Confidence and College Applications: Evidence from a Randomized Intervention*

Rustamdjan Hakimov Renke Schmacker Camille Terrier

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Abstract

This paper investigates the role self-confidence plays in college applications. Using incentivized experiments, we measure the self-confidence of more than 2,000 students applying to colleges in France. This data reveals that the best female and low-SES students significantly underestimate their rank in the grade distribution compared to male and high-SES students. By matching our survey data with administrative data on real college applications and admissions, we show that miscalibrated confidence affects college choice on top of grades. We then estimate the impact of a randomized intervention that corrects students' under- and overconfidence by informing them of their real rank in the grade distribution. The treatment reduces the impact of under- and overconfidence for college applications, to the point where only grades but not miscalibrated confidence predict the application behavior of treated students. Providing feedback also makes the best students, who were initially underconfident, apply to more ambitious programs with stronger effects for female and low-SES students.

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Rustamdjan Hakimov: University of Lausanne, rustamdjan.hakimov[at]unil[dot]ch
Renke Schmacker: University of Lausanne, renke.schmacker[at]unil[dot]ch
Camille Terrier: Queen Mary University London, c.terrier[at]qmul[dot]ac[dot]uk

1 Introduction

Access to prestigious colleges and high-paying careers varies substantially by gender and social background. In the US, children with parents in the top 1% of the income distribution are 77 times more likely to attend elite colleges and universities than children with parents in the bottom 20% of the income distribution (Chetty et al., 2017; Hoxby and Avery, 2012). Gender also plays a key role. Females disproportionately enter less selective colleges and lower-paying jobs than men (Saygin, 2016; Blau and Kahn, 2017). A number of reasons have been documented for this unequal access to college, from financial constraints (Angrist et al., 2022; Bettinger et al., 2019; Dynarski, 2000; Scott-Clayton and Schudde, 2020) to preferences regarding programs or peers (Wiswall and Zafar, 2015, 2018; Patnaik et al., 2021), information frictions (Bettinger et al., 2012; Hoxby and Turner, 2015; Bergman et al., 2019; Guyon and Huillery, 2020), and complexity and uncertainty in the admissions and aid process (Dynarski et al., 2021). While financial and informational barriers have received considerable attention, we know much less about behavioral barriers to college enrollment.[1]

This paper considers a novel behavioral constraint to college access, namely students' over- and underconfidence regarding their academic ability, two phenomena we refer to as "misconfidence." We define misconfidence as the difference between where students think they rank in the grade distribution and where they actually rank.[2] It is very common for individuals to have biased beliefs about their own abilities (Niederle and Vesterlund, 2007; Moore and Healy, 2008; Möbius et al., 2022; Burks et al., 2013). Yet, it is unclear how much misconfidence affects college choice. To shed light on these questions, we combine unique (survey and administrative) data and a randomized intervention to address three key questions: First, how large are the confidence gaps regarding academic ability by gender and socioeconomic status (SES)? Second, how much does misconfidence matter for college applications and admissions? Finally, how effective is an intervention, which provides students with feedback on their true rank in the grade distribution, at mitigating the role played by misconfidence in college applications; and does this intervention help close the gender and social college admission gap?

[1] A notable exception is the literature on preferences for competitiveness, which has found that competitiveness predicts educational and career choices (Buser et al., 2014, 2020; Boneva et al., 2021; Reuben et al., 2019). Tincani et al. (2022) also shed light on three behavioral channels: aversion to social targeting, lack of knowledge about own skills, and social preferences.

[2] Incorrect beliefs about relative position in the distribution are often referred to as over- and underplacement (Moore and Healy, 2008).

Studying how confidence affects college choice is a first-order question from both an efficiency and an equity perspective. From an efficiency perspective, over- and underconfidence can be costly. Underconfident students might shy away from the most prestigious colleges, wrongly believing they have low admission chances. In contrast, when underconfidence is irrelevant for college choice, that is, when students only apply based on their academic credentials, the final college-student match is stable, meaning that students attend their preferred college among all the colleges in which they have a high-enough score to enroll in.[3] Underconfidence is costly because it distorts stability: Some students may realize they could have been admitted to colleges they liked more had they applied.[4] Overconfidence is also costly as students might aim too high and end up unmatched (Arteaga et al., forthcoming).

From an equity perspective, studying the link between confidence and college choice is also essential because of the well-documented gender and social gaps in confidence (e.g., Niederle and Vesterlund, 2007; Almås et al., 2016; Guyon and Huillery, 2020; Bobba and Frisancho, 2022). The underconfidence of female and low-SES students can discourage them from applying to prestigious programs. This is a potential concern as prestigious colleges usually have higher returns (Zimmerman, 2019; Anelli, 2020; Altonji et al., 2016; Kirkeboen et al., 2016; Hastings et al., 2013), and enrollment in these selective colleges might be particularly beneficial for low-SES students (Black et al., forthcoming; Bleemer, 2021).

We conduct a large-scale survey of high school seniors participating in the French college admission procedure in 2021. We survey students before the national deadline for college applications, collecting information on their intended application list and their perceived admission chances in each program.[5] We also use the survey to measure students' confidence in their academic ability. To do so, we ask students about their grade point average (GPA)—a score that French students find on their school report card—and what they think the rank of this GPA is in the national distribution of college applicants. Importantly, French students do not have this information, which forces them to guess their

[3]The stability argument is particularly relevant in countries that rely on a mechanism that leads to a stable match (a common goal for centralized college admissions), but the stability objective holds more generally in decentralized college admission markets.

[4]The costs of over- and underconfidence are amplified when the size of the application list is restricted, a standard practice in countries that use centralized assignment systems, for instance, China, Australia, Turkey, and Germany.

[5]Each college offers several subjects, such as math, economics, literature, and so on. A program corresponds to a college-by-subject unit.

rank, a guess that reveals over- or underconfidence. We incentivize belief elicitation by rewarding students who correctly guess their rank. Finally, we match our survey data with administrative data on the universe of 2021 college applicants, which contains information on student application lists, the offers they receive, and the program they ultimately enroll in.

The survey data on student confidence reveals that students largely misperceive their position in the distribution. Students in the bottom half of the grade distribution are, on average, overconfident, while students in the top half are, on average, underconfident. Strikingly, underconfidence among top students is much higher among female students than among males. Conditional on true rank, top female students position themselves 9.2 percentiles lower in the distribution than top males. Underconfidence is also higher among high-achieving low-SES students, who underestimate their rank by 5.8 percentiles more than their high-SES peers. We do not find large gender and social differences in overconfidence among students in the bottom half of the distribution.

After matching survey and administrative data, we show that under- and overconfidence has actual consequences since it predicts student college applications. Underconfident applicants apply to significantly less prestigious programs (where prestige is based on the average GPA of students attending a program). Being 10 percentiles less confident reduces the prestige of the best program a student applies to by 0.07 standard deviations. It also reduces by 3.2 percentage points the probability of applying to one of the elite French programs (called CPGE). The negative effect of underconfidence on applications also lowers admission chances in prestigious programs. Being 10 percentiles less confident reduces by 0.04 standard deviations (SDs) the prestige of the program a student is admitted to and by 1.5 percentage points the probability of enrolling in one of the elite French programs.[6] These first results show that, controlling for true ability, misconfidence is correlated with the prestige of college applications and is thus likely to distort the stability of the final allocation.

In the second part of the paper, we therefore evaluate the effect of an intervention that makes students aware of their under- or overconfidence and corrects it. We embed the intervention in our survey. After measuring student confidence, we randomly split the survey participants into a treated group that receives feedback on their actual rank in the grade distribution and a control group that does not receive any feedback. This intervention

[6] In contrast, confidence does not affect the prestige of the "safe" choice that students make. Thus, underconfident students have less diversified application portfolios.

has two purposes: (1) to understand whether correcting misconfidence reduces the relevance of misconfidence for college choice, and (2) to explore whether correcting misconfidence is an effective way of alleviating the gender and social gaps.

Our results reveal that correcting misconfidence drastically reduces its importance for college choice. Providing feedback on rank reduces the role played by misconfidence in the prestige of the top program (-80%), as well as the likelihood of applying (-39%) and being admitted (-72%) to an elite program (CPGE). Among students who receive feedback, conditional on ability, misconfidence no longer plays a role in college choices. The large effect of our intervention confirms that misconfidence has a causal effect on applications and admissions. Thus, by reducing the relevance of misconfidence, providing feedback about relative ability moves the allocation closer to stability.

We then test whether rank feedback mitigates the aspiration gap among high-achieving students. While providing feedback does not significantly affect the college applications of high-achieving male students, high-achieving females apply more ambitiously when they receive feedback. Our intervention closes 81% of the gender prestige gap, 57% of the gender gap in elite program applications, and 73% of the admission gap in elite programs. Correcting misconfidence is equally effective at alleviating the social aspiration gap. Feedback closes 69% of the social gap in top program prestige; it completely closes the gap in applications and admissions to an elite program (CPGE). These results clearly show that misconfidence is a substantial behavioral constraint for equal college access.

In the last section, we investigate likely mechanisms behind our treatment effects. We conjecture that correcting misconfidence shifts students' perception of their admission chances. Recent work shows that students often have incorrect beliefs about the probability of being admitted, which makes it particularly important to understand where these misperceptions come from (Agarwal and Somaini, 2018; Kapor et al., 2020; Tincani et al., 2022; Larroucau et al., 2021; Arteaga et al., forthcoming). We use information on student-guessed admission chances from our survey to show three main results. First, higher confidence is associated with higher perceived admission chances in prestigious programs. Second, self-confidence is positively correlated with having overoptimistic beliefs to receive an offer. Finally, in the survey, we asked students to guess which program they expect they will enroll in at the end of the admission process; a variable that partially captures their perceived admission chances. We show that our intervention makes misconfidence less relevant when students predict the prestige of their final match.

Our results are of direct policy interest. Concerns regarding unequal access to college have given rise to a wide range of policies to boost college enrollment among low-SES students. These policies include preferential admissions such as quotas and reserved seats (Black et al., forthcoming; Tincani et al., 2022; Bleemer, 2021; Dur et al., 2018), the provision of information about the cost and returns of colleges (Bettinger et al., 2012; Hoxby and Turner, 2013; Bergman et al., 2019; Jensen, 2010), and financial aid (Angrist et al., 2022).[7] We add a new intervention to the policymaker's toolbox that targets a behavioral constraint (rather than financial or informational) to college access, and that effectively alleviates gender and social aspiration gaps in a way that is low cost, easy to implement, and easy to scale. From a policy perspective, our intervention is related to recent initiatives that give students individual feedback on their admission chances in schools (Arteaga et al., forthcoming; Larroucau et al., 2021). Both interventions are relevant in different contexts. While personalized information on admission chances is the most precise way of informing students, calculating these probabilities is often not possible without rich data on student rank, program competitiveness, and admission criteria. This is typically the case in countries in which the admission criteria are fuzzy or in which there is no centralized college entrance exam, like in France, Mexico, Canada, South Korea, England, and others.[8]

Our paper contributes to an extensive empirical literature documenting gender and social gaps in confidence and aspirations in the lab and in the field (Niederle and Vesterlund, 2007; Buser et al., 2014; Hoxby and Turner, 2013; Bordalo et al., 2019; Landaud et al., 2019; Santos-Pinto and de la Rosa, 2020; Möbius et al., 2022; Reuben et al., 2017). We complement this literature by providing direct evidence of the causal effect of confidence on educational choices. A few recent papers have provided indirect evidence on how confidence gaps affect education and career choice.[9] Carlana et al. (2022) and Falk et al. (2020b) show that mentoring programs provided to immigrants and to low-SES students affect both their confidence and educational choices. In the French context, Guyon and Huillery (2020) find that low-SES middle-school students underestimate their relative academic potential more

[7]In France, concerns over self-censorship in college applications led to a major reform of college admissions in 2018 (described in the paper), whose effectiveness in terms of social diversity is unclear (Cour des Comptes, 2020).

[8]In France, college admission criteria and their weights are not transparent. Policymakers are not able to calculate personalized admission chances. Students typically use their GPA as a proxy for their admission chances.

[9]More broadly, a rich literature has documented how confidence affects a wide range of real-life outcomes (Barber and Odean, 2001; Malmendier and Tate, 2005; Ortoleva and Snowberg, 2015; Sterling et al., 2020).

than high-SES students, and that this is correlated with their choice of an academic high school track. Compared to these papers, we directly measure, and experimentally alter, students' confidence regarding their relative academic ability, which allows us to quantify the causal effect of confidence on education choice.

Our paper also contributes to a literature that studies the effect that feedback on student academic ability has on achievement. Using field experiments, Azmat and Iriberri (2010) and Azmat et al. (2019) document the effect that knowledge of students' relative rank has on their effort and grades in school and university.[10] Franco (2019) provides relative performance feedback on mock tests for a college entrance exam, and finds that low-performing students decrease study effort and become less likely to take the college entrance exam. Andrabi et al. (2017) provide individual performance information and average school performance to schools and households with children, documenting positive effects on test scores.[11] Using natural experiments—the introduction and abolition of college entrance exams which give students information on their rank in the national distribution—Goodman (2016) and Goulas and Megalokonomou (2021) show that rank information increases the prestige of the universities attended by high-achieving students. Our paper directly complements this literature by exploiting information not only on the feedback that students receive on their rank, but also on their initial (often incorrect) perception of their rank. Observing students' initial confidence and the feedback they receive allows us to shed new light on the existing results, particularly to explain why entrance exams make top students more ambitious; these students tend to underestimate their skills.

Closest to our setting, Bobba and Frisancho (2019) analyze the role of Mexican students' subjective expectations of their ability in their high school choice. After asking students to take a mock exam, the authors provide individualized performance feedback to a random sample of ninth-graders, which leads high-achieving students to increase applications to academic tracks, and low-achieving students to reduce them.[12] Although related in topic, our papers differ in a number of ways. We consider the role played by confidence in

[10] A distinct literature looks at the effect of a student rank within a class and concludes that a better within-class rank increases test scores (Murphy and Weinhardt, 2020), affects the choice of academic tracks (Delaney and Devereux, 2021b), and raises future earnings (Denning et al., 2018).

[11] Recent papers show the relevance of providing feedback to parents rather than students. Dizon-Ross (2019) conducts a field experiment in Malawi, informing parents about their children's academic performance, which leads to an increase in the investment in high-ability children's education. Bergman (2021) provides weekly feedback to parents on children's missing assignments, which corrects parental over-optimism about children's performance and improves performance.

[12] Bobba and Frisancho (2022) show that the effects are driven by students updating their perceived ability when they receive feedback.

college admissions rather than high school. We focus on gender and social differences in confidence and show how rank feedback helps to close these gaps. In contrast to Bobba and Frisancho (2019), we also provide feedback without asking students to take a mock exam, we use incentivized measures of confidence, and we show how confidence affects perceived admission chances.[13]

Few papers specifically look at the relevance of self-confidence for the stability of matching markets. Pan (2019) uses lab experiments and shows that underconfident agents are worse off when the Boston rather than Deferred Acceptance mechanism is used and when students submit rank-order lists before learning their centralized exam score. Dargnies et al. (2019) show that underconfidence causes unraveling in centralized labor markets. Our paper provides field evidence that the confidence can hamper stability in college admission markets.

Finally, we contribute to a blooming literature that documents students' incorrect beliefs in their admission chances and the ensuing costs (Agarwal and Somaini, 2018; Kapor et al., 2020; Tincani et al., 2022; Larroucau et al., 2021; Arteaga et al., forthcoming). What drives these incorrect beliefs is less clear. Our results reveal that student under- and overconfidence in their academic ability are important determinants of their incorrect beliefs.

The paper is organized as follows. In Section 2, we describe the institutional context and provide descriptive evidence of aspiration gaps from the administrative data. In Section 3, we describe the survey and administrative data. Section 4 provides evidence on confidence gaps, while Section 5 demonstrates the relevance of misconfidence for college choice. Section 6 presents the results of the experimental intervention. Finally, in Section 7, we conclude.

2 Institutional Setting

2.1 College Admission in France

Higher education in France. In France, education is compulsory for children between the ages of three and 15 and consists of three cycles: primary school up to age 11, middle school (*collège*) between ages 11 and 15, and high school (*lycée*) from 15 to 18. At the end of

[13]The approach adopted by Bobba and Frisancho (2019) complements our approach by using a structural choice model to analyze not only the effect of one's ability misperception, but also the effect of uncertainty around this perception.

high school, students can obtain the high school diploma (called *baccalaureat*), which allows them to enter higher education. Three types of high schools exist that lead to three different diplomas: *bac général* (preparing for university education), *bac technologique* (preparing for short-term studies), and *bac professionnel* (preparing for a vocational career). While students from the three high-school tracks can apply to any higher education program, their aspirations and admission chances are hardly comparable. Hence, in the remainder of the paper, we focus on students from the general high-school track (*bac général*). In 2021, 421,000 *bac général* seniors applied to 14,600 higher education programs. Four main types of higher education institutions exist (presented in decreasing order of prestige):

- Preparatory classes for elite colleges (*classes préparatoires aux grandes écoles*, CPGE) enroll 10% of the students. These classes constitute the most prestigious educational track. They last for two years and prepare students for the competitive entrance exam of the *grandes écoles*. Preparatory classes are free for students. Importantly, if students fail to enter the elite colleges after preparatory class, they do not lose the two years, as they can enter the third year of public universities. Elite colleges, such as Écoles Normales Supérieures (ENS), Ecole Polytechnique, engineering schools, business and management schools, can be either public or private. Most of them last for four years. In the rest of the paper, we will refer to CPGE as the *elite track*.[14]

- Public universities enroll 57% of the students. They deliver bachelor degrees after three years of studies.

- Technical universities and technical high schools, respectively, enroll 8 and 9% of *bac général* students. They deliver technical degrees (called DUT and BTS) after three years (for DUT) or two years (for BTS).

The vast majority (66%) of higher education training is provided in public institutions. The French state subsidizes admission fees, which reduces financial constraints for students. In 2021/2022, a student typically paid 170 euros per year to enroll in an undergraduate course (France, 2022).

[14] The wages of students who graduate from a Master's program (5 years of higher education) is on average 60% higher than the wages of students who do not attend a higher-education institution. For students who graduate from a *grande école* (most of them also require 5 years of higher education), the wage bonus increases to 81% (Dabbaghian and Péron, 2021). Landaud and Maurin (2021) also find an hourly wage premium of about 15% of graduating from a first-tier *grande école* program rather than from a less prestigious *grande école* program.

College applications. During the final year of high school, students apply for post-secondary education via a centralized platform called Parcoursup. This platform allows students to browse programs using various types of filters (according to type of institution, location, public or private status, ...).[15] Using the platform, students can then submit up to 10 unordered choices, and within these choices they can make a maximum of 20 sub-choices. For example, a student can apply to a science elite track in up to 20 different institutions. This would count as one choice and 20 sub-choices.[16] Therefore, we refer to a higher education institution as an *institution* (e.g., Paris Sorbonne), and we refer to a subject within an institution as a *program* (e.g., Paris Sorbonne, Math). In Figure A.1 in the appendix, we plot a histogram of the number of choices that students made in 2021. The spike at 10 choices indicates that for many students the choice limit is binding. However, there are also a number of students who do not exhaust the limit and many who apply to more than 10 programs (e.g., by using their sub-choices or applying to programs without a limit on the number of choices).

Student information on own ability. In 2021, students had to submit their application list by March 11. Note that, in general, students finalize their applications before taking the centralized high school exit exam in June.[17] This means that students, at the time of their applications, only know their average teacher-given grades (GPA).[18] More specifically, at the end of each term (a three-month period), students receive a one-page document summarizing their grades in each subject. This sheet also indicates the student's GPA and rank within their class. This is the only information that students have to judge their ability relative to their peers. In the absence of a unique college entrance exam that gives students accurate information on their position in the ability distribution, we expect student under- or overconfidence to have a larger effect on their college applications. We discuss in the conclusion how the effect of our "confidence-correcting" intervention might

[15] See `https://dossier.parcoursup.fr/Candidat/carte` (retrieved 11/04/2022). Each program provides the following information: public or private status, fees, address, website, classes offered, admission criteria, open days, contact person, number of places, number of candidates, and number of students admitted the previous year).

[16] For some programs, the number of sub-choices is not limited (e.g., Sciences Po).

[17] Usually, the *bac* grade is a weighted average of continuous assessments and the centralized exit exam grades. In 2021, the exit exams were cancelled due to the Covid pandemic such that 82% of the high school grade is based on continuous evaluation (L'étudiant, 2021). However, also in other years, student application decisions and student priorities at colleges do not depend on exit exam performance.

[18] Students also know their grades in the centralized Literature exam, which takes place at the end of the second year of high school. Students generally take the Literature exam at the end of the second-to-last year because that subject is not taught in the last year.

differ in a different environment, for instance, one with a college entrance exam used by all colleges to rank students.

College admission criteria After the application deadline, programs review all the applications they received and rank students. Importantly, the programs are free to decide the admission criteria they will use, which makes it hard for students to figure out their priority in each program. This difficulty is exacerbated by the lack of transparency on the exact criteria employed by the programs and their respective weights.[19]

The lack of transparency on admission criteria means that many students assume that programs will use GPA as their primary criterion, an expectation that has been backed by the French Court of Auditors that identified simple GPA as a dominant criterion in flagship programs (Cour des Comptes, 2020).[20]

The fairly large uncertainty that prevails in France on admission chances in each program means that a student's under- or overconfidence can easily translate into a biased perception of their admission chances, which can in turn affect the set of colleges they decide to apply to. In the conclusion, we conjecture how a different environment, for instance, one with uniform admission criteria across colleges or clear information on admission chances, might alter the effect of our feedback intervention.

Offers and rejections. To allocate students to programs, the Parcoursup clearinghouse performs a dynamic implementation of a college-proposing deferred acceptance mechanism. On offer day, the clearinghouse sends out offers to students up to the capacity of each program. Some students may receive several offers, while others do not receive any. Students with one or multiple offers have to decide whether they want to: (i) accept an offer and renounce the other choices they made (thereby making their acceptance a definitive choice), which typically happens when a student receives an offer from their favorite program; or (ii) tentatively accept an offer, but keep the remaining choices in the hope of receiving an offer in the future from a program they prefer, which typically happens when a student receives an offer from a program which is not her favorite; or (iii) reject an offer,

[19]At the time of ranking students, programs have access to the GPA of students for the last five trimesters of high school, the grade of the centralized literature exam, which takes place in the preceding summer, and a sheet filled in by the high school teachers and the principal which contains comments on the student's cognitive and non-cognitive skills.

[20]The French Court of Auditors used machine-learning methods on student applications and admission decisions to identify the admission criteria used (Cour des Comptes, 2020).

which typically happens when there are several offers, as rules do not allow the tentative acceptance of more than one offer.

In 2021, the first offers were sent out on May 27 and the offers/rejections ended on July 16. For offers sent out on May 27, students had four days to decide on an offer, for offers sent out on May 28 they had three days, and for all offers from May 29 they had two days to decide. Declined or renounced offers are automatically given to the student with the next highest priority.

2.2 Aspiration gaps by gender and socioeconomic status

A rich literature has documented aspiration gaps by gender and socioeconomic status (Falk et al., 2020a; Carlana et al., 2022; Black et al., 2015; Page and Scott-Clayton, 2016; Hoxby and Avery, 2012; Delaney and Devereux, 2021a; Saygin, 2016). We find similar evidence in France using administrative data on the applications reported by more than 400,000 high school students in 2021. We look at the prestige of the application list, as measured by the average grades of the students enrolled in each of the programs listed by a student. More specifically, for each program, we consider the pool of students enrolled in the program, and we define its prestige according to the average high school diploma grades of these students.[21] We explain in greater detail why we proxy prestige by grades in Section 3.2.

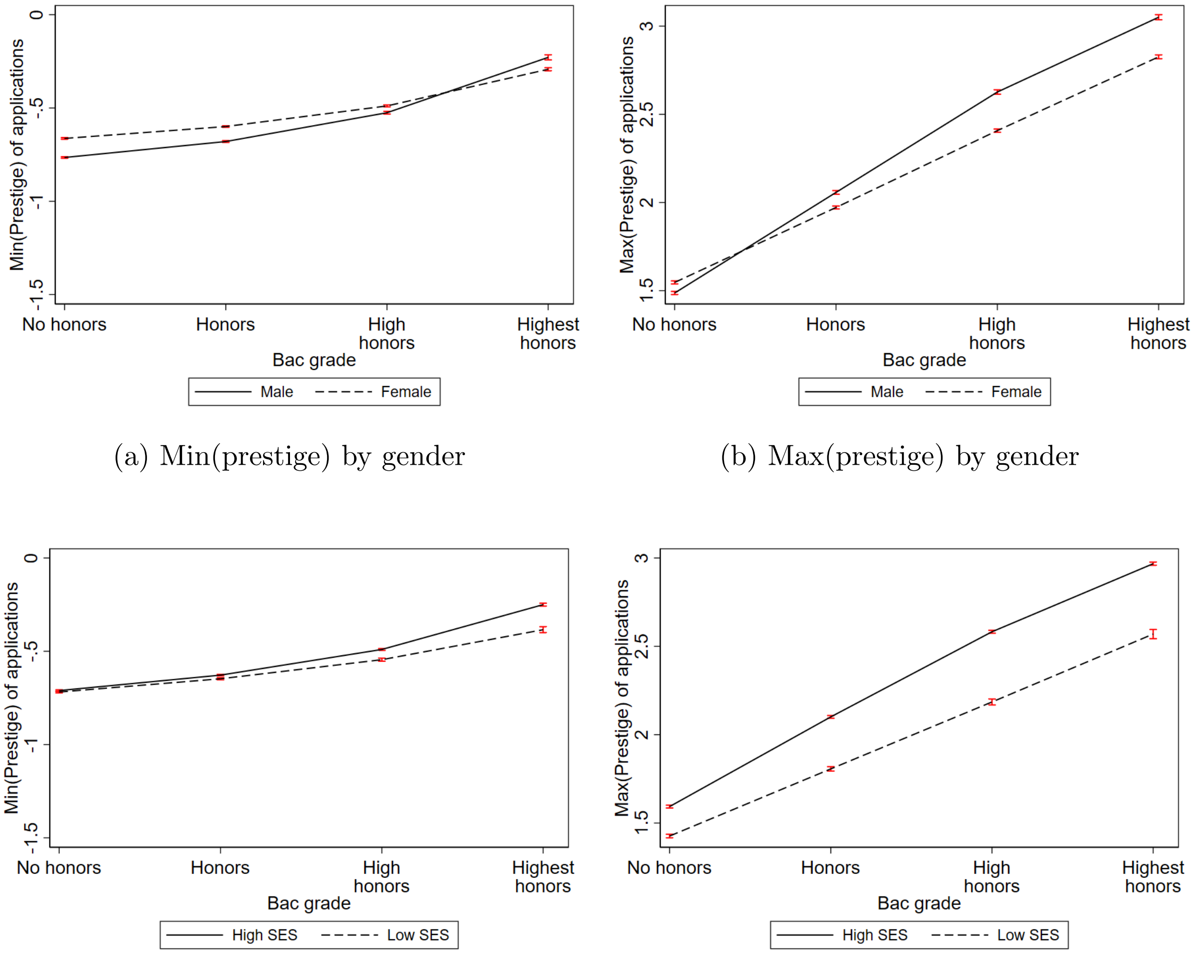
Figure 1a in the appendix shows the minimum prestige of the application list (i.e., the prestige of the "safe" program) and Figure 1b shows the maximum prestige of the application list (i.e., the prestige of the "top" program) by gender and by academic achievement (expressed on the X-axis from the lowest achievers who received "No honors" to the highest achievers who received the "Highest honors").[22]

Aspiration gap by gender. We find only small gender differences in the prestige of the "safe" program. However, large differences emerge when considering applications to "top" programs. When building their application portfolio, the best programs that high-achieving females apply to are significantly less prestigious than the best programs high-achieving males apply to. This female modesty has direct consequences for their college admissions.

[21] We standardize the prestige measure to have a mean of zero and a standard deviation of one.

[22] In France, high school diploma grades translate to the following honors (*mention*): Among 2021 high school graduates that took part in Parcoursup, 14% earned "Highest honors" (*Très bien*), 26% earned "High honors" (*Bien*), 34% earned "With honors" (*Assez bien*), and 26% were not granted honors (*Pas de mention*).

Figure 1: Prestige of applications by gender and socioeconomic status



(a) Min(prestige) by gender

(b) Max(prestige) by gender

(c) Min(prestige) by SES

(d) Max(prestige) by SES

Notes: The figures show the minimum and maximum prestige of the programs in the application list by honors level and gender/SES. The prestige of a program is defined as the mean grade level of all enrolled students. 99% confidence intervals are based on predicted values from a regression on the interaction of honors level and female/low SES.

Females with the highest honors are matched to programs with a 0.35 standard deviations (SDs) lower prestige than males with the highest honors (see Figure A.5a in the appendix). An alternative measure of aspirations is whether students apply to at least one of the prestigious elite tracks (CPGE). Figure A.4a in the appendix, shows that the best female students are also significantly less likely to apply to CPGE. Among students receiving the "highest honors," female students are 17 percentage points less likely to apply to an elite track. Again, this aspiration gap translates into a gender gap in admissions to elite tracks, with the highest honor females being 17.9 percentage points less likely than males to enroll in elite tracks (see Figure A.5a in the appendix). The large gender aspiration gap we document in France is consistent with extensive evidence in other countries that high-achieving females are less likely than males to select high-paid professions and more selective colleges (e.g., Delaney and Devereux, 2021a; Saygin, 2016; Reuben et al., 2019).

Aspiration gap by socioeconomic background. We also find remarkable aspiration gaps by socioeconomic background. Students from a lower SES apply to significantly less prestigious "top" programs, with the largest differences among the best students (see Figure 1d).[23] As previously noted, this ambition gap has consequences on admissions. Among students with the highest honors, low-SES students are matched to programs that are 0.55 SDs less prestigious than high-SES students. We find a similar pattern in applications to the elite track (CPGE). Among students receiving the highest honors, low-SES students are 14.7 percentage points less likely to include an elite track in their application list than high-SES students (see Figure A.4c in the appendix) and they are 10.7 percentage points less likely to enroll in one. The striking social gap in the aspirations we document brings one more piece of evidence to a well-documented fact: high-achieving, low-SES students are less likely to select prestigious academic tracks than high-SES students (Falk et al., 2020a; Carlana et al., 2022; Black et al., 2015; Page and Scott-Clayton, 2016; Hoxby and Avery, 2012).

To sum up, we document large aspiration gaps by gender and social background in France, a major concern because high-achievers are precisely those with the highest chances of attending prestigious colleges with higher returns (Zimmerman, 2019; Anelli, 2020; Altonji et al., 2016; Kirkeboen et al., 2016; Hastings et al., 2013). The gender and social aspiration gap may therefore reinforce existing labor market inequalities. While there may be a variety of reasons behind the aspiration gap, the literature documents systematic confidence gaps by gender and social background (e.g., Niederle and Vesterlund, 2007; Almås et al., 2016; Guyon and Huillery, 2020). If female and low-SES students are less confident in their relative academic ability than their male and high-SES peers, they could be discouraged from applying to ambitious programs. In the following sections, we combine survey and administrative data to identify the role of self-confidence in explaining the aspiration gap.

[23]We do not find large differences in the prestige of the "safe" program (see Figure 1c).

3 Data and intervention

3.1 Survey data

Social media recruitment. We conducted a large-scale survey of students participating in the French college admission procedure in 2021. Our target group—French high school seniors aged 17 to 18 years— is notoriously hard to reach using traditional sampling techniques (like telephone screening). Therefore, we recruited our sample using social media ads on Instagram, Snapchat, and Facebook; an effective recruitment channel as the overwhelming majority of our target group are active users.[24] We used the platforms' targeting options to show the ads to 17 to 18-year-old individuals living in France. Moreover, we targeted the ads by gender to obtain a gender-balanced sample. The ad (see Figure D.1 in the appendix) was shown to more than 530,000 unique users on Snapchat and to more than 550,000 unique users on Instagram and Facebook.[25] The ad invited students in their final year of high school, who were about to submit their college preferences, to participate in a survey. To incentivize participation, the ad also offered participants the chance to win Amazon.fr gift cards upon survey completion. Individuals who clicked on the ad were redirected to the Qualtrics survey. Our final sample consists of 2,034 students in the general high school track, who completed the survey between February 18 and March 11, that is, in the three weeks before the deadline to submit college application lists (March 11). Appendix D provides additional details on the recruitment process and the sample.

Background characteristics. Figure 2 provides an overview of the survey flow.We started by collecting demographic information on student birth date, gender, postal code, and school name. We employed these variables to match our survey data to the administrative data for students who did not provide their national student identifier (INE). Moreover, we elicited student risk preferences by asking them about their general willingness to take risk on an 11-point scale (Dohmen et al., 2011).

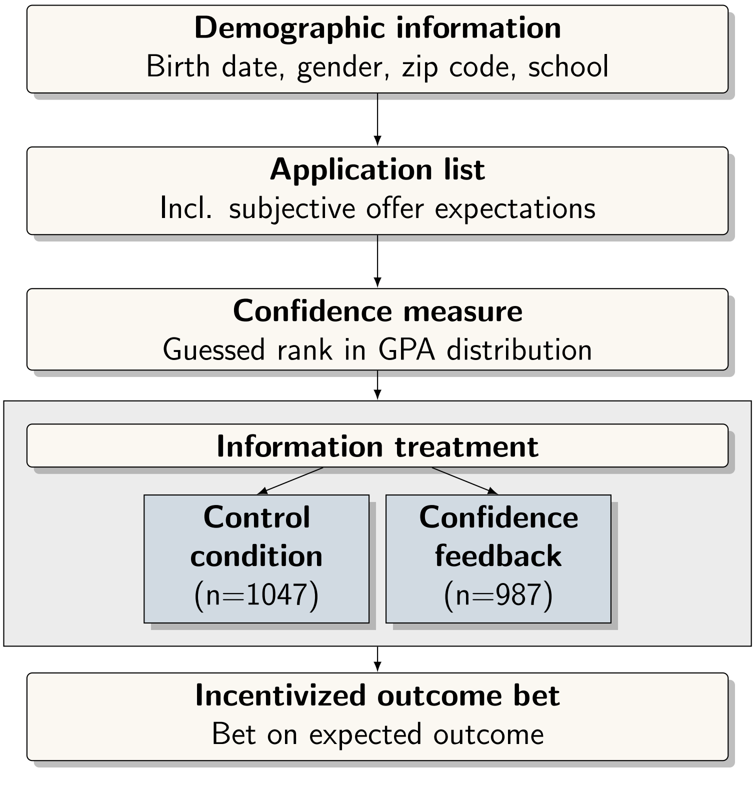
Student intended applications. We then asked students for the list of programs they were planning to apply to on Parcoursup. Students could enter between two and ten pro-

[24]In 2020, 89% of 16 to 18-year-olds in France used Instagram, and 82% used Snapchat according to a survey by Diplomeo (Leroux, 2020).

[25]These numbers are lower bounds since they are based on our own ad activities. We also hired a social media agency that bought ads on our behalf, but we do not know how many times their ads were shown (most of the ad budget was spent on our own ad though).

grams. For each program, we asked them to type in the city, the institution, and the program name. Finally, for each program on their list, we asked students how they evaluated the probability (in percent) of receiving an offer from that program. This question aims at measuring student beliefs about admission chances. Comparing these beliefs to the real offers that students receive (whose information comes from the administrative data presented below) allows us to evaluate whether student beliefs about admission chances are miscalibrated, and by how much.[26]

Figure 2: Survey Design



Confidence measure. In the second part of the survey, we measure students' confidence in their academic ability. To do so, we elicit beliefs about their rank in the grade distribution in an incentivized way. We asked students for their grade point average (GPA) in the most recent academic term.[27] After students entered their GPA, we elicited their beliefs

[26]The survey also contained questions on students' cardinal preferences for programs, on the way students acquired information on programs, and on their preferences for peers. We collected this additional data for a complementary project.

[27]As discussed in Section 2.1, the French academic year is divided into three academic terms that last three months each (Sept-Nov, Dec-Feb, and March-June). At the end of each term, students receive a

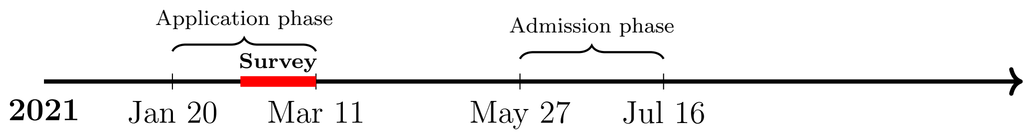


Figure 3: Survey timing in the college admissions process

about the rank of their GPA, compared to a reference sample of 1,000 students from the general high school track. Students had to report their percentile rank on a slider from 0 to 100.[28] To encourage truthful reporting, we informed students that, among those who were correct in their belief (+/- 3 percentiles), we would randomly select ten students to receive a 100 Euro Amazon.fr gift card.

We had to collect data on the reference sample of 1,000 students ourselves because information on student GPAs is not available in administrative data. Yet, despite this information being unavailable, the GPA is the most salient proxy of a student's ability in high school, which made the GPA the obvious candidate to measure student confidence. To build the reference group we therefore conducted a pre-survey 1.5 months before our main survey in which we asked students about their GPAs. We conditioned participation to students who (i) were in the last year of high school and in the general track (*bac général*), (ii) planned to apply to colleges in 2021, and (iii) were at least 16 years old. Students reported their GPA in the first trimester of the last year of high school; the same GPA we also elicited in the main survey. We used the 1,001 stated GPAs to compute the distribution of grades to which we compare students in the main survey. In Appendix E, we describe the characteristics of this sample and show that it is similar to our main survey in terms of the descriptives we elicited (age, gender composition, and average GPA).

Importantly, we were careful to reveal to the students in our main survey the characteristics of the benchmark sample. We explained that the sample had been recruited via Instagram and Facebook and that students were in the last year of the general high school track, that they planned to apply to colleges in 2021, and that their gender composition was approximately representative of Parcoursup participants (57.4% female, 42.6% male).

one-page document summarizing their average grades in each subject, and their average grades across all subjects. We asked students to report the latter grade. When participating in our survey they had not yet received the second-term GPA, so we asked them for the first-term GPA.

[28] The starting position of the slider was at the 50th percentile rank.

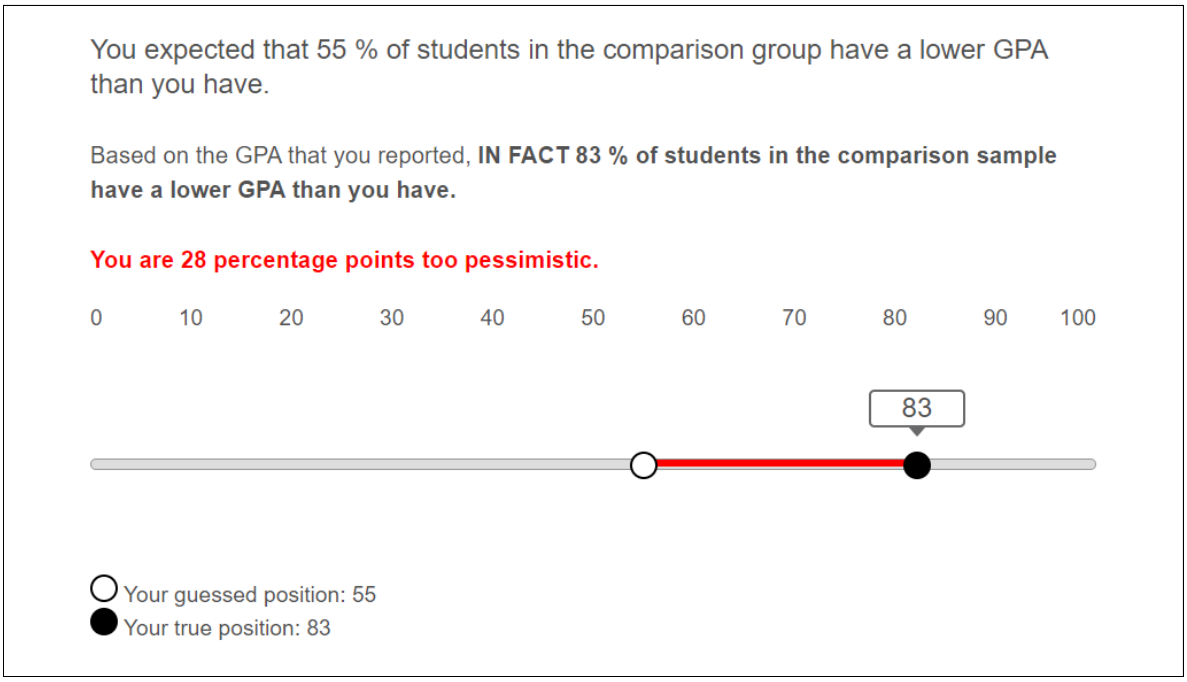
Information treatment: Correcting over- and underconfidence Just after eliciting student confidence, we implemented an information treatment to correct student over- or underconfidence. We randomly split the sample into a treated group that received feedback on their correct rank in the grade distribution and a control group that did not receive any feedback. The feedback provided is simple, as illustrated in Figure 4. On a slider, we show students both their guessed rank and their real rank. The gap between the guessed and the correct rank illustrates the degree of their misperception.

In addition, to make large mistakes (i.e., strong over- and underconfidence) more salient, we highlighted the distance between the guessed rank and the real rank in three different colors depending on how large the mistake was. When a student's guess was within three ranks of the correct rank, we colored the gap green to show a small over- and underconfidence (see Figure F.14 in the appendix). When a student's guess was between three and ten ranks away from the correct rank, we colored the gap yellow to stress a medium over- and underconfidence (see Figure F.13). Finally, when a student's guess was more than ten ranks away from the correct rank, we colored the gap red to highlight a large over- and underconfidence (see Figure F.12). Correspondingly, the feedback stated: "You are X ranks too optimistic/pessimistic" in a green, yellow, or red font.

Short-term outcome: Guess of the final match. As illustrated in Figure 3, we conducted the survey right before the application deadline, so we expect that our information treatment may have affected the final applications submitted by the students. In order to also capture short-term outcomes, in the very last part of the survey (i.e., after the information treatment), we asked students to bet on the program they expected to enroll in. They could choose one program from their submitted application list. To incentivize bets, we told students that those who correctly guessed the program would have the chance to win one of twenty 50 Euro gift cards.[29]

[29] After the mechanism ended, we contacted 20 respondents and asked which program they had accepted. 15 of them responded, and, among those, eight indicated the program they had bet on (and received the gift card), while seven indicated a program different from their bet. Note that students were not aware at the time of the survey that, to determine their payout, they would be asked to self-report the final outcome. Hence, we do not expect that the basic possibility to misreport the final outcome affected the bet in the survey.

Figure 4: Screenshot of grade feedback (red version)



Notes: After subjects guessed their rank on a slider, the treatment group received feedback on their actual rank on the same slider. In this example, the subject underestimated their rank by more than 10 percentiles. The instructions are translated from French.

3.2 Administrative data

Student demographic characteristics. We matched our survey data with administrative data, provided by the French Ministry of Education, on the universe of 2021 college applicants. The data contains information on student demographic characteristics, such as gender, age, parent profession, high school, and the final high school diploma (*baccalaureate*) grade in four honors categories ("highest honors," "high honors," "honors," and "no honors"). We use the latter information on student academic level to check whether confidence and treatment effects differ for high- and low-achieving students. During the academic year we consider (2020/2021), honors were attributed based on the continuous evaluations students took during the last two years of high school.[30] In the paper, we often

[30]Honors are usually also based on student performance in the centralized high school exit exam, but the pandemic prevented most final exams from taking place. This is why in 2020/2021 honors were attributed based on the continuous evaluations students took during the last two years of high school (French Ministry of Education, 2021). L'étudiant (2021) estimates that 82% of the general *baccalaureate* in 2021 was based on continuous evaluations.

use honors rather than the student self-reported GPA to proxy for a student's academic ability for three reasons: this variable comes from the administrative data, it summarizes student test scores over six terms (which makes it less prone to measurement error than the student self-reported GPA which only pertains to one term), and it is almost entirely determined before we run our intervention, so honors are unaffected by our intervention (French Ministry of Education, 2021; L'étudiant, 2021).

We define student socioeconomic background based on parent profession. We rely on a standard classification of occupations defined by the French statistical institute (Insee, 2016).[31] Manual workers, low-skilled employees (working and retired), and the unemployed are considered to have low socioeconomic status. We classify a student as having a low SES if both of the student's parents are low SES (or if one is low SES and the other parent is missing). Otherwise, we classify the student as having high SES.

College applications, college admissions, and program prestige. The administrative data also contains the complete list of programs students applied to, the offers they received (including the date on which the offer was made), the response given by the student to each offer, and the final match. The data covers 17,107 programs in 4,947 institutions.

One of the objectives of our analysis is to provide evidence on a confidence gap by gender and social background, and more importantly, to understand whether confidence gaps contribute to the well-documented aspiration gaps by gender and social background. To discuss aspiration gaps, we first need to define the prestige of a program. We do so based on the quality of the students it admits. For each program, we identify the students enrolled in this program, and we define the program prestige as the average high school

[31] Insee (2016) and Insee (2020) group 42 professions into four categories: manual workers (with a monthly gross income of €2,295), low-skilled employees (€2,198), intermediate occupations (€3,095), and high-skilled occupations (€5,514).

diploma grade of these students.[32,33] Figure A.2 in the appendix shows the distribution of the resulting prestige index.

Before moving to the results, let us justify why, to characterize an aspiration gap, we use the prestige of applications to indicate aspirations. Instead of prestige, other program characteristics, like college access rate, could be used to document an aspiration gap. However, college access rates, that is, the ratio of the number of students admitted over the number of applicants, are less relevant for identifying aspiration gaps because some of the most selective programs are over-demanded due to students' specific preferences rather than the program quality or the quality of the students enrolled. For instance, some programs providing training in sports, arts, or specific health-related programs are very popular, and therefore over-demanded, without being particularly prestigious. To illustrate this point, Appendix B reports the list of the 16 most prestigious programs and the 16 most over-demanded programs, and shows correlations between the prestige and access rate.

4 Evidence on confidence gaps

4.1 Confidence gaps by gender and SES

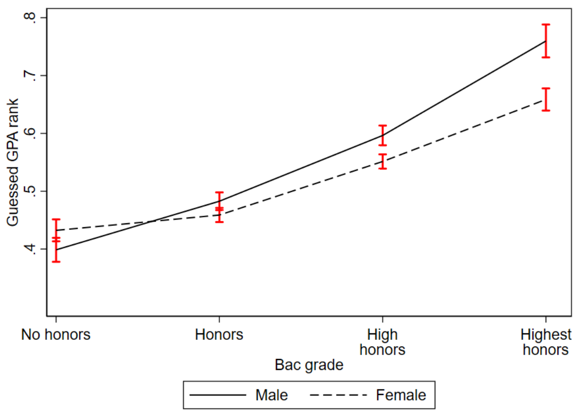
We start by presenting descriptive evidence on students' confidence in their relative ability. Figure 5 plots individuals' beliefs about their rank in the GPA distribution (Y-axis) as a function of their high school diploma grade (x-axis). The higher the rank on the Y-axis, the higher they believe they are in the GPA distribution.

[32]We standardize grades to have a mean of zero and a standard deviation of one. To calculate program prestige, we use the 2021 data and assume that our intervention did not meaningfully change the prestige of programs. Alternatively, we could use the 2020 data, which yields prestige scores that are highly correlated with those based on 2021 data, among the programs the survey participants apply to (r=0.930). However, it has the downside that for more than 12% of the programs from 2021 no prestige score can be calculated because these programs were not available in 2020. As our main results are very similar irrespective of calculating prestige based on 2020 or 2021 data, we decide for the latter.

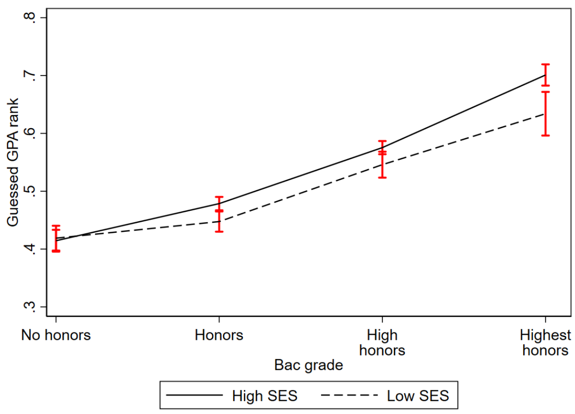
[33]Similarly, MacLeod et al. (2017) calculate the mean admission scores of graduates to measure a program's reputation in Colombia. They find that the reputation increases graduates' earnings and earnings growth. Another potential measure, the threshold grade of a program (e.g., Arenas and Calsamiglia, 2022), cannot be computed with our data since grades are only reported in four honors categories and, hence, too coarse to calculate a meaningful threshold grade.

Gender confidence gap. We find large confidence gaps between male and female students at the top of the distribution. In contrast, there are only small gender differences in confidence for students who obtain "No honors" or "Honors." Figure A.6a in the appendix illustrates this finding by plotting the guessed GPA rank against the real GPA rank, which we calculated using the reference sample. The figure shows a fuller picture of confidence along the distribution. In the bottom half of the grade distribution, males and females are all significantly overconfident, but we do not see large differences between them. In contrast, in the top half of the grade distribution, male and female students are all significantly underconfident, though female students are notably more underconfident than male students. Note that underconfidence by students at the top and overconfidence by students at the bottom is partly mechanical due to mean reversion: the worst students can only weakly overestimate their rank, while the best students can only underestimate their rank. Thus, for mechanical reasons, misconfidence is negatively correlated with true ability. To control for this mechanical effect in a flexible way, in what follows we include *bac* honors fixed effects and the true rank variable in all regressions.

Figure 5: Guessed GPA rank by honors and gender/SES



(a) Guessed rank by gender



(b) Guessed rank by SES

Notes: The figures show the guessed GPA rank by actual *bac* grade. The 90% confidence intervals are based on predicted values from a regression of guessed rank on the interaction of honors level and gender dummies.

To quantify the confidence gap, we construct the variable Misconfidence:

$$\text{Misconfidence}_i = \text{Guessed rank}_i - \text{Real rank}_i, \quad (1)$$

Misconfidence$_i$ corresponds to the difference between a student's guessed ability rank and their actual rank. This variable is positive for overconfident students who guess a higher rank than their real rank, and negative for underconfident students who guess a rank lower than their real rank. While the original values of this variable range from -100 to +100, we rescale the variable to range between -1 to 1. The larger this variable, the more overconfident (and the less underconfident) a student is. Moreover, to see whether miscalibrated confidence is driven by under- or overconfident students, we construct two additional variables. Underconfidence$_i$ is equal to the difference between the guessed rank and the real rank for underconfident students and is zero for overconfident students (hence, scaled between -1 and 0). Conversely, Overconfidence$_i$ is equal to the difference between the guessed rank and the true rank for overconfident students and zero otherwise (hence, scaled between 0 and 1). We plot the distribution of the misconfidence variable in Figure A.7 in the appendix.

In Panel A of Table 1, we regress the misconfidence variable on a female dummy variable and controls for student grades.[34] The results in columns (1), (3), and (5) show that, on average, female students are 2 percentage points more underconfident than male students. We then investigate whether female underconfidence is more prevalent among high-achievers by adding interaction terms between student grades and the female dummy variables. The results, reported in columns (2), (4), and (6) show that the gender confidence gap is heavily driven by students with a GPA at the top of the distribution. Female students with no honors (the reference category) are 3.7 percentage points more confident than males. In contrast, among students with the highest honors, female students are 9.2 (12.9-3.7) percentage points less confident than male students, with most of this difference driven by underconfident students.

We document significant gender confidence gaps, which are particularly pronounced among the best students. These findings contribute to the long-standing literature suggesting that men are, on average, more confident regarding their ability than women, partly explaining gender differences in the willingness to compete (Niederle and Vesterlund, 2007; van Veldhuizen, 2022; Gillen et al., 2019).[35] Our finding that the gender confidence gap is driven by top-performing students is consistent with Buser et al. (2022). They find that

[34]We control for *bac* honors fixed effects (to allow for differing intercepts) and the true rank variable (to allow for a common negative slope).

[35]For example, the data in Niederle and Vesterlund (2007) shows that the gender difference in willingness to compete among those who should compete (high-ability subjects) is 42 percentage points. Among those who should not compete, it is only 26 percentage points.

Table 1: Confidence gap by gender and SES

	Misconfidence		Only underconfidence		Only overconfidence	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: By gender						
Female	-0.020***	0.037**	0.021***	0.001	0.001	0.038**
	(0.007)	(0.016)	(0.004)	(0.003)	(0.005)	(0.016)
Honors	-0.010	0.021	-0.024***	-0.028***	-0.035***	-0.007
	(0.011)	(0.015)	(0.004)	(0.005)	(0.010)	(0.014)
High honors	0.008	0.052***	-0.033***	-0.049***	-0.025**	0.003
	(0.013)	(0.017)	(0.007)	(0.009)	(0.011)	(0.014)
Highest honors	0.058***	0.143***	-0.011	-0.063***	0.047***	0.080***
	(0.019)	(0.025)	(0.014)	(0.018)	(0.013)	(0.016)
Female × Honors		-0.055***		0.007		-0.049***
		(0.020)		(0.006)		(0.019)
Female × High honors		-0.073***		0.026**		-0.048***
		(0.020)		(0.011)		(0.017)
Female × Highest honors		-0.129***		0.076***		-0.053***
		(0.026)		(0.019)		(0.017)
True rank	-0.699***	-0.702***	0.252***	0.254***	-0.447***	-0.448***
	(0.022)	(0.022)	(0.015)	(0.015)	(0.017)	(0.017)
Constant	0.384***	0.353***	-0.042***	-0.032***	0.342***	0.321***
	(0.010)	(0.013)	(0.003)	(0.003)	(0.009)	(0.012)
Adj. R2	0.593	0.598	0.352	0.360	0.514	0.517
Observations	2034	2034	2034	2034	2034	2034
Panel B: By socioeconomic status						
Low SES	-0.020**	0.007	0.017***	0.001	-0.003	0.009
	(0.008)	(0.017)	(0.005)	(0.003)	(0.006)	(0.016)
Honors	-0.012	0.002	-0.020***	-0.027***	-0.033***	-0.026**
	(0.011)	(0.013)	(0.004)	(0.004)	(0.010)	(0.013)
High honors	0.004	0.019	-0.026***	-0.035***	-0.022**	-0.016
	(0.013)	(0.015)	(0.007)	(0.008)	(0.011)	(0.013)
Highest honors	0.051***	0.071***	-0.001	-0.015	0.050***	0.056***
	(0.019)	(0.020)	(0.014)	(0.014)	(0.013)	(0.015)
Low SES × Honors		-0.031		0.014**		-0.017
		(0.021)		(0.006)		(0.020)
Low SES × High honors		-0.036		0.020		-0.016
		(0.022)		(0.012)		(0.018)
Low SES × Highest honors		-0.065**		0.049**		-0.016
		(0.029)		(0.023)		(0.017)
True rank	-0.698***	-0.699***	0.249***	0.250***	-0.449***	-0.450***
	(0.022)	(0.022)	(0.015)	(0.015)	(0.017)	(0.017)
Constant	0.381***	0.369***	-0.038***	-0.031***	0.343***	0.338***
	(0.010)	(0.012)	(0.003)	(0.003)	(0.010)	(0.012)
Adj. R2	0.592	0.593	0.348	0.350	0.514	0.513
Observations	2000	2000	2000	2000	2000	2000

Notes: The table reports OLS regression estimates. In Columns (1) and (2), the dependent variable is the guessed rank minus the true rank (positive misperception); in (3) and (4), it is the true rank minus the guessed rank if a respondent underestimates her rank (degree of underconfidence) and in (5) and (6) the guessed rank minus the true rank if a respondent overestimates her rank (degree of overconfidence). Only *bac général* students are considered. Robust standard errors in parentheses. Significance levels are indicated by $* < .1, ** < .05, *** < .01$.

gender differences in the willingness to compete among Swiss students are substantially stronger for high-ability students (27 pp) compared to low-ability students (10 pp). Moreover, Bobba and Frisancho (2022) find that high-achieving female students update their ability beliefs less in response to positive feedback than high-achieving males do.

Social confidence gap. Figure 5b shows a very similar confidence gap by socioeconomic status. While high-SES and low-SES students are equally overconfident at the bottom of the distribution, there is a large underconfidence gap between low-SES and high-SES students at the top of the distribution. This finding is also supported by Figure A.6b in the appendix, in which we plot students' guessed GPA rank (y-axis) against their real rank (x-axis). Panel B of Table 1 allows us to put numbers on these confidence gaps. Low-SES students are, on average, 2 percentage points less confident, which is mostly driven by underconfident students. As previously mentioned, low-SES student underconfidence is much more prevalent among high-achieving students. Among students with the highest honors, low-SES students are 5.8 (6.5-0.7) percentage points less confident than high-SES students, with most of this difference driven by underconfident students.

Our findings contribute to a literature that suggests that students from low socioeconomic status are less accurate in assessing their abilities (Falk et al., 2020b). Closely related to our setting, Guyon and Huillery (2020) find that French high school students from low SES score 0.15 standard deviations lower on a "scholastic self-esteem" index (including items like "being just as smart as others"), despite having the same high school grades. In Mexican middle schools, Bobba and Frisancho (2019) find that high-achieving, low-SES students update their ability beliefs less in response to positive feedback compared to high-SES students.

5 Misconfidence and college choice

Our results so far document a large confidence gap between female and male students and between students from low and high social backgrounds. Confidence gaps are of particular concern if they influence student aspirations. Hence, the question we address in this section is: How much do under- and overconfidence affect student college applications and admissions?

Outcomes. We are interested in two main types of outcomes, namely college applications and college admissions. We will use these outcomes to investigate both the effect of confidence on college choice (in this section) and the effect of our information treatment on college choice (in the next section).[36]

First, we test whether self-confidence predicts the prestige of the application lists. Among all applications submitted by a student, we compute (i) the minimum prestige of the applications, which we refer to as the "safe" program, (2) the maximum prestige of the applications, which we refer to as the "top" program, and (3) the average prestige of the application list. In addition, we assess whether a student applies to at least one elite track (CPGE); an important outcome as *grandes écoles* in France lead to higher paying jobs and prestigious positions (cf. Section 2.1).

Second, we consider the prestige of the final match, which corresponds to the prestige of the program a student ultimately enrolls in, and whether a student enrolls in an elite track.

Estimation strategy To estimate whether overconfidence predicts application behavior and outcomes, we use the following specification:

$$\text{Y}_i = \alpha_0 + \alpha_1 \text{Misconfidence}_i + \alpha_2 \text{Real rank}_i + \alpha_3 X_i + \epsilon_i \tag{2}$$

where

$$\text{Misconfidence}_i = \text{Guessed rank}_i - \text{Real rank}_i, \tag{3}$$

Y_i are the outcome variables described in the previous section. The variable Misconfidence$_i$ corresponds to the difference between a student's guessed ability rank and the real rank, as defined in Section 4.1. The larger this variable, the more overconfident (and the less underconfident) a student is. Importantly, by controlling for the real rank of a student, α_1 measures the influence of miscalibrated confidence, keeping the actual rank constant.

[36] We note that, in this section, our findings cannot yet be interpreted as a causal effect. In the next section, we use our randomized intervention to establish that the relationship between misconfidence and college application behavior is indeed causal.

Table 2: Effect of misconfidence on college applications and admissions

	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Panel A: Effect of misconfidence						
Misconfidence	0.713***	0.111	0.479***	0.326***	0.430**	0.157***
	(0.201)	(0.093)	(0.139)	(0.076)	(0.186)	(0.055)
True rank	1.759***	0.312**	1.336***	0.622***	1.924***	0.252***
	(0.267)	(0.123)	(0.187)	(0.098)	(0.238)	(0.072)
Panel B: Effect of underconfidence						
Underconfidence	-0.595*	-0.252	-0.565**	-0.540***	-0.486	-0.281***
	(0.305)	(0.175)	(0.265)	(0.146)	(0.346)	(0.099)
True rank	1.416***	0.299***	1.147***	0.533***	1.756***	0.219***
	(0.243)	(0.111)	(0.172)	(0.089)	(0.216)	(0.062)
Panel C: Effect of overconfidence						
Overconfidence	0.890***	0.025	0.481***	0.216***	0.456**	0.081
	(0.282)	(0.110)	(0.160)	(0.080)	(0.210)	(0.049)
True rank	1.656***	0.246**	1.216***	0.491***	1.821***	0.178***
	(0.259)	(0.114)	(0.176)	(0.092)	(0.217)	(0.065)
Honors FE	✓	✓	✓	✓	✓	✓
Risk preference	✓	✓	✓	✓	✓	✓
Observations	1047	1047	1047	1047	914	914

Notes: Misconfidence is the difference between the guessed rank and the true rank. In Column (1), the dependent variable is the z-standardized maximal prestige (in terms of average grades of admitted students) of the application list, in Column (2), minimum prestige of the application list, in Column (3) the average prestige of the application list, and in Column (4) an indicator of whether at least one CPGE is included in the list. In Column (5) the prestige of the final match and in Column (6) it is an indicator of whether the final match is a CPGE. Only the control group and students from *bac général* are included. Robust standard errors in parentheses. Significance levels are indicated by $^{*} < .1, ^{**} < .05, ^{***} < .01$.

We include indicators of a student's honors to control for academic ability more flexibly.[37] Moreover, we control for risk preferences (Dohmen et al., 2011). We only consider students in the control group to ensure that the outcome variables are unaffected by the information treatment.

Results Table 2 shows the regression results for the misconfidence variable (the guessed rank minus the actual rank) and the true ranks of the control group. Note that if student

[37] As the impact of actual rank on the outcomes may be non-linear, we control for bac honors fixed effects to allow for differing intercepts. Alternatively, we could interact the *bac* honors fixed effects with the true rank, to allow for different slopes within each honors category. Since this does not change the coefficients of interest, we decided for the more parsimonious specification.

confidence did not matter for college choice, that is, if students applied based only on their academic ability, then only students' real rank and honors fixed effects should predict applications, and the misconfidence variable would have no effect. However, this is not what we observe.

Panel A shows that, holding ability constant, miscalibrated confidence strongly predicts application behavior. More confident applicants apply to less prestigious top programs (Max Prestige), and the magnitude of the effect is large. Being ten percentiles more confident is associated with a 0.07 standard deviations higher prestige of the top program.[38] In line with these findings, more confident students are significantly more likely to apply to one of the very prestigious CPGEs. Being ten percentiles more confident raises the probability of applying to an elite track (CPGE) by 3.3 percentage points. Interestingly, overconfidence does not affect the prestige of the "safe" program (see Min Prestige). These initial results therefore suggest that lack of confidence lowers the ambition and prestige of students' top choice, but does not affect the prestige of the "safe" program on their portfolio.

Our results so far show that higher confidence makes students apply to more prestigious programs, but does it also lead to better college admissions? Our results reveal that higher confidence indeed affects the prestige of the final match. Controlling for grades, being ten percentiles more confident, raises the prestige of the final match by 0.04 standard deviations, and the likelihood of enrolling in a CPGE by 1.6 percentage points (Columns (6) and (7) of Table 2).

Finally, we investigate whether the effect of misconfidence on college choice is driven more by underconfident or by overconfident students. In Panel B (C) of Table 2, we replace the misconfidence variable with zero for underconfident (resp. overconfident) students. The coefficients reported in Panel B (C) of Table 2 correspond to the effect of moving from no underconfidence (resp. overconfidence) to maximum underconfidence (resp. overconfidence).

We find that both underconfidence and overconfidence affect the prestige of the program selected by students. Underconfidence affects the likelihood of applying to an elite track more than overconfidence does. Being 10 percentiles more underconfident reduces the chances of applying to a CPGE by 5.4 points, whereas being 10 percentiles more

[38]The misconfidence variable ranges from -1 to 1. The coefficients report the effect of moving from well-calibrated confidence (misconfidence = 0) to maximum overconfidence (misconfidence = 1). Dividing the coefficient by 10 indicates the effect of becoming 0.1 (10 percentiles) more confident.

overconfident "only" increases the chances by 2.2 points. This asymmetric effect is not surprising given that only the best students apply to CPGE, and these high-achieving students are precisely those suffering from larger underconfidence. The asymmetric effect of under- and overconfidence on applications to the elite track directly translates into the same asymmetry in terms of admission chances. Underconfidence affects admissions to CPGE significantly ($-0.281, p < 0.01$), while the effect of overconfidence is weaker ($-0.081, p = 0.10$).

6 Effect of correcting misconfidence on college choice

6.1 Misconfidence no longer matters after feedback

Estimation strategy. In this section, we study whether correcting students' misconfidence by providing feedback on their real rank in the ability distribution has a causal effect on their application behavior.[39]

To measure the effect of correcting misconfidence, we randomly allocated students to either a treated group that received feedback on their correct rank in the grade distribution or a control group that did not receive any feedback. Table A.1 in the appendix shows that student demographic characteristics are balanced between the 1,047 students in the control group and the 987 students in the treatment group.[40] Moreover, Table A.2 shows that the application behavior in the control group is comparable to the application behavior in the administrative data.

We use the following specification to estimate the effect of correcting misconfidence on college choice:

[39]We pre-registered the experimental intervention and the main hypotheses in the AEA RCT Registry, project number AEARCRT-0007218. As described in the pre-registration, the survey had two treatment interventions. The second treatment provided advice on strategic behavior in the Parcoursup mechanism. The results of the second treatment will be reported in a separate paper, which focuses on students' strategies within the matching mechanism. In contrast, this paper mostly focuses on application behavior before the mechanism starts. We focus on slightly different outcomes compared to the pre-registration. Instead of measuring the quality of a program by the access rates we decided to use the more precise "prestige" measure (see Appendix B for an explanation why the prestige measure is better suited). Also, in the interest of space, we skip some pre-registered outcomes in the main text and report them in Appendix C.

[40]One exception is the share of the highest honor students, which is slightly higher in the control group. To address this, we control for honors fixed effects in all regressions.

$$
\begin{aligned}
\text{Y}_i =& \beta_0 + \beta_1 \text{Misconfidence}_i + \beta_2 \text{Feedback}_i \times \text{Misconfidence}_i \\
&+ \beta_3 \text{Feedback}_i + \beta_4 \text{Real rank}_i + \beta_5 X_i + \epsilon_i,
\end{aligned} \tag{4}
$$

Y_i is the outcome. Feedback_i is a dummy variable that is equal to one for the randomly-selected group of students who received information on their real rank in the ability distribution. Feedback_i is equal to zero for students in the control group. As defined above, Misconfidence_i is the difference between a student's guessed and real rank. This variable ranges from -1 (for full underconfidence) to 1 (for full overconfidence). A value of 0 corresponds to students who correctly guess their rank in the ability distribution. We refer to these students as having "well-calibrated" beliefs. All regressions control for a student's real rank. β_1 measures how much misconfidence affects college choice for students who do not receive feedback. This coefficient indicates whether, conditional on real rank, over- and underconfidence is relevant for college choice, replicating our analysis from Section 5. The coefficient β_2 measures how much providing feedback affects the relevance of overconfidence on application behavior. Moreover, β_3 estimates the effect of providing feedback for students who are neither overconfident nor underconfident as they correctly guessed their rank. Finally, X_i includes honors fixed effects to control for ability differences more flexibly, as well as controls for risk preferences.

Effect of feedback. Table 3 reports the effect of providing feedback on the students' application list (in columns 1 to 4) and on their final match (in columns 5 and 6). The top coefficient shows that for students who do not receive feedback on their rank, being more confident leads to more ambitious applications and more prestigious admissions, controlling for true ability.[41] The second coefficient (Rank feedback) shows that, unsurprisingly, correcting misconfidence has no effect on students who are neither overconfident nor underconfident (i.e., students who correctly guessed their rank in the ability distribution).

The story is completely different for students who are initially overconfident or underconfident (as shown by the coefficient on Rank Feedback × Misconfidence). For them, correcting the initial misconfidence drastically reduces how much misconfidence matters for college choice. The treatment effect is large. Without feedback, a student whose misconfidence is 10 percentiles higher applies to a top program that is 0.06 SDs more prestigious.

[41] This top misconfidence coefficient is slightly different from that reported in Table 2 because we only use the control group in Table 2.

Providing feedback reduces this boosting effect by 0.05 SDs, to the point that it makes misconfidence irrelevant for college choice. Table A.4 in the appendix shows to what extent misconfidence predicts college applications, separately by whether they are in the control or treatment group. The coefficients in Panel B clearly show that a student's misconfidence no longer plays a role for college choice once we provide feedback to students. This conclusion carries over to most of the other outcomes we consider.[42] Feedback reduces the role played by misconfidence in the likelihood of applying (-39%) and being admitted (-73%) to an elite track (CPGE).[43,44]

Summing up, our treatment intervention shows that self-confidence has a causal effect on college choice and the final match, providing high-stakes evidence of the causal effect of self-confidence. Thus, misconfidence is costly in terms of the stability of the outcome. Our light-touch intervention, while creating winners and losers, moves the outcome closer to the optimal allocation, that is, the stable match.

Given that primarily the best students (who are more likely to be underconfident) apply to elite tracks, our intervention might be particularly effective at mitigating how much underconfidence drives student college choice, especially the decision to apply to elite colleges. To shed light on this, we check next whether correcting student misconfidence has the same effect for students who are initially underconfident and those who are initially overconfident. The results reported in Table A.3 in the appendix show that the treatment reduces the impact of miscalibrated confidence for both underconfident and overconfident students (with the coefficients being more precisely measured for overconfidence). However, the results also confirm that boosting the confidence of students who are initially underconfident has a large effect on their likelihood of applying to an elite track program (CPGE) and of being admitted to one, whereas decreasing the confidence of students who are initially overconfident has no statistically significant effect on their likelihood of applying to an elite track and of being admitted to one. To illustrate the magnitudes, in

[42] While the coefficient for true rank becomes slightly smaller in the control group, note that the *bac* honors fixed effects, in particular for highest honors, have a larger coefficient. Hence, the smaller coefficient of true rank does not mean that measures of true ability become less predictive in the treatment group.

[43] Interestingly, the treatment seems to close the gap in admissions to a larger extent than the gap in applications. This could be driven by treated students behaving differently when receiving offers in the dynamic mechanism. In Appendix C.1 we show that underconfident students are more likely to accept an early offer, and that the treatment makes them more likely to accept a later offer (which tend to be of higher quality). However, the treatment effect is not statistically significant ($p = 0.168$).

[44] Finally, we discussed earlier the fact that students' over- and underconfidence does not affect the prestige of their safe choice. Consistent with this finding, providing feedback has no effect for well-calibrated students, and it has no effect on the influence of misconfidence on the prestige of their safe choice.

Table 3: Effect of correcting misconfidence on college applications and admissions

	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Misconfidence	0.613***	0.101	0.422***	0.272***	0.426***	0.147***
	(0.167)	(0.080)	(0.117)	(0.065)	(0.160)	(0.046)
Rank feedback	0.052	0.007	0.037	-0.010	0.002	0.025
	(0.044)	(0.024)	(0.034)	(0.019)	(0.045)	(0.015)
Rank feedback × Misconfidence	-0.491***	-0.024	-0.258**	-0.105	-0.104	-0.107**
	(0.179)	(0.085)	(0.127)	(0.069)	(0.176)	(0.054)
True rank	1.550***	0.268***	1.231***	0.514***	1.671***	0.215***
	(0.180)	(0.087)	(0.130)	(0.070)	(0.168)	(0.051)
Constant	1.399***	-0.812***	0.078	-0.056**	-0.544***	-0.065***
	(0.076)	(0.035)	(0.049)	(0.025)	(0.064)	(0.018)
Honors FE	✓	✓	✓	✓	✓	✓
Risk preference	✓	✓	✓	✓	✓	✓
Adj. R2	0.226	0.119	0.335	0.198	0.464	0.102
Observations	2034	2034	2034	2034	1793	1793

Notes: Overconfidence is the difference between the guessed rank and the true rank. In Column (1), the dependent variable is the z-standardized maximal prestige (in terms of average grades of admitted students) of the application list, in Column (2), minimum prestige of the application list, in Column (3) the average prestige of the application list, and in Column (4) an indicator of whether at least one CPGE is included in the list. In Column (5) the outcome is the prestige of the final match and in Column (6) it is an indicator of whether the final match is a CPGE. Only students from *bac général* are included. Robust standard errors in parentheses. Significance levels are indicated by $^* < .1,^{**} < .05,^{***} < .01$.

the absence of feedback, being 10 percentiles more underconfident reduces the propensity to apply to elite tracks by 4.8 percentage points. With feedback, increasing underconfidence by 10 percentiles only reduces the propensity by 1.8 points. The role played by underconfidence drops by 62%.

This last result raises an important question. If boosting the confidence of underconfident students increases their ambition, does that help close the gender and social aspiration gaps we document in section 4.1 among high-achieving students?

6.2 Correcting misconfidence reduces aspiration gaps

To test whether rank feedback helps close the aspiration gap among high-achieving students, we focus on the students who received the highest honors.[45] For the great majority of these students, our rank feedback informs them that their GPA rank is better than they thought.[46] Moreover, the feedback treatment confirms that they are at the top of the distribution, which may give an additional boost to students with high, but imprecise, prior beliefs. Recall that among top achievers, female and low-SES students lack confidence much more than male students and high-SES students. This suggests that providing feedback may have the largest impact on this particular group of students. We therefore test whether the feedback treatment helps close the gender and social gap.

Estimation strategy. To do so, we use the following specifications:

$$\begin{aligned} \mathrm{Y}_i = &\gamma_0 + \gamma_1 \mathrm{Feedback}_i \times \mathrm{Female}_i \\ &+ \gamma_2 \mathrm{Feedback}_i + \gamma_3 \mathrm{Female}_i + \gamma_4 X_i + \epsilon_i, \end{aligned} \tag{5}$$

and

$$\begin{aligned} \mathrm{Y}_i = &\gamma_0 + \gamma_1 \mathrm{Feedback}_i \times \mathrm{Low\ SES}_i \\ &+ \gamma_2 \mathrm{Feedback}_i + \gamma_3 \mathrm{Low\ SES}_i + \gamma_4 X_i + \epsilon_i. \end{aligned} \tag{6}$$

$\mathrm{Feedback}_i$ is a dummy variable that is equal to one for the randomly-selected group of students who receive information on their real rank in the ability distribution. $\mathrm{Feedback}_i$ is equal to zero for students who do not receive feedback. Low SES_i and Female_i are dummy variables indicating whether a student is from a low socio-economic background and female, respectively. X_i is a vector of control variables for honors. γ_2 estimates the treatment effect for males (in Eq 5) and for high-SES students (in Eq 6). We are interested in the coefficient γ_1, which estimates the differential effect of providing rank feedback for female students compared to male students (in Eq 5) and for low-SES students compared

[45]Note that the focus on highest honors students was not specified in the pre-registration as we did not expect most of the variation in self-confidence and in the prestige of applications by gender and social background to come from high-achieving students. Hence, the following analysis is motivated by our findings in the first part of the paper.

[46]92% of the students who receive the highest honors are underconfident.

to high-SES students (in Eq 6). We run these regressions on the sample of students who received the highest honors.

Effect of feedback on the gender aspiration gap. The results, reported in Table 4 show that the feedback treatment helps close the gender and social aspiration gaps. Starting with the gender gap, Panel A of Table 4 shows stronger treatment effects for high-achieving females than for high-achieving males. While the treatment does not significantly affect the college applications of high-achieving male students, high-achieving females apply more ambitiously when given feedback.[47] Among the high-achieving students in our sample, our intervention closes 80% of the gender prestige gap (0.398/0.500); a surprisingly large effect. In Panel A and B of Figure A.8 in the appendix, we go beyond average treatment effects and plot the distribution of maximum prestige, separately for treatment and control group. The figure shows that the treatment effect is driven by a reduction in the share of females who do not apply to any prestigious program. In contrast, high-achieving male students already apply to very prestigious programs in the control group.

Moreover, Table 4 shows that the treatment also closes 61% of the gender gap in elite track (CPGE) applications. Boosting confidence not only shrinks the gender application gap, it also reduces the gender gap in admissions by 72% (feedback increases women's admissions to elite tracks by 13.9 percentage points). All in all, our results show that informing high-achieving female students that their GPA rank is at the top of the distribution has a larger effect on them than on high-achieving male students, which reduces the application and admissions gap.

Effect of feedback on the social aspiration gap. We reach similar conclusions on the effect of our intervention on the social aspiration gap. Panel B of Table 4 reports heterogeneous treatment effects according to student social background. Here again, we find that correcting underconfidence has a larger effect for high-achieving, low-SES students than for high-achieving, high-SES students. Providing feedback on real rank closes 71% of the gap in the top program prestige. Figure A.8c shows that this treatment effect is mostly driven by reducing the share of non-prestigious top choices among low-SES students. Finally, the treatment completely closes the gap in applications and admission to an elite track (CPGE).

[47] Interestingly, although male highest honors students also mostly receive positive information on their rank, we find mostly negative treatment effects for male students. However, these treatment effects do not differ from zero at conventional significance levels.

Table 4: Effect of correcting misconfidence on gender and social aspiration gaps (highest honors students)

	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Panel A: By gender						
Female	-0.500***	-0.099	-0.535***	-0.327***	-0.439***	-0.283***
	(0.086)	(0.126)	(0.123)	(0.065)	(0.168)	(0.080)
Grade feedback	-0.079	-0.042	-0.229*	-0.120	-0.145	-0.066
	(0.067)	(0.149)	(0.139)	(0.078)	(0.205)	(0.105)
Grade feedback × Female	0.398***	0.034	0.452***	0.200*	0.364	0.205*
	(0.118)	(0.170)	(0.174)	(0.102)	(0.262)	(0.120)
True rank	1.507***	0.749***	2.007***	0.796***	3.322***	0.348
	(0.519)	(0.279)	(0.473)	(0.233)	(0.913)	(0.223)
Constant	2.148***	-0.764***	0.427	0.165	-0.475	0.139
	(0.463)	(0.230)	(0.434)	(0.217)	(0.824)	(0.210)
Risk preference	✓	✓	✓	✓	✓	✓
Adj. R2	0.152	0.011	0.157	0.088	0.101	0.050
Observations	320	320	320	320	298	298
Panel B: By SES						
Low SES	-0.637***	-0.265**	-0.687***	-0.301***	-0.824***	-0.226***
	(0.185)	(0.115)	(0.154)	(0.088)	(0.228)	(0.056)
Grade feedback	0.111	-0.035	0.043	-0.038	0.013	0.042
	(0.071)	(0.080)	(0.091)	(0.059)	(0.138)	(0.062)
Grade feedback × Low SES	0.450**	-0.002	0.137	0.322**	0.302	0.214*
	(0.225)	(0.146)	(0.210)	(0.141)	(0.362)	(0.123)
True rank	1.465***	0.702**	1.942***	0.766***	3.239***	0.353
	(0.459)	(0.286)	(0.448)	(0.242)	(0.904)	(0.238)
Constant	1.956***	-0.737***	0.239	0.021	-0.532	-0.016
	(0.406)	(0.239)	(0.395)	(0.219)	(0.802)	(0.213)
Risk preference	✓	✓	✓	✓	✓	✓
Adj. R2	0.179	0.034	0.201	0.066	0.146	0.027
Observations	315	315	315	315	294	294

Notes: In Column (1), the dependent variable is the z-standardized maximal prestige (in terms of the average grades of admitted students) of the application list, in Column (2), minimum prestige of the application list, in Column (3) the average prestige of the application list, and in Column (4) an indicator of whether at least one CPGE is included in the list. In Column (5) the outcome is the prestige of the final match and in Column (6) it is an indicator of whether the final match is a CPGE. Only students from *bac général* are included. Robust standard errors in parentheses. Significance levels are indicated by $^{*} < .1, ^{**} < .05, ^{***} < .01$.

Summarizing the results of our intervention, we observe large effects on the highest honor female and low-SES students. Thus, we show that a simple intervention can reduce the gender and SES gap in aspiration for the students for which we found the largest gaps: the highest honor students.

7 Mechanism: Confidence and perceived admission chances

In this section, we use our survey data to shed light on the relationship between confidence, offer beliefs, and college applications. In doing so, we build on recent work that shows that students have incorrect beliefs about their admission chances, and that, as a result, providing feedback on admission chances can be an effective way of influencing college choice (Agarwal and Somaini, 2018; Kapor et al., 2020; Tincani et al., 2022; Larroucau et al., 2021; Arteaga et al., forthcoming). Our analysis investigates how much student self-confidence affects beliefs about admission chances.

Outcomes We use three outcomes to analyze student offer beliefs:

1. Beliefs. First, in the survey, we ask students how they evaluate the probability (in percent) of receiving an offer from each program they have listed. We refer to this outcome as "Belief."[48] It is possible that we may not find any correlation between confidence and offer belief if confident students have higher offer beliefs, but they also apply to more competitive programs in which admission chances are lower. To control for this countervailing effect, we look at offer beliefs for two groups of programs that are relatively homogeneous in terms of prestige: (i) programs in the top 10% of the prestige distribution and (ii) elite track programs (CPGE).

2. Optimism. Second, we construct a variable that compares students' stated offer chances with their actual offers. We refer to this outcome as "Optimism" and we construct it as follows:

[48] We asked students about their perceived admission chances before we randomized the information treatment. We did not ask again after the intervention, so we cannot look at the feedback effect on these admission beliefs.

$$\text{(7)} \qquad \text{Optimism}_i = \frac{1}{j}\sum_j [\text{Belief on offer chance}_{ij} - \text{I(Offer received)}_{ij}],$$

where i indexes students and j the programs on their list. The belief on offer chances is bounded between 0 and 1. Hence, the Optimism variable is equal to 1 when a student is certain of receiving an offer from every program on her list (mean offer belief of 1), but receives no offer. The variable is equal to -1 when a student assigns offer beliefs of 0 to all programs on her list, but she receives offers from all programs. On average, if students had realistic offer expectations, the variable would have a mean of zero. This optimism variable, by comparing beliefs to real offers, accounts for differences in program competitiveness between students.

3. Guessed match. Finally, in the very last part of the survey (i.e., after the information treatment), we asked students to bet on the program they expected to enroll in at the end of the admission process. We compute the prestige of this program as the average GPA of the students enrolled in this program. We refer to this prestige of the guessed match as "Prestige of bet" in tables and figures.

Correlation between confidence and perceived admission chances. We check whether individuals who are more confident of their GPA rank think that their admission chances are higher. We use the following simple regression in which the outcome (Y_i) can be student belief on admission chances, student optimism on admission chances, or the prestige of the guessed match:

$$\text{(8)} \qquad \text{Y}_i = \beta_0 + \beta_1 \text{Misconfidence}_i + \beta_2 \text{Real rank}_i + \beta_3 X_i + \epsilon_i,$$

Table 5 reports the results. In Column (1), we look at students' beliefs in their chances of receiving an offer from one of the top 10% most prestigious programs or from an elite track program (in Column (2)).[49] A 10 percentile higher confidence increases by 14.7 percentage points a student's belief that she will receive an offer from one of the top 10%

[49] If a student applied to more than one program from the respective category, we take the average belief and analyze the correlation at the applicant level.

Table 5: Correlation between misconfidence and perceived admission chances

	(1) Belief (only Top10%)	(2) Belief (only CPGE)	(3) Optimism (z)	(4) Prestige of bet
Misconfidence	14.714**	10.481	0.240*	0.594**
	(6.225)	(8.550)	(0.145)	(0.243)
True rank	22.546***	37.227***	0.441**	1.830***
	(8.703)	(10.580)	(0.171)	(0.309)
Honors	-1.153	-5.377	-0.247***	0.003
	(4.403)	(6.906)	(0.068)	(0.100)
High honors	-1.226	-4.206	-0.518***	0.163
	(5.362)	(7.775)	(0.094)	(0.154)
Highest honors	-2.210	-9.253	-0.886***	0.686***
	(6.640)	(9.090)	(0.130)	(0.226)
Constant	36.187***	37.566***	0.145***	-0.106
	(4.307)	(6.807)	(0.071)	(0.105)
Adj. R2	0.017	0.060	0.050	0.267
Observations	691	381	2034	832

Notes: In Columns (1) and (2), the dependent variable is the stated belief that an offer from a respective program will be received in percent. In Column (1), only programs in the top 10% of the prestige distribution are included and in Column (2) only CPGEs. Respondents are the unit of observation and if a respondent has applied to more than one program meeting the restrictions, we take the average belief. In Column (3), the dependent variable is the optimism variable as defined in Equation (7), and in Column (4) it is the prestige of the guessed outcome bet. Only students from *bac général* are included. Robust standard errors in parentheses. Significance levels are indicated by $^{*} < .1, ^{**} < .05, ^{***} < .01$.

most prestigious programs.[50] In line with this result, Column (3) shows that students who are more confident of their relative GPA rank are more optimistic about their admission chances ($p < 0.10$). Being 10 ranks more confident, increases the degree of optimism by 0.02 standard deviations. Finally, the results reported in Column (4) show that confidence raises the prestige of the program students think they will end up attending.[51] A 10 percentile higher confidence is associated with a bet on a 0.06 SD more prestigious program.

All in all, our results show that, above and beyond a student's ability, the more confident a student is, the larger she perceives her college admission chances at competitive programs to be. This suggests that our intervention, by correcting under- and over-confidence, may have affected students' applications primarily by changing their perceived admission chances. To bring one more piece of evidence to this channel, we show next how our intervention affected students' guessed outcomes.

Effect of feedback on perceived admission chances. Table A.5 in the appendix shows how much the prestige of the guessed match is shifted by our feedback treatment.[52] Replicating our results from Table 5, higher confidence leads to higher prestige of the guessed match, controlling for true ability. However, the feedback treatment reduces the impact of misconfidence by 67%. This final result confirms that increased perceived admission chance is one of the driving forces that explains why correcting student misconfidence leads to more ambitious college applications.

8 Conclusion

We show that underconfidence plays a fundamental role in college choice; a very high-stakes environment. We document striking differences in aspirations between male and female students and between high- and low-SES students. While there might be many reasons for these differences, including preferences, information asymmetries, and budget constraints, we investigate the understudied channel of academic self-confidence. We present our results in three building blocks. First, using the unique survey data we collect, we show large gen-

[50]We also find a positive correlation between confidence and offer belief from an elite track, but due to a smaller sample size, the correlation is not statistically significant at conventional levels.

[51]For some students, we were unable to match the programs they reported in the survey to the programs in the administrative data, which explains the smaller sample size.

[52]For this analysis, we exclude participants who indicated an offer belief of 0 or 100 since the extent to which beliefs can be shifted for these participants is bounded.

der and SES gaps in self-confidence, especially for high-ability students; a group of students for whom underconfidence is particularly costly, as they have high admission chances in top programs. Second, we show that misconfidence strongly predicts college applications. Third, based on this observation, we design a simple, cheap, and easily scalable intervention, which consists of providing feedback to students on their relative rank in the national test score distribution. This intervention drastically decreases how much misconfidence matters for college applications. Most strikingly, our intervention closes between 57 to 77% of the gender gap and 69 to 100% of the social gap in application prestige, and in the likelihood of applying to elite programs (CPGE). These results show that misconfidence has a clear and large causal effect on the prestige of students' applications and on their final assignments. Confidence gaps between males and females and between students with a high and low SES are thus one of the driving forces of the gender and social aspiration gaps.

Finally, our results suggest that correcting underconfidence is more critical than correcting overconfidence. Thus, a natural policy recommendation is to target feedback to the best students to encourage them to apply to the best programs, hence mitigating the gender and SES gap in elite programs. On the other hand, informing students that they are overconfident might be particularly useful when there is a high chance they will aim too high and end up unassigned, typically in countries where most colleges are oversubscribed. In such an environment, providing feedback to both under- and overconfident students is important.

Our strong feedback effect raises questions about when and why we can expect effects of similar size. A key consideration is whether a country has a standardized nationwide college entrance test, which implies that students have a more accurate knowledge of their position in the nationwide distribution. There is no college entrance test in France, which is true for many other countries, like Austria, Belgium, Canada, Italy (except for some subjects), Mexico, the Netherlands, Germany, Denmark, Finland, and others.[53] In these countries, we surmise that our intervention would have an effect of similar size, if not larger, as students, unlike in France, are often not aware of their within-class GPA rank, which might increase student misperception of their position in the national distribution.[54] For

[53]We adopt the information about college admission practices in different countries from the excellent survey in Immorlica et al. (2020)

[54]Remember that three times a year French students receive a one-page document summarizing their average grades in each subject. This transcript also indicates the rank of the student within their class.

instance, in Germany, students only know their own GPA. They do not have information on the GPA of other students.

In contrast, in many countries, students know their scores in a centralized exam before they start college applications, for instance, in Hungary, Chile, China, Brazil, and Australia. Thus, students might easily infer their rank, and the misconfidence is likely to be smaller than in our context. The rank is sometimes even communicated directly to students with the results of the centralized exam, as in some provinces of China.[55] In these environments, our intervention might have a smaller effect.[56] Interestingly, recent papers show that centralized exams might hurt girls, as they tend to underperform under pressure (Cai et al., 2019; Arenas and Calsamiglia, 2022). Our results suggest that centralized examination has pros and cons since it could also help to fight the tendency of girls to be underconfident sparse-information environments.

Our results are relevant for policymakers who design school and college admission processes. The design of admission markets is often limited to the selection of an appropriate mechanism, whereas our results suggest that stopping there is not sufficient. Policymakers also need to carefully consider which information should be provided to students to allow them to fully express their preferences. Otherwise, the desired market outcomes (e.g., stability) might not be reached. With this conclusion, we build on a rich literature that shows the importance of providing historical cutoff grades (Immorlica et al., 2020; Hakimov et al., 2021), information about the quality of the programs (Hastings and Weinstein, 2008), and admission chances (Kapor et al., 2020). Our easy-to-scale intervention adds to the options of the designer and allows for cheap mitigation of the pre-existing gender and social inequalities among high-achieving students.

[55] In some provinces of China, students have access to the exact rank of their score nationwide and in the province. The latter is relevant due to the regional quotas of universities. See for example, https://www.gk100.com/read_70367.htm (in Chinese, retrieved 11/7/2022).

[56] Although the existence of a centralized exam is likely to be a key factor determining how well our results would replicate in different countries, other features of the college admission process might also play a role, such as the extent to which colleges rely on test scores as admission criteria (versus geographical preferences, legacy, or others), whether colleges use quotas for certain groups of students, whether all colleges use the same admission criteria, and whether these criteria are transparent.

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Appendix

A Additional Tables and Figures

Table A.1: Balance table

		Main survey			
	Admin data	Total	Control	Feedback	Difference (p-value)
Female	0.558	0.620	0.624	0.616	(0.717)
Age	17.539	17.523	17.520	17.527	(0.791)
Low SES	0.259	0.306	0.308	0.305	(0.876)
Risk preference		7.633	7.655	7.609	(0.624)
GPA		13.715	13.725	13.705	(0.822)
Honors (Bac)					
No honors	0.258	0.233	0.234	0.231	(0.873)
Honors	0.336	0.339	0.326	0.354	(0.184)
High honors	0.263	0.271	0.269	0.274	(0.831)
Highest honors	0.144	0.157	0.171	0.142	(0.071)
Region (*Académie*)					
Ile-de-France	0.195	0.209	0.197	0.222	(0.164)
Share disadvantaged	0.378	0.377	0.377	0.378	(0.721)
Survey pre-treatment					
Number of programs		4.961	4.962	4.959	(0.983)
Avg. offer probability		0.602	0.599	0.605	(0.507)
Number of observations	420,745	2,034	1,047	987	

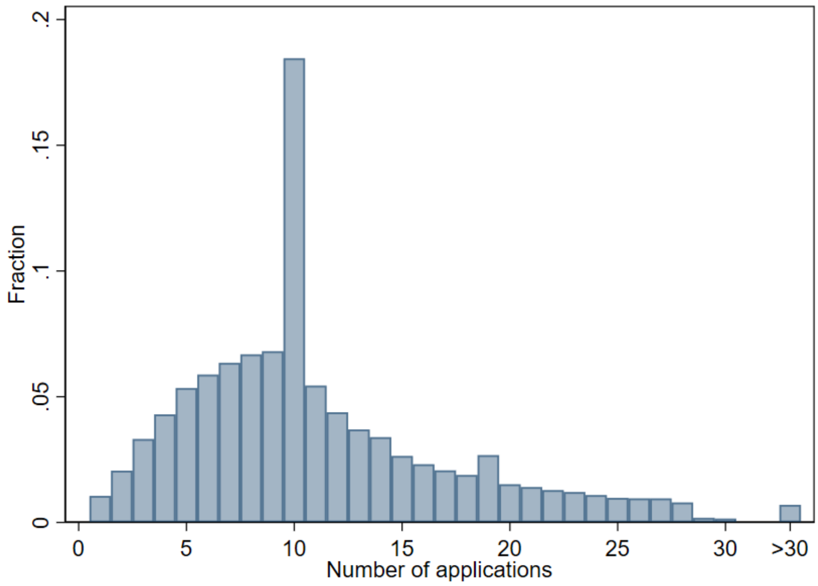
Notes: The table shows the balance of descriptive statistics in the administrative data and in the survey (total, control, and grade feedback treatment). The final column shows the p-value of a t-test comparing the treatment and control group. For comparability, only *bac général* students who graduated in 2021 are considered. Region refers to educational districts (*académie*) in which the respondent went to high school. Disadvantaged is measured as the share of individuals who receive a state scholarship to study in that district.

Table A.2: Application behavior in the administrative data and in the survey control group

	Admin data	Survey (Control)
Panel A: Application list		
Max(prestige)	2.390	2.290
	(1.106)	(1.129)
Min(prestige)	-0.625	-0.519
	(0.570)	(0.527)
Mean(prestige)	0.893	0.873
	(0.908)	(0.886)
One CPGE	0.266	0.271
	(0.442)	(0.445)
Number of applications	11.244	10.845
	(6.3311)	(5.893)
Number of observations	405,771	1,047
Panel B: Accepted program		
Prestige	0.607	0.719
	(1.183)	(1.176)
CPGE	0.103	0.091
	(0.304)	(0.287)
Number of observations	353,280	914

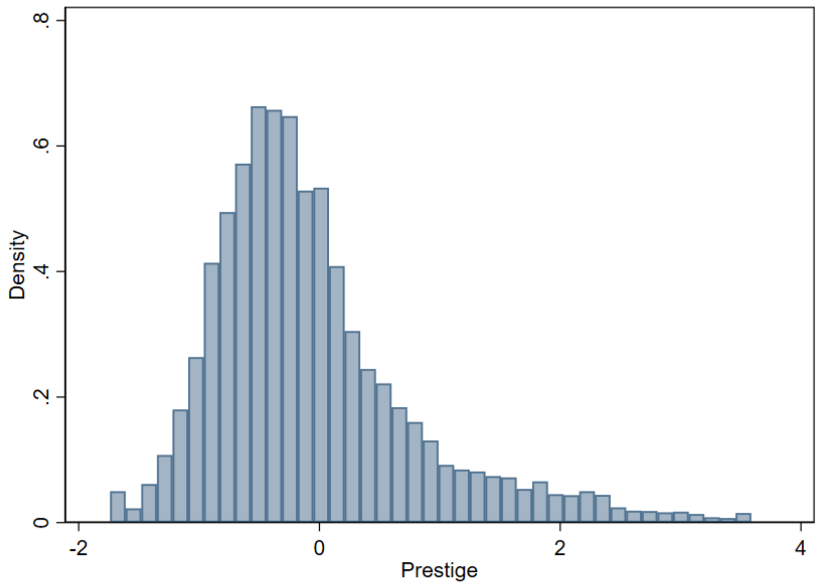
Notes: The table shows means and standard deviations (in parentheses) of characteristics of the application list (Panel A) and the final outcome (Panel B). Since these outcomes are determined post-treatment, we focus on the survey control group. Max(prestige), Min(prestige), and Mean(prestige) refer to the maximal, minimum, and mean prestige of the application list (in terms of average grades of admitted students), respectively. Prestige is defined at the program level as the z-transformed average grade of admitted students. One CPGE means that the student included one elite track in the application list.

Figure A.1: Number of applications



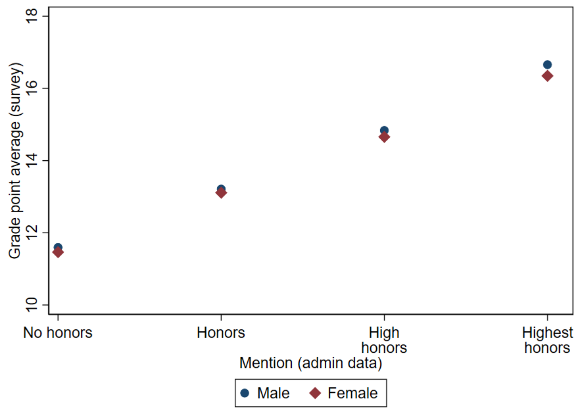
Notes: The figure shows a histogram of the number of applications that students submitted in 2021 (using the administrative data). We group together choices that are considered as one choice by the platform.

Figure A.2: Distribution of prestige measure

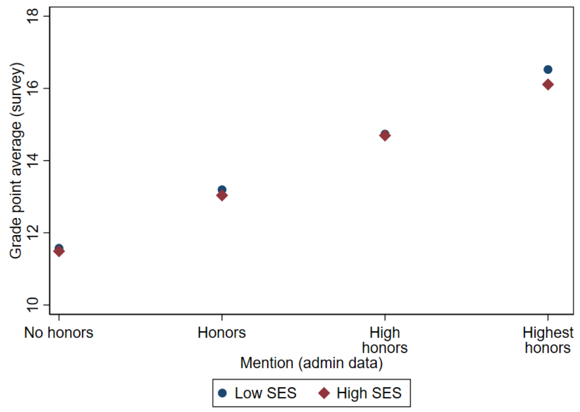


Notes: The figure shows a histogram of the prestige measure. Programs are the unit of observation. Prestige is defined at the program level as the mean *bac* grade of all admitted students. Prestige is z-standardized by subtracting the mean among all programs in the dataset and dividing by their standard deviation.

Figure A.3: Reported GPA (in the survey) by *bac* grade honors (in the admin data)



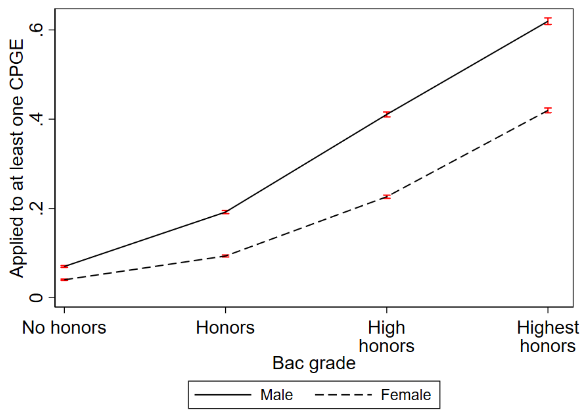
(a) By gender



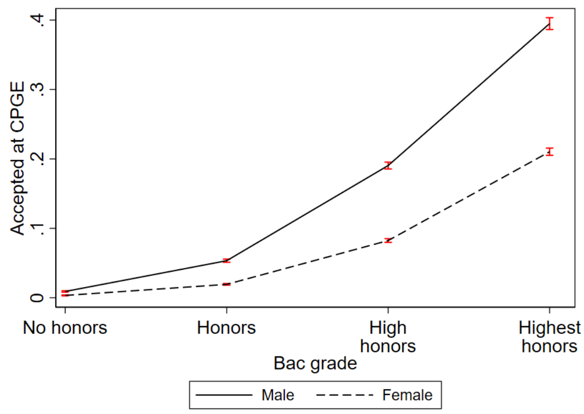
(b) By SES

Notes: The figures show the mean self-reported GPA in the survey by the overall *bac* honors in the admin data.

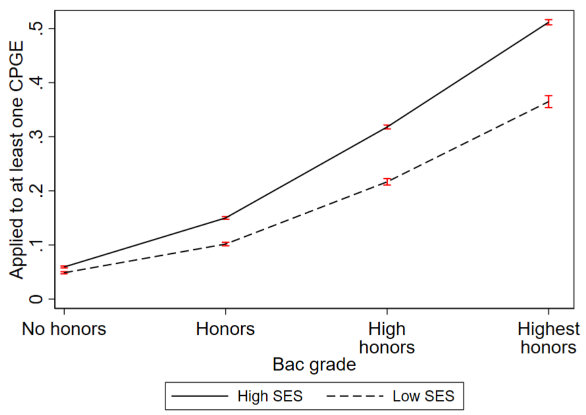
Figure A.4: Applications and match to CPGE by honors and gender/SES



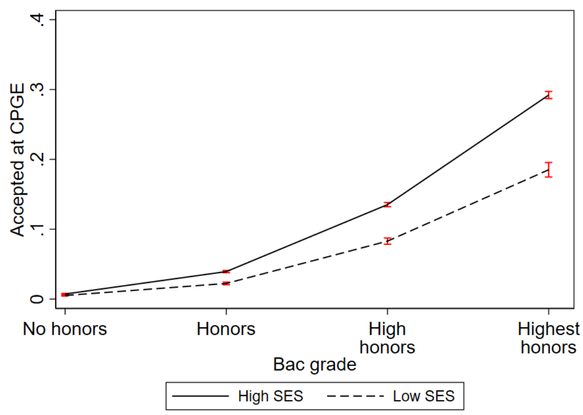
(a) Applied to CPGE by gender



(b) Matched to CPGE by gender



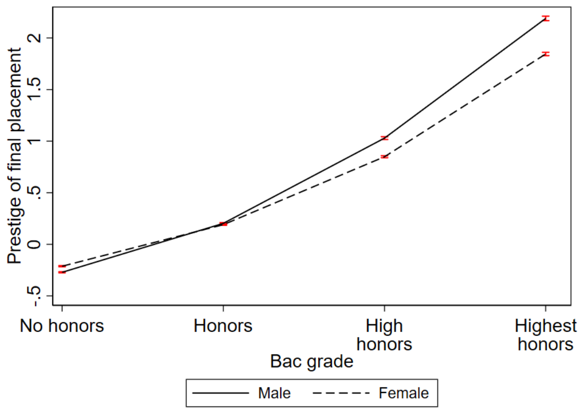
(c) Applied to CPGE by SES



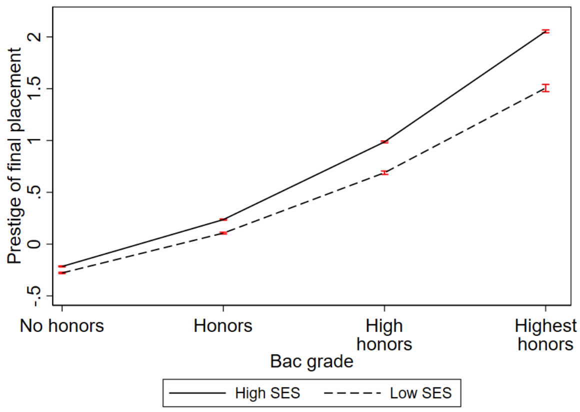
(d) Matched to CPGE by SES

Notes: The figures show the propensity to apply to a preparatory class (CPGE) and to be ultimately matched to a CPGE by honors level and gender/SES. The 99% confidence intervals are based on predicted values from a regression on the interaction of honors level and female/low SES.

Figure A.5: Prestige of accepted program by honors and gender/SES



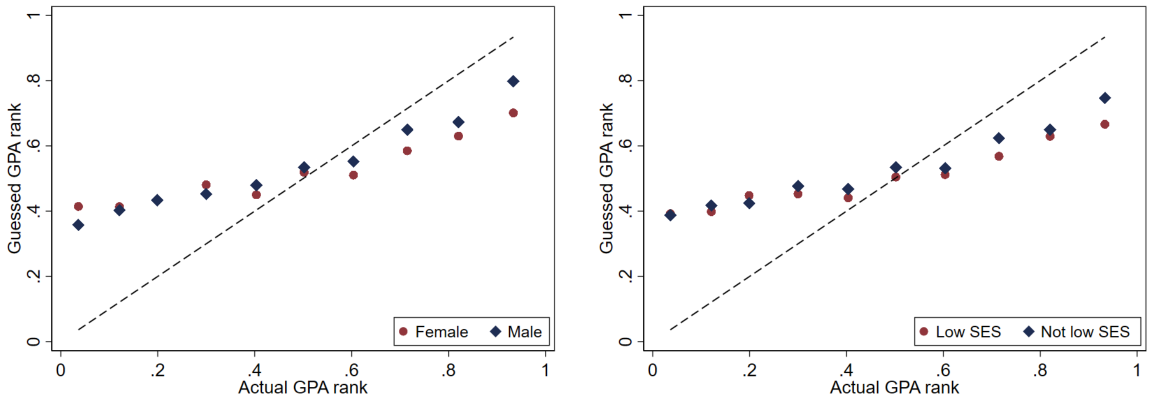
(a) Prestige by gender



(b) Prestige by SES

Notes: The figures show the prestige of the final match by honors level and gender/SES. Prestige of a program is defined as the mean grade level of all enrolled students. The 99% confidence intervals are based on predicted values from a regression on the interaction of honors level and female/low SES.

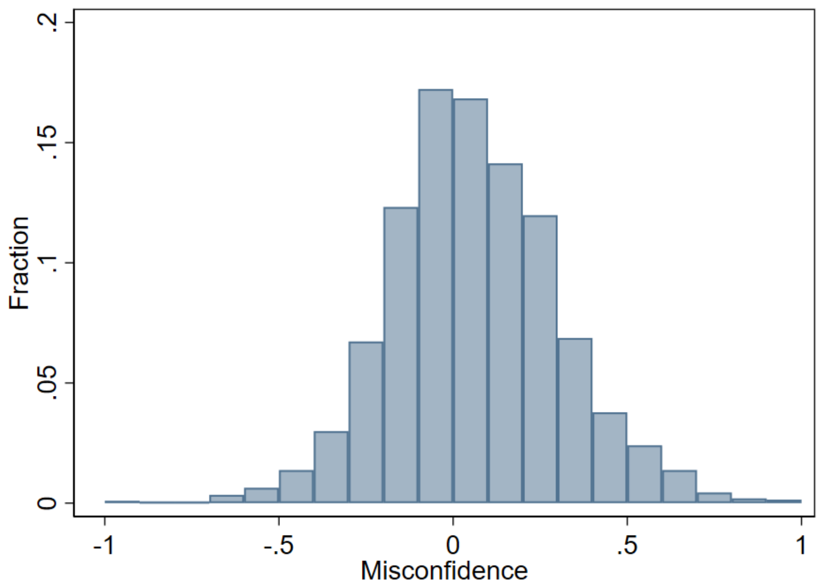
Figure A.6: Average guessed GPA rank by actual rank



(a) Guesses by gender (b) Guesses by SES

Notes: The figure shows the guessed GPA rank by actual GPA rank. The dots are mean guesses in bins of 10 ranks each. If respondents' stated guesses were accurate, they would be on the dotted 45 degree line.

Figure A.7: Distribution of misconfidence



Notes: The figure shows the distribution of misconfidence (guessed rank minus true rank).

Table A.3: Treatment effect of Grade feedback on outcomes (by under-/overconfidence)

	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Panel A: Only underconfidence						
Underconfidence	-0.702**	-0.235	-0.580**	-0.476***	-0.529*	-0.280***
	(0.275)	(0.161)	(0.238)	(0.131)	(0.313)	(0.086)
Grade feedback	-0.010	-0.000	-0.001	-0.034*	-0.003	0.002
	(0.051)	(0.024)	(0.035)	(0.019)	(0.044)	(0.014)
Grade feedback × Underconfidence	0.534	0.090	0.385	0.296*	0.046	0.254*
	(0.330)	(0.192)	(0.290)	(0.172)	(0.411)	(0.138)
True rank	1.405***	0.253***	1.124***	0.443***	1.545***	0.191***
	(0.164)	(0.077)	(0.117)	(0.062)	(0.151)	(0.044)
Panel B: Only overconfidence						
Overconfidence	0.753***	0.028	0.435***	0.198***	0.428**	0.102**
	(0.243)	(0.095)	(0.143)	(0.073)	(0.190)	(0.046)
Grade feedback	0.121**	0.006	0.068	-0.006	0.024	0.031
	(0.053)	(0.030)	(0.042)	(0.023)	(0.056)	(0.019)
Grade feedback × Overconfidence	-0.765***	0.000	-0.347**	-0.068	-0.205	-0.089
	(0.273)	(0.114)	(0.169)	(0.085)	(0.227)	(0.059)
True rank	1.457***	0.219***	1.142***	0.435***	1.552***	0.175***
	(0.176)	(0.080)	(0.123)	(0.066)	(0.156)	(0.046)
Honors FE	✓	✓	✓	✓	✓	✓
Risk preference	✓	✓	✓	✓	✓	✓
Observations	2034	2034	2034	2034	1793	1793

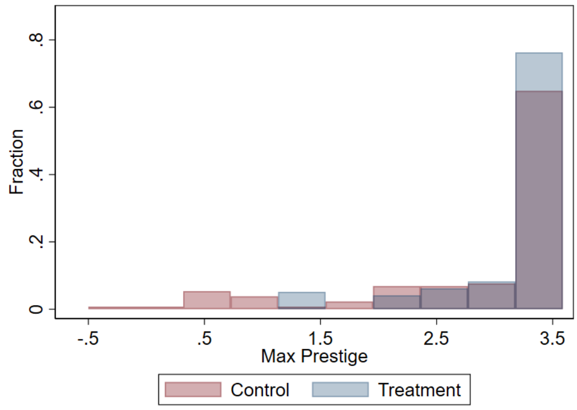
Notes: Overconfidence (Underconfidence) is the difference between the guessed rank and the true rank, and is zero for underconfident (overconfident) students. In Column (1), the dependent variable is the z-standardized maximal prestige (in terms of average grades of admitted students) of the application list, in Column (2), minimum prestige of the application list, in Column (3) the average prestige of the application list, and in Column (4) an indicator of whether at least one CPGE is included in the list. In Column (5), the outcome is the prestige of the final match and in Column (6) it is an indicator of whether the final match is a CPGE. Only students from *bac général* are included. Robust standard errors in parentheses. Significance levels are indicated by $^{*} < .1,^{**} < .05,^{***} < .01$.

Table A.4: Effect of misconfidence on college applications and admissions by treatment

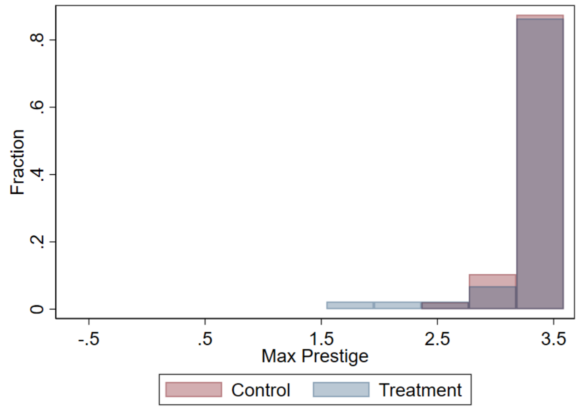
	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Panel A: Control group						
Misconfidence	0.713***	0.111	0.479***	0.326***	0.430**	0.157***
	(0.201)	(0.093)	(0.139)	(0.076)	(0.186)	(0.055)
True rank	1.759***	0.312**	1.336***	0.622***	1.924***	0.252***
	(0.267)	(0.123)	(0.187)	(0.098)	(0.238)	(0.072)
Bac grade						
Honors	0.008	0.132***	0.065	-0.005	0.127*	0.010
	(0.102)	(0.038)	(0.062)	(0.031)	(0.069)	(0.015)
High honors	0.184	0.202***	0.246**	0.057	0.399***	0.053*
	(0.148)	(0.060)	(0.100)	(0.052)	(0.112)	(0.029)
Highest honors	0.357*	0.385***	0.650***	0.230***	1.063***	0.128**
	(0.198)	(0.083)	(0.141)	(0.074)	(0.177)	(0.050)
Constant	1.337***	-0.833***	0.039	-0.084**	-0.569***	-0.077***
	(0.103)	(0.047)	(0.065)	(0.033)	(0.083)	(0.023)
Risk preference	✓	✓	✓	✓	✓	✓
Adj. R2	0.204	0.124	0.325	0.197	0.457	0.092
Observations	1047	1047	1047	1047	914	914
Panel B: Treatment group						
Misconfidence	0.017	0.062	0.105	0.110	0.320	0.029
	(0.196)	(0.097)	(0.140)	(0.074)	(0.198)	(0.066)
True rank	1.349***	0.216*	1.127***	0.408***	1.429***	0.182**
	(0.241)	(0.122)	(0.180)	(0.100)	(0.236)	(0.073)
Bac grade						
Honors	0.057	0.071*	0.063	0.038	0.184***	0.008
	(0.101)	(0.039)	(0.061)	(0.028)	(0.070)	(0.015)
High honors	0.231	0.272***	0.272***	0.104**	0.731***	0.055*
	(0.140)	(0.064)	(0.094)	(0.050)	(0.115)	(0.032)
Highest honors	0.613***	0.399***	0.744***	0.347***	1.516***	0.190***
	(0.175)	(0.088)	(0.132)	(0.074)	(0.176)	(0.054)
Constant	1.517***	-0.779***	0.157**	-0.035	-0.521***	-0.029
	(0.102)	(0.050)	(0.069)	(0.036)	(0.088)	(0.028)
Risk preference	✓	✓	✓	✓	✓	✓
Adj. R2	0.249	0.115	0.345	0.198	0.470	0.110
Observations	987	987	987	987	879	879

Notes: Misconfidence is the difference between the guessed rank and the true rank. In Column (1), the dependent variable is the z-standardized maximal prestige (in terms of average grades of admitted students) of the application list, in Column (2), minimum prestige of the application list, in Column (3) the average prestige of the application list, and in Column (4) an indicator of whether at least one CPGE is included in the list. In Column (5) the outcome is the prestige of the final match and in Column (6) it is an indicator of whether the final match is a CPGE. Only the treatment group and students from *bac général* are included. Robust standard errors in parentheses. Significance levels are indicated by $^{*} < .1,^{**} < .05,^{***} < .01$.

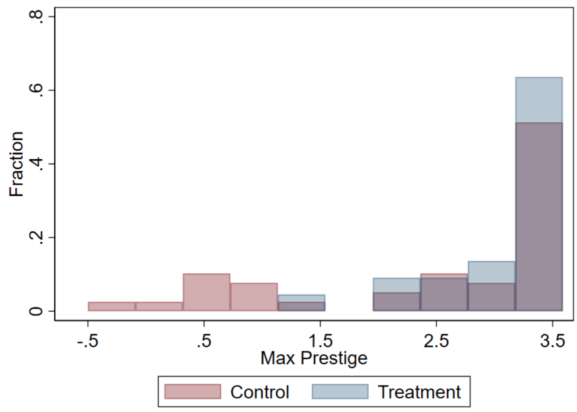
Figure A.8: Maximum prestige of highest honor students by gender and SES



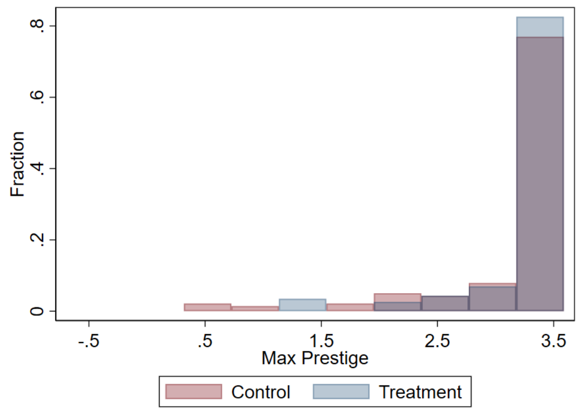
(a) Female students



(b) Male students



(c) Low-SES students



(d) High-SES students

Notes: The figure shows the distribution of the maximum prestige of the application list by treatment and control. Figures show highest honor students by gender and SES, resepectively. The histograms display ten equal-sized bins.

Table A.5: Regression of the prestige of the outcome bet on misconfidence and treatment indicator

	(1) Prestige of bet
Treatment grade feedback	0.075
	(0.057)
Misconfidence	0.548***
	(0.209)
Grade feedback	
× Misconfidence	-0.368*
	(0.222)
True rank	1.768***
	(0.219)
Honors FE	✓
Risk preference	✓
Adj. R2	0.280
Observations	1567

Notes: The dependent variable is the prestige of the guessed outcome (based on the incentivized bet on the final match). Robust standard errors in parentheses. Significance levels are indicated by $^{*} < .1, ^{**} < .05, ^{***} < .01$.

B Alternative measures to program prestige

In the first column of Table B.1, we show the 16 most prestigious programs denoted by their type.[57] As expected, the CPGEs account for the majority of the most prestigious programs. The list also includes renowned engineering schools (*Formations des écoles d'ingenieurs*), Sciences Po, and a few specialized public university degrees.

Table B.1: List of 16 most selective programs based on prestige and access rate

	Program type	
	Most prestigious	Lowest access rate
1	Licence - Sciences humaines et sociales	D.E secteur sanitaire
2	Formations des écoles d'ingénieurs	Licence - Droit-économie-gestion
3	Classe préparatoire scientifique	Licence - Sciences humaines et sociales
4	Licence - Droit-économie-gestion	Licence - Sciences - technologies - santé
5	Classe préparatoire scientifique	Licence - Sciences - technologies - santé
6	Classe préparatoire scientifique	BUT - Service
7	Sciences politiques	D.E secteur sanitaire
8	Formations des écoles d'ingénieurs	BTS - Services
9	Classe préparatoire scientifique	BTS - Services
10	Classe préparatoire scientifique	Licence - Sciences - technologies - santé
11	Classe préparatoire scientifique	BUT - Service
12	Classe préparatoire scientifique	Licence - Sciences - technologies - santé
13	Classe préparatoire scientifique	Licence - Sciences humaines et sociales
14	Classe préparatoire littéraire	DN MADE
15	Classe préparatoire scientifique	Licence - STAPS
16	Classe préparatoire scientifique	Licence - Sciences humaines et sociales
Average prestige	3.547	1.838
Average access rate	0.167	0.056

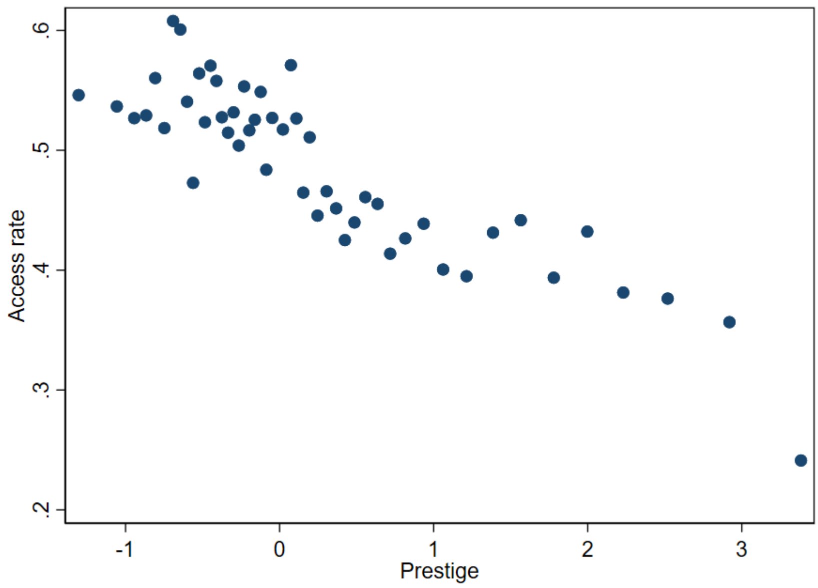
Notes: The table shows the program type of the 16 most prestigious programs (according to the average *bac* grade of the admitted students) and the 16 programs with the lowest access rate. Only programs are considered to which at least 10 survey participants applied. The bottom row shows the average prestige and access rate of the 16 programs in the table.

A potential alternative measure for the quality of a program is the access rate (the number of available seats divided by the number of applications). This access rate is strongly correlated with the prestige, as we show in Figure B.1. However, the programs with the lowest access rates are not those typically considered as very prestigious. In the second column of Table B.1, we show the 16 programs with the lowest access rate, which include technical high schools (BTS), nursing schools (*D.E. secteur sanitaire*), sports programs (STAPS), specialized public university degrees, and design classes (DN MADE). These 16 programs have an average access rate of 5.6%, but the average prestige is only 1.84 SDs. Hence, they are over-demanded, but they do not attract the best students.

[57]For data protection reasons, we cannot show the names of the institutions and programs along with the calculated prestige score.

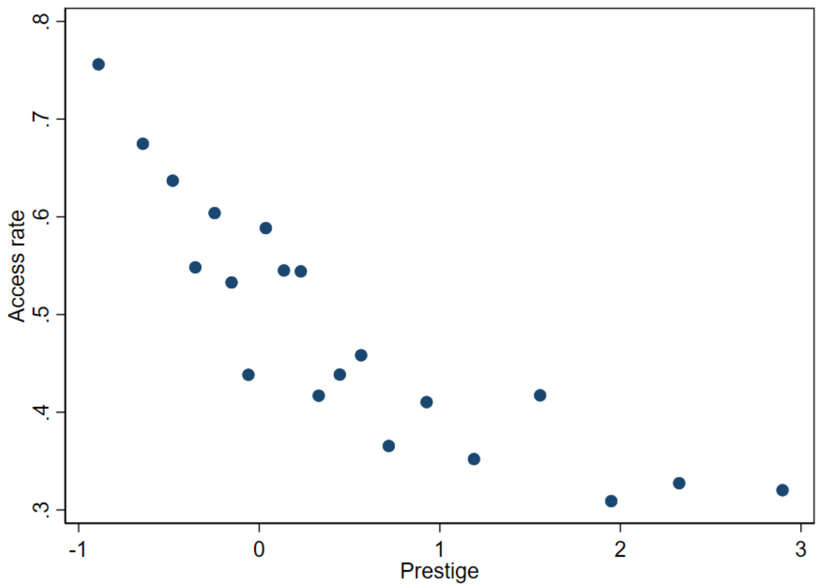
Figure B.2 illustrates this argument for health-related degrees, including nursing schools and health-related university degrees (while Figure B.1 illustrates the argument across all sectors). Overall, there is a strong correlation between access rate and prestige, but this is less true for the best programs (in terms of prestige) where the access rate does not distinguish well between the most prestigious programs.

Figure B.1: Access rate by prestige measure



Notes: The figure shows a binned scatter plot of the access rate (number of available seats by number of applications) as given on the Parcoursup platform by the prestige measure (z-transformed average *bac* grade).

Figure B.2: Access rate by prestige measure (only health programs)



Notes: The figure shows a binned scatter plot of the access rate by the prestige measure focusing on health-related programs (nursing programs and health-related university degrees).

C Further pre-registered outcomes (for online appendix)

In the pre-registration, we specified the following additional hypotheses, which are not the focus of the present paper and therefore reported in the online appendix:

- The treatment decreases the impact of underconfidence on acceptance of the first offer.
- The treatment increases the length of the submitted list of overconfident students.
- The treatment decreases the rank of the outcome bet for underconfident students and increases it for overconfident students

C.1 First offer acceptance

We conjectured that self-confidence affects the probability to accept an early offer. Remember that on the first day of the mechanism, programs send out offers to the top-ranked applicants up to their capacity. Declined offers are sent out to the next-ranked applicants. This means that students tend to receive "better" offers (where they are more likely to be marginally accepted) later in time. We hypothesized that underconfident students are more likely to accept an early offer because they do not expect to receive a better offer later.

To study the propensity to accept an early offer, we define the first offer bonus on the individual level as follows:

$$\text{First offer bonus}_i = \text{I(accept first)}_i - \frac{\text{number offers on day of first offer}_i}{\text{total number of offers}_i} \tag{9}$$

The first offer bonus is the difference between an indicator for accepting the first offer and the share of offers an individual received on the same day as the first offer. The first offer bonus approaches 1 if an individual accepts the first offer, although most of her offers arrived after the first offer. It approaches -1 if the individual does not accept the first offer and most of her offers arrived together with the first offer.

In line with the incentives of the mechanism (i.e., better offers arriving later), the first offer bonus is on average negative (-0.149) and significantly smaller than zero ($p < 0.01$).

In Table C.1, we regress the first-offer bonus on underconfidence and treatment indicators. The underconfidence coefficient shows that, in the control group, underconfidence is positively correlated with a higher first-offer bonus. That is, underconfident students are more likely to accept an early offer. We find that the treatment reduces the impact of underconfidence on the first offer bonus, but the treatment effect is not statistically significant ($p = 0.168$).

Table C.1: Regression of first offer bonus on underconfidence and treatment dummy

	(1) First offer bonus
Underconfidence	0.294***
	(0.104)
Grade feedback	0.000
	(0.019)
Grade feedback × Underconfidence	-0.185
	(0.134)
True rank	-0.073
	(0.061)
Mean first offer bonus	-0.149
Honors FE	✓
Risk preference	✓
Observations	1793

Notes: The table reports OLS regression estimates. The dependent variable is the first-offer bonus as defined in Equation (9). Significance levels are indicated by $* < .1, ** < .05, *** < .01$.

C.2 Number of applications

We hypothesized that overconfident students would apply to fewer programs and that providing feedback to overconfident students would increase the length of their submitted list.

In the first column of Table C.2, we regress the number of applications on misconfidence, controlling for true rank. Contrary to the hypothesis, more confident applicants seem to apply to more programs and this seems to be driven by underconfident students applying to fewer programs. However, this may be driven by the fact that underconfident students are less likely to apply to elite track programs (CPGE). As described in Section 2.1, students who apply to CPGE can apply to many sub-programs, which is not the case for public university programs. Hence, a student who is confident enough to apply to CPGE may apply to more programs, just because their application limit is less restricted. To rule out this possibility, we exclude all students who applied to at least one CPGE in Column 2 of Table C.2. Interestingly, the misconfidence coefficients switch signs and being more confident is associated with fewer applications (but not significantly so).

In Table C.3, we regress the number of applications on misconfidence interacted with the treatment indicator. As before, in Column 1, it appears as if more confident students apply to more programs and the treatment reduces the impact of misconfidence on applications. However, when we exclude students who apply to CPGE in Column 2, the treatment effect is not negative anymore, but positive and close to zero.

Hence, we do not find support for the hypothesis that miscalibrated confidence affects the number of applications once we control for the mechanical effect through a change in CPGE applications. Moreover, our treatment has no effect on the number of applications.

Table C.2: Regression of number of applications on misconfidence (only control group)

	(1) Number applications	(2) Number applications
Panel A: Effect of misconfidence		
Misconfidence	1.653	-0.886
	(1.234)	(1.380)
True rank	2.404*	-0.961
	(1.455)	(1.549)
Panel B: Effect of underconfidence		
Underconfidence	-3.191*	1.177
	(1.730)	(1.976)
True rank	1.805	-0.625
	(1.143)	(1.322)
Panel C: Effect of overconfidence		
Overconfidence	0.847	-0.813
	(1.805)	(1.882)
True rank	1.393	-0.677
	(1.368)	(1.411)
Sample	All	No CPGE
Honors FE	✓	✓
Risk preference	✓	✓
Observations	1047	763

Notes: The table reports OLS regression estimates. The dependent variable is the number of applications (wishes and sub-wishes). Significance levels are indicated by $* < .1, ** < .05, *** < .01$.

Table C.3: Regression of number of applications on misconfidence and treatment dummy

	(1) Number applications	(2) Number applications
Panel A: Misconfidence		
Misconfidence	1.540	-0.742
	(1.032)	(1.138)
Grade feedback	0.552**	0.221
	(0.268)	(0.275)
Grade feedback × Misconfidence	-1.671	0.128
	(1.113)	(1.129)
True rank	2.703***	0.165
	(1.049)	(1.162)
Sample	All	No CPGE
Honors FE	✓	✓
Risk preference	✓	✓
Observations	2034	1505

Notes: The table reports OLS regression estimates. The dependent variable is the number of applications (wishes and sub-wishes). Significance levels are indicated by $* < .1, ** < .05, *** < .01$.

C.3 Rank of prediction of final assignment

In the survey, we asked for students' preference list of programs they aim to apply to. We hypothesized that underconfident students would tend to bet on a program that they state to prefer less, while overconfident students bet on a program that they state to prefer more.

In Table C.4, we regress the rank of the guessed outcome in the preference list on misconfidence. Rank 1 is the most preferred program and higher values mean that programs are preferred less. We find higher degress of under- and overconfidence both lead to betting on less preferred programs, but the coefficient are far from statistically significant. Moreover, we find that true rank does not predict the rank of the guessed outcome, suggesting that the selection that students make already factors in their admission chances. These findings are in line with models of expectation-based loss aversion, in which agents rank those programs at the top of their preference list that they think they can attain (Meisner and von Wangenheim, 2023; Dreyfuss et al., 2022). Meisner (forthcoming) shows that such a pattern can emerge from disliking rejection and enjoying the confirmation of being accepted at a top-ranked program.

In Table C.5, we regress the rank of the guessed outcome on misconfidence interacted with the treatment indicator. It seems as if the treatment makes students bet on programs that are less preferred according to their preference list, irrespective of their level of misconfidence. However, remember from Section 7 that the treatment made underconfident students bet on more prestigious programs and overconfident students bet on less prestigious programs. Taken together, these results suggest that underconfident students put more prestigious programs lower in their initial preference list and revise their preferences after receiving feedback. Hence, we conclude that the preferences given in the preference list should be taken with a grain of salt.

Table C.4: Regression of rank of guessed outcome on misconfidence (only control group)

	(1)
	Rank of guessed outcome
Panel A: Effect of misconfidence	
Misconfidence	-0.059
	(0.206)
True rank	-0.039
	(0.230)
Panel B: Effect of underconfidence	
Underconfidence	0.346
	(0.368)
True rank	-0.085
	(0.214)
Panel C: Effect of overconfidence	
Overconfidence	0.140
	(0.249)
True rank	0.064
	(0.211)
Honors FE	✓
Risk preference	✓
Observations	1032

Notes: The table reports OLS regression estimates. The dependent variable is the rank of the guessed outcome in the respondent's preference list. The lower the rank, the more the individual prefers the program according to their preference list. Significance levels are indicated by $* < .1, ** < .05, *** < .01$.

Table C.5: Regression of rank of guessed outcome on misconfidence and treatment dummy

	(1)
	Rank of guessed outcome
Panel A: Misconfidence	
Misconfidence	-0.046
	(0.177)
Grade feedback	0.112**
	(0.050)
Grade feedback	
× Misconfidence	0.021
	(0.214)
True rank	0.126
	(0.180)
Honors FE	✓
Risk preference	✓
Observations	1990

Notes: The table reports OLS regression estimates. The dependent variable is the rank of the guessed outcome in the respondent's preference list. The lower the rank, the more the individual prefers the program according to their preference list. Significance levels are indicated by $* < .1, ** < .05, *** < .01$.

D Data collection

We conducted a large-scale survey of students participating in the French college admission procedure in 2021. We recruited our sample using social media ads (Instagram, Snapchat, and Facebook). Individuals who clicked on the ad were redirected to the Qualtrics survey.

On the landing page, respondents were informed of the survey and asked for consent regarding the raffle terms and the privacy policy. Of the 14,590 respondents that consented to participate, 48% dropped out on the first page of the survey when asked for their name, demographics, and contact details (see Table D.1).[58] Another 24% dropped out when asked to state the programs (city, institution, and program) they planned to apply for in Parcoursup in free-text form. In the end, 3,584 provided a guess and were randomized into treatment or control. While the completion rate may appear low, it is comparable to earlier studies and may be due to a number of factors (cf. Allcott et al., 2020). First, the sample does not consist of participants who signed up for a survey panel and, thus, showed a general interest in sharing their data. Participants may have clicked on the link out of curiosity, but decided to opt out after finding out that the survey asked for personal information. Second, respondents clicked on the ad while browsing social media, hence, they may not have been prepared to complete a 12-minute survey that contained a number of relatively tedious free-text responses (such as the application list). Although we tried to keep the survey concise, it is arguably less entertaining and requires a longer attention span than the content typically consumed on social media.

Among those participants, who completed the survey, approximately one third was recruited via Instagram and Facebook, and approximately two thirds via Snapchat. A few participants were recruited via alternative channels.[59]

Among the 3,584 complete responses, we removed duplicate entries that we identified based on the mail address, phone number, and name, leading to a sample of 3,508 valid observations.[60]

Matching of survey and admin data We match the survey data with the administrative data. To do so, we asked survey respondents for their national student number

[58] Subjects were informed that all analyses would be anonymized and that their personal information would only be used to match their responses to the administrative records and to contact them in case they had won a gift card.

[59] We also bought a small number of ads on Twitter and Google, but rapidly stopped these ads as the response rate from our target group was low. Moreover, we had a banner campaign on the website l'Etudiant (which provides information targeted at French high school students). The response rate was also low.

[60] Some students may have taken the survey multiple times to maximize their chances of winning gift cards (although we explicitly stated in the consent form that students could only enter the raffle once). If a respondent completed the survey more than once, we considered their pre-treatment answers from the first entry and their post-treatment answers from the final entry. The treatments are cumulated. That is, a respondent who received one treatment in the first attempt, and another treatment in the second attempt, is treated as receiving both treatments.

Table D.1: Sample size of main survey

Number of students	Step
14,969	Started questionnaire
14,590	Consented to participate
7,577	Entered demographics
4,101	Entered application list
3,584	Assigned to treatment
3,508	Sample without duplicates
3,267	Matched to admin data
2,034	Final sample (only *bac général*)

(INE).[61] Based on the INE, we can match 1,730 respondents. For students who did not provide their INE, we matched the survey and admin data based on the school, postal code, birth date, and gender. When these characteristics did not identify an observation uniquely, we compared the application lists reported in the survey and in the admin data of the potential matches. Using this combination of characteristics, we matched another 1,537 respondents with the administrative data. In total, this procedure allowed us to match 3,267 respondents successfully. The students we could not match are excluded from our analysis.

As specified in the pre-registration of the hypotheses related to miscalibrated confidence, we focus on students in the general high school track (*Bac général*). The reason is that treated students receive feedback on their rank compared to other *Bac général* students. Restricting the sample to *Bac général* students, yields our final sample of 2,034 respondents.

E Data collection - Survey of GPA

In January and February 2021, we aimed to recruit at least 1,000 high school students who were planning to take part in Parcoursup 2021. The goal of the pre-survey was to form a reference group to which we could compare the grades of students in the main survey.

The pre-survey was fielded between January 20 and February 1, 2021. We recruited subjects via ads on Instagram and Facebook (targeted at 17 to 18-year old French users). The ad is displayed in Figure E.2. It addressed students in the final year of the *bac*, who were prospective participants of Parcoursup. The ad offered the chance to win a 50 Euro gift card for completing a 3-minute survey.

On the landing page, subjects were pre-screened according to whether they were in the final year of high school, whether they planned to take part in Parcoursup in 2021, and whether they were at least 16 years of age. After we decided that we would form

[61] The INE is an 11-digit, unique identifier which is, for example, given on student report cards. As students also needed the INE to register on the college application platform (Parcoursup), many of them knew where to look it up.

Figure D.1: Social media ad

Notes: The figure shows the social media ad we used to recruit students. The ad targets students in the final year of high school who are about to submit their college applications to the Parcoursup platform. The ad offers the chance to win a 100 Euro giftcard for completing the survey.

Table E.2: Sample size of pre-survey

Number of students	Step
4,464	started questionnaire
2,600	passed pre-screening
2,523	Consented to participate
1,311	Entered demographics
1,264	Completed survey
1,001	In *bac général* and valid

the reference group out of students in *bac général*, we added a corresponding screening question.[62]

Table D.1 shows that 4,464 subjects started the questionnaire, of whom 2,600 subjects were screened in. Among these participants, 1,264 completed the questionnaire. After removing respondents who were not in *bac général*, duplicates and invalid responses (e.g., nonsense entries or a grade point average of 0.0), the final sample to calculate the grade distribution consisted of 1,001 participants. Among the participants, 57.4% were female, with an average age of 17.4 years, and the average GPA was 13.960.[63] These characteristics are very similar to our main survey and the population in the admin data (cf. Table A.1).

[62] On January 26, we had more than 70% of respondents from *bac général* and realized that it would be difficult to obtain a meaningful sample size for *bac technologique* and *bac professionelle*. Hence, we decided to focus the reference group on *bac général* students.

[63] Since we cannot match the pre-survey to the administrative data, we do not know the share of low-SES students in this sample.

Figure E.2: Screenshot of ad for pre-survey

Notes: The screenshot shows the Facebook ad for the pre-survey. It addressed students in the final year of high school who were planning to participate in Parcoursup 2021, and offered the chance to win a 50 Euro giftcard for completing a 3-minute survey. The Instagram ads used the same picture and text.

F Main Survey Instructions (translated from French)

Figure F.1: Screenshot of welcome screen and consent form

Welcome to the Parcoursup survey

You are invited to take part in a research study about applicants' behavior in Parcoursup. The study is administered by researchers at the University of Lausanne, Switzerland, and funded by the Swiss National Science Foundation (Project number 189152).

The study consists of a **survey** that we ask you to complete. **You can only participate in the survey if you plan to apply to study programs on Parcoursup in 2021**. The survey will ask you for your considerations around your application intentions and your expectations regarding the outcome.

If you participate in the survey, you will enter a sweepstake and **can win one of 40 Amazon.fr gift cards of 100 Euro** each (terms and conditions apply). You will only participate in the sweepstakes if you give complete answers. During the survey you have additional chances to win Amazon.fr gift cards of 50 Euro and 100 Euro each.

We may invite you for two more surveys in June 2021 and September 2021, for which you can earn additional gift cards.

Please note that participation in this study is entirely voluntary and that you may discontinue participation at any time. In this case, you will not be compensated.

▸ Privacy Policy

▸ Terms of Sweepstakes

Contact information
For any questions and comments, and to exercise your right to access or erase your personal data, please contact Dr Renke Schmacker at parcoursup@unil.ch.

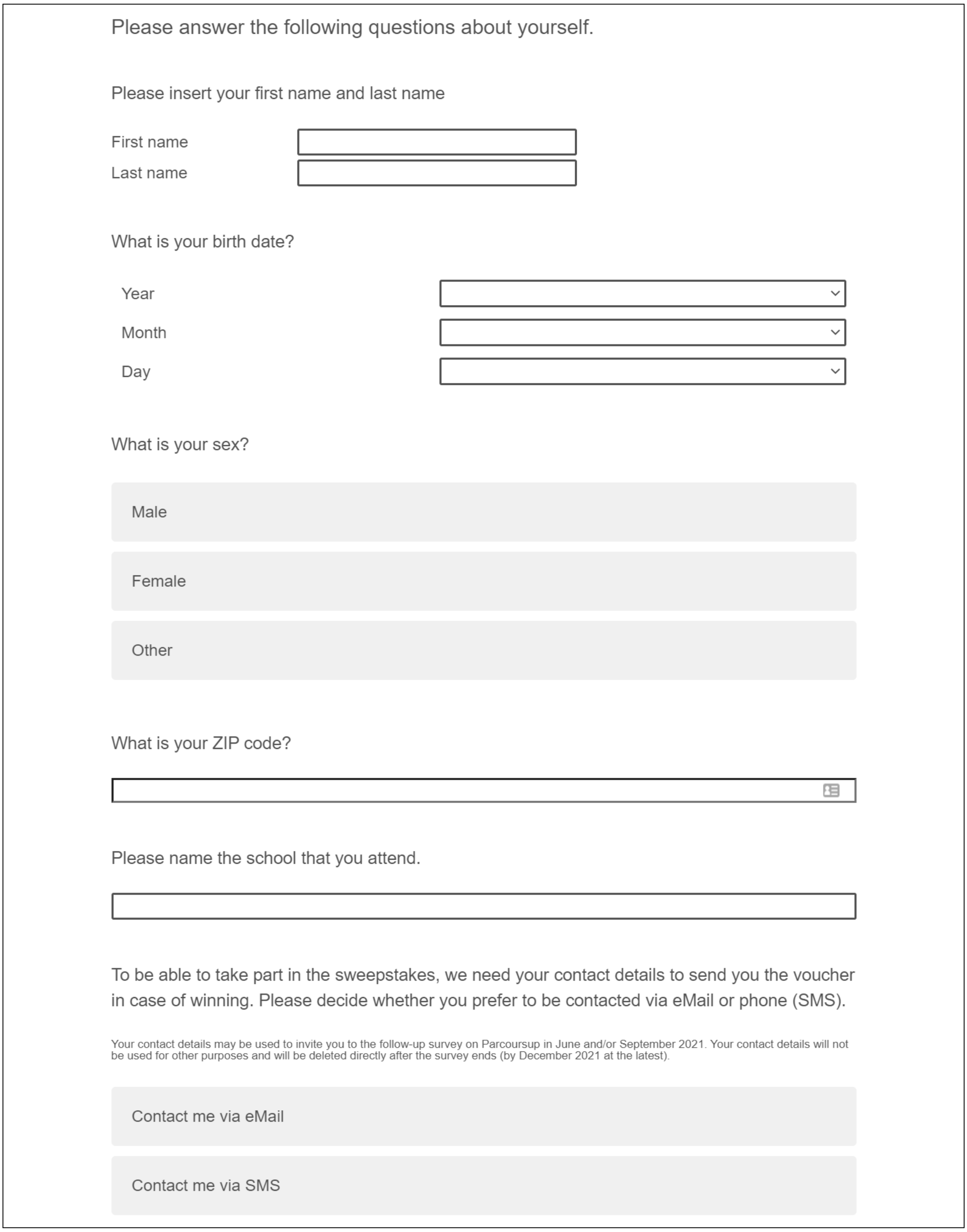
If you agree to participate in this study, please give your consent by checking the box below.

I have read and understood the Privacy Policy and the Terms of the Sweepstakes, and I consent to participate in this study

No, I do not consent to participate in this study.

Notes: Subjects were welcomed and asked to consent to the privacy policy and terms of participation. The privacy policy informed participants that their responses would be matched to administrative data and pseudonymized afterwards.

Figure F.2: Screenshot of demographic questionnaire


Please answer the following questions about yourself.

Please insert your first name and last name

First name

Last name

What is your birth date?

Year

Month

Day

What is your sex?

Male

Female

Other

What is your ZIP code?

Please name the school that you attend.

To be able to take part in the sweepstakes, we need your contact details to send you the voucher in case of winning. Please decide whether you prefer to be contacted via eMail or phone (SMS).

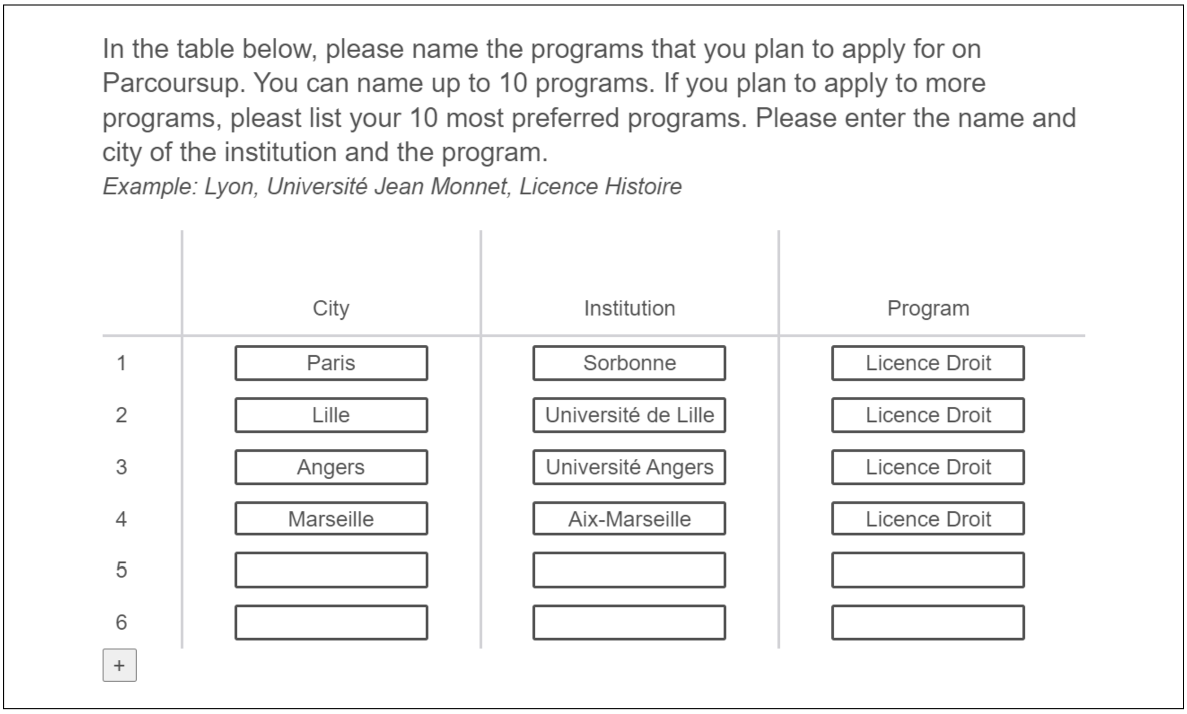
Your contact details may be used to invite you to the follow-up survey on Parcoursup in June and/or September 2021. Your contact details will not be used for other purposes and will be deleted directly after the survey ends (by December 2021 at the latest).

Contact me via eMail

Contact me via SMS

Notes: Subjects were asked for their demographic characteristics and contact details.

Figure F.3: Screenshot of application list elicitation



In the table below, please name the programs that you plan to apply for on Parcoursup. You can name up to 10 programs. If you plan to apply to more programs, pleast list your 10 most preferred programs. Please enter the name and city of the institution and the program.

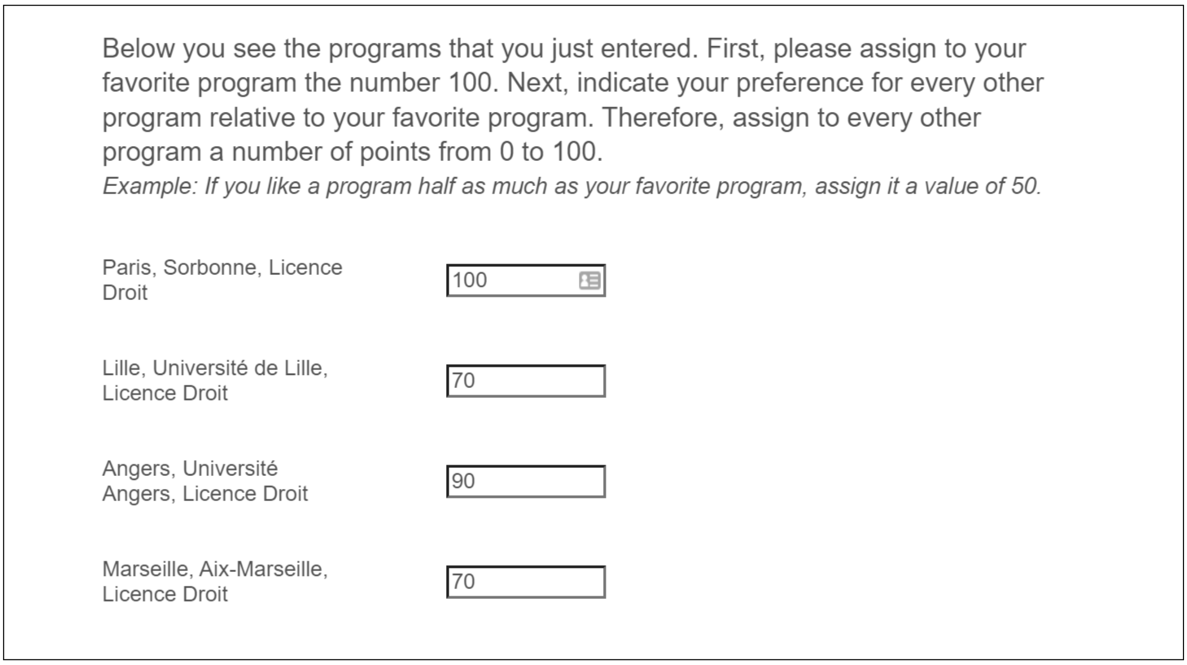
Example: Lyon, Université Jean Monnet, Licence Histoire

	City	Institution	Program
1	Paris	Sorbonne	Licence Droit
2	Lille	Université de Lille	Licence Droit
3	Angers	Université Angers	Licence Droit
4	Marseille	Aix-Marseille	Licence Droit
5			
6			

+

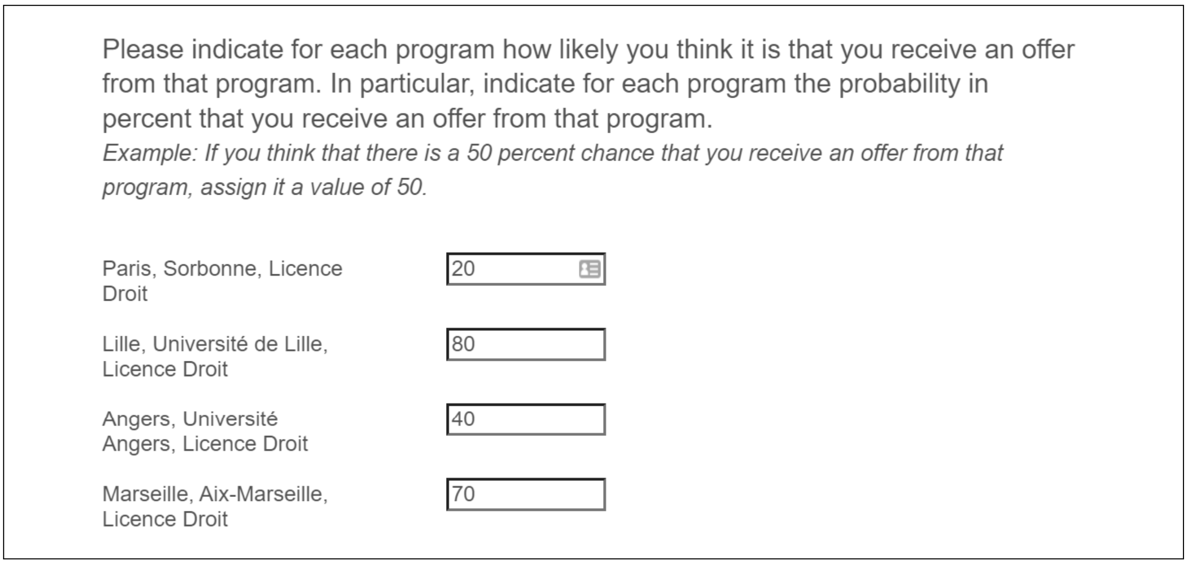
Notes: Subjects were asked to indicate the programs they planned to apply to on Parcoursup. By clicking on [+], they could extend the list and enter a maximum of 10 programs.

Figure F.4: Screenshot of preference elicitation



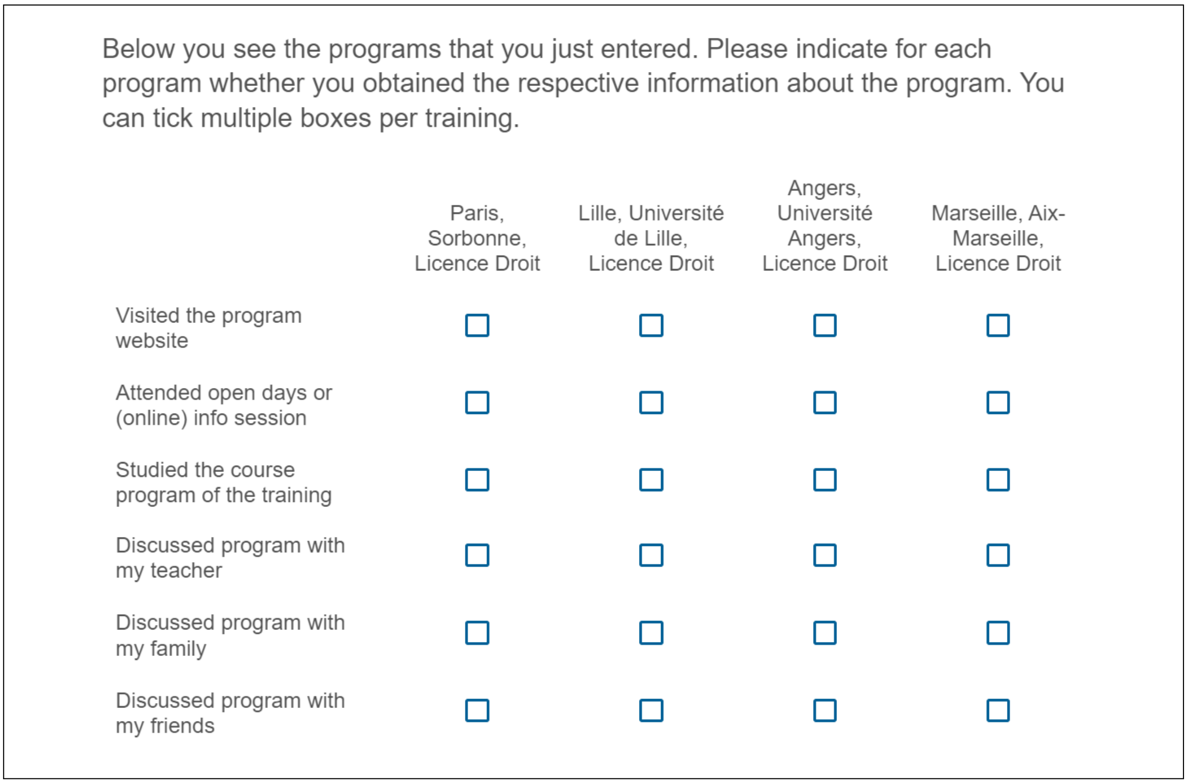
Notes: Subjects were asked for their relative preferences for the programs they had indicated on the previous screen.

Figure F.5: Screenshot of belief elicitation about offer probability



Notes: Subjects were asked for their beliefs about receiving an offer from the programs they had indicated in Figure F.3.

Figure F.6: Screenshot of question for information acquisition

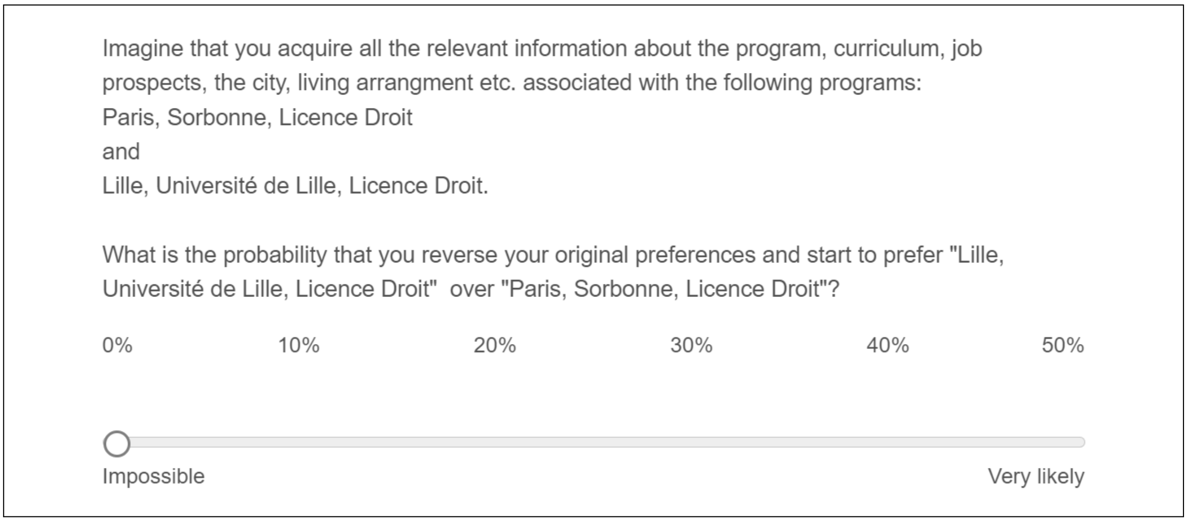


Below you see the programs that you just entered. Please indicate for each program whether you obtained the respective information about the program. You can tick multiple boxes per training.

	Paris, Sorbonne, Licence Droit	Lille, Université de Lille, Licence Droit	Angers, Université Angers, Licence Droit	Marseille, Aix-Marseille, Licence Droit
Visited the program website	☐	☐	☐	☐
Attended open days or (online) info session	☐	☐	☐	☐
Studied the course program of the training	☐	☐	☐	☐
Discussed program with my teacher	☐	☐	☐	☐
Discussed program with my family	☐	☐	☐	☐
Discussed program with my friends	☐	☐	☐	☐

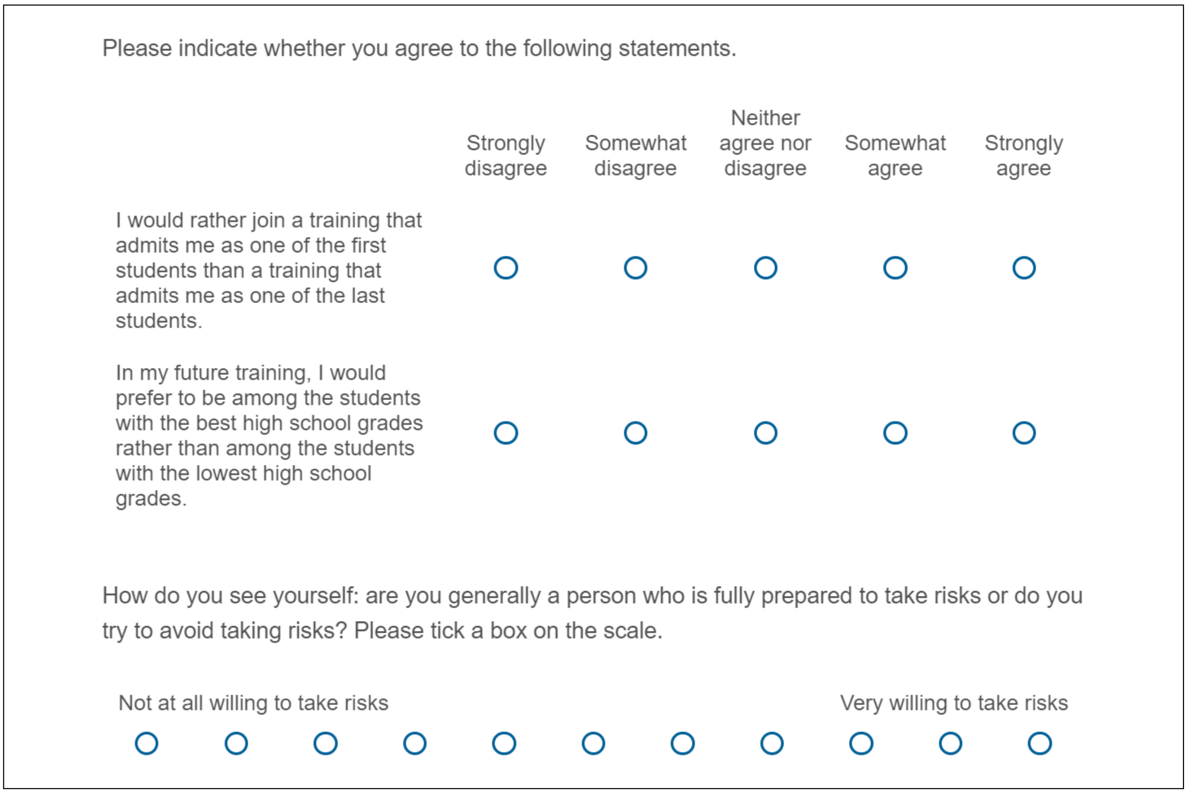
Notes: Subjects were asked whether they had acquired information on the programs they had indicated on the screen in Figure F.3.

Figure F.7: Screenshot of preference certainty question



Notes: Subjects were asked how likely it was that they would start to prefer their second most-preferred program over their most-preferred program once they had acquired all the necessary information.

Figure F.8: Screenshot of question for importance of being among the best and risk



Please indicate whether you agree to the following statements.

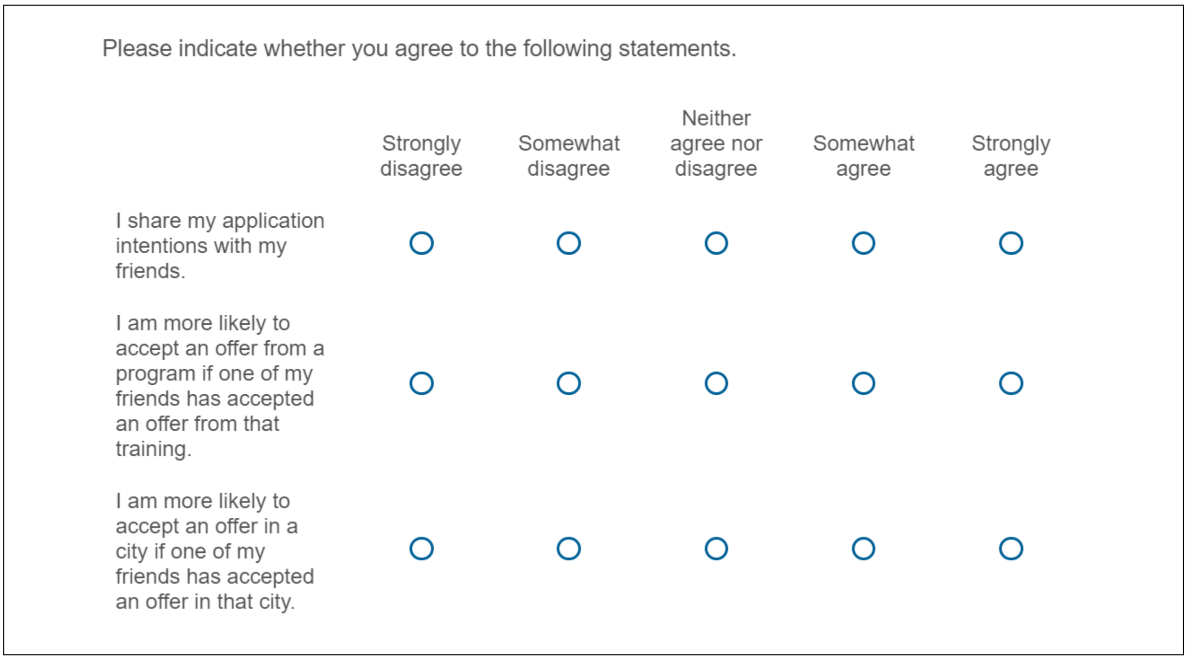
	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I would rather join a training that admits me as one of the first students than a training that admits me as one of the last students.	○	○	○	○	○
In my future training, I would prefer to be among the students with the best high school grades rather than among the students with the lowest high school grades.	○	○	○	○	○

How do you see yourself: are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale.

Not at all willing to take risks ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Very willing to take risks

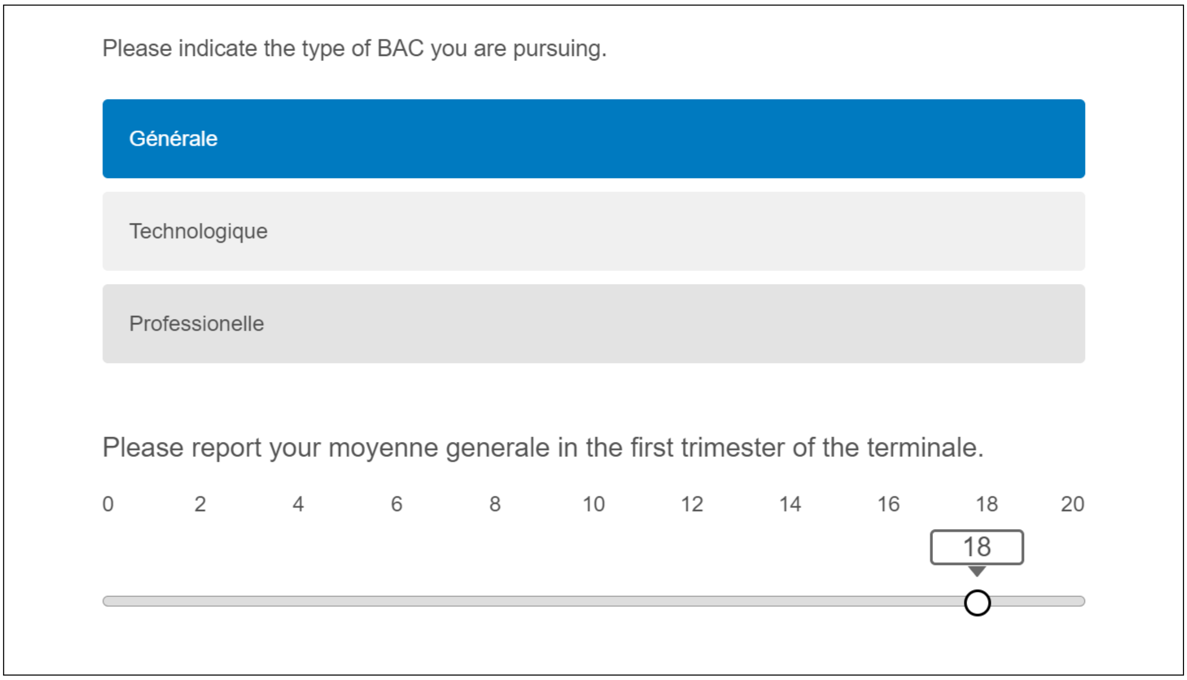
Notes: Subjects were asked for the importance of being among the best students and for their risk preferences.

Figure F.9: Screenshot of question for coordination with peers



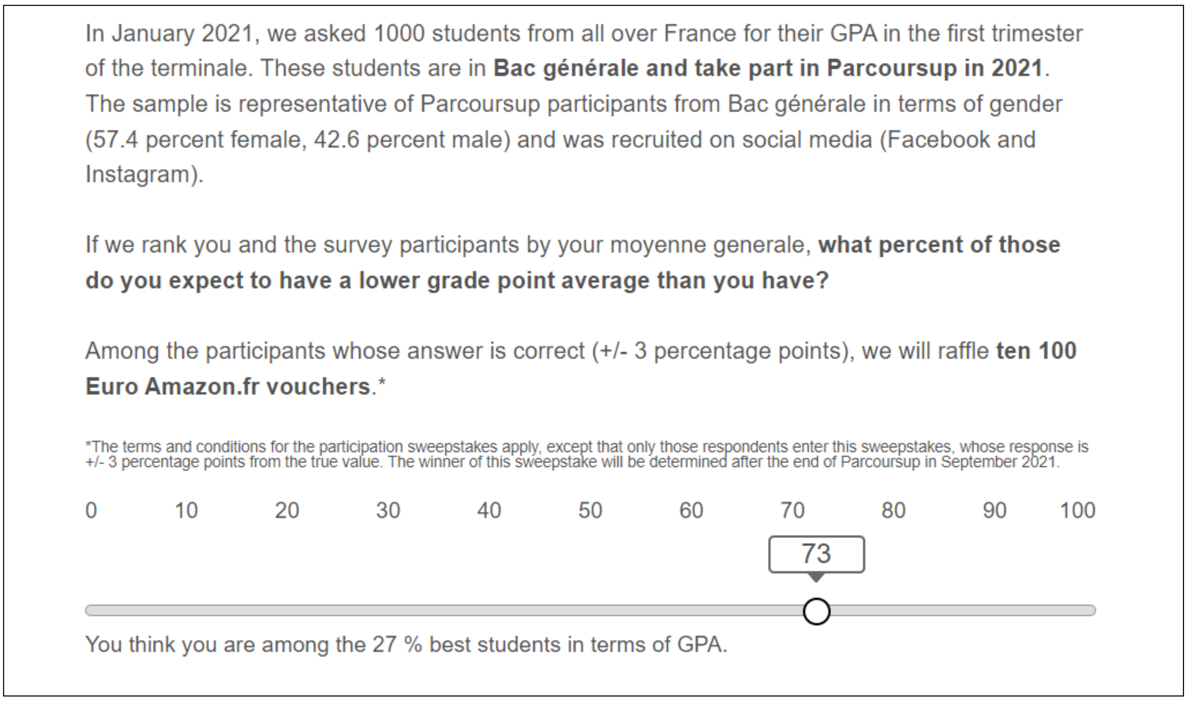
Notes: Subjects were asked whether they had coordinated their applications with their peers.

Figure F.10: Screenshot of question for GPA and type of *bac*



Notes: Subjects were asked for their *bac* type and their GPA in the previous trimester.

Figure F.11: Screenshot of question for rank in the GPA distribution



In January 2021, we asked 1000 students from all over France for their GPA in the first trimester of the terminale. These students are in **Bac générale and take part in Parcoursup in 2021**. The sample is representative of Parcoursup participants from Bac générale in terms of gender (57.4 percent female, 42.6 percent male) and was recruited on social media (Facebook and Instagram).

If we rank you and the survey participants by your moyenne generale, **what percent of those do you expect to have a lower grade point average than you have?**

Among the participants whose answer is correct (+/- 3 percentage points), we will raffle **ten 100 Euro Amazon.fr vouchers**.*

*The terms and conditions for the participation sweepstakes apply, except that only those respondents enter this sweepstakes, whose response is +/- 3 percentage points from the true value. The winner of this sweepstake will be determined after the end of Parcoursup in September 2021.

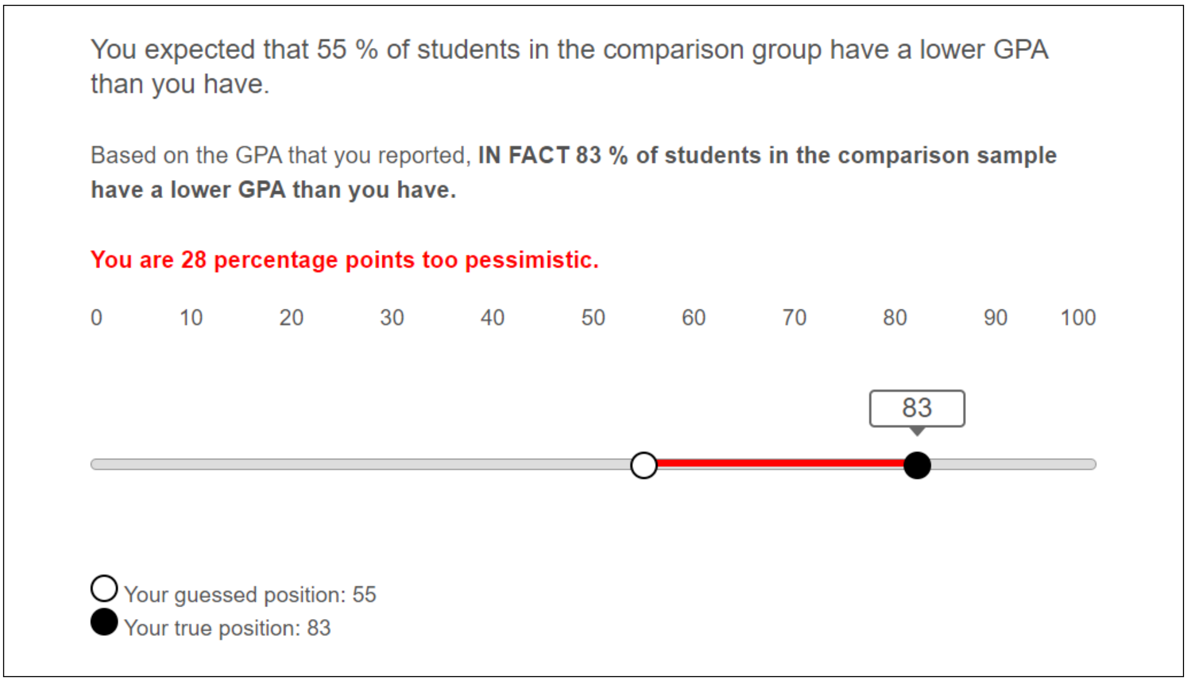
0 10 20 30 40 50 60 70 80 90 100

73

You think you are among the 27 % best students in terms of GPA.

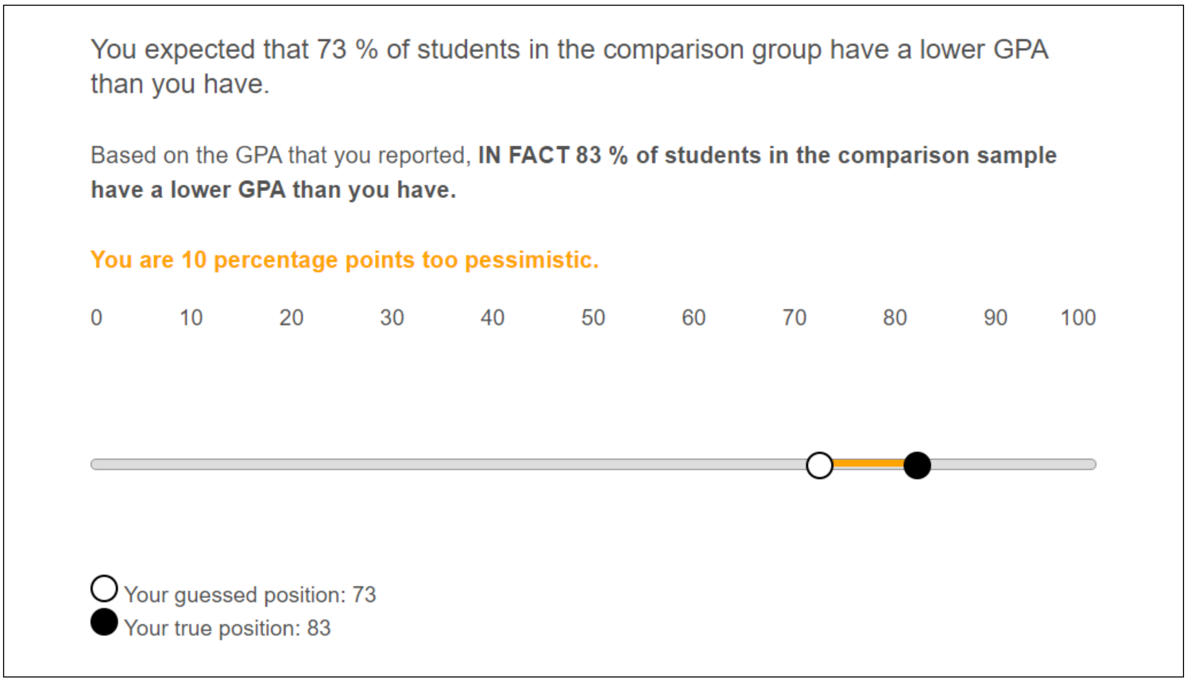
Notes: Subjects were incentivized to guess their rank in the GPA distribution.

Figure F.12: Screenshot of grade feedback (red)



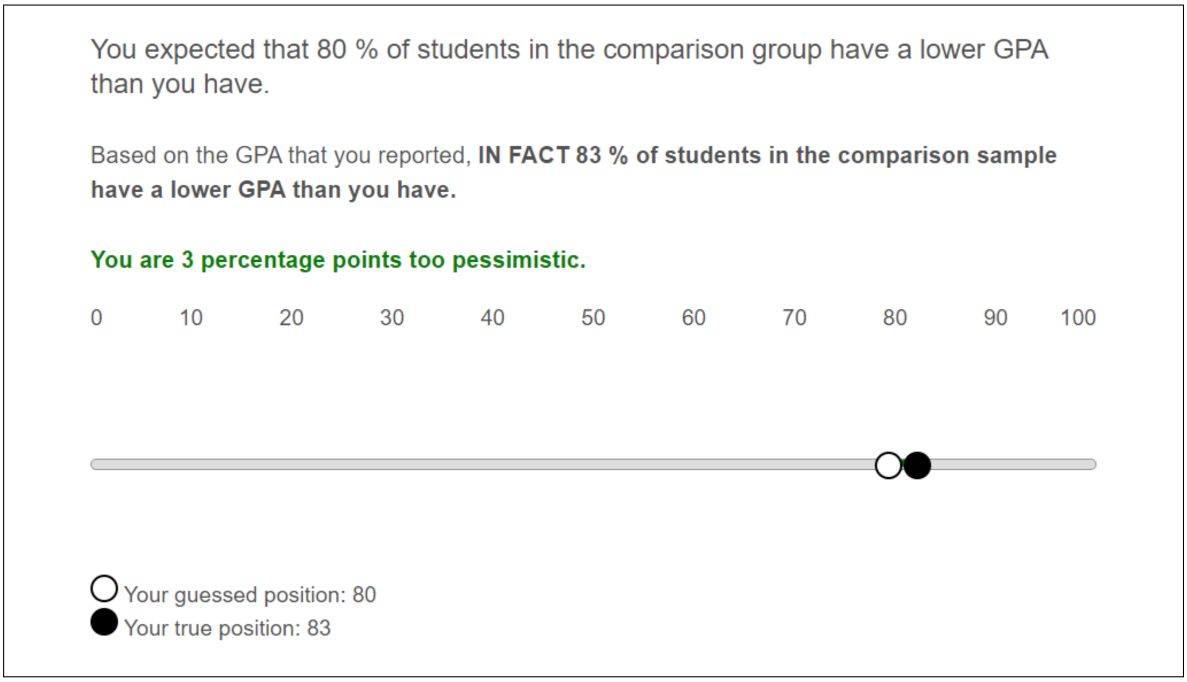
Notes: In this example, the subject underestimated their rank by more than 10 percentiles.

Figure F.13: Screenshot of grade feedback (yellow)



Notes: In this example, the subject underestimated their rank by 10 percentiles.

Figure F.14: Screenshot of grade feedback (green)



Notes: In this example, the subject underestimated their rank by less than 3 percentiles.

Figure F.15: Screenshot of mechanism knowledge quiz

Please select the statement that correctly describes the rules of Parcoursup. There is only one correct statement.

Among the participants who give the correct answer, we will raffle **ten 100 Euro Amazon.fr gift cards**.*

- By accepting the offer from a program, you renounce to receive any other offers in the furture.
- Accepting the offer from a program can reduce your chances of receiving an offer from another program you prefer in the future.
- Universities cannot withdraw a tentatively accepted offer, so there is no harm in tentatively accepting an offer and waiting for later offers.
- When you receive two offers (or more), you can accept both and wait for future offers to come.

*The terms and conditions for the participation sweepstakes apply, except that only those respondents enter this sweepstakes who give the correct answer. The winner of this sweepstake will be determined after the end of Parcoursup in September 2021.

Notes: Subjects were incentivized to choose the correct statement.

Figure F.16: Screenshot of mechanism knowledge feedback

You did not provide the correct solution.

Explanation

Accepting the offer from a program does not imply that this will be your final choice, nor that you renounce receiving other offers in the future (including offers from programs you may prefer). When you accept an offer while being on the waiting list of other programs, Parcoursup asks you which programs you prefer to the one you accepted. These programs are kept in your preference list.

The correct solution:

Universities cannot withdraw a tentatively accepted offer, so there is no harm in tentatively accepting an offer and waiting for later offers.

Explanation

Universities cannot withdraw an offer they made that has been accepted by a candidate. There is therefore no risk in accepting an offer. In addition, many candidates are on the waiting list of a program they prefer to the one they accepted. **The position on the waiting list can only improve over time.** Indeed, this position improves by one rank every time a candidate rejects an offer from this program. **It is therefore possible that a program you particularly like makes an offer to you very late in the process.** As a result, there is no risk in waiting until the end of the process and observe all offers that you could get. **Patience can only improve your chances of receiving an offer from your preferred program.**

Notes: In this example, the subject had chosen the wrong answer.

Figure F.17: Screenshot of bet on outcome

Please bet on the program that you think you will attend. This means that the program makes you an offer and that you accept that offer.

We will raffle **20 x 50 Euro Amazon.fr gift cards among those respondents for whom the expectation matches the final outcome.***

Paris, Sorbonne, Licence Droit

Lille, Université de Lille, Licence Droit

Angers, Université Angers, Licence Droit

Marseille, Aix-Marseille, Licence Droit

*The terms and conditions for the participation sweepstakes apply, except that only respondents are eligible to win who have predicted their final placement. After Parcoursup has ended (in September 2021), we will draw respondents and ask them to provide proof that they accepted an offer from the training that they predicted (e.g., by sending a screenshot from Parcoursup or a scan of the acceptance letter from the training). Only those respondents who reply within one week and can provide proof of acceptance, will win the gift card. If a person who was drawn cannot provide proof of acceptance or does not reply, we will draw a replacement winner until the 20 gift cards are distributed.

Notes: Subjects were incentivized to bet on the program they expected to attend.

G Pre-survey Instructions (translated from French)

Figure G.1: Screenshot of pre-screening questions

Are you currently in the terminale of BAC and expect to graduate in 2021?

Yes

No

Are you currently in BAC générale?

Yes

No

Do you plan to apply for Post-bac training programs via Parcoursup in 2021?

Yes

No

Are you 16 years or older?

Yes

No

Notes: Subjects were pre-screened as to whether they belonged to the target group. The survey only continued if they answered yes to all questions.

Figure G.2: Screenshot of welcome screen and consent form

Welcome to the survey

You are invited to take part in a research study about Parcoursup. The study is administered by researchers at the University of Lausanne, Switzerland, and funded by the Swiss National Science Foundation (Project number 189152).

The study consists of a **survey of around 3 minutes** that we ask you to complete. **You can only participate in the survey if you are doing your BAC in June 2021 and plan to take part in Parcoursup in 2021**.

If you participate in the survey, you will enter a raffle and **can win one of ten gift cards of 50 Euro each** that can be redeemed at Amazon.fr. Only participants who complete the survey and provide correct information can participate in the raffle.

This survey is part of a larger project about applicants' behavior in Parcoursup. If you meet the requirements, we will invite you for **another survey in February/March 2021 (for which a separate raffle of giftcards will be conducted)**.

▸ Privacy Policy

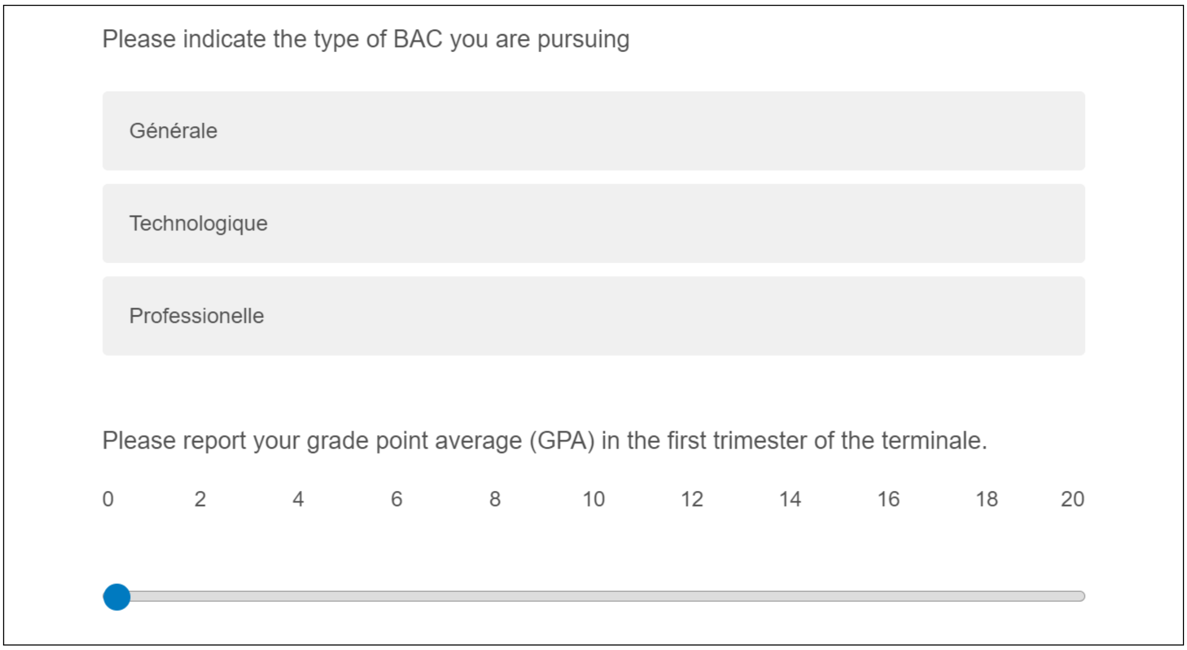
Please indicate if you have read and understood the information in this form and if you consent to participate in the study.

Yes, I consent to participate in this study

No, I do not agree to participate in this study

Notes: Subjects are welcomed and asked to consent to the privacy policy. The privacy policy informed participants that their responses would be matched to administrative data and pseudonymized afterwards. On the next screen, they were asked for their demographic details, similar to Figure F.2 below (omitted here).

Figure G.3: Screenshot of question on *bac* type and GPA



Please indicate the type of BAC you are pursuing

Générale

Technologique

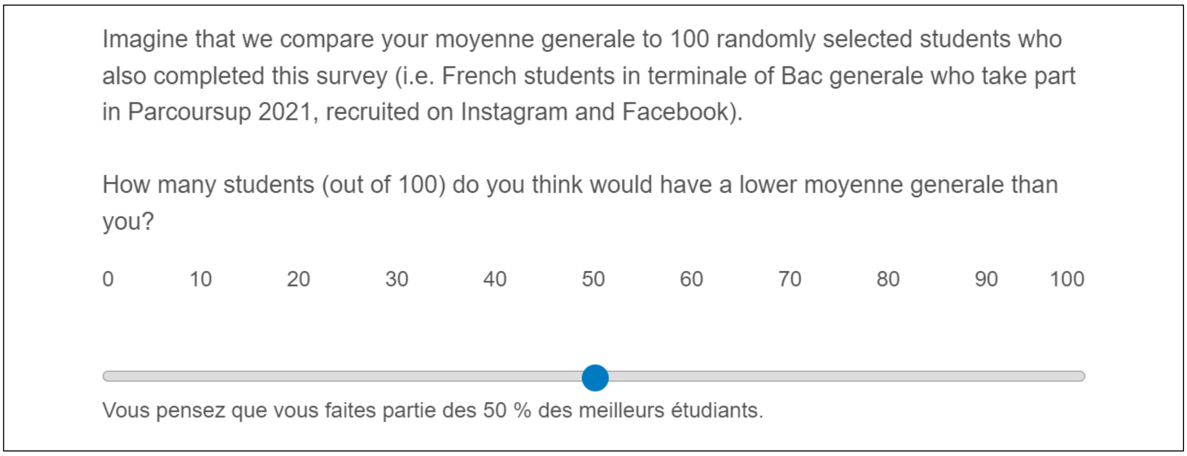
Professionelle

Please report your grade point average (GPA) in the first trimester of the terminale.

0 2 4 6 8 10 12 14 16 18 20

Notes: Subjects were asked for their *bac* type and their GPA in the previous trimester.

Figure G.4: Screenshot of question on guessed rank in the GPA distribution



Imagine that we compare your moyenne generale to 100 randomly selected students who also completed this survey (i.e. French students in terminale of Bac generale who take part in Parcoursup 2021, recruited on Instagram and Facebook).

How many students (out of 100) do you think would have a lower moyenne generale than you?

0 10 20 30 40 50 60 70 80 90 100

Vous pensez que vous faites partie des 50 % des meilleurs étudiants.

Notes: Subjects were asked to guess their rank in the GPA distribution (only hypothetically).