Does the Gender Gap in STEM Majors Vary by Field and Institutional Selectivity?

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Abstract

This research brief examines the gender gap in specific STEM majors among college sophomores and whether this gap varies across institutions of different selectivity. Using national longitudinal data, results show that women's underrepresentation on STEM is solely driven by the field of physics, mathematics, engineering, and computer science (PEMC) and that the gender gap in this particular STEM field is ubiquitous across institutions of different selectivity levels. Men are three to four times more likely to major in PEMC even when comparing males and females scoring at the top of the SATs, who have a positive orientation toward math, and are enrolled at highly selective institutions.

Research Question

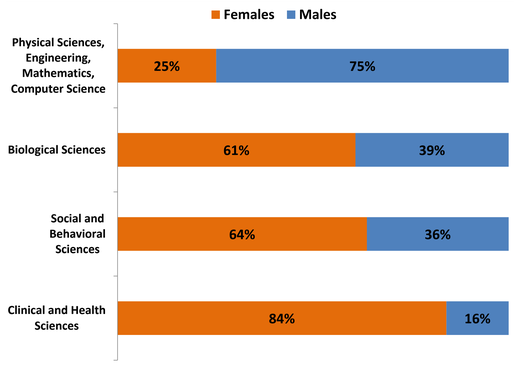
- Are highly competitive institutions doing a better job at closing the gender gap in STEM relative to their less selective counterparts?
- This study examines the prevalence of gender inequalities within STEM across institutions of different selectivity, taking into account the comparable skills, values, career orientations, and college majors of the male and female students who attend them.

Data Source and Key Measures

- Restricted-use data from the Education Longitudinal Study of 2002 (ELS:2002), the most recent U.S. nationally representative study following a cohort of students from high school to postsecondary education.
- Analytic sample: 1,660 cases, which represent 342,742 students nationwide who selected a STEM major two years after entering postsecondary school. The sample includes females and males who first enrolled in both two- and four-year postsecondary institutions.
- Dependent variable: self-reported postsecondary major in four basic STEM fields:
  - social and behavioral sciences
  - clinical and health sciences
  - biological sciences
  - physical sciences, engineering, mathematics, and computer sciences (PEMC)
- Institutional selectivity created from the NCES-Barron's Admissions Competitiveness Index by aggregating the seven categories in Barron's into mutually exclusive categories:
  - most competitive and highly competitive
  - very competitive and competitive
  - less competitive, noncompetitive, special, and missing

Gender Differences Across STEM Fields

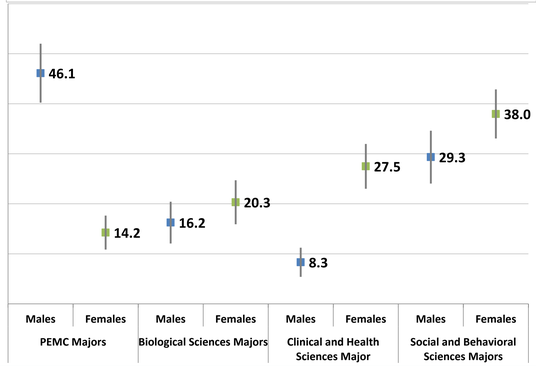
Figure 1: Percentage of Female and Male Students Selecting Specific Postsecondary STEM Majors Two Years After Enrolling in Postsecondary Education



Do STEM Students Differ in Abilities and Subjective Orientations?

- Based on multinomial logistic regression models, we estimated predicted probabilities of declaring a specific STEM major for females and males who are non-Hispanic white, whose parents attended or graduated from college, and who are attending a four-year institution and were at the 75th percentile of SAT math scores.
- Despite similarities in female and male students' math ability and interest in STEM, men are significantly more likely than women to declare a PEMC major, in contrast to the other three major STEM fields.

Figure 2: Probability of Declaring Specific STEM Majors for Students in 75th percentile of Mathematics SAT Scores, by Gender (Predicted Probability and 95% Confidence Interval)



Does the Selectivity of Postsecondary Institutions Matter?

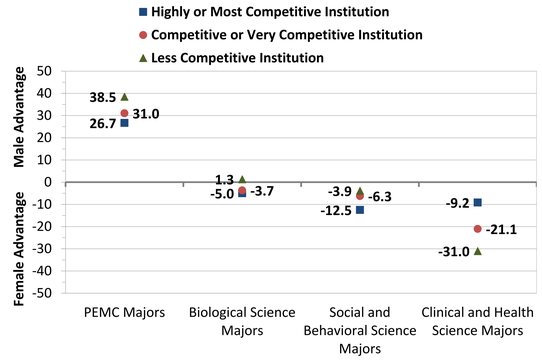
- Given that males are more likely to declare PEMC than similarly talented females, is this also the case across different types of institutions?
- Based on a second multinomial model that adds as a covariate the selectivity of the college or university attended, we estimated probabilities of declaring specific STEM majors by institutional selectivity.
- Estimates represent the probability of declaring a specific STEM major for males and females who are non-Hispanic white, whose parents attended or graduated from college, and who are attending a four-year institution, were at the 75th percentile of SAT math scores, and are enrolled in postsecondary institutions of different selectivity.

Table 1: Percentage of Female and Male Students Selecting Specific Postsecondary STEM Majors Two Years After Enrolling in Postsecondary Education

Specific Postsecondary STEM Majors Two Years After Enrolling in Postsecondary Education	Institutional Selectivity		
	Highly or Most Competitive	Competitive or Very Competitive	Less competitive, Noncompetitive, Special, or No Barron's Available
PEMC Majors			
Males	39.6	44.7	56.2
Females	13.0	13.7	17.7
Biological Science Majors			
Males	15.9	16.9	15.9
Females	20.9	20.6	14.6
Social and Behavioral Science Majors			
Males	41.1	29.7	16.6
Females	53.6	36.0	20.5
Clinical and Health Science Majors			
Males	3.3	8.7	12.6
Females	12.5	29.7	43.7

- Figure 3 shows *differences* in the probability of males and females to declare specific STEM majors by institutional selectivity. These estimates may be interpreted as the male advantage in each specific STEM major among institutions of similar selectivity.
- For instance, 39.6% of high-achieving males who declare a STEM major and attend highly or most competitive institutions are in PEMC, as opposed to 13.0% of equivalent females. Figure 3 displays the difference in the probability of male and female students to declare PEMC in this type of institutions (39.6 – 13.0 = 26.7) and that estimate can be interpreted as the male advantage in PEMC in highly or most competitive institutions.
- Figure 3 reveals that males are nearly 3 times more likely to major in PEMC than similarly qualified females *even at the most selective institutions*.

Figure 3: Gender Gap in College Students' Likelihood of Declaring Specific STEM Majors by Institutional Selectivity (Males – Females Predicted Probability, 75th pct. SAT Math)



Sealing Another Leak in the STEM Pipeline

- Though women have a representative advantage over men in three of the STEM areas, they are critically underrepresented in the PEMC disciplines, which encompass some of the most lucrative and fastest-growing career fields. This is true even at the "Ivies," where highly talented women still choose to pursue STEM majors other than PEMC.
- Two possible causal mechanisms that warrant further investigation to understand underrepresentation of women in PEMC :
  - "Personal" factors, such as female students perceiving the college coursework as uninteresting, stereotypically male, and having little salience with respect to personal and professional goals.
  - "Institutional" factors: While some colleges are known for their dedication to increasing the number of women in science and engineering, not all institutions make similar efforts to support female students, including many of the most elite.
- By losing out on the network-building and employment resources that highly selective institutions provide, the PEMC gender gap is being perpetuated in the workforce, especially at the most sought-after companies within the science and technology-focused industries.

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