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Opening the Black Box of College Major Choice: Evidence from an Information Intervention

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We study the importance of job-related and non-job-related factors in students' college major choices. Using a staggered intervention that allows us to provide students information about many different aspects of majors and to compare the magnitudes of the effects of each piece of information, we show that major choices depend on a wide set of factors. While students do not change their choices when given information about earnings, they do update their choices when told about other aspects of majors. The non-job-related factors, such as a major's course difficulty and gender composition, are important to students but not well-known to them. We also find that male and female students value different major characteristics in different ways. Lower-ability females flee from majors that they learn are more difficult than they had believed, while other students do not. On the other hand, male students are averse to being taught by female faculty, while female students are not. Overall, our results show that a variety of factors are important for students' major choices and that different factors matter for male and female students.

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Opening the Black Box of College Major Choice: Evidence from an Information Intervention*

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Abstract

We study the importance of job-related and non-job-related factors in students' college major choices. Using a staggered intervention that allows us to provide students information about many different aspects of majors and to compare the magnitudes of the effects of each piece of information, we show that major choices depend on a wide set of factors. While students do not change their choices when given information about earnings, they do update their choices when told about other aspects of majors. The non-job-related factors, such as a major's course difficulty and gender composition, are important to students but not well-known to them. We also find that male and female students value different major characteristics in different ways. Lower-ability females flee from majors that they learn are more difficult than they had believed, while other students do not. On the other hand, male students are averse to being taught by female faculty, while female students are not. Overall, our results show that a variety of factors are important for students' major choices and that different factors matter for male and female students.

Keywords: college major choice, beliefs, job-related factors, non-job-related factors

JEL Classification: I21, I23, D83

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1 Introduction

The choice of college major is one of the most important economic decisions a person can make. Majors are associated with vastly different earnings after college (Altonji et al., 2012, 2016), and at least some of these differences are causal and can be larger than the payoff from attending a selective institution (Kirkeboen et al., 2016; Andrews et al., 2017). But majors also differ along many other dimensions, such as employment prospects, work-life balance, graduation probabilities, difficulty, and student composition.

Given the importance of the college major decision, there is a large literature that explores the determinants of major choice, identifying both job-related and non-job-related factors as important (see Altonji et al. (2012) and Patnaik et al. (2021) for reviews of this literature). While monetary returns to majors are important for students (Weinstein, 2020; Long et al., 2015; Montmarquette et al., 2002; Beffy et al., 2012), many papers argue that preferences of students are perhaps more important and can explain much of the observed gender gaps in major choices (Zafar, 2013; Akyol et al., 2017; Astorne-Figari and Speer, 2019; Ngo and Dustan, 2021; Dasgupta and Sharma, 2022). Yet these preferences are something of a black box. Identifying what factors influence major choice – and their relative importance – is difficult and requires strong assumptions if one uses observed major choices.

In this paper, we use subjective expectations elicitation (pioneered by Zafar (2013) and Stinebrickner and Stinebrickner (2014) in the context of major choice) and an information intervention to open this black box of college major choice. Using a staggered information intervention, we estimate and compare the importance of a wide set of factors for the major choices of college freshmen. We study both job-related (e.g., earnings, employment, industry, and work flexibility) and non-job-related (e.g., difficulty of coursework, gender composition of students and faculty, further education, and family outcomes) aspects of majors.

For our intervention, we recruit freshmen of a selective private university (Loyola Marymount University, or LMU) to participate in a survey early in their first semester of college. Students first indicate their probabilities of majoring in different categories of majors, then

are asked about their beliefs regarding various aspects of each major category.[1] They then receive seven information sets in a randomized order. These information sets were constructed from LMU-specific administrative data and two alumni surveys, so they are relevant to the student population in our intervention. After seeing each information set, students are re-asked their major choice probabilities. After all the information is provided, we once again ask students their beliefs regarding the various aspects of majors and their major choice probabilities.

Students' beliefs about most aspects of majors are different from the information we provide. While students' beliefs about earnings are "on average" similar to the the information we give, they overestimate (relative to the information) earnings in science and engineering majors and underestimate earnings in economics and political science majors. Students also expect that their earnings will be much higher than those reported for their *top* major, the major on which they put the highest probability at the beginning of the survey. For other major characteristics such as employment probabilities, gender composition, and the probability of having children 10 years after college, students' prior beliefs are far off on average. When provided information about these factors, students partially update their beliefs toward the information given. A simple Bayesian updating framework indicates that students put a significant weight to the information we provide (ranging between 33% and 66%).

Analyzing changes in students' stated major choices after each information set shows that the earnings and employment information set has the largest effect, and the gender composition information set the smallest effect, on students' major choices. However, since our information sets lump together different pieces of information, this analysis is insufficient to understand how individual pieces of information affect students' decisions. When we dig deeper to compare how changes in students' beliefs are related to changes in their major choices (a panel fixed effects estimation), it is the employment prospects, not the earnings, that matter for the students in our sample. We also find that the number of required credits to complete a major, gender composition of students, and future work flexibility are all im-

[1] We use "beliefs" and "subjective expectations" interchangeably throughout the paper.

portant determinants of college major choice. When we focus students' *top* majors, the effect sizes become larger, indicating that students are especially paying attention to information for majors they are strongly considering. Overall, our results show that many factors other than earnings, including non-job-related factors, influence major choice. Students care about both post-college outcomes and the in-college experience when choosing a major.

We draw two other main conclusions from our results. First, there are many college freshmen – about one-third of our sample – who are "sure" about their major, giving a 100% probability of majoring in a certain field at the beginning of the study. These students are generally not swayed by the information that we give them. "Unsure" students change their stated major choices in response to new information more frequently. Hence, universities and researchers may want to focus their efforts on unsure students if the goal is to influence major choice. This finding also informs us about the timing of the information interventions about major choice. Information interventions about majors are likely to be more effective if they are done prior to college.

Second, male and female students are motivated by different factors in their major choices and sometimes may have opposing preferences about those factors. Both males and females are initially misinformed about most aspects of majors, but they respond differently to the information they are given. Two examples stand out: faculty gender composition and perceived course difficulty. While both male and female students move slightly toward majors that have a higher share of female students than they first thought, the males move *away* from majors with more female faculty, whereas female students do not react to the information about faculty gender. Lower-ability female students flee majors that have more difficult coursework than initially expected; other students, including low-ability males, are not averse to majors with more difficult courses.

The key contribution of this paper is the inclusion of a wide variety of non-job-related aspects of majors along with job-related aspects of majors in the same information intervention, which allows us to cleanly compare these aspects. Like Wiswall and Zafar (2015a), who study the effects of providing earnings information on students' major choices, our design

allows us to compare the exogenously manipulated changes in students' reported probabilities of majoring in different fields with the changes in their beliefs about various aspects of these fields. In addition to earnings and employment related information, though, we provide information about a wide set of job- and non-job factors. We are then able to disentangle the relative importance of these different pieces of information for major choice.

Our work most closely relates to the literature that uses subjective expectations and/or information interventions to understand the determinants of college major choice. A number of papers have tested the impact of giving students information about major-specific earnings or employment prospects (e.g., Wiswall and Zafar (2015a); Baker et al. (2018); Conlon (2021); Ding et al. (2021)), and others have provided students with other job-related information (or have asked about hypothetical job scenarios) touching on work flexibility, job relevance, job stability, and job satisfaction (Wiswall and Zafar, 2018; Carrell et al., 2020; Ajzenman et al., 2021). Other papers explore these ideas with the help of structural modeling (Arcidiacono et al., 2020; Wiswall and Zafar, 2021).

However, these experimental papers have rarely included information about *non-job-related* major characteristics, despite substantial evidence from the non-experimental major choice literature that these factors are important (Minaya, 2017; Kugler et al., 2021; McEwan et al., 2021).[2] A number of papers provide evidence that a student's peers (Fischer, 2017; Zölitz and Feld, 2018) and the gender composition of students and faculty (Hoffmann and Oreopoulos, 2009; Carrell et al., 2010; Griffith and Main, 2019; Breda et al., 2020; Canaan and Mouganie, 2021; Delaney and Devereux, 2021; Bostwick and Weinberg, 2022) can impact major choice. Major-switching patterns suggest that course difficulty and grading standards can lead students to change majors (Astorne-Figari and Speer, 2019; Kugler et al., 2021).[3] Our

[2]Wiswall and Zafar (2021) collect subjective expectations about marriage prospects, potential spousal characteristics, and fertility in a survey setting, but they do not provide information about these factors which is necessary to create the exogenous variation in beliefs.

[3]There is also a strand of this literature evaluating the role of siblings and parents in college major choice (Altmejd et al., 2021; Carlana et al., 2021). The state of the overall labor market (Ersoy, 2020; Blom et al., 2021) and local labor market shocks (Weinstein, 2020) also influence what students study. Our study does not address these factors.

information treatments are inspired by this literature, and we contribute by experimentally testing the relevance of different pieces of information on students' major choices.

The paper proceeds as follows. Section 2 lays the design of our information intervention and a summary statistics of our sample. Section 3 presents our findings. Section 4 concludes.

2 Intervention Design

2.1 Design Overview

Freshmen at Loyola Marymount University (LMU), a selective private university in Los Angeles, California, were invited to participate in an online survey about major choice early in their first semester. We focus exclusively on freshmen so that the students are unlikely to have complete knowledge of majors' characteristics. This timing also ensures that we have many respondents who are still unsure about their major at the time of the survey.[4]

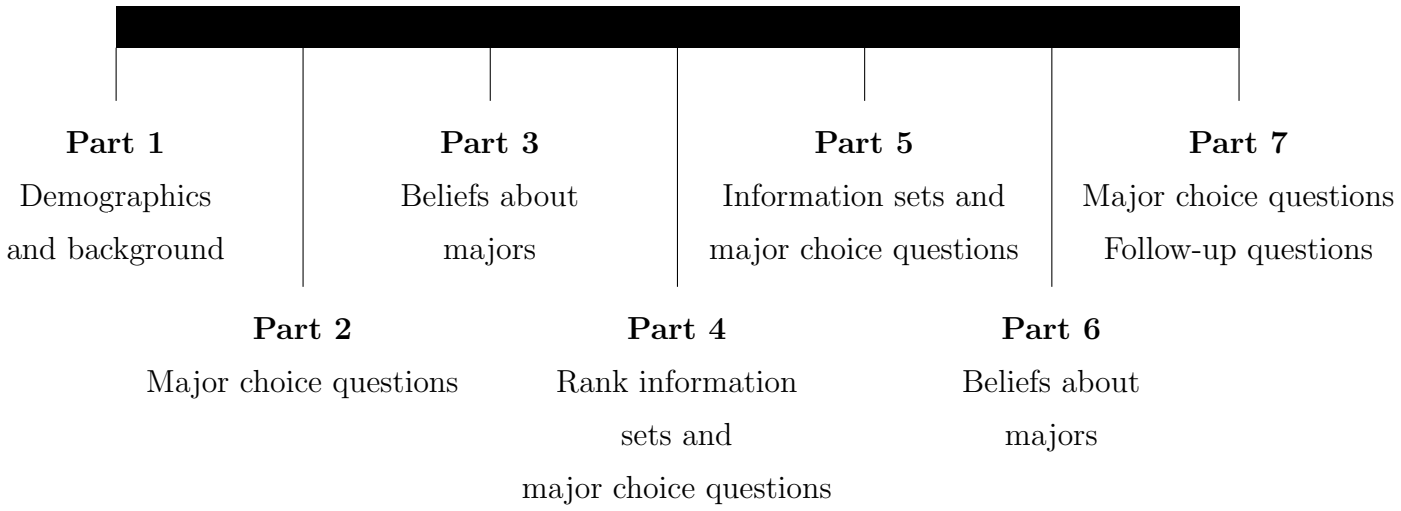
The survey has seven parts, summarized in Figure 1.[5] The first part of the survey asks students questions about their demographics, educational background, and family characteristics. In Part 2, we ask students about their major choice using eight different categories of majors offered at LMU. In Part 3, we ask students their opinions and beliefs about various aspects of these major categories. Then, students rank information sets that they will receive in the next part of the survey in terms of importance to them. In Part 5, students receive information regarding different aspects of majors in a random order. After each information set, we repeat the major choice questions from Part 2. In Part 6, we re-ask students their beliefs about various aspects of each major category. In Part 7, students answer some follow-up questions. Within three days of completing the survey, students are sent $30 in the form of Amazon e-gift cards.

[4]According to administrative data obtained from LMU, 78% of students who entered as first-time freshmen from 2017 to 2019 declared a major when they enter LMU, and 19% of those students switched to a different major by the beginning of their third year.

[5]The survey is accessible here: https://mylmu.co1.qualtrics.com/jfe/form/SV_8G1E792jjyWIiY6.

The result of this design is that we have students' beliefs about different aspects of majors and their stated major choice probabilities, measured both before and after the whole set of information is provided. This design allows us to conduct panel fixed effects estimations. We also have students' stated probabilities of majoring in each field both before and after receiving *each* of the information sets, which are given in random order, allowing us to compare the effects of the various information sets on major choices. Rather than giving a different set of information to different groups of students – which would require a huge sample given the information we want to provide – we design an intervention in which students receive all information sets. This methodology allows us to create a sample much larger than the number of students actually surveyed, because we have several observations per student. Given the costs and logistics of performing an information intervention at this scale, this design choice was necessary. A potential drawback of this design is that we ask students the same major choice question ten times, which might lead to decision fatigue or increased experimenter demand effects.

Figure 1: Survey Parts



2.2 Survey Details

Part 1 The first part of the survey asks students questions about their demographics, educational background, and family characteristics. We ask students their gender, age,

ethnicity, highest level of education of father and mother, high school GPA, high school rank, SAT/ACT scores, intended field of study, whether they have declared a major, financial aid status, and annual family income.

Part 2 In the second part of the survey, we ask students the probability that they will graduate from LMU with a degree in each of the eight major categories (the *major choice* question). For simplicity, we ask them to assume that they will certainly graduate with a degree and to consider only their primary major when answering this question. Hence, their answers to this question must add up to 100%.[6] The *major choice* question forms the basis for our main dependent variables.

There are 52 majors offered at LMU in total, which we put into eight categories to use in our survey questions: *Biology, Biochemistry, and Health Sciences*; *Physical Sciences, Engineering, and Computer Science*; *Communication and Fine Arts*; *Film and Television*; *Business*; *Economics and Political Science*; *Psychology and Sociology*; and *Humanities and Other Social Sciences*. We choose these categories of majors, rather than asking about every major offered at LMU separately, to keep the survey manageable. There is a trade-off between simplicity and comprehensiveness when choosing major categories. Using a smaller number of major categories would put very different majors together and make the information more difficult to interpret for students, whereas using a larger number of major categories would make the survey too long.[7] Appendix Figure 1 shows which specific majors are in each category according to our classification. Students are shown this figure before they answer the *major choice* questions.

When classifying majors into these eight categories, we keep "similar" majors together in the same category. We consider major characteristics, which school these majors belong to at LMU, and the number of students in each category. According to the data obtained

[6]According to the university's official statistics, the actual share of freshmen at LMU who graduate with a degree from LMU is about 80%.

[7]In comparison, Wiswall and Zafar (2015a) have only four major categories and an additional category for not graduating, and Arcidiacono et al. (2012) have six categories.

from the Registrar's Office in Fall 2020, the eight major categories range from 511 students (*Biology, Biochemistry, and Health Sciences*) to 1,791 students (*Business*).

Part 3 In the third part of the survey, we ask students their beliefs about various aspects of each major category. We ask students 15 questions about each major's difficulty, gender composition (both students and faculty), graduate school probabilities, employment prospects, earnings, most common industry, workplace characteristics, and family status. Table 1 lists these questions. We elicit students' beliefs about themselves for most of the questions, with the exception being the questions for which we have administrative data (questions 2-5 in Table 1). That is, rather than asking what they think about students majoring in *Business*, we ask them to imagine that they are graduating with a degree in *Business*. The answers to these belief questions are not incentivized. Although incentivized belief elicitation is a common technique, it is not feasible in our context due to two reasons. First, most of our belief questions are about outcomes that will happen ten years after graduation. Second, even if we observe the outcomes, we can only observe them for the chosen major, but not the counterfactual ones. Grewenig et al. (2020) find that incentivizing belief accuracy about average earnings by professional degree does not have an effect on beliefs.

Part 4 In this part of the survey, we ask students what information is the most important to them. Students are told that they will receive information about various aspects of majors in the next part of the survey and are asked to rank which information sets they would most like to see. Appendix Figure 2, which students are shown before they rank the information sets, displays what type of information is contained in each set. To incentivize truthful ranking, we inform students that their rankings might affect which information set they will see in the next part of the survey without providing them details about the process. Then, we randomly select 5% of students to only receive their highest-ranked information set, while the remaining 95% of students receive all information sets in a randomized order. Before moving to Part 5, we re-ask students the *major choice* question, in case thinking about different aspects of majors in Parts 3 and 4 has affected their major choices.

Table 1: Belief Questions

Question	Answer Choices
1. What do you think about the average difficulty of the courses in each of the following major categories?	(1-10, 1: very easy, 10: very difficult)
2. What is the average required semester hours that need to be completed within the program for each of the following major categories	range of hours
3. What percentage of the LMU freshmen in each of the following major categories do you think graduate from LMU (with any major) within 4 years?	0-100
4. What percentage of the LMU students in each of the following major categories do you think is female?	0-100
5. What percentage of the LMU faculty in each of the following major categories do you think is female?	0-100
6. What is the probability that you will continue your education immediately after graduation if you major in the following major categories?	0-100
7. What is the probability that you will have a graduate degree (masters, professional, PhD, etc.) 10 years after graduation if you major in the following major categories?	0-100
8. What is the probability that you will be employed right after graduating from LMU with a bachelor's degree if you major in the following major categories?	0-100
9. What is the probability that you will be employed full-time 10 years after graduation if you major in the following major categories?	0-100
10. What will be your annual earnings 10 years after graduation if you major in the following major categories?	range of earnings
11. What is the most likely industry that you will work in 10 years after graduation if you major in the following major categories?	industry categories
12. What is the probability that you will work in a job 10 years after graduation where you agree or strongly agree with the statement "my current job is flexible in terms of availability of part-time work" if you major in the following major categories?	0-100
13. What is the probability that you will work in a job 10 years after graduation where you agree or strongly agree with the statement "my current job has work-life balance" if you major in the following major categories?	0-100
14. What is the probability that you will be single 10 years after graduation if you major in the following major categories?	0-100
15. What is the probability that you will have at least one child 10 years after graduation if you major in the following major categories?	0-100

Notes: For questions 6-15, students were told to assume that they will certainly graduate with a degree from LMU. Students were told to answer question 10 by disregarding inflation and by assuming that they will be full-time employed 10 years after graduation.

Part 5 Students are provided with the information sets in a randomized order. The exact information provided can be found in Appendix Figures 3-9. Students are told to examine the information carefully since it might affect their beliefs and major choices. To alleviate potential experimenter demand effects, students are also told that it is normal if some of the information provided does not change their beliefs and major choices. After each information set, we repeat the *major choice* question. Students are not reminded of their earlier answers to this question.

To construct the information sets, we use three sources, as described in Appendix Table 1. First, we obtained publicly available data from the Registrar's Office and the Office of Institutional Research, and we collected data from department websites. Second, we com-

piled data from the First Destination Survey (FDS) 2019 and 2020. The FDS is conducted by LMU's Career and Professional Development Center and asks graduating LMU students questions about their career plans. The response rate for the FDS is 51.3% for the years we have used. Finally, since most of the information we want to provide was not readily available, we conducted a survey with LMU graduates of 2010, 2011, and 2012 to measure outcomes approximately ten years after graduation. To do so, we obtained majors and personal email addresses of graduates of undergraduate programs of those three years from the Registrar's Office. We then sent an invitation email to take a short survey to 3,918 graduates in total. Overall, 203 graduates took our alumni survey.[8]

Part 6 In this part, we repeat the belief questions of Part 3 to see if and how students' beliefs about the major factors have changed after seeing the information. Students are not reminded of their prior answers.

Part 7 Finally, we ask students the *major choice* question one last time. We also ask them whether they have paid attention to the questions and information throughout the research study and which information (if any) they think was the most important at changing their thinking about major choice.

2.3 Implementation

An invitation email to participate in an online research study about major choice was sent to all freshmen enrolled at LMU in Fall 2021 (1,677 students). The email included a survey link. Students were given fifteen days to participate, and we sent them two reminder emails. Students were told to complete the survey in one sitting in a quiet place using a computer. Surveys were implemented through Qualtrics. At the beginning of the survey, students had to electronically sign an informed consent form and declare that they are age 18 or older to

[8]Since the email addresses were collected by the Registrar's Office at the time of enrollment, many of them were outdated. Consequently, delivery was unsuccessful for 1,489 of these graduates. We tried to reach out to the graduates with invalid email addresses through LinkedIn. But this task is challenging since LinkedIn only allows a small number of messages to be sent to non-contacts. We messaged 39 graduates through LinkedIn direct message and sent an additional 82 connection requests. We have received 14 responses from this LinkedIn sample and include those responses in the information sets. The alumni survey is accessible here: https://mylmu.co1.qualtrics.com/jfe/form/SV_6ujkPn6U1KYhj0i.

be able to continue with the research study. Between Parts 3 and 4 and between Parts 5 and 6, students were told to take three-minute breaks, enforced through Qualtrics, and students could also take longer than three minutes. At the end of the survey, we collected consent for obtaining administrative records. The median student took 62 minutes to complete the survey.

2.4 Summary Statistics

Table 2 presents summary statistics for our sample.[9] Column 1 shows the average values of answers to Part 1 survey questions for the 270 students who completed all parts of the research study.[10] The most common intended field of study is *Business* (19.5%), followed by *Psychology and Sociology* (16.5%). About 78% of students have officially declared a major.

Columns 2 and 3 split the sample into students who are unsure about their major and those who are sure. We define "sure" as putting a 100% probability on majoring in a certain field in Part 2, prior to the information provision. 84 students (32%) were sure of their major, while 186 (68%) were unsure. Even the unsure students claim to have a good idea of what they will major in; only 28% put less than 80% probability on their top intended major. Column 6 shows that the sure students are significantly more likely to report that they have officially declared a major, but the fields of study for sure and unsure students are not statistically different. Columns 4 and 5 look at male and female students separately. 65% of students in our sample are female. There are some differences in terms of intended field of study between males and females, as one might expect. Males are more likely to major in *Physical Sciences, Engineering, and Computer Science*, for example, while females are more likely to major in *Psychology and Sociology*.

[9] Appendix Table 2 compares our sample to the freshmen cohort of 2021 at LMU and to the national data.

[10] Overall, 387 students attempted to take our survey. 51 students only opened the survey link but did not proceed to the next page, 40 students started but did not complete the survey, 3 students did not give consent, and 19 students could not continue because they were under age 18. Our survey was sent only to freshmen, but 4 non-freshmen took the survey and were thus dropped. Those who finished and did not finish the survey are statistically similar on most characteristics, although those who finished the survey are more uncertain of their intended major. A randomly-chosen 11 students were only provided with their highest ranked information set to ensure incentive compatibility in Part 4 of the survey, so any analysis that involves information sets has 259 students instead of 270 students.

Table 2: Summary Statistics

	(1) All	(2) Unsure	(3) Sure	(4) Male	(5) Female	(6) p-values (2)=(3)	(7) p-values (4)=(5)
Sure about major	.311	0	1	.333	.291	N/A	.485
Female	.648	.667	.607	0	1	.345	N/A
Race							
Asian	.163	.172	.143	.178	.16	.549	.714
Black	.093	.102	.071	.078	.103	.422	.51
White	.407	.409	.405	.389	.417	.953	.659
Hispanic	.148	.145	.155	.144	.143	.838	.972
Multi-race	.152	.129	.202	.178	.137	.121	.383
Other	.037	.043	.024	.033	.04	.441	.788
Age	18.15	18.15	18.16	18.2	18.13	.933	.131
Household Income (in thousands)	232	227	244	256	214	.504	.085
Father college graduate	.644	.672	.583	.667	.64	.16	.668
Mother college graduate	.852	.844	.869	.844	.851	.595	.881
Father has Master's or above	.256	.28	.202	.211	.274	.18	.264
Mother has Master's or above	.367	.376	.345	.322	.389	.625	.29
High School GPA	3.777	3.779	3.774	3.766	3.784	.875	.499
High School Rank							
Top 1%	.03	.032	.024	.022	.034	.706	.588
Between Top 1% and Top 10%	.337	.344	.321	.411	.303	.717	.079
Between Top 10% and Top 25%	.47	.462	.488	.411	.503	.696	.158
Between Top 25% and Top 50%	.137	.134	.143	.144	.126	.852	.671
Between Top 50% and Top 75%	.026	.027	.024	.011	.034	.884	.267
Took SAT or ACT	.433	.425	.452	.444	.411	.673	.608
Officially declared a major	.781	.747	.857	.778	.777	.043	.991
Intended Field of Study							
Biology, Biochemistry & Health Sciences	.13	.108	.179	.089	.154	.108	.137
Physical Sciences, Engineering & CS	.07	.086	.036	.122	.046	.136	.022
Communication and Fine Arts	.111	.129	.071	.089	.126	.164	.372
Film and Television	.13	.108	.179	.178	.097	.108	.06
Business	.196	.183	.226	.233	.177	.408	.277
Economics and Political Science	.078	.086	.06	.1	.069	.454	.372
Psychology and Sociology	.167	.167	.167	.056	.223	1	0
Other Social Sciences	.044	.043	.048	.011	.057	.866	.076
Uncertain	.074	.091	.036	.122	.051	.107	.039
Observations	270	184	86	90	175	270	265

Notes: Column 1 is all students who completed our survey. Columns 2 and 3 are students who are unsure and sure about their major choices, respectively. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Columns 4 and 5 are male students and female students, respectively. Column 6 tests the equality of means across sure and unsure students and Column 7 tests the equality of means across male and female students.

3 Results

We begin our analysis by looking at how well-informed students were before receiving the information, and then investigate which information sets were most important to students and most powerful in changing their stated major choices. After that, we look at the individual pieces of information and ask how students updated their beliefs with the new information and how those updated beliefs translated into changes in stated major choices. Finally, we zoom out to see how the entire intervention affected students' stated major choices.

3.1 Students' Initial Beliefs

We would only expect a change in major choices if students' beliefs were actually changed by the information we give them, which requires that the information is new to students. Table 3 column 1 presents the information given to students, and column 2 presents students' prior beliefs elicited in Part 3 of the survey across all majors for each of the belief questions. Comparing these columns, we see that students' prior beliefs are significantly different (at the 1% level) than the information given on all pieces of information except on required hours, graduation probabilities, female faculty ratio, and earnings (see column 7).[11]

For example, students overestimate (relative to the information we provide) the probability of having children 10 years after college by about 20 percentage points and underestimate the chance of being single. Students also overestimate the probability of going to graduate school immediately after college but underestimate the chances of having a graduate degree ten years later. On employment, students vastly underestimate the chances of being employed both right after college and ten years later. Comparing prior beliefs of unsure and sure students (column 8) and comparing prior beliefs of males and females (column 9), there are not many statistically significant differences. Appendix Table 4 shows the differences between the prior beliefs and the information, separately for the eight major categories. Students' beliefs are

[11] Appendix Table 3 shows the pairwise correlations between prior beliefs on different questions. Although most beliefs are only weakly correlated, we see strong positive correlations between "similar" pieces of beliefs, such as female student ratio and female faculty ratio ($\rho = 0.623$) and being employed immediately after graduation and working in a full-time job in 10 years ($\rho = 0.735$).

generally "off" about all majors, but while students are correct on average about earnings, they underestimate earnings in science and engineering fields but overestimate earnings in *Economics and Political Science*. Students also initially overestimate the difficulty of the sciences but underestimate the difficulty of several other majors. Their beliefs about student and faculty gender are all over the map. Overall, most of the information we provided is not well-known to the students.

Table 3: Information and Students' Prior Beliefs

	(1) Info	(2) All	(3) Unsure	(4) Sure	(5) Male	(6) Female	(7)	(8)	(9)
							p-values		
							(1)=(2)	(3)=(4)	(5)=(6)
Difficulty of courses	6.70	6.41	6.47	6.28	6.18	6.53	0.000	0.220	0.017
		(2.19)	(2.15)	(2.28)	(2.24)	(2.17)			
Required hours	54.00	52.37	52.31	52.48	55.92	50.29	0.259	0.959	0.072
		(27.58)	(26.60)	(29.62)	(28.07)	(27.35)			
Graduation probabilities	75.12	73.12	72.18	75.20	76.03	71.84	0.110	0.276	0.094
		(23.12)	(22.84)	(23.60)	(20.65)	(23.94)			
Female student ratio	55.88	53.37	52.76	54.71	52.62	53.86	0.000	0.095	0.255
		(16.53)	(16.54)	(16.43)	(14.78)	(17.50)			
Female faculty ratio	49.50	48.78	47.90	50.74	50.15	48.22	0.254	0.033	0.132
		(16.69)	(16.73)	(16.44)	(13.91)	(18.03)			
Pr. of continuing education	21.44	45.47	46.72	42.71	42.87	46.89	0.000	0.235	0.187
		(32.89)	(31.73)	(35.15)	(32.89)	(32.94)			
Pr. of holding a graduate degree	54.50	43.51	44.34	41.69	40.15	45.46	0.000	0.439	0.096
		(33.78)	(32.61)	(36.19)	(33.43)	(33.94)			
Pr. of initial employment	66.31	49.81	50.07	49.22	49.52	49.76	0.000	0.786	0.935
		(29.11)	(28.19)	(31.04)	(29.72)	(28.88)			
Pr. of employment in 10 years	88.12	64.52	65.19	63.03	65.85	63.64	0.000	0.544	0.521
		(32.11)	(31.23)	(33.96)	(32.25)	(32.31)			
Earnings in 10 years (in 10K)	11.40	11.83	12.30	10.79	12.69	11.44	0.484	0.170	0.410
		(13.77)	(14.92)	(10.71)	(15.45)	(12.98)			
Pr. of working in a flexible job	26.75	47.38	48.93	43.96	47.08	47.68	0.000	0.048	0.813
		(25.61)	(24.84)	(26.92)	(26.58)	(25.14)			
Pr. of having work-life balance	58.75	50.56	50.63	50.42	50.60	50.75	0.000	0.926	0.948
		(24.01)	(23.10)	(25.90)	(24.58)	(23.91)			
Pr. of being single	44.00	40.63	39.46	43.22	39.58	41.26	0.003	0.156	0.513
		(24.05)	(23.03)	(25.97)	(25.49)	(23.36)			
Pr. of having children	22.38	42.72	42.60	42.99	39.20	44.76	0.000	0.906	0.064
		(26.88)	(25.98)	(28.78)	(26.14)	(26.95)			
Observations		2260	1488	672	720	1400			

Notes: Column 1 presents the information provided to the students. Columns 2-6 presents mean prior beliefs elicited in Part 3 of the survey across all majors for each of the belief questions. Column 2 is the average beliefs of all students who completed our survey. Columns 3 and 4 are the average beliefs of students who are unsure and sure about their major choices, respectively. Columns 5 and 6 are the average beliefs of male students and female students, respectively. Standard deviations are reported in parentheses. Column 7 reports p-values for the average beliefs of all students being equal to information provided, Column 8 reports the p-values for equality of means across sure and unsure students, and Column 9 reports the p-values for equality of means across male and female students. P-values are based on a regression framework where the standard errors are clustered at the subject level.

3.2 What types of information are students interested in?

In Table 4, we look at which information sets students say are the most important to them, using their answers from Part 4 of the survey. The most important information set

to students is Employment & Earnings, which is ranked either first or second by 61% of students, with Major Difficulty ranking second at 40%. The Family Status information set is the least important, with only 10% rating it highly and 59% rating it at or near the bottom. Employment & Earnings is ranked highest by both males and females. As compared with females, males are more interested in seeing Industry Outcomes, while females are more interested than males in Major Difficulty, Gender Composition, and Workplace Characteristics. In results not shown here, we find that the rankings of "sure" and "unsure" students are largely similar.

Table 4: How Students Rank the Information Sets

Rank	Major Difficulty	Gender Composition	Graduate School	Employment & Earnings	Industry Outcomes	Workplace Characteristics	Family Status
1	26.7	6.3	4.81	33.0	16.7	6.3	6.3
2	13.3	14.4	11.5	28.2	14.1	14.4	4.1
3	13.0	11.9	18.2	16.3	12.6	19.3	8.9
4	17.8	13.3	14.8	13.0	16.3	15.6	9.3
5	12.6	16.7	20.0	6.3	18.2	14.1	12.2
6	10.7	18.5	19.3	2.2	13.0	21.9	14.4
7	5.9	18.9	11.5	1.1	9.3	8.5	44.8
Overall							
1st or 2nd	40.0	20.7	16.3	61.1	30.7	20.7	10.4
6th or 7th	16.7	37.4	30.7	3.3	22.2	30.4	59.3
Females							
1st or 2nd	44.0	24.0	17.7	56.0	22.9	25.7	9.7
6th or 7th	17.1	34.3	28.6	5.1	25.7	28.6	60.6
Males							
1st or 2nd	32.2	15.6	13.3	72.2	45.6	8.9	12.2
6th or 7th	16.7	43.3	33.3	0.0	14.4	35.6	55.7

Notes: Students' rankings of the information sets from Part 4 of the survey. Each column is an information set. First row presents the percentage of students who rank that information set first, second row presents the percentage of students who rank that information set second, etc. Each row adds up to 100%.

3.3 Which information sets are the most important at moving students' major choices?

We now look at which information sets have the largest impacts on students' major choice probabilities. Here we take advantage of the staggered survey design in which students are

asked their major choice probabilities before and after seeing each information set, which are given in an individually randomized order (Part 5 of the survey). We run regressions of the form

$$|\pi_{imt} - \pi_{imt-1}| = \sum_{k=1}^{7} \alpha_k IS_{it}^k + \epsilon_{imt} \tag{1}$$

where π_{imt} is probability of student i graduating with a degree in major category m elicited at time t where $t \in \{1, 2, 3, 4, 5, 6, 7\}$, IS_{it}^k is a dummy variable which is equal to 1 if the information set student i sees at time t is equal to information set k and 0 otherwise. In other words, we compare the major probabilities given by the student just before and just after seeing each information set. For each student, we have 56 observations (8 major categories times 7 observations per major). We cluster standard errors at the student level. The question here is which information sets had the largest impact on students' stated major choices, not the direction in which they moved students' choices, so we look at the absolute change in reported probabilities rather than the raw change.

Table 5 presents the results. Column 1 reports the results for the overall sample. The top panel shows the estimated absolute percentage point change in all major probabilities after seeing each information set, and the p-values comparing information sets pairwise are found below. The Employment & Earnings information set stands out from the others; its coefficient is the highest (1.9 ppts) and is statistically significantly different from all other coefficients. This finding is perhaps unsurprising given that students said it was the information set they most wanted to see. The Gender Composition set seems to be the least impactful, with the smallest coefficient (0.8 ppts), which is significantly different from most of the others. These coefficients are somewhat small, but that is expected since we have eight major categories, some of which are likely irrelevant for the student. In Section 3.6, we repeat this analysis restricting our sample to the students' top ranked major and find larger coefficients.

Table 5: Information Sets and Major Probability Changes

	Absolute Change in Stated Major Choice						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Unsure	Sure	Male	Female	p-values	
						(2)=(3)	(4)=(5)
Major Difficulty	1.119***	1.565***	0.155	1.026***	1.192***	0.000	0.711
	(0.217)	(0.304)	(0.153)	(0.351)	(0.280)		
Gender Composition	0.787***	1.044***	0.232	0.541**	0.930***	0.002	0.182
	(0.147)	(0.200)	(0.158)	(0.216)	(0.196)		
Graduate School	1.320***	1.448***	1.046**	1.012***	1.509***	0.464	0.292
	(0.237)	(0.266)	(0.481)	(0.352)	(0.316)		
Employment & Earnings	1.885***	2.099***	1.424**	1.523***	2.114***	0.320	0.309
	(0.287)	(0.314)	(0.603)	(0.443)	(0.377)		
Industry Outcomes	1.299***	1.629***	0.585*	1.230**	1.365***	0.028	0.811
	(0.249)	(0.324)	(0.347)	(0.486)	(0.291)		
Workplace Characteristics	1.151***	1.540***	0.311*	1.119***	1.195***	0.000	0.856
	(0.189)	(0.259)	(0.180)	(0.346)	(0.231)		
Family Status	1.047***	1.373***	0.345	0.442***	1.380***	0.015	0.01
	(0.223)	(0.292)	(0.306)	(0.147)	(0.332)		
p-values:							
difficulty=composition	0.068	0.050	0.098	0.158	0.231		
difficulty=graduate	0.412	0.683	0.056	0.935	0.387		
difficulty=employment	0.003	0.021	0.046	0.182	0.007		
difficulty=industry	0.399	0.803	0.264	0.649	0.468		
difficulty=workplace	0.851	0.913	0.516	0.724	0.992		
difficulty=family	0.765	0.537	0.584	0.103	0.554		
composition =graduate	0.026	0.149	0.079	0.143	0.081		
composition=employment	0.000	0.000	0.060	0.037	0.001		
composition=industry	0.036	0.058	0.362	0.193	0.096		
composition=workplace	0.070	0.068	0.744	0.145	0.258		
composition=family	0.233	0.236	0.744	0.573	0.164		
graduate=employment	0.028	0.030	0.440	0.158	0.082		
graduate=industry	0.940	0.581	0.417	0.621	0.704		
graduate=workplace	0.479	0.750	0.083	0.689	0.357		
graduate=family	0.307	0.794	0.224	0.102	0.728		
employment=industry	0.008	0.017	0.136	0.329	0.014		
employment=workplace	0.003	0.012	0.067	0.294	0.004		
employment=family	0.003	0.026	0.043	0.014	0.044		
industry=workplace	0.441	0.705	0.410	0.802	0.374		
industry=family	0.361	0.451	0.608	0.116	0.963		
workplace=family	0.686	0.620	0.926	0.057	0.595		
Observations	14504	9912	4592	4816	9464		
Subjects	259	177	82	86	169		

Notes: The dependent variable is the absolute difference between a student's stated probability of graduating with a degree in a major category elicited at time t versus at time t-1 in Part 5 of the survey ($|\pi_{imt} - \pi_{imt-1}|$). Independent variables are the information set dummies. We have 56 observations (8 majors*7 information sets) per student in each column. Column 1 is all students who finished our survey, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Standard errors are clustered at the subject level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Our interpretation of these results assumes that the effects of information sets are additively separable. It could be instead that the order in which the information sets are presented matters. To check on this, we look at order effects in Appendix Figure 10. The coefficients are similar to each other for the first six rounds of information provision, and the coefficient for the last round is slightly (but significantly) smaller than the rest, perhaps indicating fatigue by the end of the survey. We have also looked at order effects separately by information set and do not find any consistent patterns. Given these findings, the assumption of additive separability seems plausible.

Columns 2 and 3 of Table 5 reveal that the effect of each information set is larger for the unsure students than for the sure students (a joint test gives a p-value of 0.000), but the ranking of which information sets matter the most is largely the same. In columns 4 and 5, we see that women respond more to seeing information about family status than men do (1.3 ppts, compared with 0.4 ppts for men, and the difference is significant at the 1% level), which is in line with prior evidence that family expectations are particularly important for females' major choices (Wiswall and Zafar, 2021). While women respond slightly more to the Employment & Earnings information set than men do, this difference is not significant.

As a second test of the impact of the information sets, Appendix Table 5 shows estimates of the probabilities that seeing each information set led to *any* change in the elicited major probabilities. For all seven information sets, the provision of information led to significant changes in students' major probabilities. For example, after seeing the Employment & Earnings information set, 38% of students made at least some change to their probabilities (50% of unsure students and 12% of sure students). This shows that students are paying attention to each of the information sets.

So far, we have shown that many factors seem to matter in students' major choices, not just ones related to job and earnings outcomes. However, since each information set is a collection of several pieces of information, we cannot say yet what specific pieces of information are impacting students' beliefs or how those changes in beliefs relate to actual changes in stated major choices. We investigate the specific pieces of information in Sections 3.4 and 3.5.

3.4 How did information affect students' beliefs?

Now we assess how the information affected students' beliefs. We would only expect a change in major choices if students' beliefs were actually changed by the information, which requires that the information was both new and relevant to students. We have already seen that the information we provided was new to students (Section 3.1), so there is ample opportunity for students to update their beliefs if the information is relevant to them.

If we assume that our students are Bayesian updaters, that would imply that their posterior beliefs (elicited in Part 6 of the survey) are a weighted average of their prior beliefs and the information provided. In that case, regressing the change in beliefs (posterior-prior) on their surprise (information-prior) would tell us how students' revisions of beliefs relate to how surprised they are by the information (the learning rate).[12] The Bayesian model predicts that students' belief updates should be a linear function of their surprises. However, in a similar setup to ours, Wiswall and Zafar (2015b) find that the majority of students are not Bayesian updaters, so we do not want to impose this assumption.

Instead, we start with a non-parametric analysis in Figure 2, using a local linear regression to explore the relationship between belief updating (posterior-prior) and surprise (information-prior). There is a positive and roughly linear relationship between the surprise and belief updating for most of the questions, and students generally update in the direction of the information they receive. There are a few partial exceptions: initial graduate school probabilities, workplace flexibility in terms of having part-time work, and probability of having children ten years after graduation. For these, there are some students who are negatively surprised by the information but update positively (the portion of data in the upper left quadrant of the figures). This may echo some findings in Wiswall and Zafar (2015b), showing that students are more conservative in their updating when the news is negative rather than positive.

[12]Here we use the term "surprise" for the difference between the information and prior beliefs rather than "accuracy" because most of the beliefs are elicited about self, whereas the information belongs to LMU alumni. Furthermore, some of our information was taken from an alumni survey that may not be representative of all LMU alumni.

Because the relationships between surprise and updating are mostly linear, we proceed by regressing the updating of beliefs on the surprise in beliefs:

$$posterior_{imb} - prior_{imb} = \alpha_b + \gamma_b^*(information_{mb} - prior_{imb}) + \epsilon_{imb}$$

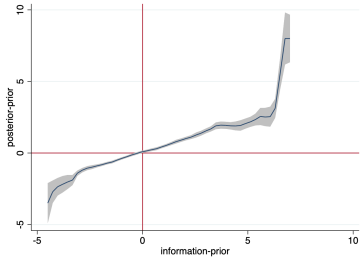
where $prior_{imb}$ is student i's beliefs about major m regarding topic b elicited before the information provision (Part 3), $posterior_{imb}$ is student i's beliefs about major m regarding topic b elicited after the information provision (Part 6), and $information_{mb}$ is the information provided to students about major m regarding topic b.

Appendix Table 7 Panel A shows the results for the whole sample. For all opinion questions, surprise coefficients are positive, ranging between 0.33 and 0.66, and statistically significant at the 1% level.[13] For example, the coefficient for the course difficulty belief measure is 0.49, indicating that average student puts a weight of 49% to the information provided and puts a weight of 51% to their prior belief. These results imply that students are updating partially rather than fully, which makes sense given that much of our information is about a sample of LMU alumni and not the students themselves. Differences in updating rates might be due the perceived precision of the information provided, the perceived confidence in prior beliefs, and/or varying levels of attention to the information provided. There might be some spurious correlation between the update and surprise due to students' beliefs getting closer to the information when they are asked twice, for example. Since we do not have a control group, we are unable to measure the degree of spurious correlation in our study. However, other information studies show that the magnitude of spurious updating is generally quite small (Cavallo et al., 2017; Cullen and Perez-Truglia, 2021). We have also checked for differential updating by the order of information provision and have not found any significant patterns. Panels B to E of the table show the results for the unsure, sure, male, and female students separately. Testing for the equality of coefficients across sure and unsure students and across male and female students, we find that they update similarly.

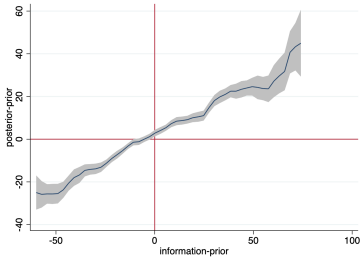
[13]The constant shows the mean change in beliefs in the case of no surprise. It captures the changes that are unrelated to the information content (for example, the same question being asked twice or thinking more about the question) and/or that are due to correlated learning.

Figure 2: Local Linear Regression of Change in Beliefs on Surprise

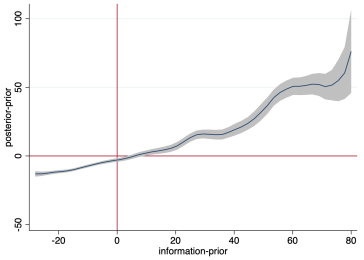
Difficulty of courses



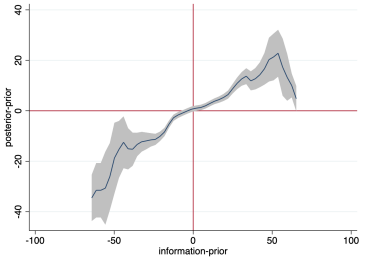
Required hours



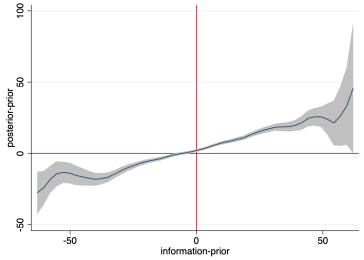
Graduation probabilities



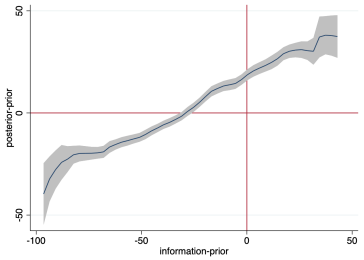
Female student ratio



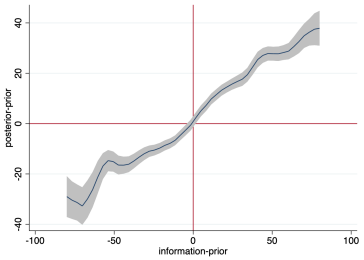
Female faculty ratio



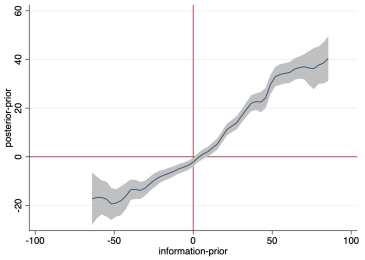
Cont. education at graduation



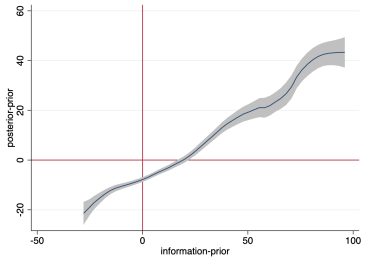
Having a grad degree in 10 years



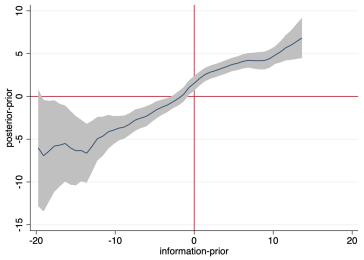
Being employed at graduation



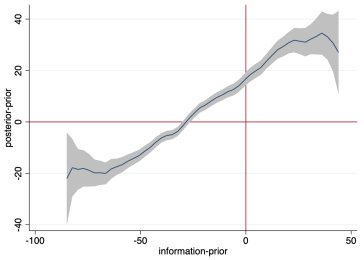
Being employed in 10 years



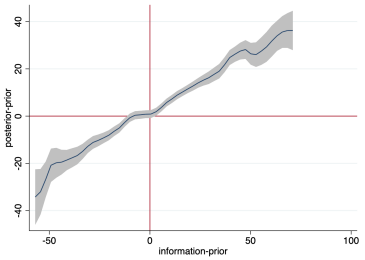
Earnings in 10 years



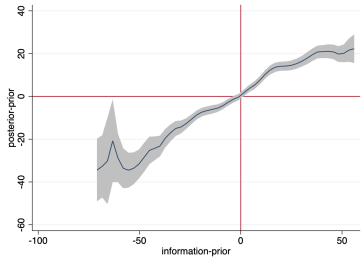
Workplace flexibility



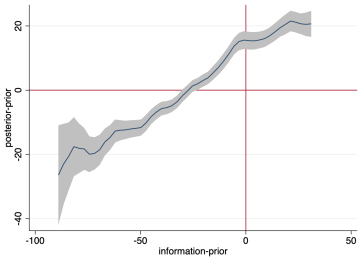
Work-life balance



Being single in 10 years



Having children in 10 years



Notes: 95% confidence intervals are depicted in the figures. The earnings surprise variable has a long left tail; so the bottom 5% of the observations were dropped for the local linear regression figure. All the statistics reported in the text and tables regarding earnings use all of the observations.

3.5 How do changes in beliefs relate to changes in major choices?

We have shown that most of the information we provided was actually new to students and that students' updated beliefs are a function of the information provided. Now we are ready to ask how those updated beliefs translated into changes in the students' major probabilities. To do this, we run the following regression:

$$\pi_{imFinal} - \pi_{imInitial} = \alpha_0 + \sum_{b=1}^{14} \alpha_b (posterior_{imb} - prior_{imb}) + \epsilon_{im} \tag{2}$$

where $\pi_{imFinal}$ is the probability of student i graduating with a degree in major category m elicited at the end of the experiment (Part 7) and $\pi_{imInitial}$ is the probability of student i graduating with a degree in major category m elicited at the beginning of the experiment (Part 2). For each student, we have 8 observations since we have 8 major categories. Standard errors are clustered at the student level.

We use the "final" and "initial" major choice probabilities here, so we are asking how students' changes in beliefs affected stated major choices after they have seen all information sets. Table 6 presents the results. Column 1 is all students, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. To make the magnitudes of the coefficients comparable, we standardize all of the changes in belief variables, so changes are given in standard deviations of the distribution of prior beliefs about each aspect of majors. We exclude the changes in beliefs about industry outcomes of different majors from this table, because we cannot meaningfully compare these magnitudes to the others.[14]

For the full sample, believing that a major has a higher share of female students translates into a higher probability of choosing that major, with a coefficient of 0.42. This means that for every standard deviation that beliefs change toward "more females in the major", the

[14]Given that some of the initial beliefs are strongly correlated, one might worry about multicollinearity, which could lead us to mistakenly conclude that some beliefs do not matter due to their large standard errors. Appendix Table 6 shows the pairwise correlations between different change in beliefs variables. All correlation coefficients are below 0.60, which indicates there is no severe multicollinearity. We also check the variance inflation factor (VIF), which is between 1 and 2 for all the variables in the regressions of Table 6, which suggests multicollinearity is not an issue, since variables whose VIFs are greater than 10 are counted as potentially problematic.

Table 6: How Changes in Beliefs Relate to Changes in Stated Major Choices

	Change in Major Choices (Final-Initial)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Unsure	Sure	Male	Female	p-values	
						(2)=(3)	(4)=(5)
Change in beliefs about							
Difficulty of courses (sd)	-0.354	-0.354	-0.238	0.409	-0.763**	0.773	0.013
	(0.235)	(0.341)	(0.215)	(0.350)	(0.314)		
Required hours (sd)	0.263**	0.451**	-0.035	0.220	0.331*	0.037	0.705
	(0.131)	(0.217)	(0.080)	(0.226)	(0.188)		
Graduation probabilities (sd)	0.091	0.127	0.084	0.101	0.125	0.856	0.945
	(0.140)	(0.225)	(0.058)	(0.279)	(0.189)		
Female student ratio (sd)	0.415**	0.769***	-0.316*	0.636*	0.334	0.000	0.487
	(0.183)	(0.237)	(0.173)	(0.376)	(0.221)		
Female faculty ratio (sd)	-0.204	-0.378	0.104	-0.670*	-0.043	0.135	0.175
	(0.209)	(0.293)	(0.133)	(0.387)	(0.253)		
Pr. of continuing education (sd)	-0.153	-0.282	0.078	0.137	-0.234	0.259	0.437
	(0.212)	(0.311)	(0.069)	(0.392)	(0.274)		
Pr. of holding a graduate degree (sd)	0.137	0.166	-0.026	-0.006	0.271	0.506	0.428
	(0.192)	(0.279)	(0.0712)	(0.240)	(0.256)		
Pr. of initial employment (sd)	0.288*	0.408*	0.0326	-0.080	0.488**	0.164	0.131
	(0.167)	(0.243)	(0.116)	(0.304)	(0.221)		
Pr. of employment in 10 years (sd)	-0.472***	-0.588**	-0.164	-0.155	-0.689***	0.115	0.116
	(0.165)	(0.235)	(0.130)	(0.238)	(0.242)		
Earnings in 10 years (sd)	0.056	0.088	-0.126	0.108	0.013	0.231	0.752
	(0.102)	(0.120)	(0.132)	(0.284)	(0.107)		
Pr. of working in a flexible job (sd)	0.301**	0.400**	0.230*	0.132	0.407**	0.439	0.265
	(0.126)	(0.178)	(0.128)	(0.165)	(0.183)		
Pr. of having work-life balance (sd)	-0.199	-0.284	-0.069	-0.078	-0.355	0.421	0.389
	(0.168)	(0.246)	(0.103)	(0.193)	(0.257)		
Pr. of being single (sd)	-0.0273	0.080	-0.203*	-0.018	0.026	0.173	0.882
	(0.117)	(0.174)	(0.114)	(0.272)	(0.134)		
Pr. of having children (sd)	-0.247*	-0.296	-0.159	-0.457	-0.143	0.547	0.435
	(0.133)	(0.199)	(0.110)	(0.375)	(0.149)		
Constant	0.010	-0.034	0.013	0.089	-0.078	0.709	0.336
	(0.073)	(0.116)	(0.050)	(0.144)	(0.099)		
Observations	2072	1416	656	688	1352		
Subjects	259	177	82	86	169		

Notes: The dependent variable is the difference between a student's stated probability of graduating with a degree in a major category elicited at the end of the experiment (Part 7) and the student's stated probability of graduating with a degree in that major category elicited at the beginning of the experiment (Part 2). Independent variables are the change in beliefs (posterior-prior) regarding the factors presented in each of the opinion questions. These variables are standardized using the standard deviation of the prior belief distribution of each opinion question. We have 8 observations per student in each column. Column 1 is all students who finished our survey, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Standard errors are clustered at the subject level and reported in parentheses. Appendix Table 8 shows that the results remain similar if we include a large set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

probability of majoring in that field goes up by 0.42 ppt. Believing a major requires more credit hours within the major also has a positive effect on choosing that major (0.26 ppt). It may be that students interpret more required hours as the major being more rigorous, or it could be that students prefer a more specific and less flexible course schedule (which might require less scheduling work on the students' part). Job flexibility is a positive factor, and having children after 10 years is a slight negative.

Interestingly, the earnings information does not have any significant effect on stated major choices, despite the Employment & Earnings information set being the most powerful of all information sets in Table 5. Recall that while students had accurate views about earnings on average, they were still surprised by the information for the individual majors and for their top majors. This seeming contradiction occurs because it is the employment related information from the Employment & Earnings information set that is actually moving students' choices. Confusingly, the change in beliefs about employment right after college and employment ten years later have opposite effects on major probabilities. Believing a major has a higher employment rate right after college has a positive effect on major choice (+0.29 ppt), but the opposite is true for employment ten years later (-0.47 ppt).

Looking at the changes in stated major choices of unsure students, we see that the exact same factors matter. Comparing the unsure and sure students in columns 2 and 3, we see that unsure students' major choices are more responsive to changes in their beliefs. We can reject the joint test of equality of means across the two groups with a p-value of 0.010.

The gender differences seen in columns 4 and 5 help us understand the overall effects. Four things stand out. First, female students are driving the odd results for employment probabilities. Female students are moving strongly toward the majors about which they are positively surprised regarding initial employment opportunities (+0.49 ppt), but the opposite effect for employment ten years after graduation is even stronger (-0.69 ppt). It may be that female students are seeing employment ten years later as a substitute for having children or being secure enough to engage in home production, although this is not showing up in the family variables, so we cannot say for sure that this is the reason. This explanation would be

consistent with results from Wiswall and Zafar (2021), who find that female students believe that completing a degree in science or business (relative to a humanities or social sciences degree) will reduce their chances of being married and their expected number of children.

Second, women have a strong negative reaction to majors that they learn have more difficult coursework (-0.76 ppt), while men move (insignificantly) toward the more difficult majors (this gender difference is statistically significant at the 5% level). This is the largest coefficient of all for women, meaning that changes in beliefs about course difficulty are having the largest effect on women's stated major choices of any information. This is in line with results from papers showing that women prefer less competitive environments (Buser et al., 2014) and could also reflect a gender gap in (over)confidence (Bertrand, 2011; Owen, 2022).

Third, male students are the main drivers of the results on the gender composition of the major. Male students move strongly toward majors that they learn have a higher share of female students than originally thought (+0.63 ppt) but equally away from majors that they learn have a higher share of female faculty than expected (-0.65 ppt), both significant at the 10% level. Female students also seem to prefer more female classmates, though not significantly, but have no preference regarding faculty gender. Males' seeming preference for fields with more male professors echoes the findings from the literature on faculty evaluations, where male students consistently give higher ratings to male instructors (e.g., Boring (2017)).

Finally, women seem to have a strong preference for majors associated with jobs that are flexible to part-time work (+0.41 ppt), while men do not have much reaction to this information. This would be consistent with other evidence on gender differences in job preferences, showing that women prefer more flexible jobs (Wiswall and Zafar, 2018; He et al., 2021). We interpret this with some caution since a large minority of students (38%) updated their beliefs about flexibility in the opposite direction of the information given.

The results of Table 6, particularly the gender differences in how students respond to the information about course difficulty, lead us to look for heterogeneity by academic ability. We would like to know if, for example, high-ability and low-ability women behave differently, or

if men and women of the same ability levels are behaving in the same way. The best measure of academic ability we have from our survey is a student's high school GPA. While GPA is an imperfect measure, it has been shown to be highly predictive of a student's performance in college, even more so than test scores (Geiser and Santelices, 2007).

Appendix Table 9 repeats Table 6 but splits the sample by high school GPA and gender. Two things stand out. First, the gender difference in reactions to the difficulty of majors is entirely driven by lower-GPA female students. These students have a strong negative reaction to majors that they learn are more difficult than they believed, perhaps correctly concluding that they will not perform very well in those majors. On the other hand, lower-GPA males do not behave this way; they are undeterred when they learn a major is more difficult than they expected. This is consistent with the observation in Astorne-Figari and Speer (2019) that lower-ability women switch away from competitive majors as they go through college, while lower-ability males do not. Second, the gender difference in reactions to the gender of faculty is driven by the higher-GPA males. These students are the most averse to being taught by female faculty; the coefficient is negative and large, but not statistically significant potentially due to the small sample size.

We did not initially intend to look for heterogeneity in terms of academic ability in our results. However, the heterogeneity result on course difficulty helps us understand the main effects we observed, and also suggests a reason for gender gaps observed in some of the most difficult majors, like physical sciences and engineering. There are many students, both male and female, who might find these majors above their ability level, but only the female students react to that information by seeking other majors.

3.6 Focusing on students' top major choice

Throughout the paper, we have included all major categories in our analysis, even those that a student is not seriously considering. An alternative approach is to limit our analysis of changes in major choice only to the student's *top* major from the beginning of the survey. This approach ignores any changes the student makes to the probability of majoring in

anything else and thus dramatically lowers the number of observations. Here we repeat our analysis focusing only on those top majors. 247 of our students have a unique top major, 12 students have two top majors, and 1 student has three top majors, so although our number of students is 259, the number of observations here is 274.

Appendix Table 10 replicates the results of Table 3 for a student's top major. Comparing columns 1 and 2, we see that students a re generally misinformed about educational prospects, employment probabilities, and family outcomes even for their top majors, although their beliefs are more accurate about course difficulty and gender composition. Unlike in the overall findings, students' beliefs about the earnings for their top major are, on average, $45,000 higher than the information they are given. This could reflect the fact that students select into majors that they think they will earn more.

Appendix Table 11 replicates the results of Table 5 for students' top majors. Note that for "sure" students, the top major can only be revised downward, not upward. The coefficients for all the information sets are larger than in the overall analysis, indicating that students are revising their top major choices more than other majors. The order of which information sets matter the most is largely the same as in the overall analysis, although the coefficients are closer to each other. The difference between sure and unsure students are also more muted.

Finally, Appendix Table 12 replicates the results of Table 6 for students' most likely majors. Once again, the coefficients are mostly larger than in the overall analysis. While the results on the female student ratio and initial employment probabilities continue to hold, the results on the required hours, probability of employment in 10 years, and the job flexibility are no longer significant. Our general story of gender differences still holds: male and female students have different responses to the coursework difficulty and the faculty gender composition. However, for this sample, it is the men who move significantly toward majors that they believe are more difficult while women do not significantly react to this information (the gender difference is statistically significant at the 10% level).

These results give us confidence that our information intervention is affecting how students think about important decisions, not just causing them to shift around the probability of majoring in things that they are unlikely to actually choose. In results not shown here, we have also found that students update their beliefs similarly for the top majors as they do for all majors. Further, our conclusions are similar if we use all major categories with a nonzero probability at the beginning of the survey rather than only focusing on the top major.

3.7 How does the entire intervention change students' stated major choices?

Now we zoom out to ask how the entire intervention – receiving all of the information sets – changed students' major choices from the beginning of the experiment to the end. We run regressions for each major category of the form

$$\pi_{imFinal} - \pi_{imInitial} = \sum_{m=1}^{8} \alpha_m Major_m + \epsilon_{im} \tag{3}$$

where $\pi_{imFinal}$ is the probability of student i graduating with a degree in major category m elicited at the end of the experiment (Part 7) and $\pi_{imInitial}$ is the probability of student i graduating with a degree in major category m elicited at the beginning of the experiment.

Table 7 presents these results. For the whole sample of students (column 1), there is a movement away from *Film and Television* (-1.1 ppt in major probability) and toward *Business* (+1.2 ppt). None of the other major probabilities changes significantly, but since these are averages, different students can move probabilities up and down to cancel each other out. Columns 2 and 3 distinguish between sure and unsure students. The sure students do not change any of their major probabilities significantly by the end of the experiment. The unsure students move significantly toward *Business* (+1.5 ppt) and away from *Film and Television* (-1.7 ppt).

Columns 4 and 5 reveal some interesting differences by gender (p-value for the joint test of equality is 0.105). Over the course of the experiment, males move strongly toward *Business*

Table 7: Students' Major Changes from Beginning to End

	Change in Major Choices (Final-Initial)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Unsure	Sure	Male	Female	p-values	
						(2)=(3)	(4)=(5)
Biology, Biochemistry & Health Sciences	-0.070	0.085	-0.402	0.628	-0.426	0.507	0.171
	(0.371)	(0.479)	(0.558)	(0.604)	(0.479)		
Physical Sciences, Engineering & CS	0.598	0.791	0.183	0.093	0.870	0.363	0.349
	(0.448)	(0.653)	(0.136)	(0.539)	(0.631)		
Communication and Fine Arts	-0.052	0.065	-0.305	-0.174	0.009	0.549	0.754
	(0.315)	(0.409)	(0.464)	(0.384)	(0.443)		
Film and Television	-1.095**	-1.743***	0.305	-1.884*	-0.719	0.013	0.298
	(0.465)	(0.631)	(0.526)	(1.004)	(0.499)		
Business	1.189**	1.554**	0.402	2.407**	0.598	0.162	0.124
	(0.496)	(0.697)	(0.435)	(1.045)	(0.542)		
Economics and Political Science	0.151	0.446	-0.488	-1.860*	1.178*	0.275	0.01
	(0.545)	(0.782)	(0.345)	(0.969)	(0.665)		
Psychology and Sociology	-0.191	-0.393	0.244	0.924	-0.763	0.542	0.242
	(0.645)	(0.917)	(0.500)	(1.221)	(0.770)		
Other Social Sciences	-0.531	-0.805	0.0610	-0.134	-0.746	0.171	0.372
	(0.396)	(0.564)	(0.283)	(0.367)	(0.578)		
Observations	2072	1416	656	688	1352		
Subjects	259	177	82	86	169		

Notes: The dependent variable is the difference between a student's stated probability of graduating with a degree in a major category elicited at the end of the experiment (Part 7) and the student's stated probability of graduating with a degree in that major category elicited at the beginning of the experiment (Part 2). Independent variables are the major category dummies. We have 8 observations per student in each column. Column 1 is all students who finished our survey, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Standard errors are clustered at the subject level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

(+2.3 ppt) and away from both *Film and Television* and *Economics and Political Science* (each -1.8 ppt). Females, on the other hand, move toward *Economics and Political Science* (+1.2 ppt). While they do shift toward *Business* (+0.6 ppt, insignificant), this is smaller than the corresponding effect for males ($p = 0.014$). Once again, we see that receiving the same information has different effects on the choices of males and females.

We looked at one final question: how many students changed their *top* major choice from the beginning of the survey to the end? Only 20 of 270 students (7%) of students switched their top major choice from one major to another. This finding suggests that some of the effects of our experiment – like changing how seriously one considers a major – will not

show up in actual major choices (because administrative data would not, for example, give students' second or third choice of major). But these changes are still important and could affect students' minors or elective course choices, which could affect labor market outcomes even if they do not show up as changes in major choice (Light and Wertz, 2022).

3.8 Robustness Checks

It is possible that some students did not properly answer the probabilistic major choice questions either because they did not pay attention or they miscategorize the major they intend to choose. Comparing students' answers to this question in Part 2 of the survey (before any information provision) to their reported intended major in Part 1 of the survey, only about 5% of students in the survey had a top major that is different from their reported intended major in the survey. We have repeated our main analyses dropping these students, and results are similar.

At the end of the survey, we ask students whether they have paid attention to major choice questions, prior belief questions, posterior belief questions, and information provided. 23 out of 270 students (8.5%) stated that they paid no or little attention to at least one of these four items. Our results remain similar when we drop these students.

Throughout the paper, we look at change in major probabilities using $\pi_{imFinal} - \pi_{imInitial}$. Alternatively, we can use $\pi_{imFinal} - \pi_{imPart4}$, where $\pi_{imPart4}$ is the probability of student i graduating with a degree in major category m elicited after the initial belief elicitation but before any information provision. Appendix Tables 13 and 14 repeat the analysis of Tables 6 and 7 using this alternative dependent variable. Our results remain qualitatively similar.

4 Conclusion

Using a staggered information intervention, we show that both job-related and non-job-related factors influence students' stated college major choices. While students rank earnings and employment information as the most important when asked, their choices respond more

to information about other factors, including job flexibility, course difficulty, and the gender composition of the major. Students clearly care about both the post-college outcomes and the in-college experience when choosing a major. Much of the research on major choice has focused on helping students to understand the monetary returns. Our paper suggests that this strategy has limits. Instead, if colleges want students to make well-informed major decisions early, then they must provide a wide set of information about majors.

This paper has some potential limitations. First, our outcome variable is students' stated major choice probabilities instead of their actual major choices. This approach relies on the assumption that the stated choices are reflective of what students actually choose. We believe this is a plausible assumption since stated choices strongly correlate with actual choices in education contexts (Arcidiacono et al., 2020; Boneva and Rauh, 2017) and because only 11% of the students had an official major six months after our study (obtained from the Registrar's Office) that is different from their top reported major category at the end of our survey. Excluding students who miscategorized their majors at the beginning, this is only about 7%. Second, it is possible that decision fatigue or experimenter demand effects distort students' beliefs or stated major choices. To alleviate decision fatigue, we have two short built-in breaks in the survey. To alleviate the experimenter demand effects, we conduct the survey online and we do not provide any incentives to students to revise their beliefs or major choices. Finally, this study is based on data from Loyola Marymount University, where students declare their majors while entering the university and 65% of students come from families at the top quintile of the U.S. income distribution. Results might be different in a context where students do not choose their majors until later or where financial concerns are the main drivers of major choices.

Our findings help us understand some of the well-documented gender gaps in major choice. Males dominate some STEM fields, while females make up the majority of majors like biology, education, nursing, and the humanities (Turner and Bowen, 1999). We provide a detailed accounting of how males and females have different preferences over major characteristics. For example, our results suggest that the difficulty of the coursework is one factor that

contributes to the gender gap in hard sciences. Our results also show that policy changes could have surprising effects on major choices and gender gaps. We find that some male students are averse to being taught by female faculty, while female students do not show a preference for or against female faculty. Hiring more female faculty in a traditionally male field, for example, might not lead more female students to sign up. Instead, it could drive away some of the male students, which will in turn lead to a smaller gender gap in that major, but also a smaller major overall.

These results have important implications both for researchers and policymakers. One interesting feature of our study is the distinction between students who come in sure about their major (about one-third of our sample) and those who do not. These groups react differently to information. The sure group rarely changes their major choice probabilities in response to the information. The unsure group is more sensitive to the information. This is important both for researchers – who are sometimes puzzled when information provision does not change students' choices – and for policymakers and administrators, who sometimes try to influence students' major choices. There seems to be a subset of students who come into college with their minds made up, and these students are unlikely to respond to such attempts. Eliciting major choice probabilities before any intervention can help researchers and administrators better target their efforts toward those whose minds are still open. Additionally, interventions designed to influence college major choice may be better-suited for high schools than for college, when many students have already made up their minds.

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A Appendix

A.1 Appendix Tables

Table 1: Sources of Information

Information	Source
1. Difficulty of the courses	Alumni Survey
2. Required semester hours that need to be completed within the program	Department Websites
3. Freshmen graduation rates (4-year within university)	Institutional Research Office
4. Percentage of female students	Registrar's Office
5. Percentage of female faculty	Department Websites
6. Percentage of graduates continuing education immediately after graduation	First Destination Survey
7. Percentage with graduate degree 10 years after graduation	Alumni Survey
8. Percentage of employed immediately after graduation	First Destination Survey
9. Percentage of employed full-time 10 years after graduation	Alumni Survey
10. Annual earnings 10 years after graduation (for full-time employed)	Alumni Survey
11. The most common industry 10 years after graduation	Alumni Survey
12. Percentage of graduates who agree or strongly agree with the statement "my current job is flexible in terms of availability of part-time work" 10 years after graduation	Alumni Survey
13. Percentage of graduates who agree or strongly agree with the statement "my current job has work-life balance" 10 years after graduation	Alumni Survey
14. Percentage of graduates who are single 10 years after graduation	Alumni Survey
15. Percentage of graduates who have at least one child 10 years after graduation	Alumni Survey

Notes: The Alumni Survey was conducted in Summer 2021. The data on the required semester hours and the percentage of female faculty was collected in Winter 2021. Freshmen graduation rates is a weighted average of freshmen graduation rates for classes of 2016 to 2020. The data on the percentage of female students is based on all undergraduates students enrolled at LMU in Fall 2020. The data on percentage of graduates continuing their education and employed immediately after graduation was based on First Destination Survey 2019 and 2020.

Table 2: Comparison of sample to LMU freshmen and all college students

	(1) Sample	(2) LMU Freshman Cohort, 2021	(3) All 4-Year College Students, 2020
Gender			
Female	.648	.523	.581
Race			
Asian	.163	.086	.074
Black	.093	.085	.130
White	.407	.418	.528
Hispanic	.148	.231	.218
Multi-race	.152	.088	.043
Other	.037	.092	.007
Field of Study			
Biology, Biochemistry & Health Sciences	.130	.095	.166
Physical Sciences, Engineering & CS	.070	.082	.176
Communication and Fine Arts	.111	.098	.097
Film and Television	.130	.120	.005
Business	.196	.180	.181
Economics and Political Science	.078	.054	.048
Psychology and Sociology	.167	.095	.060
Other Social Sciences	.044	.060	.090
Uncertain/Undeclared	.074	.217	
Other Fields			.178
Observations	270	1677	

Notes: Column 1 presents the distribution of students in our sample in terms of gender, race, and intended field of study. Column 2 presents the distribution of the freshmen of Fall 2021 (from which our sample is recruited) in terms of gender, race, and declared field of study. Column 3 data is taken from the NCES's Digest of Education Statistics and gives the distribution of all students enrolled in 4-year colleges and universities in 2020 (not just freshmen). The data by field of study is from the American Community Survey using 4-year graduates aged 24 and under in 2019 and 2020.

Table 3: Correlations between the initial beliefs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Prior beliefs regarding													
	difficulty of courses	required hours	graduation prob.	female student ratio	female faculty ratio	continuing education at graduation	holding grad. degree in 10 years	initial employment	employment in 10 years	earnings in 10 years	workplace flexibility	work-life balance	being single in 10 years	having children in 10 years
Prior beliefs regarding														
Difficulty of Courses	1													
Required Hours	0.299***	1												
Graduation Prob.	-0.0696**	0.0331	1											
Female Student Ratio	-0.209***	-0.107***	0.227***	1										
Female Faculty Ratio	-0.153***	-0.0949***	0.222***	0.623***	1									
Continuing Education	0.233***	0.157***	0.101***	0.0775***	0.0227	1								
Holding Grad. Degree	0.179***	0.0993***	0.120***	0.0930***	0.0409	0.773***	1							
Initial Employment	0.139***	0.106***	0.140***	0.0163	0.0111	0.356***	0.402***	1						
Employment in 10 years	0.135***	0.175***	0.132***	-0.0096	-0.0065	0.433***	0.457***	0.735***	1					
Earnings in 10 years	0.178***	0.156***	0.0270	-0.0719***	-0.0533*	0.114***	0.135***	0.191***	0.170***	1				
Flexible job	-0.139***	-0.0673**	0.170***	0.194***	0.153***	0.162***	0.157***	0.350***	0.315***	0.0606**	1			
Work-life balance	-0.141***	-0.0446*	0.187***	0.214***	0.197***	0.182***	0.178***	0.366***	0.343***	0.0372	0.642***	1		
Being Single	0.196***	-0.0336	0.0582**	-0.0648**	-0.0769***	0.151***	0.127***	0.104***	0.0793***	0.0702**	0.0332	0.0149	1	
Having Children	-0.0706**	-0.0457*	-0.0261	0.120***	0.0992***	0.149***	0.122***	0.159***	0.141***	0.00958	0.266***	0.330***	-0.0775***	1

Notes: Each cell shows the pairwise correlation between the row variable and the column variable. Variables are the prior beliefs elicited in Part 3 of the survey across all majors for each of the opinion questions. *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Differences between Students' Prior Beliefs and Information Provided, by Major

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Surprise (Information-Prior Belief) about													
	difficulty of courses	required hours	graduation probabilities	female student ratio	female faculty ratio	continuing education at graduation	holding graduate degree in 10 years	employed at graduation	employed in 10 years	earnings in 10 years	workplace flexibility	work-life balance	being single in 10 years	having children in 10 years
Majors														
1	-0.490***	9.865***	11.41***	19.33***	17.04***	-18.05***	23.21***	-12.42***	23.90***	-2.769***	-20.98***	6.571***	-5.201***	-3.359**
	(0.0894)	(1.868)	(1.428)	(0.925)	(0.995)	(2.233)	(2.206)	(1.918)	(2.110)	(0.915)	(1.590)	(1.437)	(1.610)	(1.629)
2	-1.046***	19.51***	6.039***	-8.081***	0.965	-25.81***	31.14***	14.63***	26.01***	-1.855*	-1.849	28.48***	-4.579***	-8.996***
	(0.0931)	(1.875)	(1.438)	(0.849)	(0.985)	(2.171)	(2.147)	(2.014)	(2.144)	(0.947)	(1.659)	(1.466)	(1.601)	(1.640)
3	0.321***	1.625	5.228***	12.98***	-4.232***	-17.76***	21.76***	25.03***	32.10***	0.271	-33.87***	12.52***	6.467***	-29.15***
	(0.111)	(1.567)	(1.442)	(0.802)	(0.878)	(1.761)	(1.865)	(1.737)	(1.986)	(0.616)	(1.501)	(1.474)	(1.403)	(1.674)
4	-0.0251	0.552	-4.317***	-4.409***	-15.51***	-31.63***	-2.158	39.30***	14.46***	-1.840	-10.73***	-9.649***	17.37***	-32.03***
	(0.121)	(1.642)	(1.376)	(0.836)	(0.888)	(1.773)	(1.799)	(1.756)	(1.920)	(1.230)	(1.564)	(1.487)	(1.429)	(1.629)
5	1.083***	5.143***	-3.830***	-2.853***	0.363	-32.97***	-24.44***	24.86***	24.26***	0.0176	-18.90***	7.656***	-6.297***	-17.46***
	(0.123)	(1.611)	(1.308)	(0.762)	(0.868)	(1.930)	(2.029)	(1.720)	(1.844)	(0.983)	(1.531)	(1.389)	(1.379)	(1.666)
6	0.662***	-10.94***	-1.479	-6.633***	0.591	-23.58***	7.073***	14.98***	23.62***	1.510**	-23.04***	20.46***	8.564***	-20.92***
	(0.105)	(1.640)	(1.444)	(0.817)	(0.913)	(2.017)	(2.035)	(1.772)	(1.931)	(0.645)	(1.421)	(1.336)	(1.454)	(1.625)
7	0.639***	-10.03***	-2.923**	9.015***	8.938***	-26.93***	13.06***	17.40***	20.48***	0.289	-28.46***	-10.92***	18.36***	-16.12***
	(0.116)	(1.667)	(1.403)	(0.818)	(0.955)	(2.052)	(2.193)	(1.702)	(1.942)	(0.638)	(1.501)	(1.437)	(1.402)	(1.697)
8	1.129***	-3.556**	5.409***	1.031	-4.058***	-14.08***	18.40***	8.946***	23.31***	0.260	-25.23***	10.87***	-5.591***	-33.92***
	(0.112)	(1.634)	(1.514)	(0.888)	(0.877)	(1.914)	(2.060)	(1.767)	(1.987)	(0.514)	(1.488)	(1.432)	(1.367)	(1.709)
Observations	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072
Subjects	259	259	259	259	259	259	259	259	259	259	259	259	259	259

Notes: The dependent variables are the "surprises" (information provided in Part 5 of the survey minus prior belief elicited in Part 3 of the survey) regarding each major category for each of the opinion questions. Different columns correspond to different opinion questions. There are 8 observations per student. Major 1 is *Biology, Biochemistry, and Health Sciences*, Major 2 is *Physical Sciences, Engineering, and Computer Science*, Major 3 is *Communication and Fine Arts*, Major 4 is *Film and Television*, Major 5 is *Business*, Major 6 is *Economics and Political Science*, Major 7 is *Psychology and Sociology*, and Major 8 is *Humanities and Other Social Sciences*. Standard errors are clustered at the subject level and are reported in parentheses.*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Information Sets and Any Change in Major Probabilities

	Any Change in Stated Major Choice Probabilities						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Unsure	Sure	Male	Female	*p*-values	
						(2)=(3)	(4)=(5)
Major Difficulty	0.255***	0.362***	0.024	0.256***	0.260***	0.000	0.938
	(0.0272)	(0.0363)	(0.0172)	(0.0476)	(0.0339)		
Gender Composition	0.212***	0.282***	0.061**	0.174***	0.237***	0.000	0.238
	(0.0255)	(0.0340)	(0.0267)	(0.0414)	(0.0329)		
Graduate School	0.270***	0.356***	0.085***	0.267***	0.278***	0.000	0.857
	(0.0277)	(0.0362)	(0.0312)	(0.0483)	(0.0347)		
Employment & Earnings	0.382***	0.503***	0.122***	0.372***	0.396***	0.000	0.707
	(0.0303)	(0.0378)	(0.0366)	(0.0527)	(0.0378)		
Industry Outcomes	0.228***	0.299***	0.073**	0.186***	0.254***	0.000	0.206
	(0.0262)	(0.0346)	(0.0291)	(0.0424)	(0.0337)		
Workplace Characteristics	0.301***	0.412***	0.061**	0.337***	0.290***	0.000	0.447
	(0.0286)	(0.0372)	(0.0267)	(0.0515)	(0.0351)		
Family Status	0.236***	0.316***	0.061**	0.209***	0.254***	0.000	0.417
	(0.0265)	(0.0351)	(0.0267)	(0.0443)	(0.0337)		
p-values:							
difficulty=composition	0.109	0.031	0.184	0.091	0.468		
difficulty=graduate	0.595	0.887	0.060	0.811	0.633		
difficulty=employment	0.000	0.000	0.021	0.025	0.000		
difficulty=industry	0.347	0.117	0.105	0.183	0.867		
difficulty=workplace	0.097	0.182	0.262	0.147	0.356		
difficulty=family	0.448	0.196	0.184	0.290	0.854		
composition =graduate	0.025	0.037	0.420	0.075	0.163		
composition=employment	0.000	0.000	0.098	0.000	0.000		
composition=industry	0.588	0.657	0.742	0.829	0.604		
composition=workplace	0.002	0.001	1.000	0.002	0.130		
composition=family	0.407	0.379	1.000	0.496	0.604		
graduate=employment	0.000	0.000	0.323	0.029	0.001		
graduate=industry	0.139	0.142	0.742	0.091	0.519		
graduate=workplace	0.269	0.150	0.323	0.160	0.733		
graduate=family	0.209	0.288	0.485	0.229	0.495		
employment=industry	0.000	0.000	0.210	0.000	0.000		
employment=workplace	0.004	0.013	0.135	0.472	0.003		
employment=family	0.000	0.000	0.060	0.001	0.000		
industry=workplace	0.009	0.003	0.709	0.004	0.291		
industry=family	0.786	0.664	0.709	0.598	1.000		
workplace=family	0.024	0.015	1.000	0.028	0.291		
Observations	1813	1239	574	602	1183		
Subjects	259	177	82	86	169		

Notes: The dependent variable is a dummy variable that is equal to 1 if a student had change in any of their major probabilities elicited at time t versus at time t-1 in Part 5 of the survey. Independent variables are the information set dummies. We have 7 observations per student in each column. Column 1 is all students who finished the survey, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Standard errors are clustered at the subject level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Correlations between the belief updates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Posterior beliefs-Prior beliefs regarding													
	difficulty of courses	required hours	graduation probabilities	female student ratio	female faculty ratio	continuing education at graduation	holding grad. degree in 10 years	initial employment	employment in 10 years	earnings in 10 years	workplace flexibility	work-life balance	being single in 10 years	having children in 10 years
Posterior beliefs-Prior beliefs regarding														
Difficulty of Courses	1													
Required Hours	0.0798***	1												
Graduation Prob.	-0.0733***	0.0491*	1											
Female Student Ratio	-0.0430	0.0027	0.140***	1										
Female Faculty Ratio	-0.0138	-0.0131	0.178***	0.364***	1									
Continuing Education	0.0136	0.0607**	0.101***	0.0295	0.0286	1								
Holding Grad. Degree	-0.0211	0.0390	0.117***	0.0461*	0.0530*	0.589***	1							
Initial Employment	0.0571**	-0.0110	0.0675**	-0.0014	-0.0168	0.202***	0.203***	1						
Employment in 10 years	-0.0172	0.0414	0.0758***	-0.0045	-0.0091	0.276***	0.269***	0.566***	1					
Earnings in 10 years	0.00572	0.0618**	0.0470*	-0.0016	0.0458*	0.0188	0.0495*	0.135***	0.104***	1				
Flexible job	0.0051	0.0235	0.0967***	0.0763***	0.0511*	0.128***	0.0563*	0.141***	0.177***	0.0175	1			
Work-life balance	0.0004	0.0440*	0.0586**	0.0722***	0.0773***	0.188***	0.104***	0.149***	0.216***	0.0186	0.504***	1		
Being Single	-0.0315	0.0153	-0.0052	-0.0040	0.0404	-0.0292	0.0014	0.0891***	0.0778***	0.0510*	0.0862***	0.0766***	1	
Having Children	0.0193	0.138***	0.0204	0.0418	0.0473*	0.120***	0.0856***	0.0153	0.0163	0.0580**	0.213***	0.219***	0.0231	1

Notes: Each cell shows the pairwise correlation between the row variable and the column variable. Variables are the posterior beliefs elicited in Part 6 of the survey minus the prior beliefs elicited in Part 3 of the survey across all majors for each of the opinion questions. Surprise is the information provided in Part 5 of the survey minus the prior beliefs elicited in Part 3 of the survey across all majors for each of the opinion questions. . *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: How Posterior Beliefs Move with New Information

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Posterior-Prior beliefs regarding													
	difficulty of courses	required hours	graduation probabilities	female student ratio	female faculty ratio	continuing education at graduation	holding grad. degree in 10 years	employed at graduation	employed in 10 years	earnings in 10 years	workplace flexibility	work-life balance	being single in 10 years	having children in 10 years
Panel A: All Students														
Surprise	0.493***	0.497***	0.657***	0.363***	0.486***	0.545***	0.475***	0.511***	0.554***	0.329***	0.569***	0.511***	0.523***	0.431***
	(0.0267)	(0.0369)	(0.0534)	(0.0257)	(0.0287)	(0.0350)	(0.0282)	(0.0341)	(0.0476)	(0.0882)	(0.0380)	(0.0376)	(0.0385)	(0.0397)
Constant	0.0499	1.963**	-0.935	-0.0968	2.669***	17.65***	2.582***	0.767	-8.064***	1.507***	16.79***	2.177***	0.958	11.96***
	(0.0464)	(0.834)	(0.776)	(0.501)	(0.545)	(1.571)	(0.902)	(0.791)	(0.822)	(0.536)	(1.361)	(0.787)	(0.951)	(1.350)
Observations	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072
Subjects	259	259	259	259	259	259	259	259	259	259	259	259	259	259
Panel B: Unsure Students														
Surprise	0.481***	0.472***	0.597***	0.365***	0.465***	0.576***	0.467***	0.515***	0.595***	0.301***	0.574***	0.520***	0.552***	0.412***
	(0.0311)	(0.0432)	(0.0623)	(0.0289)	(0.0352)	(0.0415)	(0.0323)	(0.0398)	(0.0535)	(0.101)	(0.0458)	(0.0478)	(0.0470)	(0.0466)
Constant	0.0318	2.983***	-1.866**	-0.298	2.340***	18.37***	2.806***	0.635	-9.100***	1.832**	17.21***	2.058**	1.366	12.51***
	(0.0564)	(0.929)	(0.922)	(0.589)	(0.674)	(1.849)	(1.042)	(0.991)	(1.021)	(0.749)	(1.610)	(0.982)	(1.135)	(1.763)
Observations	1416	1416	1416	1416	1416	1416	1416	1416	1416	1416	1416	1416	1416	1416
Subjects	177	177	177	177	177	177	177	177	177	177	177	177	177	177
Panel C: Sure Students														
Surprise	0.516***	0.539***	0.789***	0.362***	0.541***	0.492***	0.487***	0.503***	0.482***	0.455***	0.563***	0.497***	0.471***	0.466***
	(0.0491)	(0.0667)	(0.0859)	(0.0506)	(0.0483)	(0.0625)	(0.0521)	(0.0638)	(0.0894)	(0.0811)	(0.0668)	(0.0608)	(0.0628)	(0.0703)
Constant	0.0861	-0.202	1.434	0.325	3.513***	16.64***	2.106	1.033	-6.043***	0.673	16.03***	2.410*	-0.184	10.63***
	(0.0801)	(1.685)	(1.383)	(0.914)	(0.924)	(2.876)	(1.767)	(1.325)	(1.354)	(0.442)	(2.463)	(1.317)	(1.646)	(2.027)
Observations	656	656	656	656	656	656	656	656	656	656	656	656	656	656
Subjects	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Panel D: Male Students														
Surprise	0.472***	0.509***	0.483***	0.303***	0.421***	0.505***	0.437***	0.540***	0.625***	0.186*	0.622***	0.533***	0.442***	0.359***
	(0.0413)	(0.0697)	(0.0931)	(0.0400)	(0.0604)	(0.0552)	(0.0438)	(0.0605)	(0.0842)	(0.112)	(0.0767)	(0.0786)	(0.0702)	(0.0648)
Constant	0.0504	1.870	-3.753**	-1.610**	1.196	16.41***	2.977*	1.525	-7.913***	1.426**	17.07***	1.628	-0.973	8.524***
	(0.0786)	(1.556)	(1.500)	(0.723)	(0.934)	(2.531)	(1.608)	(1.387)	(1.230)	(0.582)	(2.786)	(1.634)	(1.704)	(2.204)
Observations	688	688	688	688	688	688	688	688	688	688	688	688	688	688
Subjects	86	86	86	86	86	86	86	86	86	86	86	86	86	86
Panel E: Female Students														
Surprise	0.500***	0.492***	0.696***	0.399***	0.504***	0.564***	0.491***	0.499***	0.521***	0.441***	0.534***	0.496***	0.578***	0.456***
	(0.0353)	(0.0429)	(0.0590)	(0.0318)	(0.0316)	(0.0460)	(0.0368)	(0.0420)	(0.0571)	(0.0779)	(0.0413)	(0.0396)	(0.0452)	(0.0473)
Constant	0.0474	1.948**	0.00992	0.622	3.324***	18.33***	2.476**	0.143	-8.135***	1.499**	16.30***	2.490***	1.985*	13.21***
	(0.0590)	(0.982)	(0.861)	(0.664)	(0.684)	(2.060)	(1.107)	(0.967)	(1.086)	(0.746)	(1.481)	(0.860)	(1.151)	(1.603)
Observations	1352	1352	1352	1352	1352	1352	1352	1352	1352	1352	1352	1352	1352	1352
Subjects	169	169	169	169	169	169	169	169	169	169	169	169	169	169
p-values:														
Sure=Unsure	0.542	0.400	0.0710	0.960	0.201	0.259	0.745	0.864	0.279	0.236	0.893	0.770	0.301	0.518
Male=Female	0.600	0.838	0.0540	0.0620	0.226	0.408	0.343	0.581	0.307	0.0620	0.311	0.670	0.104	0.224

Notes: The dependent variables are the posterior beliefs elicited in Part 6 of the survey minus the prior beliefs elicited in Part 3 of the survey across all majors for each of the opinion questions. Surprise is the information provided in Part 5 of the survey minus the prior beliefs elicited in Part 3 of the survey across all majors for each of the opinion questions. Different columns correspond to different opinion questions and each column is a separate regression. There are 8 observations per student. Panel A includes all students who finished the survey. Panels B and C have unsure and sure students, respectively. Panels D and E have male and female students, respectively. P-values are for the hypotheses that the coefficients are equal for sure vs unsure students and that the coefficients are equal for male versus female students. Standard errors are clustered at the subject level and are reported in parentheses.*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Replication of Table 6 with full set of controls

	Change in Major Choices (Final-Initial)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Unsure	Sure	Male	Female	p-values	
						(2)=(3)	(4)=(5)
Change in beliefs about							
Difficulty of courses (sd)	-0.351	-0.310	-0.300	0.577	-0.833**	0.866	0.015
	(0.254)	(0.382)	(0.280)	(0.506)	(0.343)		
Required hours (sd)	0.266*	0.456*	-0.0290	0.183	0.359*	0.057	0.675
	(0.140)	(0.237)	(0.102)	(0.239)	(0.203)		
Graduation probabilities (sd)	0.100	0.159	0.0757	0.0452	0.148	0.832	0.751
	(0.152)	(0.249)	(0.0717)	(0.400)	(0.205)		
Female student ratio (sd)	0.412**	0.755***	-0.373*	0.666	0.360	0.000	0.439
	(0.184)	(0.236)	(0.206)	(0.406)	(0.231)		
Female faculty ratio (sd)	-0.195	-0.369	0.132	-0.666	-0.0553	0.171	0.226
	(0.221)	(0.319)	(0.166)	(0.413)	(0.274)		
Pr. of continuing education (sd)	-0.180	-0.323	0.122	0.0489	-0.231	0.246	0.499
	(0.232)	(0.337)	(0.0980)	(0.412)	(0.310)		
Pr. of holding a graduate degree (sd)	0.127	0.150	-0.0335	-0.0681	0.274	0.539	0.403
	(0.214)	(0.320)	(0.0957)	(0.314)	(0.276)		
Pr. of initial employment (sd)	0.282	0.375	0.0815	-0.175	0.526**	0.224	0.120
	(0.173)	(0.246)	(0.156)	(0.348)	(0.237)		
Pr. of employment in 10 years (sd)	-0.527***	-0.636**	-0.241	-0.156	-0.822***	0.187	0.097
	(0.182)	(0.269)	(0.184)	(0.281)	(0.281)		
Earnings in 10 years (sd)	0.0617	0.0796	-0.137	0.00179	0.0337	0.219	0.912
	(0.112)	(0.138)	(0.158)	(0.353)	(0.116)		
Pr. of working in a flexible job (sd)	0.326**	0.449**	0.274*	0.182	0.437**	0.454	0.464
	(0.137)	(0.203)	(0.156)	(0.236)	(0.196)		
Pr. of having work-life balance (sd)	-0.249	-0.346	-0.0570	-0.124	-0.443	0.475	0.362
	(0.193)	(0.281)	(0.109)	(0.275)	(0.298)		
Pr. of being single (sd)	-0.0337	0.0870	-0.270*	0.00591	0.0356	0.143	0.781
	(0.126)	(0.191)	(0.142)	(0.346)	(0.149)		
Pr. of having children (sd)	-0.281**	-0.324	-0.199	-0.497	-0.187	0.679	0.563
	(0.141)	(0.217)	(0.141)	(0.448)	(0.162)		
Constant	0.102	0.451	2.606	-4.730	1.612	0.753	0.47
	(1.982)	(3.483)	(3.605)	(5.561)	(3.119)		
Observations	2044	1402	642	676	1336		
Subjects	259	177	82	86	169		

Notes: The dependent variable is the difference between a student's stated probability of graduating with a degree in a major category elicited at the end of the experiment (Part 7) and the student's stated probability of graduating with a degree in that major category elicited at the beginning of the experiment (Part 2). Independent variables are the change in beliefs (posterior-prior) regarding the factors presented in each of the opinion questions. These variables are standardized using the standard deviation of the prior belief distribution of each opinion question. We have 8 observations per student in each column. Column 1 is all students who finished our survey, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Controls include all controls listed in Table 2 and major specific abilities elicited in Part 2 of the survey. Standard errors are clustered at the subject level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: How Change in Beliefs Relate to Change in Stated Major Choices: Replication of Table 6, Split by High School GPA and Gender

	Change in Major Choices (Final-Initial)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	High GPA	Low GPA	High GPA		Low GPA		*p*-values	
			Male	Female	Male	Female	(3)=(4)	(5)=(6)
Change in beliefs about								
Difficulty of courses (sd)	-0.138	-0.526	-0.308	-0.124	0.723	-1.357**	0.678	0.008
	(0.238)	(0.389)	(0.323)	(0.311)	(0.516)	(0.572)		
Required hours (sd)	0.121	0.309	0.148	0.175	0.283	0.438	0.902	0.750
	(0.107)	(0.207)	(0.167)	(0.156)	(0.371)	(0.319)		
Graduation probabilities (sd)	0.0812	0.116	0.750**	-0.0623	-0.0433	0.236	0.027	0.566
	(0.139)	(0.214)	(0.349)	(0.124)	(0.360)	(0.328)		
Female student ratio (sd)	0.408*	0.422*	0.0200	0.527*	0.847*	0.234	0.458	0.289
	(0.244)	(0.251)	(0.638)	(0.272)	(0.469)	(0.340)		
Female faculty ratio (sd)	-0.375	-0.0511	-1.236	-0.215	-0.548	0.208	0.220	0.238
	(0.241)	(0.321)	(0.824)	(0.196)	(0.430)	(0.475)		
Pr. of continuing education (sd)	0.0929	-0.341	0.442	0.120	-0.0511	-0.491	0.375	0.558
	(0.164)	(0.356)	(0.296)	(0.217)	(0.568)	(0.495)		
Pr. of holding a graduate degree (sd)	-0.177	0.343	-0.164	-0.150	0.283	0.551	0.963	0.632
	(0.171)	(0.307)	(0.204)	(0.207)	(0.366)	(0.423)		
Pr. of initial employment (sd)	0.0765	0.429*	-0.639*	0.430**	0.112	0.571	0.004	0.391
	(0.167)	(0.248)	(0.324)	(0.183)	(0.400)	(0.358)		
Pr. of employment in 10 years (sd)	-0.460**	-0.468*	-0.0456	-0.658**	-0.115	-0.750*	0.091	0.233
	(0.187)	(0.253)	(0.233)	(0.276)	(0.368)	(0.385)		
Earnings in 10 years (sd)	0.0683	0.101	0.101	0.0284	0.0249	0.205	0.795	0.726
	(0.0835)	(0.226)	(0.270)	(0.0835)	(0.454)	(0.248)		
Pr. of working in a flexible job (sd)	0.436**	0.229	-0.0610	0.608**	0.149	0.358	0.084	0.580
	(0.182)	(0.178)	(0.305)	(0.240)	(0.205)	(0.317)		
Pr. of having work-life balance (sd)	-0.140	-0.296	0.430	-0.402	-0.321	-0.444	0.031	0.815
	(0.199)	(0.262)	(0.266)	(0.279)	(0.247)	(0.464)		
Pr. of being single (sd)	0.166	-0.119	-0.231	0.491	0.143	-0.180	0.166	0.396
	(0.253)	(0.136)	(0.388)	(0.351)	(0.356)	(0.141)		
Pr. of having children (sd)	-0.0981	-0.320	-0.231	-0.117	-0.790	-0.122	0.683	0.286
	(0.0886)	(0.230)	(0.247)	(0.140)	(0.572)	(0.259)		
Constant	0.0968	-0.0176	0.205	-0.0148	0.0184	-0.143	0.306	0.512
	(0.0998)	(0.102)	(0.179)	(0.122)	(0.179)	(0.170)		
Observations	856	1216	248	600	440	752		
Subjects	107	152	31	75	55	94		

Notes: The dependent variable is the difference between a student's stated probability of graduating with a degree that major category elicited at the end of the experiment (Part 7) and the student's stated probability of graduating with a degree in that major category elicited at the beginning of the experiment (Part 2). Independent variables are the change in beliefs (posterior-prior) regarding the factors presented in each of the opinion questions. These variables are standardized using the standard deviation of the prior belief distribution of each opinion question. We have 8 observations per student in each column. Columns 1 and 2 are students with an above-median high school GPA and below-median high school GPA, respectively. Columns 3 and 4 are male and female above-median high school GPA students, respectively. Columns 5 and 6 are male and female below-median high school GPA students, respectively. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Information and Students' Prior Beliefs: Replication of Table 3 (Only for Top Majors)

	(1) Info	(2) All	(3) Unsure	(4) Sure	(5) Male	(6) Female	(7)	(8) *p*-values	(9)
							(1)=(2)	(3)=(4)	(5)=(6)
Difficulty of courses	6.605	6.625	6.577	6.738	6.389	6.773	0.862	0.576	0.167
		(2.046)	(1.958)	(2.250)	(2.135)	(2.011)			
Required hours	53.52	56.51	55.14	59.77	58.79	55.18	0.069	0.198	0.303
		(26.43)	(25.66)	(28.08)	(26.74)	(26.48)			
Graduation probabilities	74.61	76.27	75.64	77.79	78.88	75.18	0.231	0.471	0.162
		(22.04)	(21.84)	(22.58)	(18.50)	(23.24)			
Female student ratio	56.05	56.15	55.78	57.02	51.26	58.75	0.911	0.580	0.000
		(16.54)	(16.10)	(17.61)	(14.48)	(17.16)			
Female faculty ratio	49.51	50.19	48.49	54.24	49.78	50.56	0.492	0.005	0.676
		(15.87)	(15.75)	(15.50)	(12.77)	(17.40)			
Pr. of continuing education	19.26	61.59	61.09	62.77	57.12	64.70	0.000	0.688	0.053
		(30.11)	(28.88)	(33.03)	(30.62)	(29.48)			
Pr. of holding a graduate degree	48.35	60.84	58.33	66.83	56.38	63.83	0.000	0.041	0.083
		(31.13)	(30.76)	(31.39)	(33.01)	(29.84)			
Pr. of initial employment	70.09	62.11	60.82	65.18	65.22	60.88	0.000	0.188	0.187
		(24.83)	(24.62)	(25.21)	(24.69)	(24.59)			
Pr. of employment in 10 years	88.51	77.79	75.85	82.42	78.63	77.87	0.000	0.018	0.815
		(23.06)	(24.60)	(18.20)	(23.02)	(22.95)			
Earnings in 10 years (in 10K)	11.82	16.30	15.97	17.09	16.90	16.14	0.000	0.692	0.781
		(20.67)	(20.06)	(22.16)	(21.03)	(20.75)			
Pr. of working in a flexible job	27.35	54.60	55.74	51.87	56.69	53.72	0.000	0.235	0.357
		(24.69)	(24.57)	(24.91)	(25.68)	(24.02)			
Pr. of having work-life balance	56.33	57.28	56.46	59.25	56.56	58.05	0.535	0.366	0.629
		(22.34)	(21.69)	(23.85)	(23.49)	(21.78)			
Pr. of being single	43.81	39.91	39.92	39.90	37.81	41.04	0.013	0.997	0.312
		(23.36)	(22.51)	(25.43)	(25.02)	(22.52)			
Pr. of having children	23.89	44.36	43.86	45.57	39.28	47.32	0.000	0.639	0.019
		(26.48)	(25.55)	(28.72)	(26.50)	(25.96)			
		285	201	84	95	185			

Notes: The observations are restricted to the top major(s) based on the student's stated probability of graduating with a degree in a major category elicited at the beginning of the experiment (Part 2). Column 1 presents the information provided to the students. Columns 2-6 presents mean prior beliefs elicited in Part 3 of the survey across all majors for each of the belief questions. Column 2 is the average beliefs of all students who completed our survey. Columns 3 and 4 are the average beliefs of students who are unsure and sure about their major choices, respectively. Columns 5 and 6 are the average beliefs of male students and female students, respectively. Standard deviations are reported in parentheses. Column 7 reports p-values for the average beliefs of all students being equal to information provided, Column 8 reports the p-values for equality of means across sure and unsure students, and Column 9 reports the p-values for equality of means across male and female students. P-values are based on a regression framework where the standard errors are clustered at the subject level.

Table 11: Information Sets and Major Probability Changes: Replication of Table 5 (Only for Top Majors)

	Absolute Change in Stated Major Choice						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Unsure	Sure	Male	Female	*p*-values	
						(2)=(3)	(4)=(5)
Major Difficulty	3.438***	4.641***	0.622	3.297**	3.587***	0.001	0.854
	(0.742)	(1.014)	(0.613)	(1.272)	(0.938)		
Gender Composition	2.281***	2.865***	0.915	1.802**	2.575***	0.032	0.453
	(0.493)	(0.648)	(0.636)	(0.816)	(0.632)		
Graduate School	4.223***	4.281***	4.085**	3.286**	4.793***	0.927	0.388
	(0.875)	(0.943)	(1.933)	(1.302)	(1.165)		
Employment & Earnings	5.204***	4.995***	5.695**	4.418***	5.721***	0.781	0.459
	(0.874)	(0.710)	(2.423)	(1.328)	(1.157)		
Industry Outcomes	4.131***	4.896***	2.341*	4.110**	4.235***	0.149	0.952
	(0.870)	(1.088)	(1.396)	(1.823)	(0.963)		
Workplace Characteristics	3.051***	4.089***	0.622	2.385***	3.458***	0.000	0.323
	(0.589)	(0.811)	(0.394)	(0.705)	(0.827)		
Family Status	3.182***	3.953***	1.378	1.407***	4.156***	0.104	0.034
	(0.790)	(0.996)	(1.230)	(0.530)	(1.173)		
p-values:							
difficulty=composition	0.080	0.059	0.113	0.229	0.205		
difficulty=graduate	0.398	0.734	0.064	0.986	0.385		
difficulty=employment	0.094	0.736	0.047	0.537	0.110		
difficulty=industry	0.365	0.771	0.266	0.626	0.429		
difficulty=workplace	0.572	0.552	1.000	0.532	0.864		
difficulty=family	0.777	0.549	0.586	0.150	0.638		
composition =graduate	0.034	0.177	0.088	0.226	0.079		
composition=employment	0.001	0.003	0.060	0.071	0.007		
composition=industry	0.038	0.062	0.360	0.253	0.069		
composition=workplace	0.236	0.159	0.698	0.583	0.294		
composition=family	0.257	0.263	0.739	0.537	0.178		
graduate=employment	0.269	0.457	0.412	0.528	0.363		
graduate=industry	0.931	0.592	0.444	0.624	0.683		
graduate=workplace	0.238	0.871	0.056	0.556	0.308		
graduate=family	0.315	0.767	0.243	0.154	0.659		
employment=industry	0.304	0.931	0.138	0.852	0.279		
employment=workplace	0.031	0.371	0.031	0.195	0.083		
employment=family	0.039	0.330	0.044	0.020	0.248		
industry=workplace	0.165	0.380	0.243	0.383	0.234		
industry=family	0.362	0.453	0.610	0.158	0.951		
workplace=family	0.882	0.905	0.562	0.246	0.588		
Observations	14504	9912	4592	4816	9464		
Subjects	259	177	82	86	169		

Notes: The observations are restricted to the top major(s) based on the student's stated probability of graduating with a degree in a major category elicited at the beginning of the experiment (Part 2). The dependent variable is the absolute difference between a student's stated probability of graduating with a degree in a major category elicited at time t versus at time t-1 in Part 5 of the survey ($|\pi_{imt} - \pi_{imt-1}|$). Independent variables are the information set dummies. We have 56 observations (8 majors*7 information sets) per student in each column. Column 1 is all students who finished our survey, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Standard errors are clustered at the subject level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 12: How Change in Beliefs Relate to Change in Stated Major Choices: Replication of Table 6 (Only for Top Majors)

	Change in Major Choices (Final-Initial)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Unsure	Sure	Male	Female	p-values	
						(2)=(3)	(4)=(5)
Change in beliefs about							
Difficulty of courses (sd)	1.826	2.418	0.791	5.842*	-0.365	0.497	0.080
	(1.507)	(2.088)	(1.146)	(3.332)	(1.420)		
Required hours (sd)	0.0287	0.698	-0.984	2.218	-0.532	0.371	0.366
	(1.115)	(1.745)	(0.636)	(2.935)	(1.047)		
Graduation probabilities (sd)	0.672	1.506	-0.189	1.169	0.781	0.282	0.872
	(0.846)	(1.254)	(0.959)	(2.269)	(0.965)		
Female student ratio (sd)	2.738**	3.814**	-0.122	6.307*	2.257	0.081	0.272
	(1.366)	(1.843)	(1.294)	(3.460)	(1.493)		
Female faculty ratio (sd)	-0.104	-0.955	1.263	-3.342	0.909	0.202	0.115
	(0.953)	(1.171)	(1.314)	(2.546)	(1.045)		
Pr. of continuing education (sd)	-1.216	-1.064	-0.466	-0.352	-1.886	0.761	0.535
	(1.038)	(1.397)	(1.422)	(1.937)	(1.581)		
Pr. of holding a graduate degree (sd)	-0.918	-0.966	1.075	-0.348	-0.782	0.380	0.898
	(1.177)	(1.571)	(1.755)	(3.128)	(1.493)		
Pr. of initial employment (sd)	2.690**	3.594**	-0.027	2.393	2.612*	0.125	0.944
	(1.359)	(1.804)	(1.536)	(2.834)	(1.473)		
Pr. of employment in 10 years (sd)	-1.848	-2.734*	0.0814	-2.721	-2.467*	0.192	0.930
	(1.154)	(1.563)	(1.516)	(2.599)	(1.402)		
Earnings in 10 years (sd)	0.217	0.283	-0.560	-0.268	-0.133	0.349	0.926
	(0.543)	(0.715)	(0.550)	(1.372)	(0.582)		
Pr. of working in a flexible job (sd)	0.319	-0.445	1.572*	0.972	0.094	0.155	0.562
	(0.703)	(1.109)	(0.890)	(1.259)	(0.879)		
Pr. of having work-life balance (sd)	0.612	1.032	-0.127	0.442	0.713	0.499	0.908
	(0.889)	(1.331)	(1.094)	(2.026)	(1.232)		
Pr. of being single (sd)	0.254	1.158	-1.383	1.171	0.236	0.180	0.696
	(1.037)	(1.437)	(1.248)	(2.162)	(1.133)		
Pr. of having children (sd)	-0.854	-0.515	-1.738*	-0.622	-0.902	0.444	0.890
	(0.968)	(1.325)	(0.886)	(1.787)	(1.044)		
Constant	-1.998**	-2.244**	-1.024	-1.610	-2.746**	0.394	0.589
	(0.867)	(1.110)	(0.910)	(1.785)	(1.172)		
Observations	274	192	82	91	179		
Subjects	259	177	82	86	169		

Notes: The observations are restricted to the top major(s) based on the student's stated probability of graduating with a degree in a major category elicited at the beginning of the experiment (Part 2). The dependent variable is the difference between a student's stated probability of graduating with a degree that major category elicited at the end of the experiment (Part 7) and the student's stated probability of graduating with a degree in that major category elicited at the beginning of the experiment (Part 2). Independent variables are the change in beliefs (posterior-prior) regarding the factors presented in each of the opinion questions. These variables are standardized using the standard deviation of the prior belief distribution of each opinion question. We have 8 observations per student in each column. Column 1 is all students who finished our survey, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Standard errors are clustered at the subject level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13: How Change in Beliefs Relate to Change in Stated Major Choices: Replication of Table 6 with alternative dependent variable

	Change in Major Choices (Final-Part 4)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Unsure	Sure	Male	Female	p-values	
						(2)=(3)	(4)=(5)
Change in beliefs about							
Difficulty of courses (sd)	-0.469*	-0.337	-0.646	0.302	-0.853**	0.626	0.033
	(0.284)	(0.317)	(0.551)	(0.365)	(0.399)		
Required hours (sd)	0.0869	0.0911	0.128	-0.182	0.282**	0.887	0.124
	(0.131)	(0.219)	(0.138)	(0.270)	(0.137)		
Graduation probabilities (sd)	-0.0911	-0.191	0.0888	-0.205	-0.0606	0.122	0.648
	(0.0974)	(0.156)	(0.0919)	(0.289)	(0.129)		
Female student ratio (sd)	0.258	0.550	-0.312	0.363	0.203	0.040	0.815
	(0.249)	(0.344)	(0.237)	(0.644)	(0.239)		
Female faculty ratio (sd)	-0.149	-0.242	-0.0129	-0.741*	0.0695	0.467	0.080
	(0.211)	(0.305)	(0.0758)	(0.392)	(0.247)		
Pr. of continuing education (sd)	-0.0618	-0.103	0.0762	0.0948	-0.0973	0.429	0.601
	(0.147)	(0.214)	(0.0746)	(0.331)	(0.162)		
Pr. of holding a graduate degree (sd)	0.148	0.182	0.0522	0.00106	0.191	0.600	0.524
	(0.153)	(0.225)	(0.102)	(0.225)	(0.197)		
Pr. of initial employment (sd)	0.379**	0.444*	0.190	0.259	0.459**	0.439	0.664
	(0.180)	(0.244)	(0.222)	(0.403)	(0.225)		
Pr. of employment in 10 years (sd)	-0.627**	-0.706**	-0.409	-0.872	-0.513**	0.526	0.538
	(0.253)	(0.337)	(0.325)	(0.531)	(0.248)		
Earnings in 10 years (sd)	-0.0428	-0.0136	-0.288	-0.448	0.0453	0.420	0.218
	(0.130)	(0.144)	(0.311)	(0.377)	(0.138)		
Pr. of working in a flexible job (sd)	0.222**	0.289*	0.116	0.0594	0.316*	0.367	0.279
	(0.110)	(0.156)	(0.113)	(0.168)	(0.167)		
Pr. of having work-life balance (sd)	-0.149	-0.315*	0.136	0.112	-0.392**	0.030	0.045
	(0.128)	(0.167)	(0.123)	(0.153)	(0.198)		
Pr. of being single (sd)	-0.00821	-0.00208	0.00333	-0.115	0.0813	0.978	0.467
	(0.109)	(0.162)	(0.114)	(0.237)	(0.130)		
Pr. of having children (sd)	-0.0876	0.0549	-0.296	0.473	-0.201	0.299	0.080
	(0.157)	(0.184)	(0.284)	(0.330)	(0.200)		
Constant	0.00913	-0.0226	0.0496	-0.0137	-0.0577	0.551	0.799
	(0.0656)	(0.0992)	(0.0696)	(0.156)	(0.0763)		
Observations	2072	1416	656	688	1352		
Subjects	259	177	82	86	169		

Notes: The dependent variable is the difference between a student's stated probability of graduating with a degree in a major category elicited at the end of the experiment (Part 7) and the student's stated probability of graduating with a degree in that major category elicited at Part 4 of the survey (after prior belief elicitation but before information provision). Independent variables are the change in beliefs (posterior-prior) regarding the factors presented in each of the opinion questions. These variables are standardized using the standard deviation of the prior belief distribution of each opinion question. We have 8 observations per student in each column. Column 1 is all students who finished our survey, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Standard errors are clustered at the subject level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 14: Students' Major Changes from Beginning to End: Replication of Table 7 with alternative dependent variable

	Change in Major Choices (Final-Part 4)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Unsure	Sure	Male	Female	p-values	
						(2)=(3)	(4)=(5)
Biology, Biochemistry & Health Sciences	-0.277	-0.0782	-0.707	-0.370	-0.237	0.332	0.811
	(0.328)	(0.423)	(0.492)	(0.284)	(0.483)		
Physical Sciences, Engineering & CS	-0.119	-0.259	0.183	-0.359	0	0.546	0.729
	(0.492)	(0.719)	(0.136)	(0.823)	(0.631)		
Communication and Fine Arts	-0.0245	0.444	-1.037	0.572	-0.328	0.256	0.262
	(0.469)	(0.368)	(1.254)	(0.412)	(0.688)		
Film and Television	-0.0322	-0.527	1.037	-0.417	0.163	0.253	0.639
	(0.550)	(0.559)	(1.254)	(1.053)	(0.654)		
Business	1.514**	1.916**	0.646*	3.339**	0.621	0.163	0.079
	(0.587)	(0.845)	(0.332)	(1.465)	(0.498)		
Economics and Political Science	-0.281	-0.186	-0.488	-2.278*	0.728*	0.698	0.019
	(0.488)	(0.698)	(0.345)	(1.211)	(0.410)		
Psychology and Sociology	-0.384	-0.590	0.0610	-0.0273	-0.574	0.465	0.647
	(0.523)	(0.730)	(0.512)	(1.028)	(0.612)		
Other Social Sciences	-0.396	-0.720*	0.305	-0.459	-0.373	0.033	0.888
	(0.290)	(0.407)	(0.252)	(0.495)	(0.368)		
Observations	2072	1416	656	688	1352		
Subjects	259	177	82	86	169		

Notes: The dependent variable is the difference between a student's stated probability of graduating with a degree in a major category elicited at the end of the experiment (Part 7) and the student's stated probability of graduating with a degree in that major category elicited at Part 4 of the survey (after prior belief elicitation but before information provision). Independent variables are the major category dummies. We have 8 observations per student in each column. Column 1 is all students who finished our survey, columns 2 and 3 are unsure and sure students, and columns 4 and 5 are males and females. Sure students are those who put a 100% probability on majoring in a certain field in Part 2 of the survey. Standard errors are clustered at the subject level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A.2 Appendix Figures

Figure 1: Major Categories

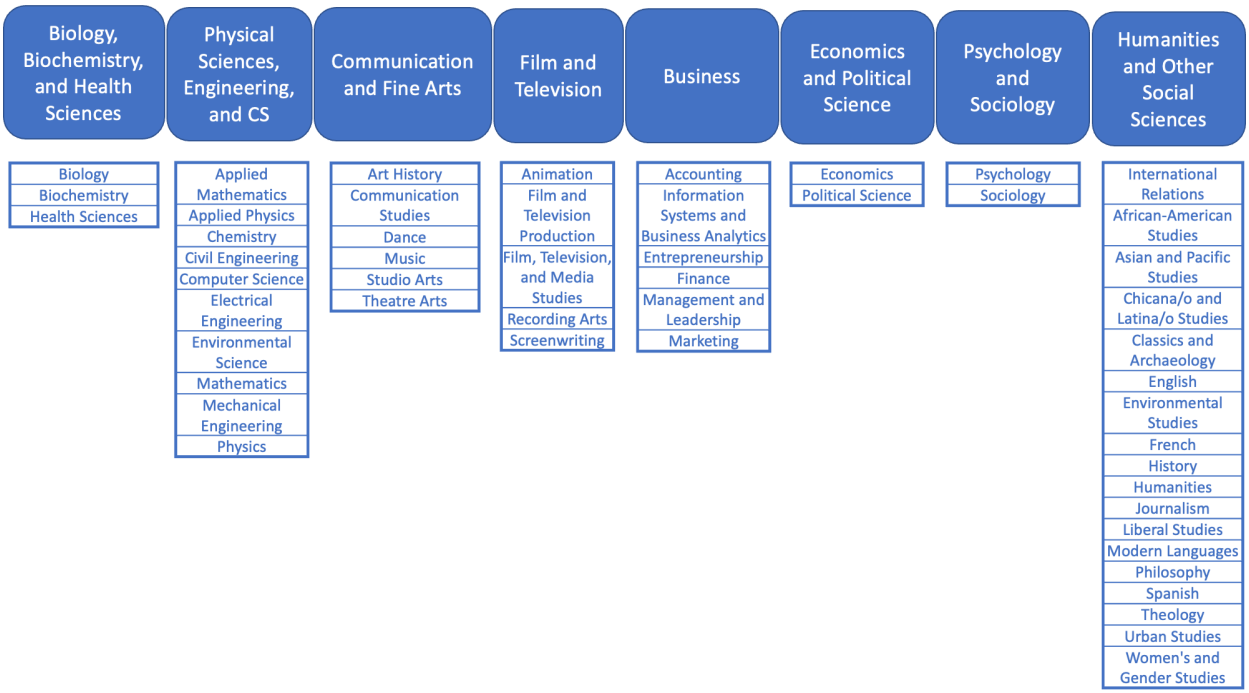


Figure 2: Information Sets

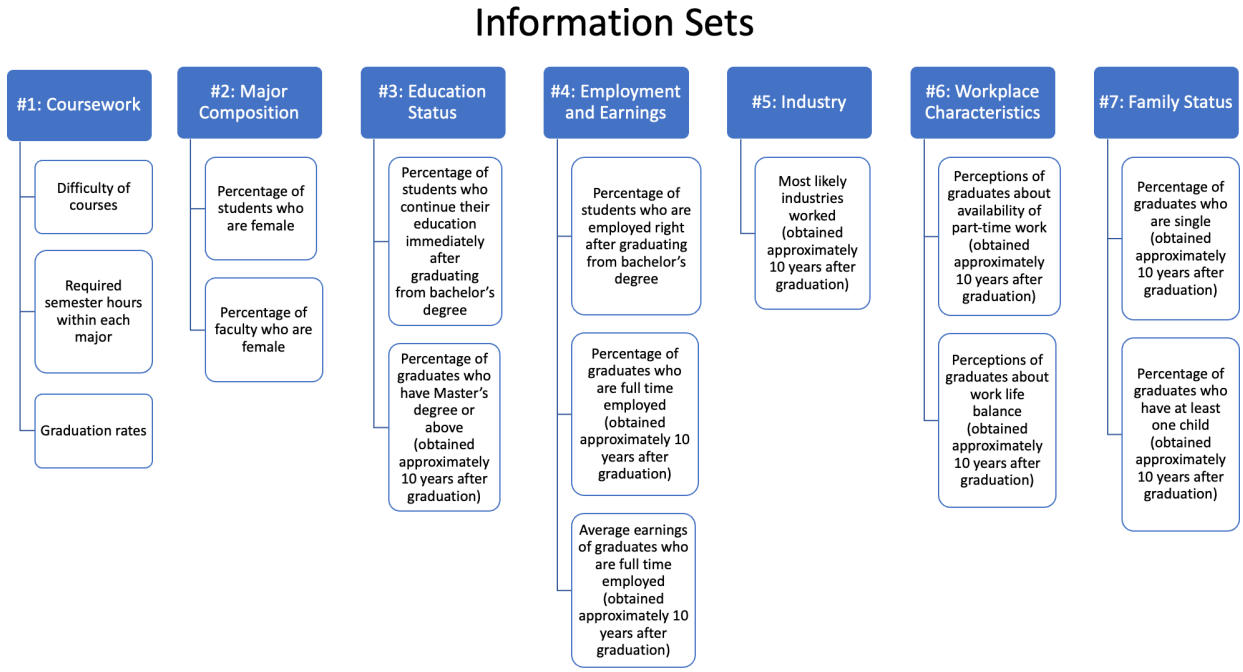


Figure 3: Information Set 1 (Coursework)

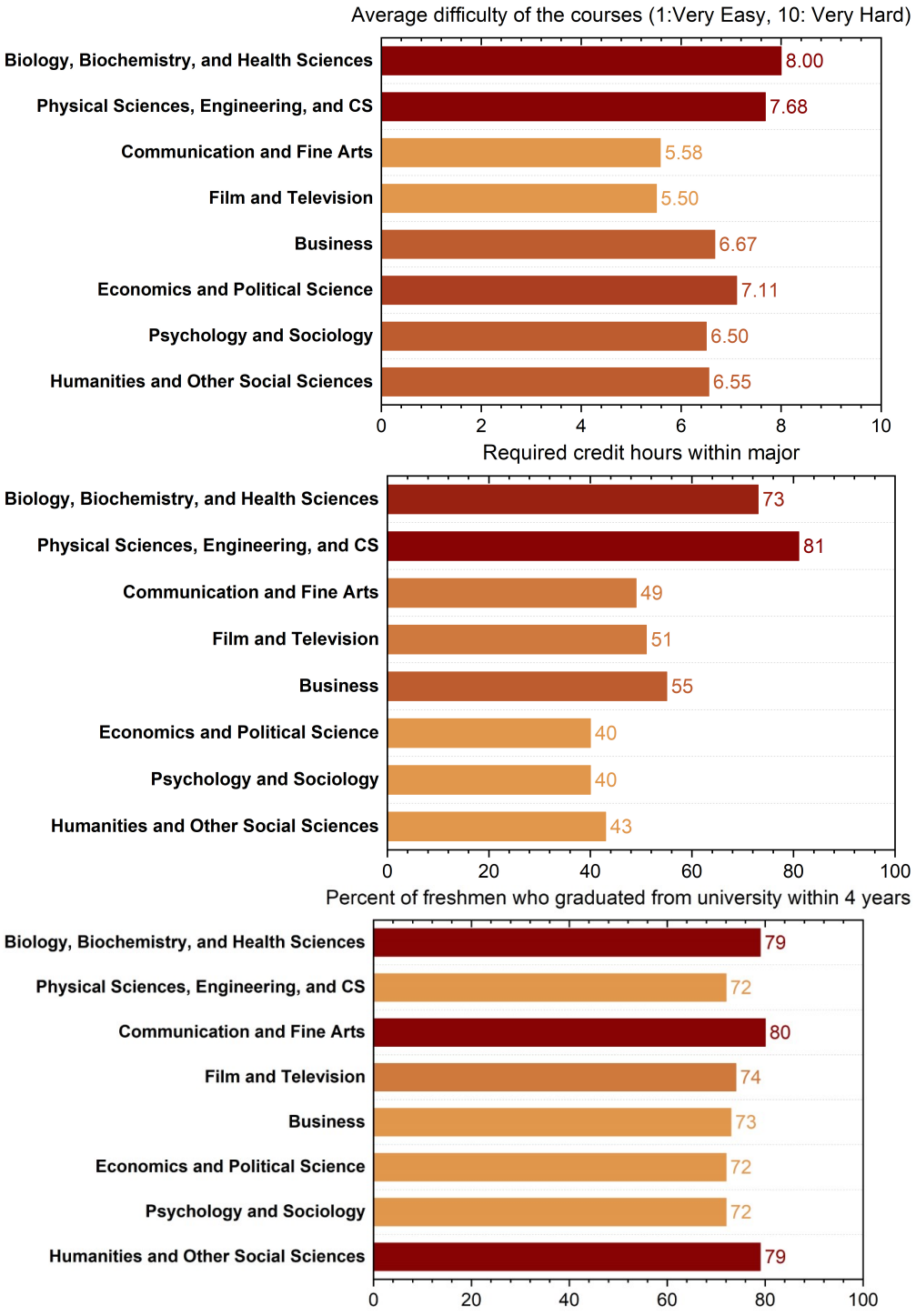


Figure 4: Information Set 2 (Major Composition)

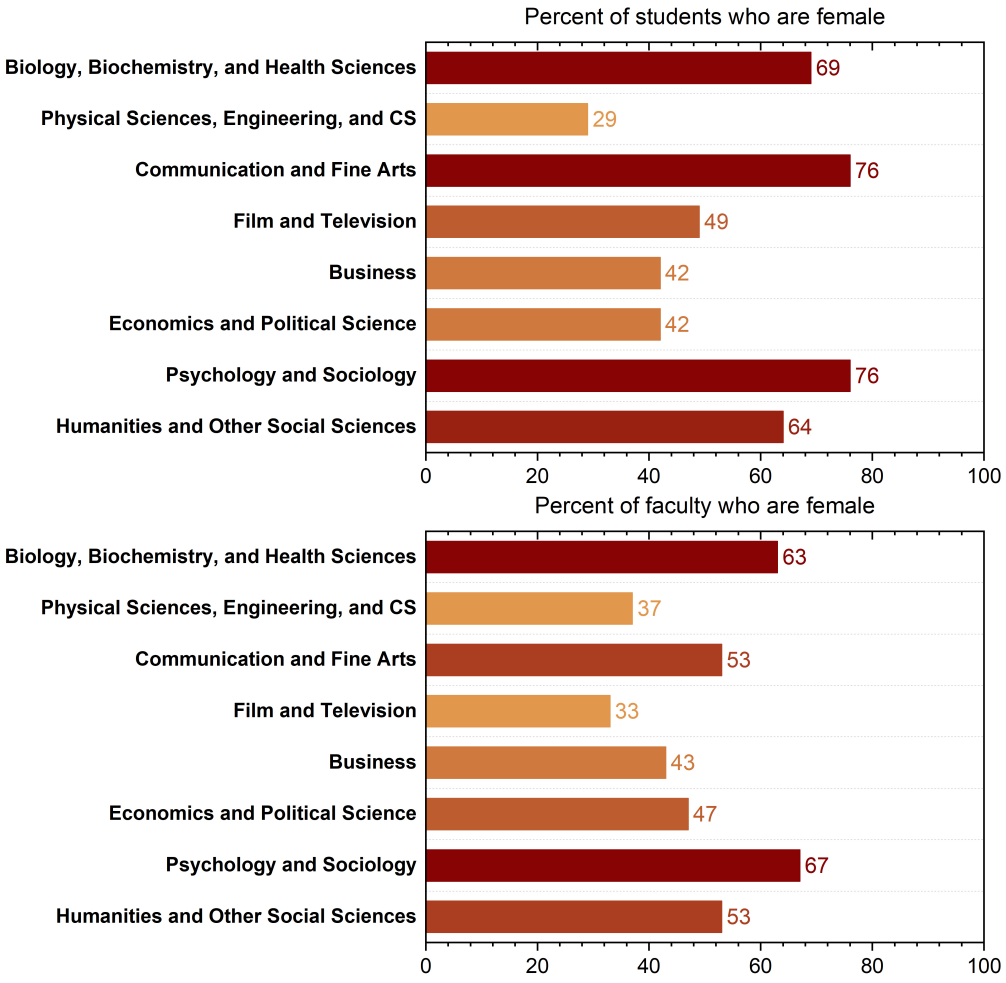


Figure 5: Information Set 3 (Education Status)

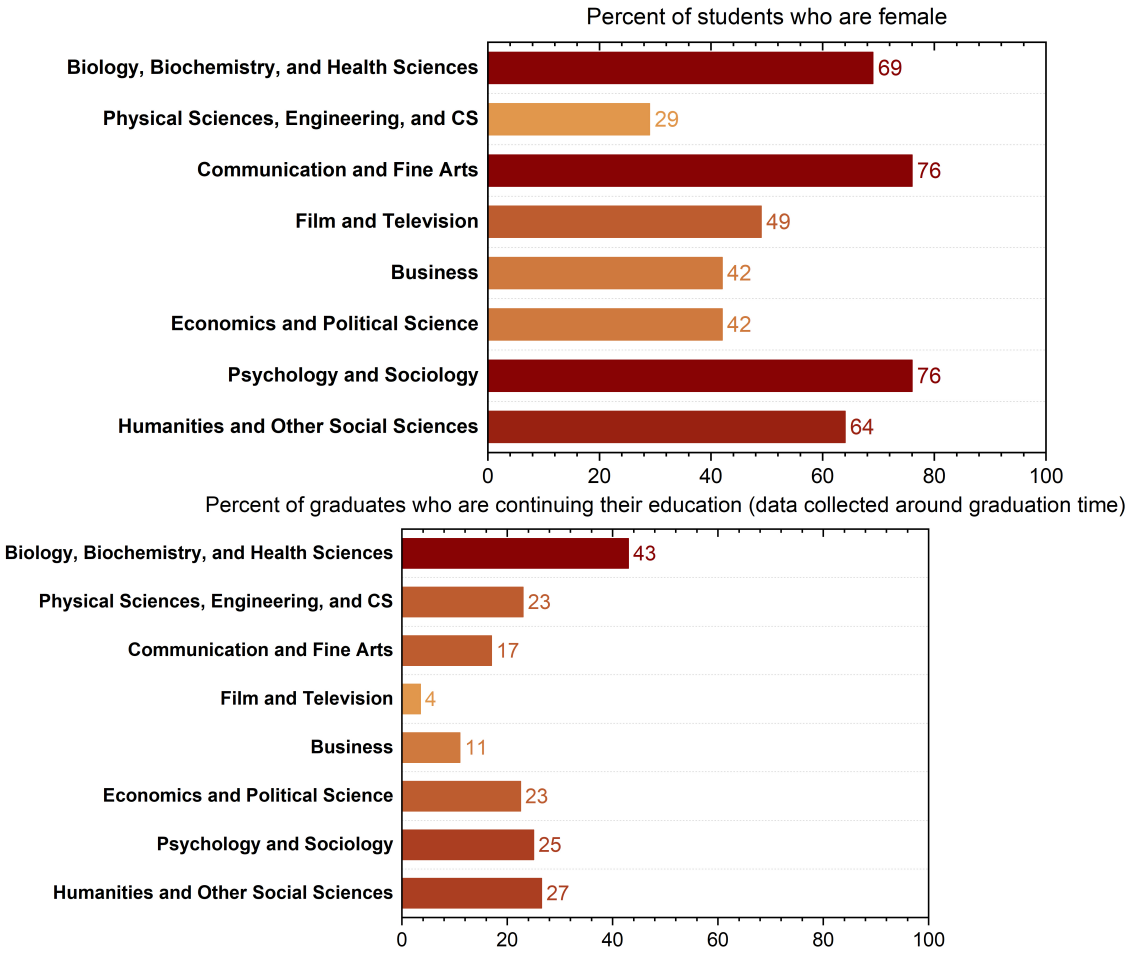


Figure 6: Information Set 4 (Employment and Earnings)

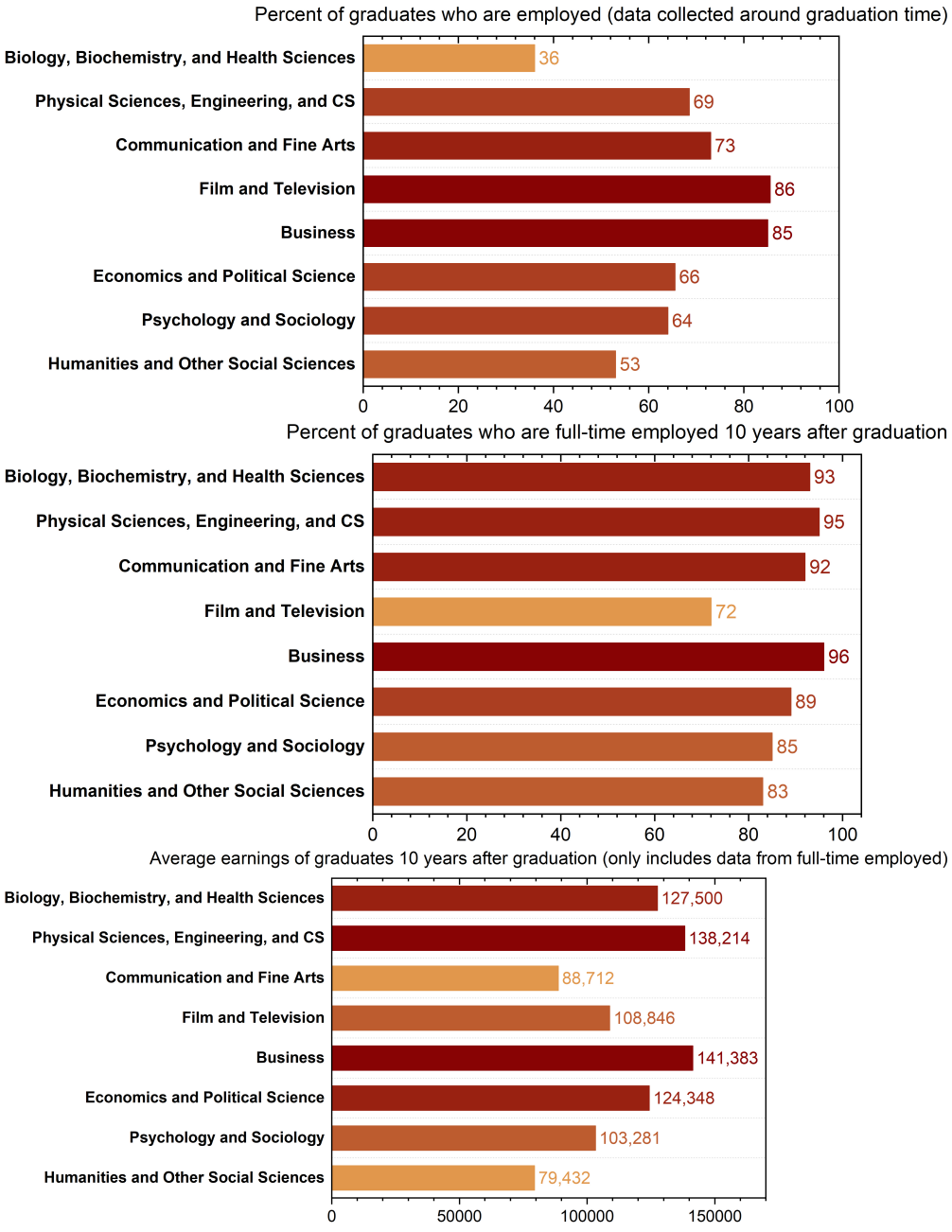


Figure 7: Information Set 5 (Industry)

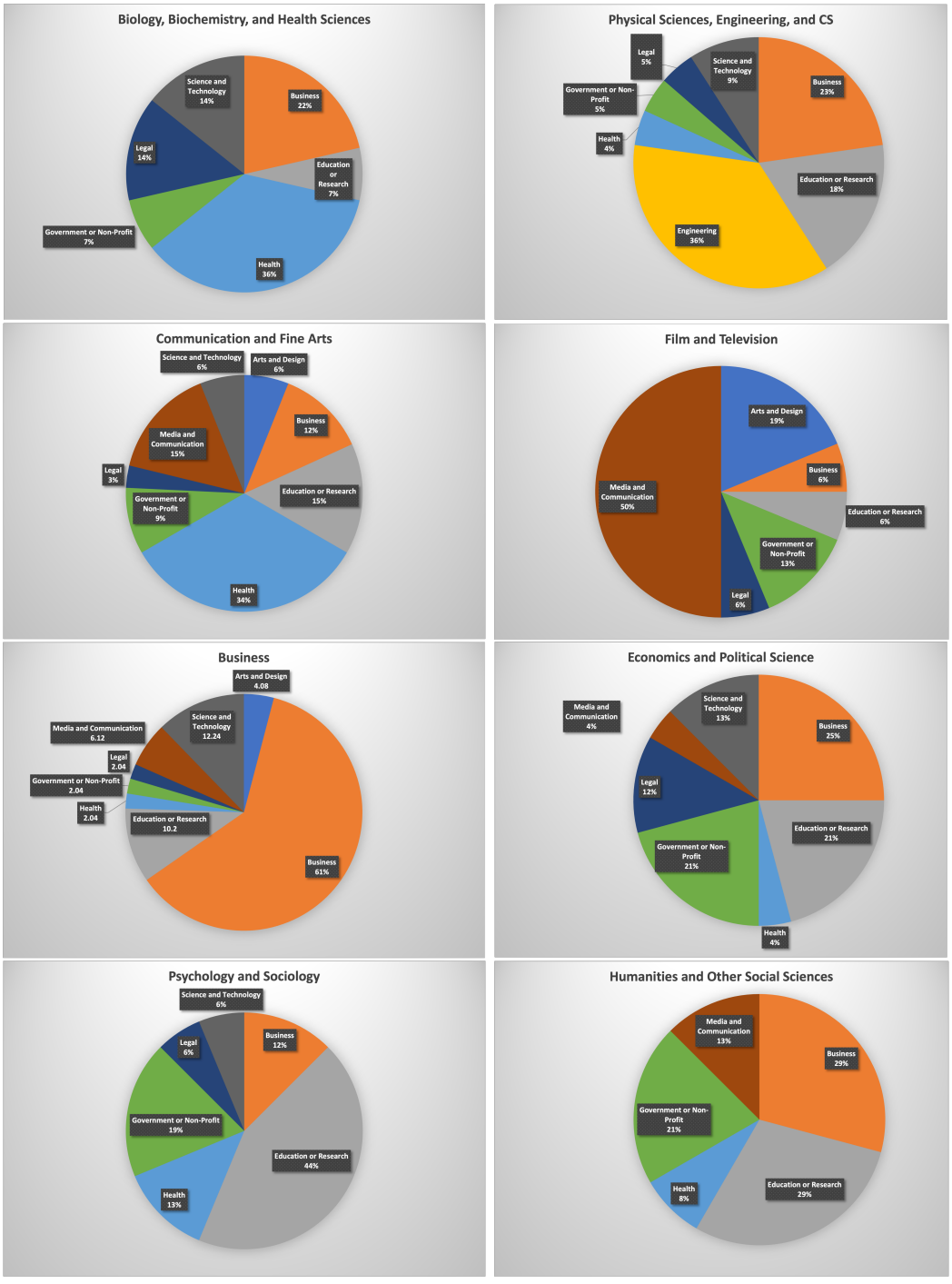


Figure 8: Information Set 6 (Workplace Characteristics)

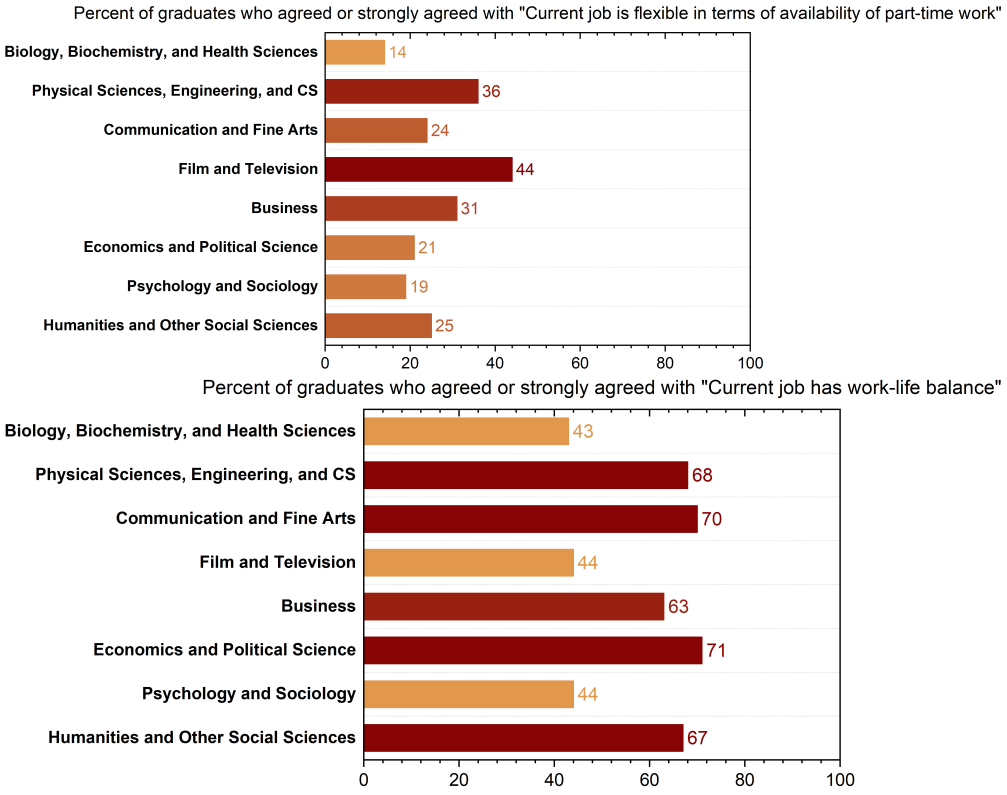


Figure 9: Information Set 7 (Family Status)

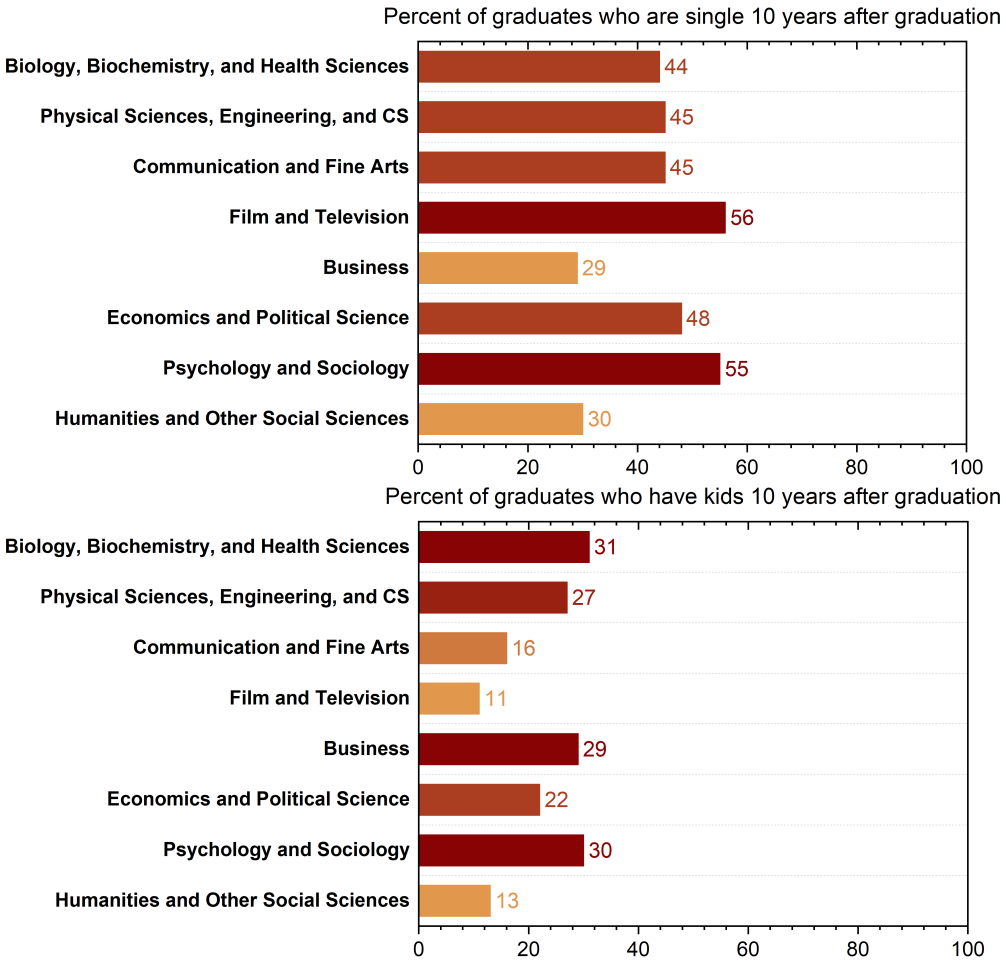
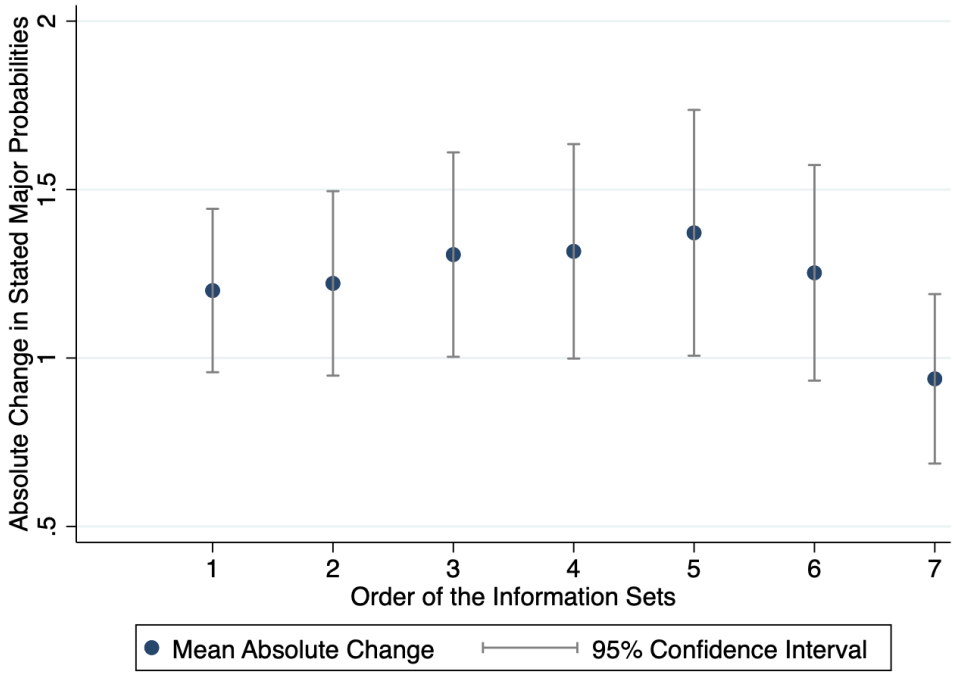


Figure 10: Order Effects



Notes: The dependent variable is the absolute difference between a student's stated probability of graduating with a degree in a major category elicited at time t versus at time t-1 in Part 5 of the survey ($|\pi_{imt} - \pi_{imt-1}|$). X axis shows the order at which a given information set is presented. Gray bars depict the 95% confidence intervals.