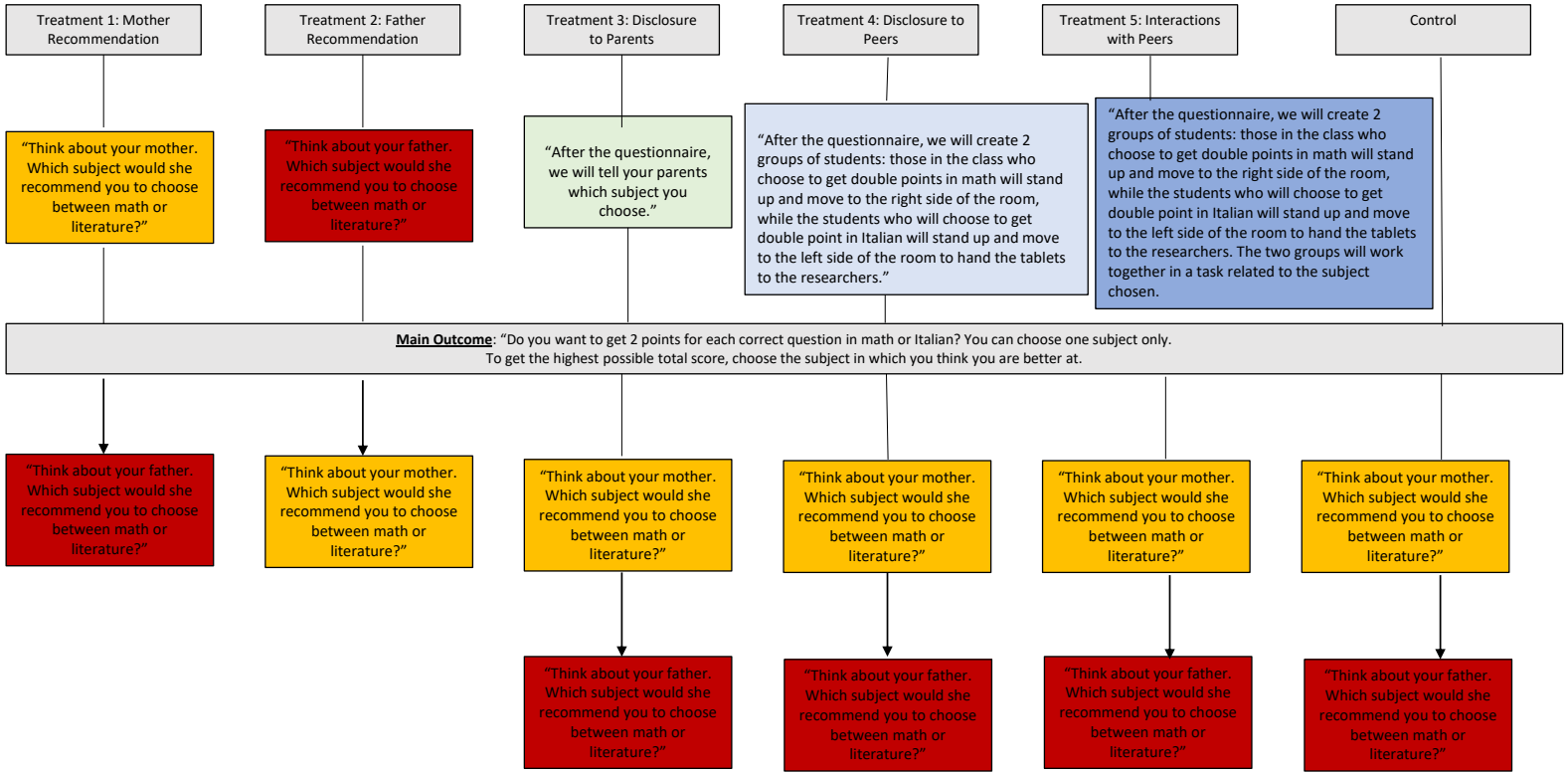
- "In which subject do you think your MALE classmates (who are in the classroom at the moment) have chosen to gain 2 points for each correct answer? Options: (a) all of them chose math; (b) all of them chose math except for 1 or 2; (c) all of them chose math except for 3 or 4; (d) half chose math and half chose Italian; (e) all of them chose Italian except for 3 or 4; (f) all of them chose Italian except for 1 or 2; (g) all of them chose Italian."

- "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 1 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 1 or 2; (g) all of them chose Italian."

- "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.

Figure B.I. Experimental Design



Notes: These figures summarize the experimental design and the order of the questions observed by students assigned to the treatments or control group.

B.2 Part II: Questionnaire

B.2.1 Implicit Association Test

We invited students to complete a seven-block IAT following the schematic overview presented in Table B.I. Half of the students completed the IAT as presented in the table, while the other half completed the IAT with the blocks in the following order: 1, 5, 6, 7, 2, 3, and 4 ("order incompatible" IAT). The order of the two schemes was 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 must 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 B.I. IAT: Blocks

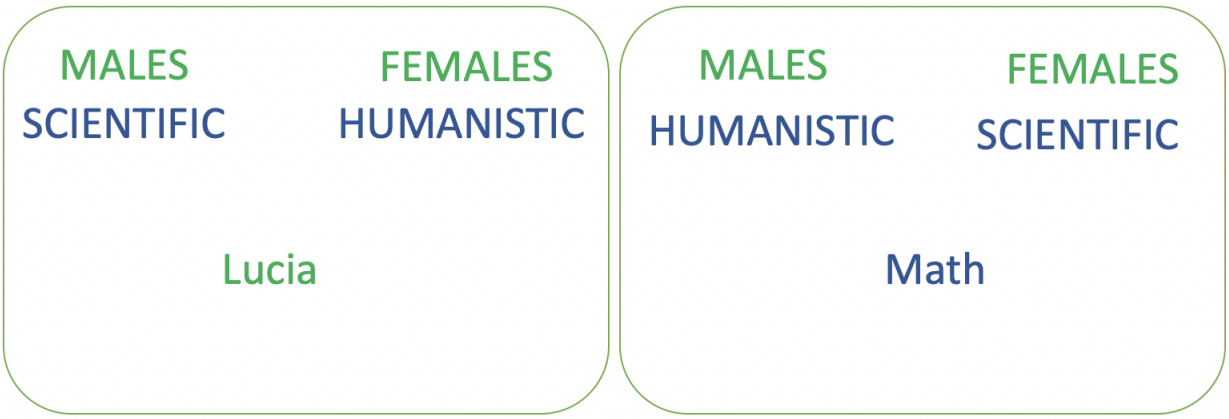
Blocks	Left Categories	Right Categories
1	Maschio (male)	Femmina (female)
2	Scientifico (scientific)	Umanistico (humanistic)
3	Maschio (male) and scientifico (scientific)	Femmina (female) and umanistico (humanistic)
4	Maschio (male) and scientifico (scientific)	Femmina (female) and umanistico (humanistic)
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)

Table B.II summarizes the stimuli presented within each category, while Figure B.II shows a screenshot of the tablet.

Table B.II. 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 B.II. Screenshot of the IAT



B.2.2 Self-Reported Answers and Background

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 opportunities (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.

B.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. A psychologist is not a job suitable for men.
8. A 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.

B.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]*

B.2.5 Background

Finally, we elicited information on students' siblings and parents, including information on their parents' level of education and occupation.

C Online Appendix: Parents' Questionnaire

C.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)