

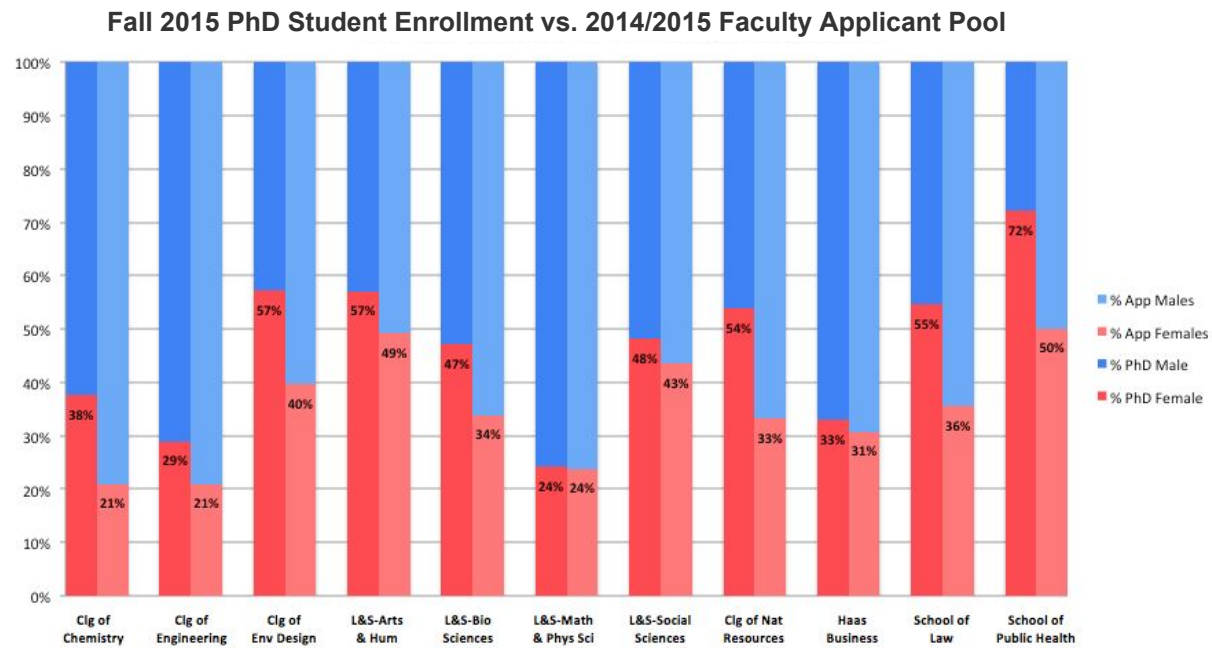
Faculty Diversity in STEM

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How does the Berkeley faculty hiring process create a male dominated teaching environment?

To answer this question we looked at the different stages of UC Berkeley’s hiring process to determine where the gender discrepancy arises. We leveraged data from the Office of Faculty Equity and Welfare as well as academic personnel data to analyze changes in proportions for male and female candidates in the tenure-track hiring process. We found that, at Berkeley, the hiring process did not play as large of a role in creating disproportionate gender representation among new faculty hires as we initially thought. The largest proportional difference in tenure-track pursuit arose in the decision to apply. Despite attaining doctorate degrees at similar rates as males in many different fields STEM and non-STEM alike, females are applying for tenure track positions at a significantly lower rate than males (see Figure 1). Our project attempts to address the causes for this phenomenon.

Figure 1:



Hypotheses

We based our research methods on the following hypotheses:

- Females are self selecting out of the tenure-track process
- Females have more negative experiences in their graduate studies
- Females have more negative perceptions of the tenure-track process.

Survey Design

In order to test our hypotheses and determine possible causes for the low female applicant rates, we designed a survey to be sent to UC Berkeley graduate students that included questions about career priorities, experiences as a graduate student, and perceptions of self and the tenure-track process. The first section of the survey had statements for which the survey respondent would rank their level of agreement (see Figure 2). The next section was designed to determine whether there were gender differences in career priorities. We asked respondents to “Rank the factors in order of importance in influencing your decision to pursue an academic or non-academic career” (1 being most important and 8 being least important). In order to determine whether their desire to pursue a faculty position had changed in their time as a graduate student, we asked the following two questions:

21. Will you consider pursuing a tenure-track faculty position in the future?

22. Upon entering your graduate program were you intending to pursue a tenure-track faculty position?

Answering “Yes” to question 22 and “No” to question 21 would indicate that their career intentions changed at some point during their graduate studies. Finally, we asked general background questions including gender and academic department and provided an open ended comment section for those wishing to express additional thoughts.

Figure 2:

Example Survey Question

2. To what extent do you agree or disagree with the following statement:

I have found it easy to establish connections with faculty in my field.

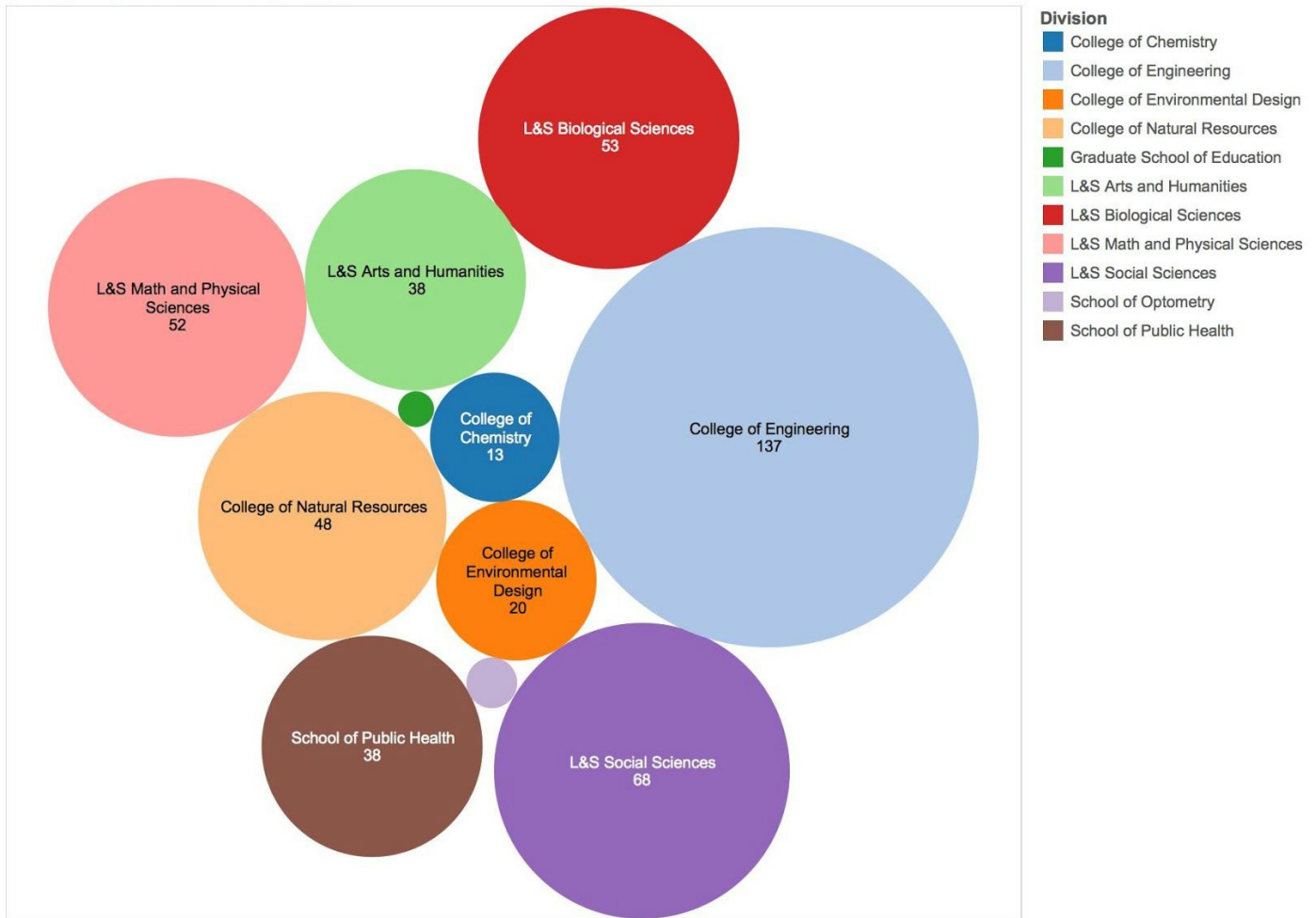
- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Undecided

Survey Responses

The survey was emailed to Graduate Student Affairs Officers for departments within all graduate divisions on campus. From there, the survey was distributed to graduate students and the responses were collected over the course of approximately 2 weeks. We received a total of 478 responses consisting of students from all graduate divisions on campus. Figure 3 displays the proportion of survey responses by division.

Figure 3:

Survey Representation by Division



Division and sum of Number of Records. Color shows details about Division. Size shows sum of Number of Records. The marks are labeled by Division and sum of Number of Records. The data is filtered on Q18, which keeps Female and Male.

Survey Analysis

We began our analysis by looking at the responses for questions 21 and 22 as mentioned previously. Figure 4 shows the trend we hypothesized: that females are selecting out of the tenure track career. With all divisions aggregated, we found that during their graduate studies, there was an increase in males who decide to pursue faculty careers, while there was a decrease in females intending to pursue. Breaking down the same figure for each division, we found similar trends for almost every division (see Figure 5).

Figure 4:

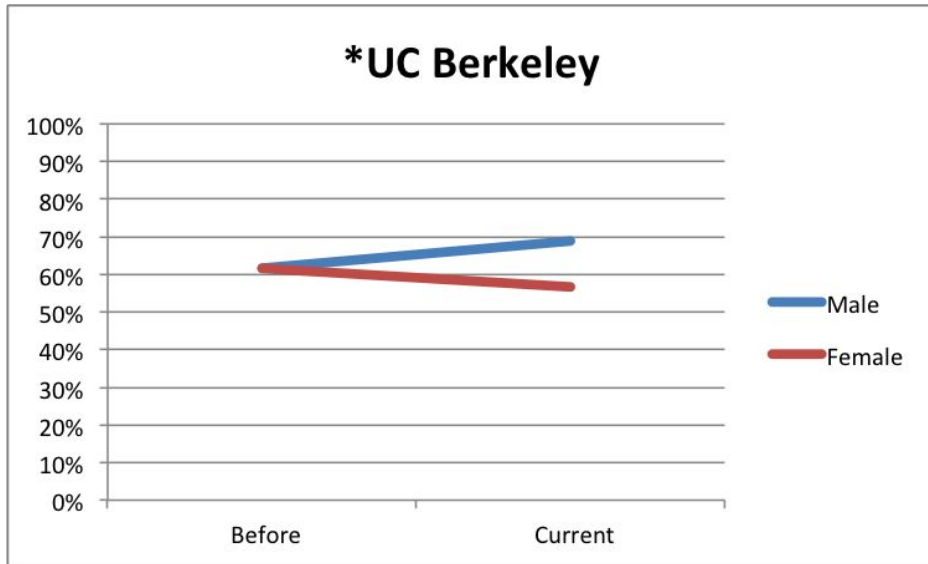
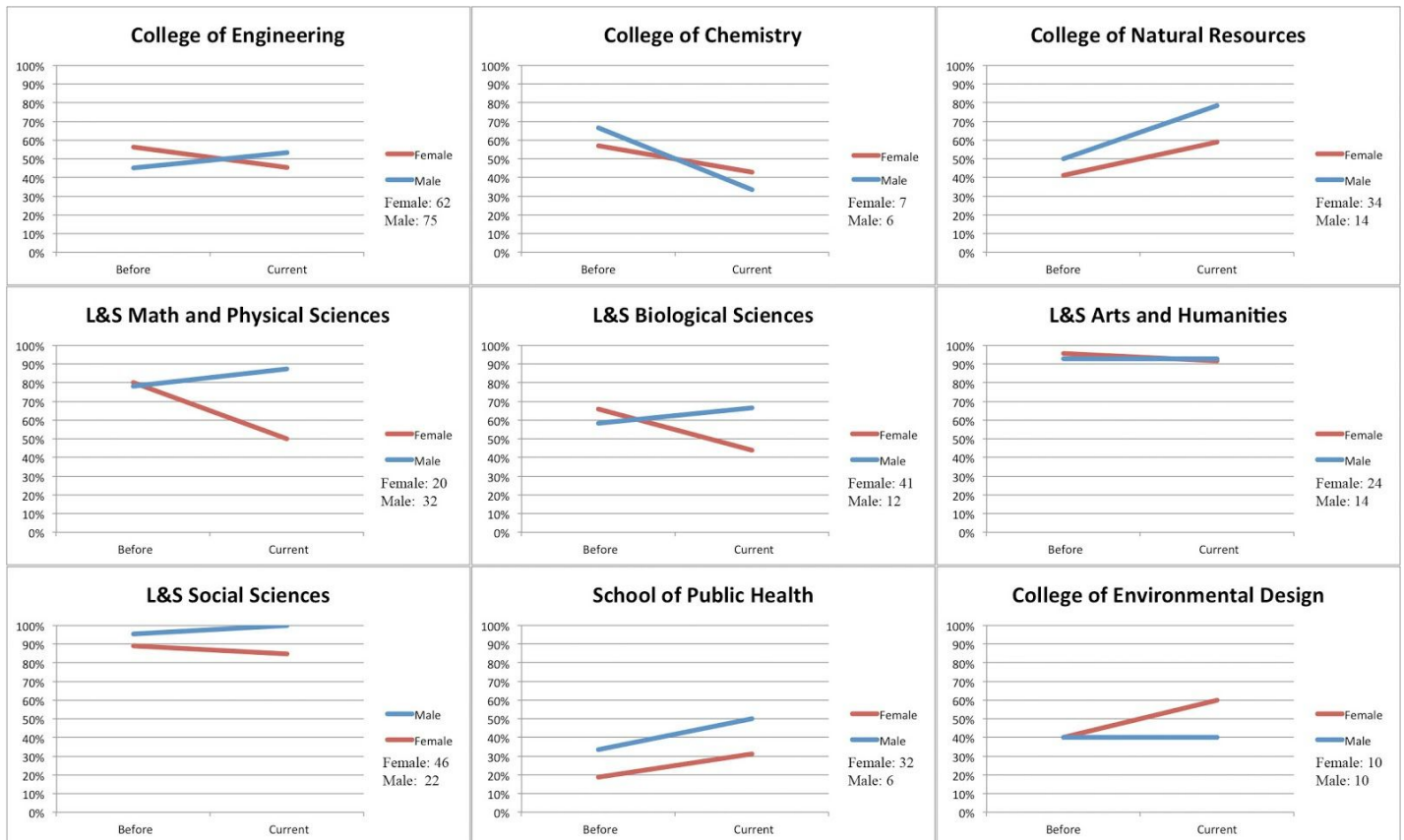


Figure 5:



Career Priorities

We were curious whether men and women had different career priorities that led to certain factors influencing their decision to pursue or not, thus question 14 of our survey asked to rank the factors by importance. Our analysis of the results, shown in Figure 6, showed that the career priorities did not vary by gender.

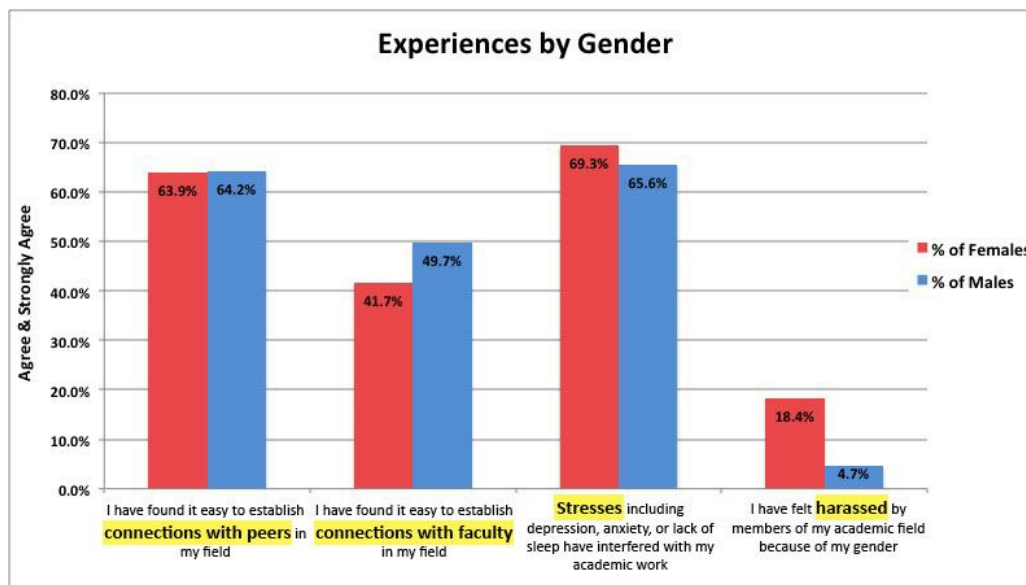
Figure 6:

FEMALES									
	Salary	Work/Life Balance	Advancement Opportunities	Family Friendly	Work Culture	Job Security	Competitive Applicant Pool	Ability to make Tangible Contributions	
1	4.7%	32.0%	6.6%	4.3%	11.7%	3.9%	9.0%	27.7%	
2	11.3%	15.6%	9.4%	12.1%	22.7%	8.6%	7.0%	13.3%	
3	14.1%	11.7%	10.9%	14.8%	18.0%	15.2%	4.7%	10.5%	
4	14.1%	7.8%	20.7%	13.7%	14.8%	15.2%	5.9%	7.8%	
5	14.1%	9.0%	18.0%	13.7%	15.2%	16.4%	7.4%	6.3%	
6	22.3%	6.3%	12.9%	16.4%	6.3%	17.2%	9.0%	9.8%	
7	10.9%	7.8%	14.8%	12.5%	7.8%	16.0%	17.6%	12.5%	
8	8.6%	9.8%	6.6%	12.5%	3.5%	7.4%	39.5%	12.1%	
MALE									
	Salary	Work/Life Balance	Advancement Opportunities	Family Friendly	Work Culture	Job Security	Competitive Applicant Pool	Ability to make Tangible Contributions	
1	6.4%	26.9%	6.4%	5.3%	12.3%	7.0%	12.3%	23.4%	
2	12.3%	15.8%	9.4%	9.4%	19.3%	10.5%	11.1%	12.3%	
3	15.8%	10.5%	14.6%	15.2%	16.4%	16.4%	2.9%	8.2%	
4	15.2%	8.8%	17.5%	17.5%	14.6%	14.6%	5.3%	6.4%	
5	9.9%	12.9%	15.8%	14.6%	12.3%	16.4%	8.8%	9.4%	
6	15.8%	7.6%	19.9%	9.4%	10.5%	19.3%	8.8%	8.8%	
7	14.0%	8.8%	10.5%	14.6%	9.4%	9.4%	20.5%	12.9%	
8	10.5%	8.8%	5.8%	14.0%	5.3%	6.4%	30.4%	18.7%	

Experiences

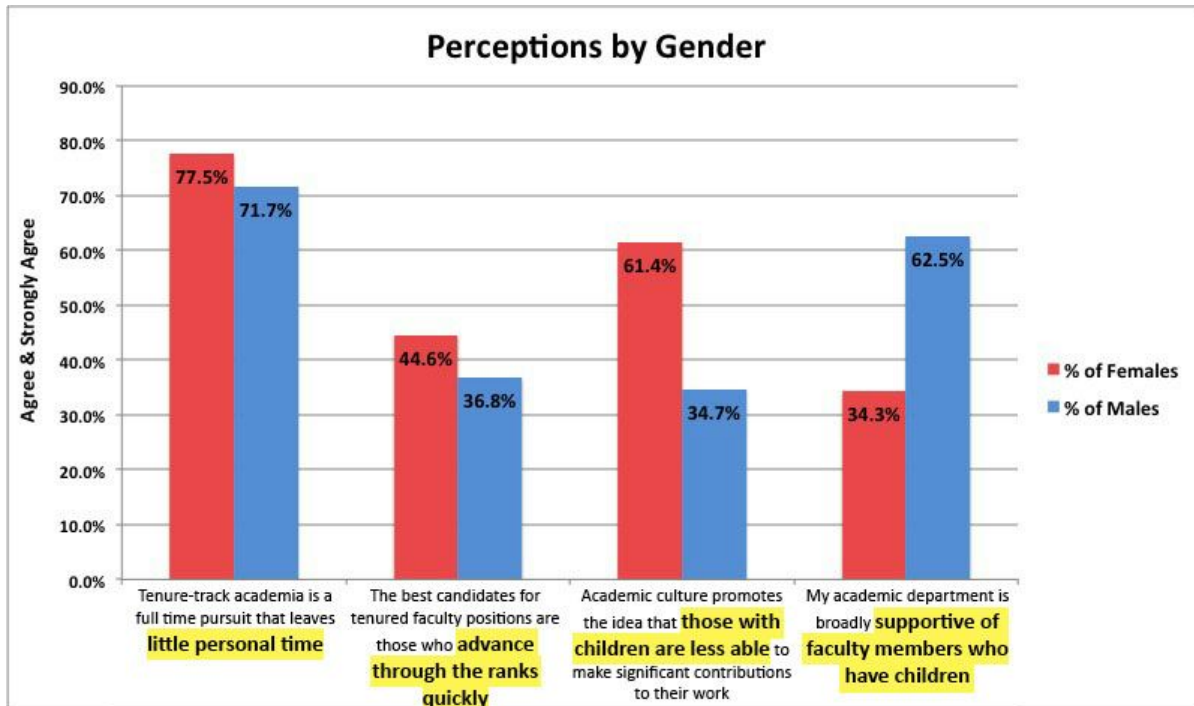
Our four questions regarding the graduate experience received relatively the same answers from men and women. The one with the highest difference was “I have felt harassed by members of my academic field because of my gender.” 13.7% more women agreed with this statement.

Figure 7:



Perceptions

Figure 8:



For each one of these questions, females agreed at higher rates with the negative statements and agreed at lower rates for the positive statements. The variance between gender responses varied by question as shown in Figure 8.

Figure 9:

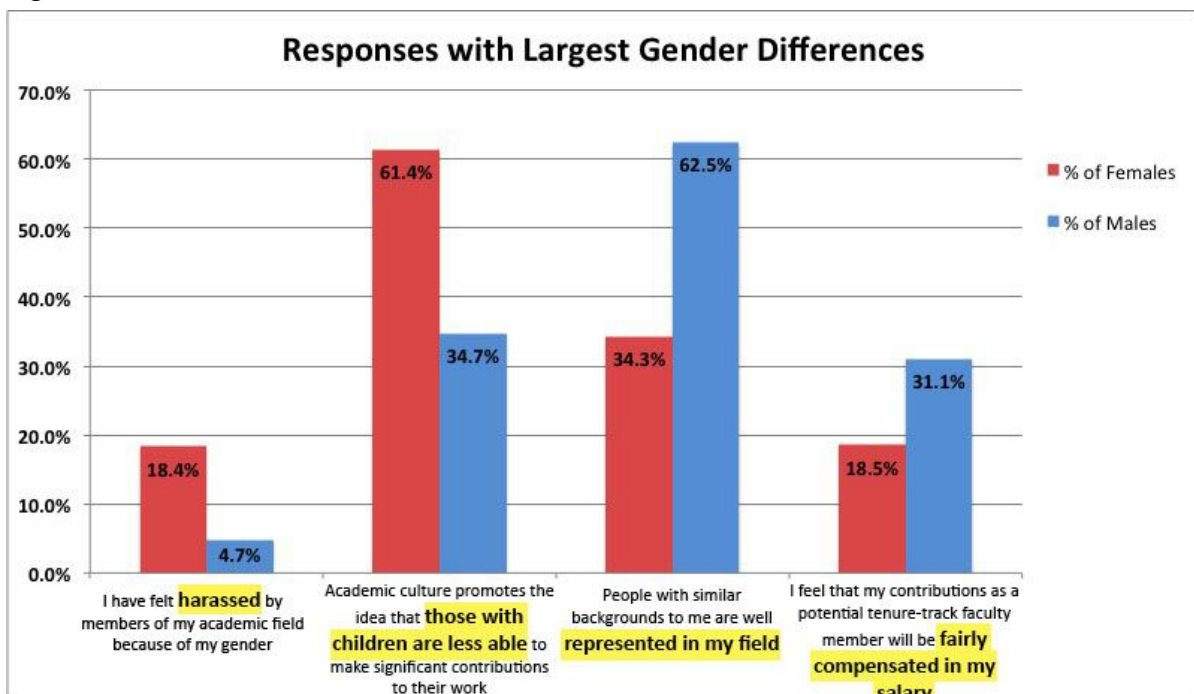
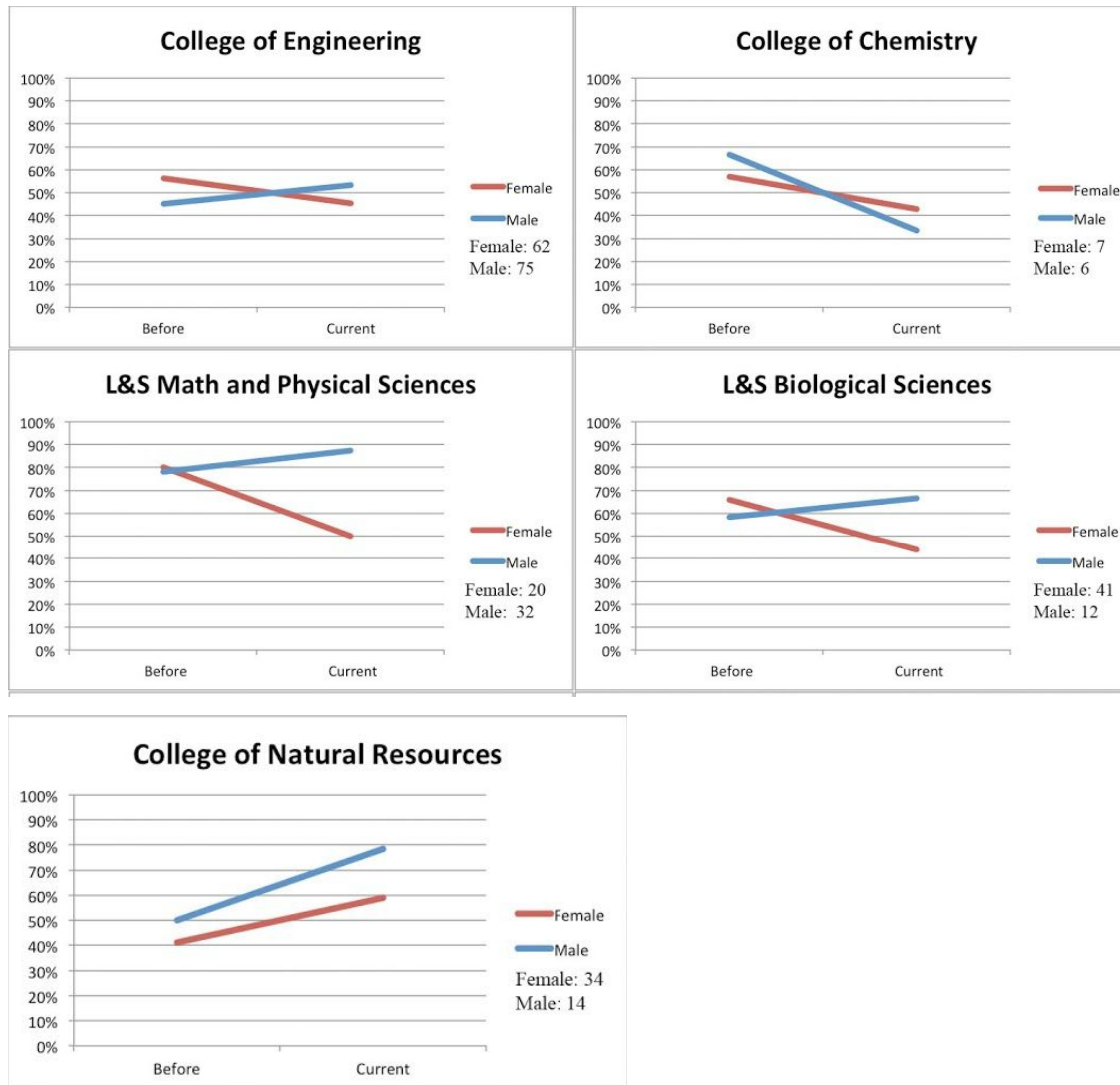


Figure 9 shows the questions that received the largest differences between male and female respondents.

Pursuit

From the above figures we were able to gather that perceptions and experiences differed across gender. However, we wanted to know how they differed when considering those pursuing and not pursuing. We narrowed our focus to STEM divisions because a large majority of our responses were from STEM departments, and these divisions also seemed to have the largest differences. Figure 10 shows that a smaller percentage of women choose to pursue for four out of five of the divisions we considered as STEM.

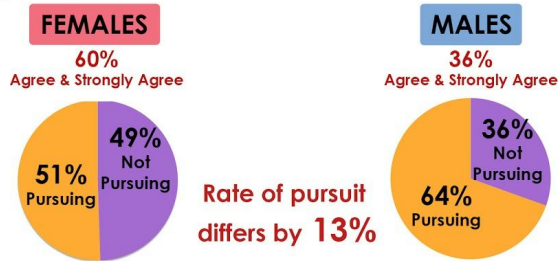
Figure 10:



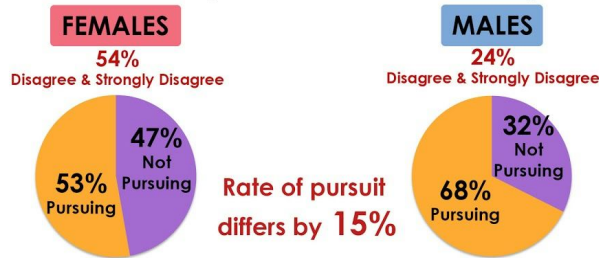
With our aggregated STEM divisions, we broke down question responses by females and males, then by those pursuing and not pursuing faculty careers. This was intended to provide us with a better understanding of the impact gender and various question responses had on graduate students' career choices. We found six questions with a 10% or greater difference in males pursuing versus females pursuing. Figure 11 shows the six questions with the largest differences in rate of pursuit.

Figure 11:

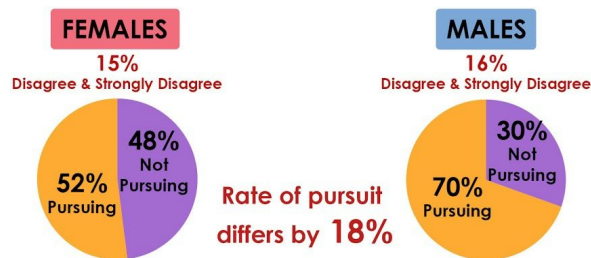
Academic culture promotes the idea that those with children are less able to make significant contributions to their work



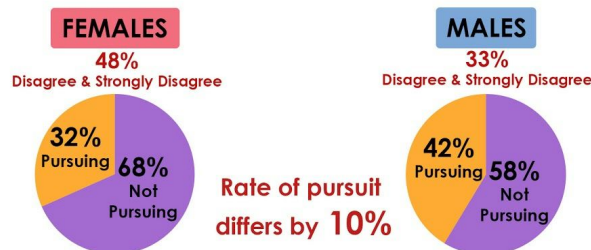
People with similar backgrounds to me are well represented in my field



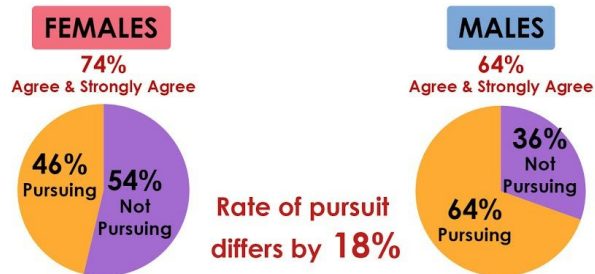
I have found it easy to establish connections with peers in my field



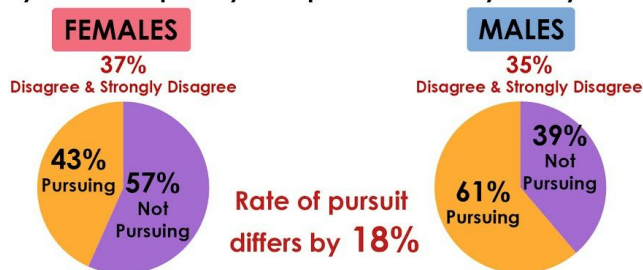
I believe I would be a competitive candidate for a tenure-track faculty position



Stresses including depression, anxiety, or lack of sleep have interfered with my academic work



I feel that my contributions as a potential tenure-track faculty member will be fairly and adequately compensated in my salary



These six questions represented the following themes:

- Failure to connect with peers
- Self selecting out from lack of confidence
- Consequences of having children as a female faculty member
- Lack of representation in graduate school
- Stresses
- Unfair salary compensation

Many of these themes were addressed and elaborated on in the supplemental comments portion of our survey.

Survey Comments

We left an option for people to leave comments about their experiences that may not have been covered through the questions on the survey. We pulled out a comment for each of the themes mentioned above:

Failure to connect with peers

“As a PhD student **I wish there was more of a cordial environment** for everybody to bond within my department. With a **clique attitude** there is **little room to know more and gain resources from peers** and colleagues on future career choices.” - Female, Biology

Lack of confidence

“Very few of my peers who graduate end up going into academia, which makes me feel that

Berkeley graduate students in my field are somehow **under prepared or not competitive** in the academic job market.” - Female, Engineering

Perception of family friendly environment in academia

“As a woman in STEM, I feel as though there is a struggle as I make my way on a **career track seemingly built for men**. I have strong female PI figures to look up to, but can't help but notice that **the most successful ones don't have children**.” - Female, MCB

Lack of representation

“Such collaboration set these individuals on a path to success. I've seen no exceptions to this rule. However such **opportunities have been largely unavailable to me**. I believe this is for the social reason that people tend to choose to collaborate and mentor people they identify with, and there are and were **no potential mentors who are like me i.e. female**.” - Female, EECS

Stresses

“I think the **pressure to excel is too high** and often times I feel **anxious and depressed** at the same time. I'm not sure what part of academia makes us feel this this way but I certainly **doubt my ability to continue** on a tenure-track given my exposure in the PhD and my inability to have the right amount of self-confidence, humility, and drive.” - Female, ERG

Unfair salary compensation

“I feel it's too competitive, requires **a lot of work with little pay off (both career wise and financial wise)**.” - Female, Mechanical Engineering

Research Flaws

- Some of the survey takers expressed confusion over question 14's wording, which was the career priorities ranking question.
- Like most surveys, there is a bias in who chooses to participate. People with stronger opinions tend to respond more, which was evident especially in the comments section where almost all of the comments were negative.
- There is a bias also in the question where we ask them if they were intending to pursue tenure track when they first started their graduate program. People further along in the program may not accurately remember what their intentions were when they first started.

Improvements

Questions to be added to the survey:

- Where/ how many places are you applying to? - We are curious about this because perhaps one source of the problem is that women are more selective about where they apply to.
- How far along in the program are you? - Opinions about their experience, and decisions to pursue or not may vary depending on where students are in their program.
- Are you able to pursue topics of your interest? - Multiple people in the comments expressed frustration over wanting to do academia, but not being able to pursue the topics of research that they are interested in for reasons such as not finding advisors who are

knowledgeable in these topics, or because of lack of research grants. We are curious how the impact on pursuit from this factor may differ by gender.

For future research, we think it would be interesting to compare results of this same type of survey with other universities, including non-research universities, to learn what kinds of problems are specific to UC Berkeley. Additionally, we could conduct interviews on graduate students' experiences that may reveal perspectives that we hadn't considered in our survey. Collecting more responses to generate higher statistical significance could reveal important findings about PhD students and their paths to faculty careers.