Are 2-Year Colleges the Key? Institutional Variation and the Gender Gap in Undergraduate STEM Degrees*

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ABSTRACT

Studies of gender gaps in science, technology, engineering, and mathematics (STEM) higher education have rarely considered 2-year colleges, despite the fact that most enrollees are women. Situated in an interdisciplinary literature on gender and inequality in students' pathways to STEM higher education, this study used Beginning Postsecondary Students:2004/2009 nationally representative panel data on 5,210 undergraduate students. The primary research question posed was: How does initial college type influence the gender gap in STEM undergraduate degrees? First, we describe and illustrate distinct patterns in the degrees earned by men and women who initially enroll in 2-year and 4-year institutions. Leveraging rich control measures, we estimated a series of multivariate logistic regressions to robustly estimate gender gaps in non-STEM, social/behavioral sciences, life sciences, and natural/engineering sciences degree fields. Results from these degree clusters were distinct and underscored the limitations of "STEM" as an umbrella category. College type was more influential on the life sciences and social/behavioral sciences; effects on natural/engineering sciences degrees were experienced primarily by men, especially among baccalaureate degree earners. Gender gaps among life sciences and natural/engineering sciences bachelor's degree earners were wider among initial 2-year students (favoring women and men, respectively). The discussion contextualizes and offers implications from our findings.

KEY WORDS: Higher education, gender, STEM degree, community college, women in STEM

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Abstract:

Studies of gender gaps in STEM higher education rarely consider two-year colleges, despite the fact that most enrollees are women. Situated in an interdisciplinary literature on gender and inequality in students' pathways to STEM higher education, this manuscript uses Beginning Postsecondary Students: 2004/09 nationally representative panel data on 5,210 undergraduate students. The primary research question posed is: how does initial college type influence the gender gap in STEM undergraduate degrees? First, we describe and illustrate distinct patterns in the degrees earned by men and women who initially enroll in two-year and four-year institutions. Leveraging rich control measures, we then estimate a series of multivariate logistic regressions to robustly estimate gender gaps in non-STEM, social/behavioral sciences, life sciences, and natural/engineering sciences degree fields. Results on these degree clusters are distinct, underscoring the limitations of "STEM" as an umbrella category. College type is more influential on life sciences and social/behavioral sciences; effects on natural/engineering sciences degrees are experienced primarily by men, especially among baccalaureate degree earners. Gender gaps in life and natural/engineering bachelor's degree earners are wider among initial-two year students (favoring women and men, respectively). The discussion contextualizes and offers implications from our findings.

INTRODUCTION

U.S. women now surpass men in university enrollment and degrees earned (e.g., DiPrete & Buchmann, 2013) but remain underrepresented in high-wage natural sciences and engineering fields (National Science Foundation, 2016). This gender disparity may have broader economic implications, as women tend to earn degrees in fields with some of the lowest median earnings (Carnevale, Strohl, & Melton, 2011). Problematically, most studies have excluded two-year college students from their analyses of the gender gap in undergraduate science, technology, engineering, and mathematics (STEM) fields. Instead, existing research has focused on students attending four-year, residential, and often elite institutions (e.g., Cech, Rubineau, Silbey, & Seron, 2011; Mullen, 2013). It may have been acceptable in the past to dismiss the relevance of two-year colleges as producers of STEM degrees. Increasingly however, these institutions are engines of scientific production (Lundy-Wagner & Chan, 2016; Wang, 2013a, 2013b). Fifty percent of STEM jobs require an Associates' degree or less (Rothwell, 2013). Meanwhile, in 2009, 44.5% of traditional-age college students were enrolled in two-year colleges (Dunbar, et al., 2011). These trends suggest the growing importance of two-year colleges in U.S. STEM postsecondary education.

Notably, two-year colleges may play a crucial role in efforts to broaden participation in postsecondary STEM fields among women, and women of color in particular (Johnson, Starobin, & Santos Laanan, 2016; Wang, 2013a). White and Asian men continue to be the most likely to pursue these fields (National Science Foundation, 2013). However, two-year college students are more likely to be women and members of underrepresented minority groups (Horn, Nevill, &

Griffith, 2006).[1] It seems then especially important to understand whether and how STEM participation gaps operate among two-year college students, given the relative dearth of literature on this phenomenon and the importance of aligning students' collegiate training with the labor market. Because research and theory about the gender gap in STEM has so strongly focused on four-year colleges, it seems essential not only to examine the experiences of two-year college students but also consider their experiences alongside their four-year college peers.

Using the most recent complete cohort of the nationally representative Beginning Postsecondary Students (BPS: 2004/2009) study, we investigate the gender gap in STEM undergraduate degrees, distinguishing among degree fields. This manuscript primarily investigates the following question: how does the gender gap differ by college type, if at all? We organize our analysis around four sub-questions. First, what is the nature of the postsecondary STEM gender gap? Second, how does the gender gap in STEM majors vary among those beginning in two- and four-year colleges? Third, to what extent do college experiences influence the gender gap in STEM degree fields among those who start college in two-year and four-year institutions? Finally, we conduct additional robustness checks on our predictors and outcome measures to pose our final research question: to what extent does the effect of initial college type persist across alternative specifications of our measures and in specific STEM degree fields?

[1] The terms "underrepresented groups" and "underrepresented minorities" refer to individuals who are underrepresented in the STEM educational system and work force, in particular those from one or more of the following racial or ethnic groups: black or African American, Latino or Hispanic, American Indian or Alaska Native, Native Hawaiians or other Pacific Islanders (see e.g., National Science Foundation, 2013).

LITERATURE REVIEW

Gender Inequality in STEM: The Stakes and the Limitations

Why does gender inequality in STEM majors matter? Variation in undergraduate major is a principal driver of the gender wage gap, both indirectly through subsequent occupational choices and even directly, independent of work-related factors (Bobbitt-Zeher, 2007; see also Gill & Leigh, 2000). Women are the primary earners for over 40 percent of U.S. households with children (Wang, Parker, & Taylor, 2013). Therefore, their degree fields and subsequent economic returns have consequences for society, families, and individual women. Additionally, projected growth in the increasingly scientific and technical global labor force motivates the call for a robustly skilled and inclusive STEM labor force which includes women from all backgrounds (Beede, Julian, Langdon, McKittrick, Khan, & Doms, 2011; U.S. Commission on Civil Rights, 2010). There are then both economic and social justice rationales for investigating gender inequality in high-earning fields.

Some have suggested ability and preparation explain gender differences in STEM. However, mathematics ability does not appear to meaningfully vary by gender (Hyde & Linn, 2006). As measured by SAT college placement examination scores, mathematics ability alone does not influence gender differences in undergraduate major, even when focusing on those with the highest levels of ability (Riegle-Crumb, King, Grodsky, & Muller, 2012; Wang, Eccles, & Kenny, 2013). Even though gender gaps in high school mathematics and science course taking have closed (DiPrete & Buchmann, 2013; Nord, et al., 2011), the best-prepared and most mathematically able girls remain disproportionally less confident in their mathematics ability and less likely to enter mathematically-intensive STEM majors (Perez-Felkner, McDonald, Schneider, & Grogan, 2012; Perez-Felkner, Nix, & Thomas, 2017). Altogether, mathematics and science ability and pre-college preparation tend to be positively associated with majoring in a STEM field (e.g., Engberg & Wolniak, 2013), but they do not meaningfully move the needle with respect to gender differences in postsecondary STEM fields.

What about college academic achievement in STEM? There has been limited research on the role of undergraduate STEM grades as predictors of degree persistence (Wang, 2016). Thus far, findings have been mixed. A study of North Carolina freshmen at public universities found STEM GPA (as compared to non-STEM GPA) does not explain gender differences in choice of STEM or non-STEM majors (Stearns, Jha, Giersch, & Mickelson, 2013). Notwithstanding, other studies have identified a relationship between STEM GPA and college major, albeit less so for women. In an investigation using two national U.S. cohorts, Griffith (2010) found students with a higher ratio of their first year STEM GPA over their total GPA are more likely to continue majoring in STEM. Still, STEM grades appear more important for men's persistence in STEM majors than for women (Griffith 2010; Rask 2010), if they are influential at all. It is even less clear whether and how STEM postsecondary coursework predicts STEM degrees among two-year students. In summary then, we do not yet know to what degree pre-college and college ability and achievements predict postsecondary gender gaps in STEM.

College experiences seem to differentially steer men and women into STEM fields (Ma, 2011; Sax, 2008). Decades of debate on potential limitations of Tinto's (1987) integration theory notwithstanding (Braxton, 2000; Hurtado & Carter, 1997; Tierney, 1999), academic and social integration continue to be seen as key factors in student success. Academic integration appears to have specific importance for STEM students, including mentors (Seymour & Hewitt, 1997) and academic clubs and organizations (Eisenhart & Finkel, 1998). While social integration has been studied at four-year institutions, the effect of it on women's STEM degree attainment is comparatively less clear, perhaps in part as a result of an overly broad definition of STEM (Gayles & Ampaw, 2014). As the precise effects of college experiences remain unclear even among four-year students, we consider these further in the current study, with attention to both four-year and two-year college students.

Two-Year Colleges and Diverse Student Pathways

Students in two-year colleges may have particularly distinct experiences and pathways to STEM fields, in part because of differences in who first attends two- versus four-year institutions. Two-year college students are more likely to be socioeconomically disadvantaged and first-generation college (e.g., Park, 2012). They are more likely to be immigrants or children of immigrants (Teranishi, Suárez-Orozco, & Suárez-Orozco, 2011). Moreover, limited access to four-year colleges in many states may constrain underrepresented students with close family ties or expectations that they will not attend college far from home (López Turley, 2009).

In addition to personal and family background differences, two-year and four-year students' prior schooling experiences also vary. The high schools they attend tend to be less affluent and college-oriented than those attended by students who begin their post-secondary studies in four-year colleges (Niu & Tienda, 2013). Students who start in community colleges tend to complete fewer college-level and advanced high school mathematics courses; these are associated not only with majoring in STEM but also with transition to four-year and selective colleges, especially for students of color (Grubb, 1991; Stearns, Potochnick, Moller, & Southworth, 2008). In sum, initial two-year college students seem to begin postsecondary education with different resources and preparation than students who begin at four-year colleges.

Intersectionality theory highlights the importance of considering the interplay of multiple, intersecting identities, particularly with respect to the diverse experiences of women of color and from less socioeconomically advantaged families (Cho, Crenshaw, & McCall, 2013; Crenshaw, 1991). Given the decades-long national interest in broadening the pool of potential STEM talent, demographic blinders may be the biggest problem with the field's over-focus on four-year college pathways into STEM careers. Women outnumber men across all postsecondary institutional types, but this is especially true in the two-year sector (St. Rose & Hill, 2013). Women's postsecondary STEM outcomes may be conditioned on their racial-ethnic and social class backgrounds (Ma, 2011; Maple & Stage, 1991; Ong, Wright, Espinosa, & Orfield, 2011). Students' multiple identities may influence women's experiences with STEM courses and majors (Carlone & Johnson, 2007; Jones & McEwen, 2000). In addition, women's pathways to STEM degrees may be affected by stereotypic beliefs and implicit biases held by those they encounter in their college environments (Cheryan, Plaut, Davies, & Steele, 2009; Nosek & Smyth, 2011).

Are Community Colleges Chillier for Women in STEM?

The community college pathway into STEM careers has gained recent empirical attention (Lundy-Wagner & Chan, 2016; Wang, 2013a, 2016) but continues to be understudied. Some evidence suggests two-year colleges can have a "chilling" effect on students, cooling out their scientific ambitions (Clark, 1960; Hall & Sandler, 1984). While this "chilly climate" phenomenon is most often used in examining workplace culture and four-year institutions (e.g., Hurtado, Eagan, Tran, Newman, Chang, & Velasco, 2011), it appears relevant for two-year colleges as well. For instance, in a study of community college students enrolled in traditionally female- and male-dominated majors, Morris and Daniel (2008) found women were generally more likely to perceive the climate as chilly. Their study directly compared climate perceptions among nursing, education, engineering, and information technology (IT) students but did not examine gender differences across these majors.

Women may experience more hostile STEM climates than their male peers, even in community colleges. In a multi-institutional study, two-year college women who perceived a chilly climate experienced weaker cognitive growth in scientific and other areas during their first year, as compared to female peers in four-year colleges (Pascarella, et al., 1997). This finding aligns with Reyes' (2011) study of four women of color who transferred from a local community college to STEM majors at a four-year research university. Women attributed stigma and negative treatment they encountered to their ethnicity, gender, and challenges in the transfer status. Taken together, it seems women who perceive a chillier climate might be dissuaded from majoring and persisting in STEM fields. While new research has begun to identify strategies for administrators and faculty to help community college STEM students succeed (e.g., Johnson, et al., 2016; Rodriguez, Cunningham, & Jordan, 2016), the studies reviewed above suggest the increasing utilization of two-year colleges by U.S. students could actually exacerbate the gender gap in STEM majors.

On the other hand, college type may have no effect on the gender gap. Findings on institutional selectivity among four-year institutions are mixed. In a twenty-three postsecondary institution study, selectivity rank did not meaningfully explain variation in STEM among women and underrepresented minorities (Smyth & McArdle, 2004). Meanwhile, Gaston Gayles and Ampaw (2014) found women at selective four-year institutions were less likely to complete STEM degrees than their counterparts at non-selective institutions, using BPS: 1996/2001 data. By contrast, the gender gap in physical, engineering, mathematics, and computer sciences is smaller at more selective institutions (nearly 3 to 1) than at less selective institutions (nearly 4 to

1) (Schneider, Milesi, Perez-Felkner, Brown, & Gutin, 2015). In addition, other studies – albeit not focusing on gender – indicate a negative relationship between STEM and institutional selectivity (Engberg & Wolniak, 2013), especially at large and highly selective research universities (Griffith, 2010). Based on these results, college type is an important factor to consider when examining the gender gap in completion of STEM degrees, though it is unclear what role two-year colleges may play.

Current Study: Gender, College Type, and Specific STEM Fields

This study examines how college type affects the gender gap in undergraduate STEM degree attainment. As demonstrated above, this gender gap has considerable economic and social consequences for women and for society at large. Two-year institutions have been a particularly relevant and understudied gateway to STEM degrees, especially for women. In a gender wage gap study of two cohorts of students in the 1980s and early 1990s, Gill and Leigh (2000) observed a smaller gender gap in engineering majors among two-year colleges than among four-year colleges. However, the more recent studies reviewed above suggest two-year colleges may have a negative effect, despite their associations with postsecondary access and opportunity. This puzzle underscores the importance of better understanding how college type affects women's chances of earning STEM degrees.

STEM fields vary. While higher education scholars tend to define STEM broadly, research on postsecondary gender differences increasingly distinguish between STEM degree field clusters (Ceci, Ginther, Kahn, & Williams, 2014; Perez-Felkner, et al., 2012; Riegle-Crumb & King, 2010). Gender inequality differs among postsecondary STEM fields – for example, engineering versus health (Corbett & Hill, 2015; Schneider, et al., 2015). Focusing on specific disciplines and disciplinary clusters allows for a more effective examination of gender inequality's consequences and causes (Ceci, et al., 2014; Kanny, Sax, & Riggers-Piehl, 2014). Building on this literature, this longitudinal study compares the completion of specific STEM degrees among two-year and four-year students, six years after enrolling in college. We detail our methodology below.

METHODS

Data Source

We used National Center of Education Statistics (NCES) data from the most recent complete Beginning Postsecondary Students study (BPS: 2004/09), a nationally representative longitudinal cohort of U.S. college students who first attended a postsecondary institution during the 2003–04 academic school year. NCES used a two-stage sampling design (Wine, Janson, & Wheeless, 2011). First, they sampled 1,670 institutions eligible for the National Postsecondary Student Aid Study (NPSAS:04) based on U.S. federal aid authorization criteria. From these institutions, 49,410 first-time undergraduate students were identified as (1) enrolled in academic programs and/or credit-generating courses at these institutions and (2) not concurrently enrolled in secondary school or equivalency programs. These respondents were surveyed at the end of their first and third years of college (2004, 2006), and six years after first starting (2009). NCES then followed 44,670 of these students in two follow-up rounds, selected from multiple compiled data sources ranging from NPSAS:04 base year information, student-level institutional data, and federal student loan information. From this rich trove of administrative and institutional data, a final round of 18,640 students was selected for inclusion in the BPS:04/09 cohort.

Sample

We restricted the sample to women and men who completed an associate's or bachelor's degree within six years after first starting college (2009). To ensure effective comparisons while using both secondary and postsecondary transcript data in our analysis, we limit the study to students who attended U.S. high schools and earned degrees with a specific major. Respondents were excluded if they: attended K-12 school abroad (n=1,660), were degree non-completers (n=7,940), and/or had unspecified or otherwise missing major field of study information (n=5,010)[i]. These at times overlapping exclusions brought our initial eligible sample down to 6,100 cases. Our final restriction pertained to an additional 890 listwise deleted cases, associated with missing data on any of our independent variables, specifically: parent education (n=50), high school transcript information including standardized test scores (n=450), high school GPA (n=70), college STEM GPA (n=320), and college type (n=10). These restrictions yielded a final sample size of 5,210 students.

Analytic Strategy

After an initial series of descriptive analyses, we used multinomial logistic regression modeling to compare predicted probabilities of graduating with degrees in non-STEM fields as compared to the natural/engineering sciences, life sciences, and social/behavioral sciences. To enhance the generalizability of our results, we used response adjusted, calibrated bootstrap replicate weights for transcript respondents (BPS:2004/09 variables wtc001-200) in our analyses, which were compared to and consistent with our unweighted results. We also employed a panel weight (wtc000) to adjust for stratification in the sample design.

Primarily, this study investigates how the gender gap in earned scientific degrees differs among two- and four-year college students. We pose and respond to the following research questions. First, what is the nature of the postsecondary STEM gender gap? Second, to what extent does the gender gap vary across two- and four-year colleges? Third, how do college experiences influence the gender gap in STEM degree fields among those who start college in two-year and four-year colleges? Finally, does initial college type similarly predict gender differences in STEM degree field across alternative specifications of our measures? Across these questions, we also assess whether these predictions vary across STEM clusters: natural/engineering sciences, life sciences, and social/behavioral sciences. Our multinomial logistic regression model used to answer our third research question is displayed below; multiple enhancements to the model are made to respond to our final research question.

$$\begin{aligned}
&Degree\ field\ (2009) \\
&\quad = \beta_0 + \beta_1(gender) + \beta_2(income\ percentile) \\
&\quad + \beta_3(parent\ education) + \beta_4(race/ethnicity) \\
&\quad + \beta_5(high\ school\ GPA) + \beta_6(SAT\ math) + \beta_7(SAT\ verbal) \\
&\quad + \beta_8(highest\ H.S.math\ course) + \beta_9(college\ STEM\ GPA) \\
&\quad + \beta_{10}(academic\ integration) + \beta_{11}(social\ integration) \\
&\quad + \beta_{12}(two-year\ college\ 2004) + \mu
\end{aligned}$$

Measures

Degree field. The outcome variable for this analysis is the highest undergraduate degree field (associate's or bachelor's degree) at the end of the study (2009). These fields were categorized into one of four degree field clusters: non-STEM (the reference category), natural/engineering sciences, life sciences, and social/behavioral sciences. For a more detailed account of which specific majors were categorized into each of these four clusters, see appendix A. We investigate an alternative specification of this measure in response to our final research question: bachelor's degree field, for those students who earned a bachelor's degree.

Individual background characteristics. Female gender is indicated by students' self-report; for ease of interpretation, we recoded this binary measure as 1=women and 0=men. Race-ethnicity was coded into five groups: white, Asian, black, Latino, and other/multiple race(s) (e.g., multiple groups, Native Hawaiian, etc.). Socioeconomic status was measured with two distinct variables: family income percent rank in the 2003-04 school year (range: 0-100) and parental education level (no college, some college, four-year degree, or graduate/professional degree). Because this study focuses on community college students, we included Pell grant receipt (0 = no Pell, 1 = Pell grant receipt) in a sensitivity analysis on socioeconomic status.

Pre-college science readiness. We also considered the effects of respondents' academic ability and preparation for scientific majors, as measured by their derived SAT mathematics and verbal scores (range: 200-800) and the highest level of mathematics they completed in high school (1=less than Algebra II, 2 = Algebra II, 3 = more than Algebra II). We include a measure of high school GPA across all academic courses (ranging from 1=0.5-0.9 to 7=3.5-4.0), as a domain-general indicator of academic performance in high school, distinct from the domain-specific test scores and postsecondary STEM grades.

College type. College type was coded according to whether the respondent first enrolled in a two-year or four-year college (1=four-year; 2=two-year), using data from the 2003/04 school year. We also assess an interaction term for the combined effect of gender and college type (gender*college type), as well as an alternative specification described below.

College experiences. NCES created academic and social integration indices; problematically, these scales are not directly comparable as they are based on different numbers of items and then averaged. Instead, we used weighted factor analysis (weight=wtc000) to derive scaled variables representing two- and four-year college students' self-reported frequency of participation in certain activities at the first institution they attended in the 2003/04 school year (0 = never, 1 = sometimes, 2 = often). Our academic integration measure ($\alpha = .94$) indicates how often students: met with an academic advisor, had social contact with faculty members, or spoke with faculty about academic matters. Our social integration measure (α = .91) indicates how often students participated in school clubs, school sports, and study groups.[ii]

STEM GPA. Additionally, we used transcript data to capture respondents' college STEM GPA (0 = did not have a STEM GPA, 1= less than a 3.0, and 2 = more than a 3.0).

Alternate postsecondary success indicators. In response to research question #4 and because of the scarcity of information on STEM pertaining to community college starters, we add alternative specifications of our model. Notably, we consider not only at first institution type, but also the last institution attended in 2009, six years after the start of the study (1=four-year; 2=two-year). We conduct a final series of models restricting our sample to only those who earned bachelors' degrees at the end of six years at any institution, including students who transferred from two-year to four-year institutions. Only 520 respondents in our sample stopped at an associate's degree and were thus excluded from the (bachelor's degree only) final analysis (n=4,690).

Limitations

In the interest of most precisely modeling the full set of characteristics distinguishing students who apply to two- and four-year colleges, a prior version of this manuscript used a propensity score design to match respondents sharing a similar likelihood of initially attending two-year colleges (the treatment) versus four-year colleges (the control). Respondents were matched based on these propensities, setting up a quasi-experimental comparison to assess the effect of initial enrollment in two-year colleges on the gender gap in specific scientific fields. Upon presenting and discussing these findings with methodologists and the researchers who designed the BPS: 2004/09 study, we were assured the bootstrap replicate weighting strategy we use is both sufficient and best used alone, to avoid over-specifying our analytic models.

Beyond the challenges of best reducing bias in our estimates, other limitations are worth noting. First, our variable selection draws on the current literature, which has focused on four-year institutions. Accordingly, further research may suggest alternative measures of student integration and pre-college ability (i.e. SAT scores) which are better suited to unbiased comparisons across two- and four-year college students. Second, Nationally representative longitudinal data offers the advantages of generalizability and opportunities to observe respondents' pathways over a six-year period. Notwithstanding, our statistical power is too limited to examine the gender gap within individual scientific majors rather than degree field clusters. These clusters are arguably more appropriate however to assess comparable offerings at two- and four-year colleges.

This study compares the gender gap among two-year college students and four-year college students in similar fields of study, even among those who did not later transfer to four-year colleges and earn bachelor's degrees. Our final research question parses this line of inquiry across various related outcome measures, aiming to distinguish between the final observation of students' degree pathways, while acknowledging this may not be their final postsecondary term. Related, we recognize underrepresented minority students are likely disproportionately represented in the excluded group of degree non-completers. To avoid further losing underrepresented groups from our study (e.g., Native Americans), we created an inclusive while still limited race/ethnicity variable (described above) and encourage data scientists and in our other work engage in intersectional large-scale quantitative studies of STEM higher education.

FINDINGS

RQ1: What Is The Nature of the Postsecondary STEM Gender Gap?

Table 1describes the variables used in our analysis. To aid interpretation of gender differences in our later model results, we report means and percentages within the subsamples of women and men, rather than for the sample as a whole. Analysis of variance tests (ANOVA) were used to estimate statistical differences by gender on each variable.

[INSERT TABLE 1]

We turn first to demographic characteristics. Women earn postsecondary degrees at higher rates than their male peers nationally – as discussed earlier – as also observed in this nationally representative sample (n=3,130 women and n=2,080 men). Correspondingly, these degree-earning men were slightly more socioeconomically advantaged and less diverse than their female peers. As compared to students at their first postsecondary institution, the family income of men ranked higher than that of women (61.0% vs. 57.8%). Men were also more likely to have a parent who completed more than a bachelor's degree (33.1% vs. 30.4%). Turning to race/ethnicity, more men than women self-identified as white (80.3% vs. 77.6%). Asian students comprised the next highest representation among the sample, representing about 5.9% of men and 7.5% of women. 5.6% of men and 6.8% of women identified as black. 3.7% of men and 3.9% of women identified as Latino/a. Finally, 4.6% of men and 4.3% of women identified as either more than one race or another race.

Turning to pre-college characteristics, degree-completing men scored higher and were better prepared in mathematics than their female peers. More specifically, these men performed higher on the college preparatory SAT mathematics (men=560.2; women=525.8; $p<.001$) and even the SAT verbal (men=541.0; women=538.3; $p<.01$) examinations. Again, these results are representative of those men who complete university degrees (noted above as somewhat more socioeconomically more advantaged than their female peers), not the population of U.S. youth as a whole. In a related finding, women were less likely than men to have completed more than Algebra II in high school (men=79.6%; women=76.3%). However, with respect to academic performance across all academic courses, women earned higher grades ($p<.001$).

Notably, the male advantages we observed in personal and pre-college characteristics were less consistent in college. Still, slightly more women than men first enrolled in two-year colleges (16.6% vs. 15.2%). More women than men did not take STEM courses for credit: 23.3% of women and 17.5% of men have no STEM GPA. But while men were more likely to take STEM classes than women, women who completed these classes earned higher grades. 36.1% of women earned above a 3.0 STEM GPA, as compared with 35.4% of men ($p<.05$). The gender gap was wider for those with a STEM GPA lower than 3.0, favoring women: 40.6% of women earned less than a 3.0 as compared to 47.0% of men ($p<.001$). Notably, women were also more academically and socially integrated than men, albeit difficult to observe in the NCES-restricted figures ($p<.001$); an alternative table with numerically transformed values is available from the authors by request.

These descriptive gender differences in students' demographic and pre-college characteristics suggest why we might see more men in natural/engineering science majors than women. On average, men are better prepared for these majors at the end of high school, having completed more advanced mathematics courses and scoring higher on the mathematics (and verbal) sections of the SAT. Once in college however, women who enroll in STEM courses perform just as well as men or better. They are also more socially and academically integrated. Next, we examine the gender gap by STEM major.

Figure 1 shows the weighted distribution of men and women by their undergraduate degree fields as of 2009. These descriptive statistics indicate 39.5% of men and 60.5% of women graduated with non-STEM degrees. Men earned natural/engineering sciences degrees at a rate over two and a half times higher than women: 72.4% of men and 27.6% of women earned their highest undergraduate degrees in these fields. However, a mirror opposite pattern exists with life sciences degrees: 27.7% were men and 72.3% were women. Related, women's rate of earning social/behavioral degrees was two times higher than that of men (33.2% for men vs. 66.8% for women). Looking across the graph, gender differences in degree fields were substantial; the only degree cluster where the gender balance tipped against women was the natural/engineering sciences. In sum, gender imbalances in STEM are not uniform. Next, we examine how these gender gaps in degree field vary by college type.

[INSERT FIGURE 1]

RQ2: Gender Differences in STEM among Two- And Four-Year College Students

Figure 2 builds on the prior graph, displaying the weighted distribution of earned degrees among men and women, as varies among those who start in two-year and four-year institutions. We subtract the proportion of women and men in four-year colleges from the proportion in two-year colleges, to arrive at the difference by college type. For example, 16.0% of men in two-year colleges earn natural/engineering science degrees; this compares to 19.7% of men in four-year colleges. As shown, the difference by college type equals -3.8%; the negative sign indicates four-year colleges have more men in natural/engineering than do two-year colleges. Turning to women, there is a 1.1% difference in natural/engineering degree share by college type: 5.0% of women in four-year colleges earn these degrees, as compared to 3.9% of women in two-year colleges.

The array of results across the graph reinforces the importance of STEM field-specificity. The negative relationship between two-year college enrollment and natural/engineering science degrees was noted above. The largest numerical difference for women was in social/behavioral sciences; four-year college students were better represented as compared to two-year college students (-10.6% for women, -4.0% for men). Two-year colleges had more students in non-STEM and life science fields, as compared with four-year colleges. The difference by college type was larger for women in life sciences (+9.2%) than for men (+2.7%); college type differences in non-STEM majors were smaller for women (+2.5%) than men (+5.0%). Now that we understand national patterns in the gender gap in STEM degrees by degree cluster and college type, we turn to our subsequent research questions examining potential explanations for these differences, leveraging our longitudinal survey-weighted data and statistical controls.

[INSERT FIGURE 2]

RQ3: How Do College Experiences and Characteristics Influence the STEM Gender Gap?

From this point onward, our results represent weighted estimates of our outcomes, reported as predicted probabilities to enhance their interpretive clarity. Generated using the margins command in Stata 14 (see Long & Freese, 2014), these probabilities represent the chance of earning degrees in one of the four postsecondary degree clusters, at a particular value (e.g., STEM GPA > 3.0), when holding all other variables either at a set value or at their means. Tables and figures report on our full model, as shown in the methodology section above. Statistical significance is reported for gender differences. Reporting focuses on college experiences and characteristics. The multivariate logistic regression models from which these estimates are based are highly significant.

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[INSERT TABLE 2]

First, we describe the primary model, with all predictors other than gender at their mean values. Consistent with the descriptive results reported earlier, gender gaps varied by degree field and were largest in natural/engineering sciences (-11.8%) and life sciences (+8.4%). The negative sign indicates the natural/engineering sciences gap favors men, while the plus sign indicates the life sciences gap favors women. Women also have an advantage in attaining social/behavioral sciences degrees, although the significance and magnitude is smaller (+4.1%).

Second, the gender gap in natural/engineering and life sciences varies by STEM GPA. As compared to the primary model estimates reported above, the gender gap in natural/engineering sciences was wider among students with more than a 3.0 STEM GPA (-14.1%). Correspondingly, the gap was smaller among those with *less* than a 3.0 STEM GPA (-10.5%). Turning to the relationship between GPA and the life sciences gender gap, the same pattern holds, although to a lesser degree and favoring women rather than men. The gender gap was wider when estimated for students with STEM GPAs higher than 3.0 (+9.6%), as compared to the primary model. It seems the higher the GPA, the wider the gender gap.

Finally, we turn to academic and social integration, with predicted probabilities estimated for students at the 75th percentiles of these measures. The gender gap in natural/engineering sciences was a percentage point narrower among students at the 75th percentile of academic integration (-10.7% vs. -11.8%). Similarly, the life sciences gender gap was about a percentage point narrower among students at the 75th percentile of academic integration (+7.6% vs. +8.4%). By contrast, social integration was associated with a 0.3% increase in the width of both the natural/engineering and life sciences gender gaps. In sum, in these fields, academic integration was associated with about a narrower gender gap, and social integration was associated with a modestly wider gender gap. Neither academic nor social integration affected gender gaps in non-STEM and social/behavioral sciences.

Having examined college experiences, we turn to college type. Figure 3 displays the probability of earning degrees in these fields, for men and women at two- and four-year institutions. While natural/engineering sciences varied widely by gender, as noted above, there was limited within-gender variation by college type: a 0.7% difference among men, favoring two-year colleges. Overall, college type differences were widest in social/behavioral and especially in life sciences: two-year college men and four-year college women had nearly the same likelihood of earning life science degrees (17.3% and 17.7%, respectively). By contrast, two-year college men had a 10.1% chance of earning life science degrees, and four-year college women had a 29.2% chance. Students' share of degrees in social/behavioral sciences ranged from 10.9% of two-year college men to 20.6% of four-year college women. Women were more likely to earn social/behavioral science degrees than men, and four-year college students were more likely than two-year college students.

[INSERT FIGURE 3]

Table 3 reports further on how the gender gap in these degree fields varied by college type, using pairwise comparisons between the predicted probabilities. Bonferroni tests were used to compare the statistical significance of these comparisons. The two field clusters with the widest gender gaps across our prior analyses – natural/engineering sciences and life sciences – continued to have highly significant gender gaps. Notably for both, the gender gap was smaller at four-year colleges than at two-year colleges. For natural/engineering sciences, the difference in the gender gap was less than one percentage point: -12.4% (two-year) as compared to -11.7% (four-year). The college type difference was greater in life sciences: +11.9% (two-year) versus +7.6% (four-year). Reading Figure 3 and Table 3 together provides an explanation for the college type effect. In natural/engineering sciences, men's probability of earning these degrees was higher in two-year institutions; women's probability was near identical across institutional types. In life sciences however, the probability of earning these degrees was higher for women in two-year colleges and lower for men in four-year colleges; indeed, the likelihood for two-year college men and four-year college women was quite similar.

[INSERT TABLE 3]

Altogether then, we found mixed results for the effect of college type on the gender gap in obtaining STEM degrees. Women's chances of earning natural/engineering sciences majors did not differ, although men were more likely to earn degrees in these fields at two-year rather than four-year colleges. Non-STEM degrees did not vary meaningfully by gender nor college type. Social/behavioral fields varied across both indicators, but the modest gender differences did not reach statistical significance. Notwithstanding, life sciences varied widely by gender as well as college type, and the gender gap in these fields was 1/3 smaller at four-year colleges.

RQ4: How Sensitive Are These Effects to Alternative Specifications of Our Measures?

We conducted additional sensitivity analyses. First, we investigated the possibility of a potential interaction between gender and college type on degree field, by adding an interaction term (gender*college type) to the prior model. While the interaction term was insignificant across our multinomial logistic model, Figure 4 indicates the prior pattern in natural/engineering and life science fields continued to hold. For women, the difference in the gender gap by college type remained minor (5.3% at four-year colleges and 5.0% at two-year colleges, after transforming the probabilities into percentages). Still, the gender gap in natural/engineering among initial two-year students widened slightly, up to -13.0%. As with natural/engineering sciences, the predicted gender gap among two-year college students also widened by nearly 5 percentage points to 16.4% with the addition of the interaction between gender and college type. By contrast, the gender gap among initial four-year enrollees was one point narrower, at 6.5%.

[INSERT FIGURE 4]

Next, we examined the extent to which the STEM gender gap in two-year and four-year colleges varies specifically among those who earn bachelor's degrees by the end of the study (six years after starting college). Building on the prior multinomial logistic regression model, we restricted our analytic sample to bachelors' degree recipients only ($n=4,690$, $F=8.94$, $p<.000$). We again focused on the probability of earning degrees in natural/engineering sciences and life sciences, the degree field clusters with statistically significant gender differences. Notably, Figure 5 shows a change for both natural/engineering and life sciences in the relationship between gender, college type, and predicted probability of degree. Intriguingly, this change occurred in opposite directions. As compared to Figure 4, the gender gap in natural/engineering sciences *increased* among those who started in two-year colleges. The widening of the gap can be attributed to changes among men and women – more initial two-year college men earning bachelors' degrees in natural/engineering sciences and slightly fewer women earning bachelor's, as compared to earning either an associate's or bachelor's degree in this field (5.0%), as reported earlier. Meanwhile, the gender gap in the predicted probability of earning bachelor's degrees in life sciences was *smaller* among initial two-year students (22.8% for women, 10.1% for men) than the gender gap among initial two-year students in earning either an associate's or bachelor's life sciences degree. The probability of two-year college starters earning bachelor's degrees in life sciences was lower for both women and men.

[INSERT FIGURE 5]

Two additional supplemental robustness checks bear mention but are not shown for space constraints. We tested the degree to which Pell grant receipt in the first year of the study affects our results. This measure – an indicator of socioeconomic status as well as a blunt measure of financial aid receipt – did not significantly predict of earned degrees across the degree field clusters, nor affect the relationship among gender, degree field, and college type. We also investigated the degree to which our model results vary when using *last* (2009) in addition to *initial* (2004) college type. Results were generally consistent with our prior findings.

DISCUSSION

While women have surpassed men in earning bachelor's degrees, they have yet to achieve parity in certain STEM fields, most notably in natural/engineering sciences. Research indicates the biggest determinant of the wage gap between men and women is undergraduate degree field (Bobbitt-Zeher, 2007). Notably, the gender wage gap in STEM careers is smaller than in non-STEM careers (Beede, et al., 2011). Since women are more likely to attend two-year colleges (Horn, et al., 2006), it is important to consider the role of two-year colleges in affecting or maintaining the gender gap in natural/engineering sciences. This is especially true given the traditional role of two-year colleges: to enhance college access and opportunity (Doyle & Gurbunov, 2011).

We expected to find a college type effect. Instead, we found gender gap in STEM degrees does not consistently vary among initial two-year and four-year college enrollees. Results indicate that two-year colleges neither increase nor decrease women's chances of earning natural/engineering degrees, those associated with the highest financial returns to degree (Carnevale, et al., 2011). Rather, college type primarily affects the gender gap in life sciences and, to a lesser extent, social/behavioral sciences as well. Below we indicate how our findings might advance the literature on gendered inequality in STEM in higher education more broadly.

Gendered Inequality in Specific STEM Fields

Notable findings on non-STEM and social/behavioral sciences degree outcomes notwithstanding, the discussion below focuses on natural/engineering and life sciences degrees. We narrow the discussion because of important differences in status, earnings, and perceived difficulty among these field clusters (Cheryan, 2012; Corbett & Hill, 2015). Once male-dominated, life science undergraduate programs have increasingly become attractive and heavily utilized pathways for women's career advancement, certainly in allied health fields commonly offered as majors at two-year colleges. By contrast, natural/engineering sciences generally continue to be primarily male domains, including at two-year colleges. The findings reported below illustrate the importance of parsing “STEM” into its component fields and degree clusters, to better investigate how gender functions across postsecondary institutional categories.

Our first research question focused on descriptive gender differences among U.S. undergraduate degree earners, the population to which this nationally representative study generalizes. U.S. cohort studies have found women with non-college educated fathers experienced the biggest gains in degree attainment (Buchmann & DiPrete, 2006). However, our descriptive findings indicate pre-college factors favor men, especially socioeconomic resources and academic preparation. Once in college, we found women were more integrated than men and earned higher STEM grades, both notable findings for conceptualizing the social and academic levers for potential interventions aimed at broadening women’s participation in STEM fields.

In addition, we found starkly inverse participation gaps in natural/engineering and life sciences. Of those earning their highest undergraduate degrees in natural/engineering sciences, 72.4% were men and 27.6% were women. Among life science degree earners, 27.7% were men and 72.3% were women. Women were also twice as likely to earn social/behavioral degrees as compared to men (33.2% vs. 66.8%). Indeed, “STEM” is a category limited in its utility. We also investigated differences by college type. Descriptively, the share of men in natural/engineering sciences was 3.8% percentage points lower in two-year institutions than four-year institutions. The share of women in these fields was 1.1% lower in two-year than four-year institutions. Overall however, the share of men and women by college type varied more widely in non-STEM, life sciences, and social/behavioral sciences fields.

Multivariate logistic regression analyses estimated men and women’s chances of earning STEM degrees, with attention to college experiences and characteristics. Turning first to college experiences, the gender gap was smaller among highly academically integrated students who met with an academic advisor, had social contact with faculty members, and spoke with faculty about academic matters. This suggests that academic integration for women in natural/engineering sciences may be one strategy used to decrease the gender gap in these fields. Gender gaps were also slightly wider among highly socially integrated natural/engineering and life sciences students. With respect to the debate about how grades in STEM coursework influence persistence to STEM degrees, we found a wider gender gap in natural/engineering and life sciences among those with more than a 3.0 STEM GPA, a considerable feat in many STEM fields. This finding conforms with research indicating the gender gap in STEM fields is not attributable to differences in innate mathematical ability (Hyde, 2014; Perez-Felkner, et al., 2017) but may be better explained with further research on postsecondary STEM classrooms, departmental and institutional climates, and indeed college type.

Conceptualizing the STEM Gender Gap

Across our predictive models, the relationship between the STEM gender gap and college type varied across our measures, in both magnitude and direction. We observed the following across a series of estimates. First, initial college type did not meaningfully influence women's likelihood of completing natural/engineering degrees. Even when examining only bachelor's degree recipients in our final model, women who initially enrolled in two-year colleges are only marginally less likely than their four-year counterparts to earn these degrees. This suggests women's increasing use of two-year colleges is not diminishing their likelihood of obtaining natural/engineering sciences degrees.

Future research should examine more carefully the undergraduate component of pipeline to STEM degrees and mechanisms to curb talent loss among women, especially at two-year institutions. Two-year colleges' access mission aligns with the aim of broadening access to high-status and high fields – especially in natural/engineering sciences; this especially rings true for the diverse and often less economically advantaged women who typically attend these colleges (Corbett & Hill, 2015; St. Rose & Hill, 2013).

While research on STEM higher education has tended to overlook two-year college students, our findings show promise. With respect to undergraduate gender disparities in degrees earned, we find these are neither static across STEM degree fields nor isolated to four-year and elite colleges. Given how little is known about STEM pipelines at two-year institutions, and policy levers directing students into these courses and majors (Gaertner, Kim, DesJardins, & McClarty, 2014; Schiller & Muller, 2003), it is imperative to better understand the mechanisms for reducing inequality in STEM across postsecondary institutional types.

Appendix A: Coding the Dependent Variable

Non-STEM includes the following degree programs: Architecture and related services, Area, ethnic, cultural, gender, and group studies; Visual and performing arts; Business, management, marketing, and related support services; Communication, journalism, related programs, and technologies; Construction trades; Education; English language and literature/letters; Foreign languages, literatures, and linguistics; Legal professions and studies; Mechanic and repair technologies/technicians; multi/interdisciplinary studies; Parks, recreation, leisure, and fitness studies; Precision production; Personal and culinary services; Philosophy and religious studies; Public administration and social service professions; Homeland security, law enforcement, firefighting and related protective services; Transportation and materials moving; and Liberal arts and sciences, general studies and humanities.

Natural/engineering sciences include: Computer and information sciences and support; Engineering; Mathematics and statistics; Physical sciences; Science technologies/technicians; and Engineering technologies and engineering-related fields.

Life sciences include: Agriculture, agriculture operations, and related sciences; Biological and biomedical sciences; and Health professions and related programs.

Social/behavioral sciences include: Family and consumer sciences/human sciences; Psychology; Social sciences, and History.

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[i] Each of our reported number (N) of cases is rounded to the nearest 10, in accordance with NCES restricted data use confidentiality procedures. For this reason, figures reported here may not add perfectly.

[ii] While participation in study groups is at times and was in fact in NCES's original index grouped with the measures of academic integration listed above, it held more closely with social integration measures in our analyses of the data, perhaps supported by studies noting the inconsistent association between study group participation and academic performance (e.g., Arum & Roksa, 2011).

Table 1. Sample Characteristics, Beginning Postsecondary Students (2004)

	Mean			SD		Range	
Independent Variables	Men	Women		Men	Women	Men	Women
Demographic characteristics							
Family income percent rank	61.0%	57.8%		27.0%	27.3%	0-100%	0-100%
Parent education							
High school degree or less	14.8%	17.5%		35.6%	38.0%	0-100%	0-100%
Some college	21.2%	23.9%		40.9%	42.6%	0-100%	0-100%
Bachelor's degree	30.9%	28.2%		46.2%	45.0%	0-100%	0-100%
More than a bachelor's	33.1%	30.4%	^	47.1%	46.0%	0-100%	0-100%
Race/ethnicity							
White	80.3%	77.6%		39.7%	41.7%	0-100%	0-100%
Asian	5.9%	7.5%		23.5%	26.3%	0-100%	0-100%
Black	5.6%	6.8%		22.9%	25.1%	0-100%	0-100%
Latino	3.7%	3.9%		18.8%	19.3%	0-100%	0-100%
Other / Multiracial	4.6%	4.3%	^	20.9%	20.2%	0-100%	0-100%
Pre-college characteristics							
H.S. GPA (1=<1.0; 7=3.5-4.0)	6.24	6.41	***	1.0	0.8	1-7	1-7
SAT Math Score	560.2	525.8	***	105.1	99.8	200-800	220-800
SAT Verbal Score	541.0	538.3	**	101.1	100.6	200-800	200-800
Highest level of H.S. math							
Less than Algebra II	4.2%	5.0%		36.9%	21.7%	0-100%	0-100%
Algebra II	16.2%	18.7%		36.9%	39.0%	0-100%	0-100%
More than Algebra II	79.6%	76.3%	^	40.3%	42.5%	0-100%	0-100%
College characteristics							
Initial Enrollment Type							
Two-year college	15.2%	16.6%		35.9%	16.7%	0-100%	0-100%
Four-year college	84.8%	83.4%	^	35.9%	83.4%	0-100%	0-100%
College STEM GPA							
No STEM GPA	17.5%	23.3%	^	38.0%	42.3%	0-100%	0-100%
Less than 3.0	47.0%	40.6%	***	49.9%	49.1%	0-100%	0-100%
More than 3.0	35.4%	36.1%	*	47.8%	48.0%	0-100%	0-100%
Academic integration index	0.4	0.4	***	0.4	0.4	-0.4	1.5
Social integration index	0.5	0.5	***	0.5	0.5	-0.2	1.7

Note: Beginning Postsecondary Students Study: 2004 to 2009. N= 5,210 students who earned associate's or bachelor's degrees (women = 3,130; men = 2,080). Descriptive figures are rounded to nearest tenth and N of cases is rounded to the nearest 10, in accordance with NCES restricted data use confidentiality procedures. An ANOVA was used to estimate the statistical significance of gender differences in this set of variables plus the dependent variable (R^2=.16, p<.000), including for individual variables. Reference categories selected by the ANOVA model are indicated with "^". The reference category for Pell grant recipient (non-recipient) is not shown here, for space constraints. Stars indicate significance: * p<.05, ** p<.01, *** p<.001. Data are based on unweighted counts.

Table 2

Table 2. Gender Gap in Scientific Degree Attainment among College Graduates, by College Experiences

	Gender Gap in Degree Field										
	Non-STEM (reference)			Natural / Engineering Sciences			Life Sciences			Social / Behavioral Sciences	
Predictors	%		Std. Err.	%		Std. Err.	%		Std. Err.	%		Std. Err.
All other predictors at their mean values (means)	-0.66%		2.71%	-11.79%	***	1.21%	8.36%	***	1.65%	4.09%	*	1.79%
College STEM GPA												
Less than 3.0 (reference)	-1.11%		2.80%	-10.51%	***	1.16%	7.38%	***	1.57%	4.24%		1.99%
More than 3.0	0.52%		2.84%	-14.06%	***	1.71%	9.58%	***	1.90%	3.96%		1.49%
No STEM GPA	-2.01%		2.67%	-10.05%	***	1.47%	8.04%	***	1.70%	4.01%		2.06%
Academic index (75th percentile)	-1.08%		2.61%	-10.66%	***	1.19%	7.64%	***	1.64%	4.10%	*	1.82%
Social Index (75th percentile)	-0.61%		2.77%	-12.13%	***	1.29%	8.60%	***	1.66%	4.14%	*	1.83%
F-Statistic	6.54	***										

Source: Beginning Postsecondary Students Study: 2004 to 2009. N= 5,210 students who earned associate's or bachelor's degrees (women = 3,130; men = 2,080). N of cases is rounded to the nearest 10, in accordance with NCES restricted data use confidentiality procedures.

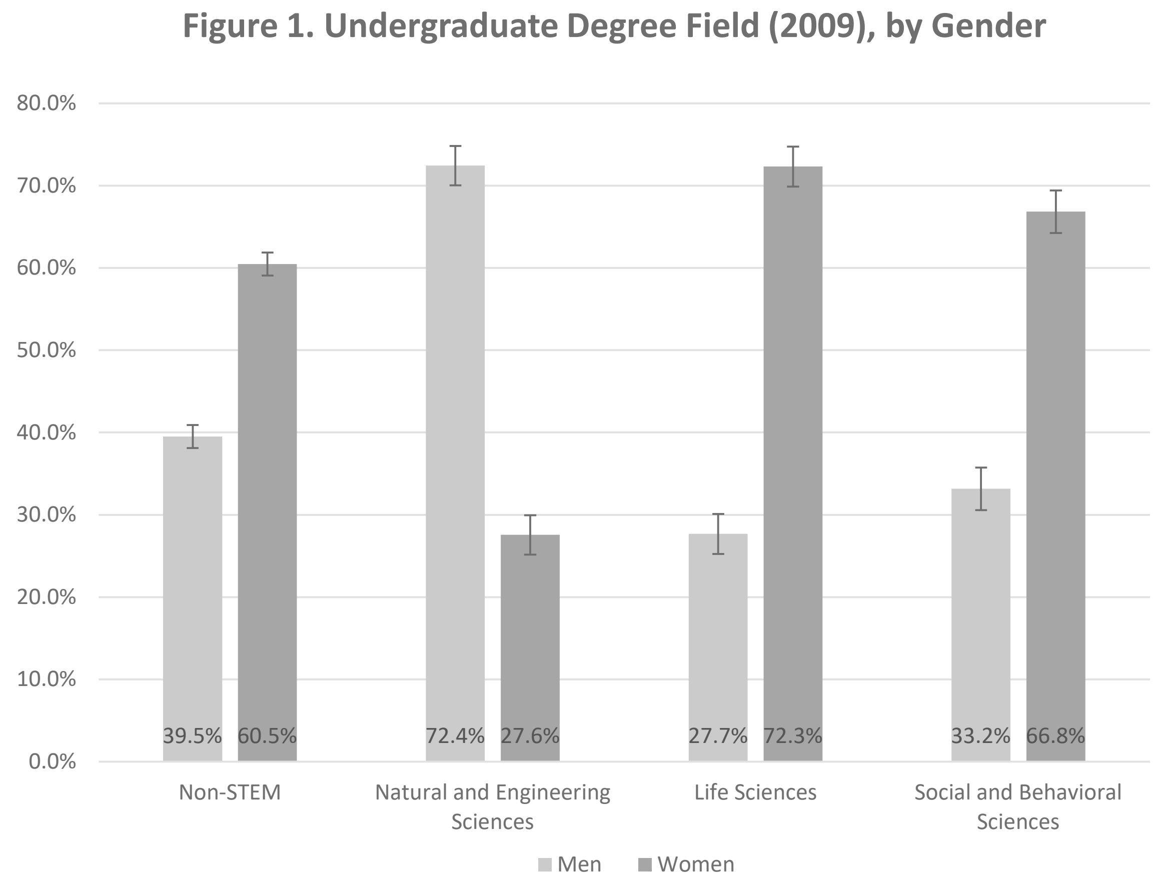
Note: Predicted probabilities are calculated using the margins commands in Stata 14, indicating the effect of the individual predictor, with all other predictors (besides gender) held constant at their means. For ease of interpretability, we multiply the probabilities by 100 to report them in the form of estimated percentages. As noted in the methodology section of the manuscript, our estimates include the following co-variates, not shown to maximize space: race/ethnicity, family income rank, parent education, SAT mathematics score, SAT verbal score, highest high school mathematics completed, high school GPA, and college type. Full models are available by request from the authors. The gender gap is calculated using pairwise comparisons of predictive margins, evaluating the magnitude and statistical significance of estimated differences between men and women in each degree field category. *p < .05 **p < .01 ***p < .001 (two-tailed tests).

Table 3. Gender Gap in Probability of Degree, by College Type

College Type	Non-STEM	Natural / Engineering Sciences		Life Sciences		Social / Behavioral Sciences
Two-year college	-2.07%	-12.36%	***	11.90%	***	2.53%
Four-year college	-0.34%	-11.66%	***	7.59%	***	4.41%

Source: Beginning Postsecondary Students study, 2004/09, restricted-use data. N=5,210. N of cases is rounded to the nearest 10, in accordance with NCES restricted data use confidentiality procedures.
Note: The gender gap within college types is measured as $Probability_{women}$ - $Probability_{men}$. For ease of interpretation, probabilities were multiplied by 100 and reported as percentages. Bonferroni tests were used to compare the significance of gender differences in these predicted effects. As noted in the methodology section of the manuscript, our estimates include the following co-variates, not shown to maximize space: race/ethnicity, family income rank, parent education, SAT mathematics score, SAT verbal score, highest high school mathematics completed, high school GPA, and college type. Full models are available by request from the authors. * p <.05, ** p <.01, *** p<.001 (two-tailed tests).

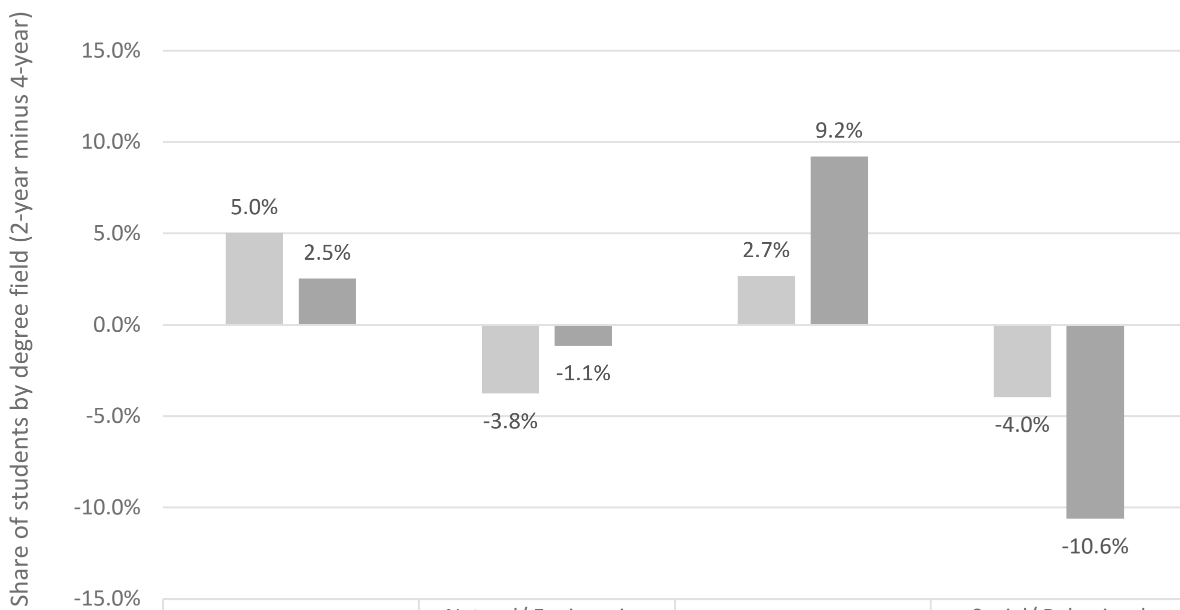
Figure 1



Source: Beginning Postsecondary Students Study: 2004/09. N=5,210, representing a weighted population of 389,560 degree-earning men and 586,700 degree-earning women. Descriptive figures are rounded to the nearest tenth for results and ten for N of cases, in accordance with NCES restricted data use confidentiality procedures. Error bars represent weighted standard errors. Results represent the field of study for the highest associate's and bachelor's degrees earned. Data are weighted using replicate weights (wtc000, wtc001-200).

Figure 2

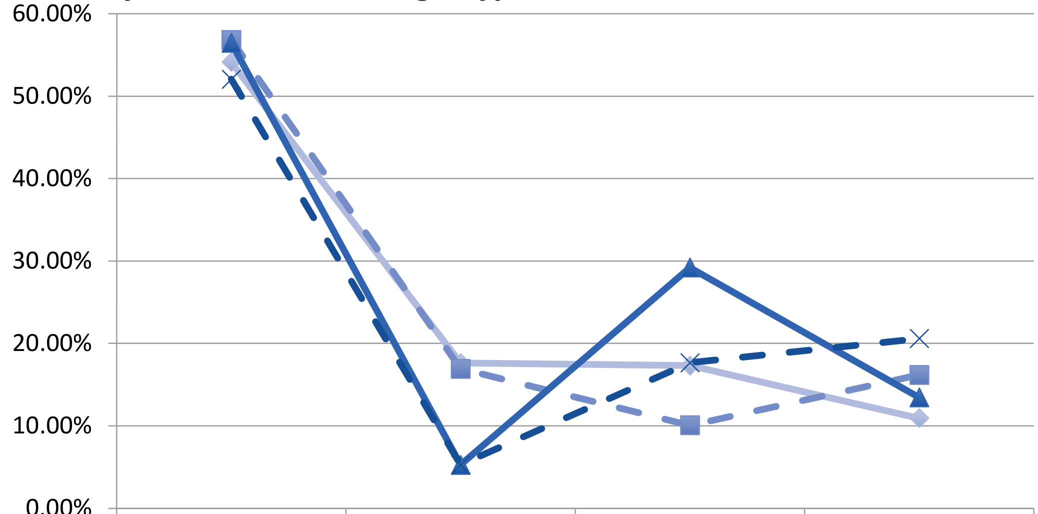
Figure 2. Differences in Degree Field Between 2-year and 4-year College Students, by Gender



	Non-STEM	Natural/ Engineering sciences	Life sciences	Social/ Behavioral sciences
Men	5.0%	-3.8%	2.7%	-4.0%
Women	2.5%	-1.1%	9.2%	-10.6%

Figure 3

Figure 3. Predicted Probability of Degree Field, by Gender and College Type



	Non-STEM	Natural / Engineering Sciences	Life Sciences	Social / Behavioral Sciences
Two-year college men	54.14%	17.63%	17.31%	10.92%
Four-year college men	56.83%	16.92%	10.07%	16.18%
Two-year college women	56.49%	5.27%	29.22%	13.44%
Four-year college women	52.07%	5.26%	17.66%	20.59%

Source. Beginning Postsecondary Students study, 2004/09, restricted-use data.
Note. The gender gap within college types is measured as $\text{Probability}_{women}$ - Probability_{men}. For ease of interpretation, probabilities were multiplied by 100 and reported as percentages.

Figure 4.

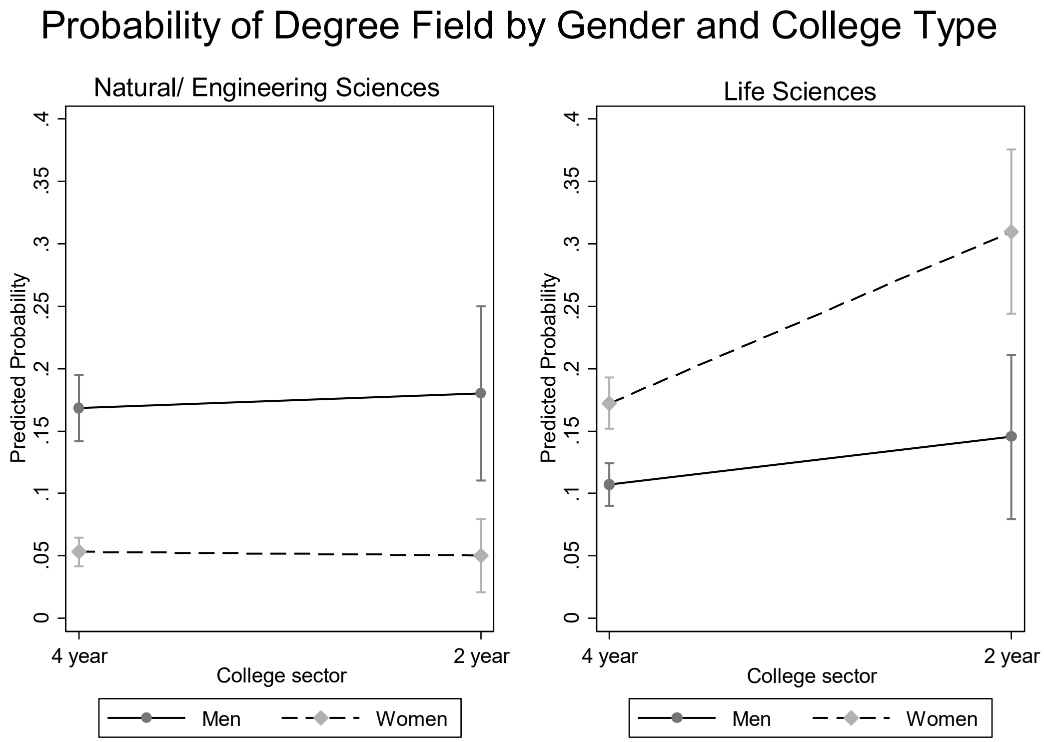

Probability of Degree Field by Gender and College Type
Natural/ Engineering Sciences
Life Sciences
Predicted Probability
0
.05
.1
.15
.2
.25
.3
.35
.4
4 year
2 year
College sector
Men
Women

Figure 5

Figure 5.