Teachers College Record
The Voice of Scholarship in Education

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

by Barbara Schneider, Carolina Milesi, Lara Perez-Felkner, Kevin Brown & Iliya Gutin — July 16, 2015

This research brief examines the gender gap in specific STEM majors among college sophomores and whether this gap varies across selectivity. Using national longitudinal data, results show that women's underrepresentation on STEM is solely driven by the field o engineering, and computer science (PEMC) and that the gender gap in this particular STEM field is ubiquitous across institutions of 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 orientation toward math, and are enrolled at highly selective institutions.

Many have argued that securing a good job is less about *if* you completed a postsecondary degree than *where* you attended college a ranking and reputation of the most competitive universities often serve as powerful signifiers to the most desirable employers, while themselves provide invaluable networking resources for future advancement. Numerous studies have demonstrated the payoff in car graduate education that results from attending such selective colleges (Long, 2008; Dale & Krueger, 1999; Zhang, 2005). It then com students entering these top-tier universities are, for the most part, highly talented males and females at or near the top of their cla requisite training and intensive preparation during high school to guarantee admission to these institutions.

Further, the economic advantages of majoring in science, technology, engineering, or mathematics (STEM) are well-established (Jone Langdon, McKittrick, Beede, Khan, & Doms, 2011; Arcidiacono, 2004); thus we would expect many of the most accomplished student at those institutions which offer the best chance of obtaining a lucrative job (Chen, 2009; Nicholls, Wolfe, Besterfield-Sacre, Shumar One approach to increasing the number of women in the STEM workforce is to focus on reducing the gender gap at these highly comp Indeed, many elite colleges and universities already offer resources and programs designed to support women in STEM majors. The q such institutions are doing a better job at closing the gender gap in STEM relative to their less selective counterparts.[1] Our study exa gender inequalities within STEM across types of institutions, taking into account the comparable skills, values, career orientations, a male and female students who attend them.

To better understand the mechanisms underlying gender discrepancies in certain STEM fields, researchers have considered mathemat Stanley, 1980; Wai et al, 2010); mindset and interest in mathematics (Dweck, 2007; Perez-Felkner, McDonald, Schneider, & Grogan, 2 attainment values (Eccles, 1994). However, little research has looked at how the choice of postsecondary institution affects careers does examine institutional selectivity tends neither to distinguish among STEM majors nor compare women to men (e.g., Smyth & Mc Wolniak, 2013; Davies & Guppy, 1997). Given that postsecondary institutions have different concerns when it comes to fostering envi social and academic support to females pursuing science and engineering degrees (Marra, Rodgers, Shen, & Bogue, 2009; Amelink & (priorities is to add institutional selectivity to the growing list of factors that may account for any gender gaps in STEM fields, especia engineering, mathematics and computer sciences (PEMC) where female underrepresentation in degrees and careers is most problema Williams 2014; Blickenstaff, 2005; Riegle-Crumb, Moore, & Ramos-Wada, 2011).

DATA AND METHODS

STUDY SAMPLE

This analysis employs restricted-use data from the Education Longitudinal Study of 2002 (ELS:2002), the most recent U.S. nationally conducted by the National Center for Education Statistics following a cohort of students from high school to postsecondary educatior ELS:2002 reports on the females and males who declared majors in STEM fields by the second follow-up wave, which took place in 2(overwhelming majority of students in the analytic sample were sophomores in college (Ingels, Pratt, Wilson, Burns, Currivan, Rogers, 2007). Our analytic sample of 1,660 is weighted to represent 342,742 students nationwide who selected a STEM major two years afte school. The sample includes females and males who first enrolled in both two- and four-year postsecondary institutions.

MEASURES

The dependent variable is postsecondary major, which corresponds to a self-reported measure while students were enrolled in their college.[2] Our categories of interest are the four basic STEM fields: social and behavioral sciences; clinical and health sciences; biolog sciences, engineering, mathematics, and computer sciences (PEMC). Our analysis includes the following covariates:

Student Background Characteristics

To control for individual and family characteristics, we used the following independent measures: gender (1 = *female*, 0 = *male*); par *least one parent attended or completed postsecondary education,* 0 = *otherwise*); and race-ethnicity (*Asian, African American, Lati* Hispanic white as the reference category.

Academic Ability

We assessed students' academic ability using college entrance examination scores in mathematics. Given regional variation in U.S. st and general equivalencies between the exams, the National Center for Education Statistics (NCES) measures we used included studen SAT I examination as well as those who had completed the ACT examination, normalized to fit the SAT scale for mathematics ability

Subjective Orientations to Mathematics

Tenth-grade high school students were presented with a series of items tapping the extent to which they agreed with statements reg mathematics ability (ability to master math skills); mathematics mindset (belief that most people can learn to be good in math); anc (belief that math is important). The strength and direction of their subjective orientations was measured from most negative (1 = *st.* positive (4 = *strongly agree*).

Career Attainment Values

Tenth-grade students were asked to evaluate the importance of the following items about their careers from low (1 = *not important*) *important*): steady work (being able to find steady work), family (importance of having children), and altruism (helping others in cor

Postsecondary Experience

Here, we used student enrollment (1 = *enrolled in a four-year college;* 0 = *enrolled in a two-year college*) and an institutional select ELS: 2002 Restricted-Use Second Follow-up Data Files and the NCES-Barron's Admissions Competitiveness Index. We aggregated the s into three mutually exclusive categories (1 = *most competitive* and *highly competitive*; 2 = *very competitive* and *competitive*; and 3 *noncompetitive*, *special*, and *missing*, which predominantly includes two-year postsecondary institutions).

ANALYTIC PLAN

All estimates account for the ELS:2002 complex design. Percentages, regression coefficients, and predicted probabilities all are weig that applies to all sample members who responded in the base year and the second follow-up. This weight allows projections to the were 10th graders in spring 2002. Estimates presented in tables and figures also take into account clustering and strata information (replicate weights (F2BYP1 through F2BYP200, also developed by NCES).

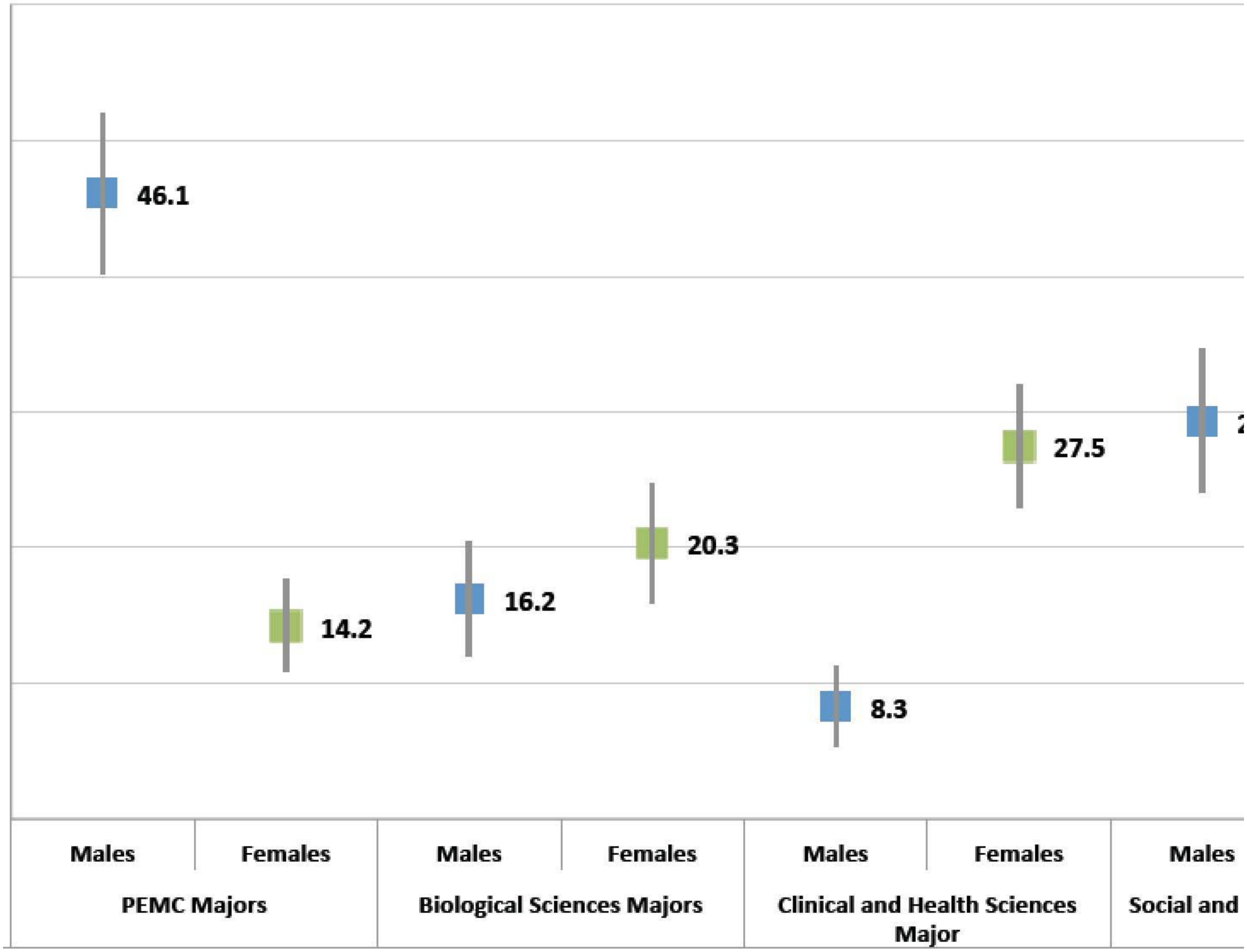
We estimated a series of multinomial logistic regression models to examine the associations between student, family, and postsecond characteristics and the selection of specific STEM majors. The dependent variable consists of the four specific STEM fields mentioned category corresponds to PEMC. We estimated models with different sets of covariates. Our initial models include student's gender, ra education, SAT scores, and a variable indicating whether the student was enrolled in a four-year college (as opposed to a two-year c models adds to this set of covariates career attainment values and subjective orientations toward mathematics. Finally, we add mea institutional selectivity.

To facilitate the interpretation of multinomial regression coefficients, we estimated a series of predicted values using the "margins" Specifically, we estimated the predicted probability that females and males would select a particular STEM field given a relevant lev individual- and institutional-level covariates. We indicate the specific levels and values used in predicted probabilities as we describ for more information about data and methods, repression estimates, and predicted probabilities based on these regression models).

HOW DO STEM STUDENTS DIFFER IN ABILITIES AND ORIENTATIONS?

As others have shown when comparing students across STEM fields (Ceci et al, 2014), we find no significant difference between male PEMC with regard to subjective orientations, career attainment values, and mathematical ability (see note #3). However, if we take further such gender parity is not maintained. Figure 1 shows the predicted probability of declaring a specific STEM major for females Hispanic white, whose parents attended or graduated from college, and who are attending a four-year institution and were at the 75 scores.

Figure 1. Probability of Declaring Specific STEM Majors for Students in 75th percentile of Mathematics SAT Scores, by Gender (P 95% Confidence Interval)



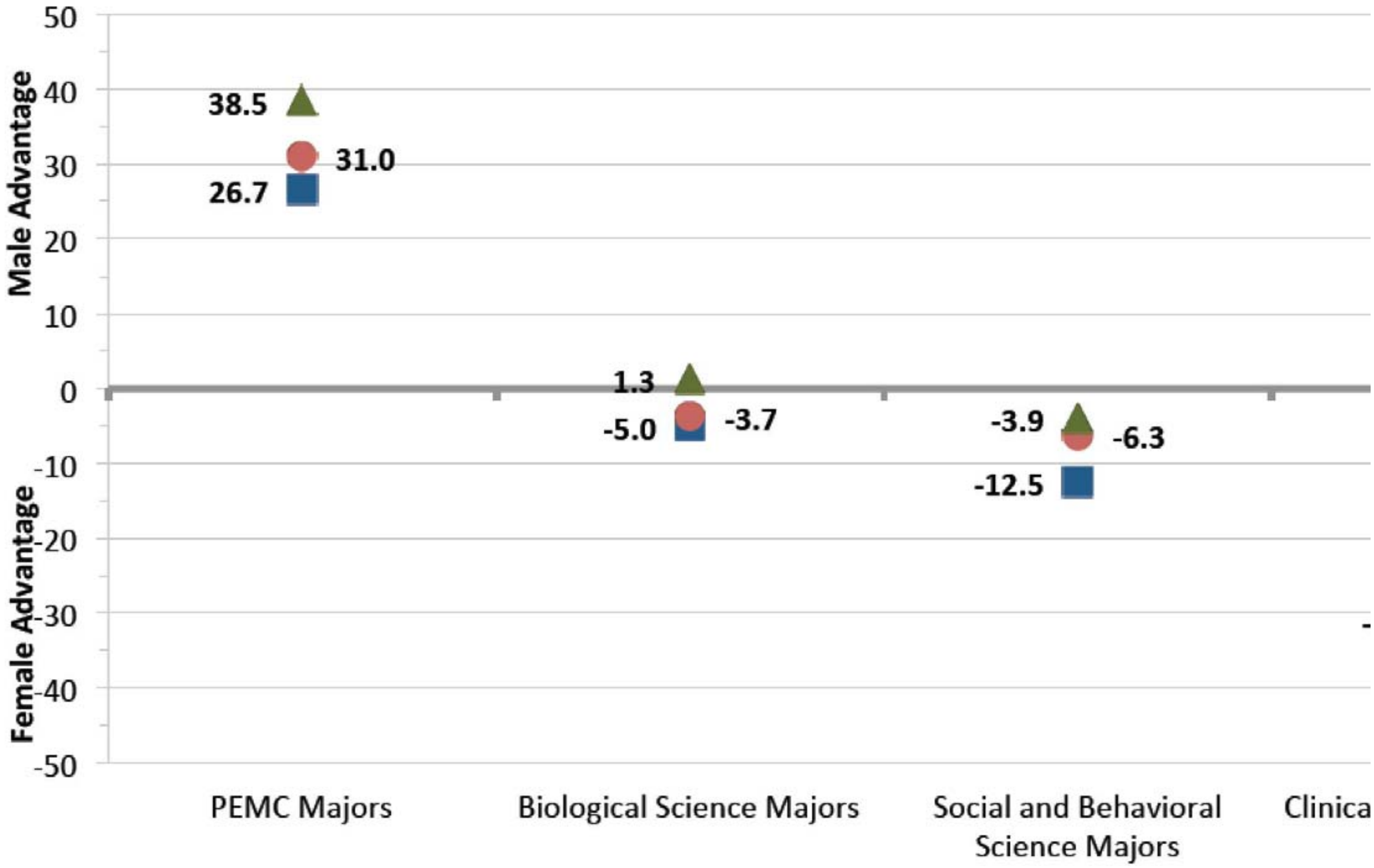
Note: Estimates correspond to the probability of declaring a specific STEM major for males and females who are non-Hispanic white, or graduated from college, who are attending a four-year institution, and were at the 75th percentile of SAT math scores. Predicted regression estimates presented in Table S2.

Figure 1 shows that nearly half (46.1%) of high-achieving males who declare a STEM major are in PEMC compared to only 14.2% of fer
are more than three times as likely as equally talented women to pursue PEMC. In contrast, high-achieving females are equally repre
sciences (20.3% of females vs. 16.2% of males), have a modest advantage in social and behavioral sciences (38.0% of females vs. 29.3
times more likely to pursue clinical and health sciences (27.5% of females vs. 8.3% of males). This means that despite similarities in
math ability and interest in STEM, men are significantly more likely than women to declare a PEMC major, in contrast to the other th

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 instit
second model that adds as a covariate the selectivity of the college or university attended as measured by the NCES-Barron's Admiss
Figure 2 shows *differences* in the probability of males and females to declare specific STEM majors by institutional selectivity. These
interpreted as the male advantage in each specific STEM major among institutions of similar selectivity. For instance, 39.6 percent o
declare a STEM major and attend highly or most competitive institutions are in PEMC, as opposed to 13.0 percent of equivalent fema
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 es
as the male advantage in PEMC in highly or most competitive institutions. Conversely, 41.1 percent of high-achieving STEM males anc
achieving STEM females attending highly or most competitive institutions are in Social and Behavioral Science. Figure 2 displays this
-12.5) and that estimate can be interpreted as the male disadvantage or female advantage in Social and Behavioral Science among s
most competitive institutions. Figure 2 reveals perhaps the most troubling result, that males are nearly 3 times more likely to major
qualified females even at the most selective institutions (26.7).

Figure 2. Gender Gap in College Students' Likelihood of Declaring Specific STEM Majors by Institutional Selectivity, for Majors fc percentile of Mathematics SAT Scores



SEALING ANOTHER LEAK IN THE STEM PIPELINE

Though women have a representative advantage over men in three of the STEM areas (see Figure 1), they are critically underreprese disciplines, which encompass some of the most lucrative and fastest-growing career fields (Lockard & Wolf, 2012; Taylor, 2007). This where highly talented women still choose to pursue STEM majors *other* than PEMC.

The first three waves of ELS:2002 analyzed here do not allow us to know the extent to which the reported gender gaps in specific ST differences in students' initial selection of majors or differences in women's attrition from majors. Although our data does not allow causes underlying this gender gap, we propose two possible causal mechanisms that warrant further investigation. The underreprese may be attributed to personal factors, such as female students perceiving the college coursework as uninteresting, stereotypically m salience with respect to personal and professional goals. Or it may be that "institutional" factors are also at play. While some colleg dedication to increasing the number of women in science and engineering, not all institutions make similar efforts to support female of the most elite. By losing out on the network-building and employment resources that these highly selective institutions provide, w gender gap is being perpetuated in the workforce, especially at the most sought-after companies within the science and technology- our study suggests that all colleges and universities, even the most elite, should be working harder to attract women into PEMC and

Notes

1. Highly selective and private institutions have been found to improve the likelihood of women from minority and lower socioecono a STEM degree (Espinosa, 2011; Steidl, 2012); however, there is no research to our knowledge that either compares supports for wom institutions or looks at how the effectiveness of supports for females varies by type of STEM field, specifically for physical sciences, and computer science (PEMC).

2. While declared majors may seem less robust a measure than degree field at graduation, research suggests that women's attrition early rather than late in their postsecondary studies (Griffith, 2010; Ma, 2011). Importantly, our measure uses the latest wave of ELS transcript data pertaining to field of study will not be released for analysis until 2015.

3. An online supplement can be downloaded here: https://arc.uchicago.edu/TCR-2015-Online-Supplement. Supplement includes stu analytic plan, Figure S1, Tables S1-S6.

Acknowledgment

This material is based upon work supported by the National Science Foundation under Grant Numbers HRD-1232139 and DRL-0815295 and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of t Foundation. We would also like to acknowledge and thank Sarah-Kathryn McDonald for her contributions in the early stages of this w

References

Amelink, C. T., & Creamer, E. G. (2010). Gender differences in elements of the undergraduate experience that influence satisfaction major and the intent to pursue engineering as a career. *Journal of Engineering Education*, *99*(1), 81–92.

Arcidiacono, P. (2004). Ability sorting and the returns to college major. *Journal of Econometrics*, *121*(1), 343–375.

Benbow, C., & Stanley, J. (1980). Sex differences in mathematical ability: Fact or artifact? *Science, 210*(4475), 1262–1264.

Bozick, R., & Lauff, E. (2007). *Education Longitudinal Study of 2002 (ELS:2002): A First Look at the Initial Postsecondary Experience of 2002 (NCES 2008-308).* Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department DC.

Blickenstaff, J. C. (2005). Women and science careers: leaky pipeline or gender filter? *Gender and Education, 17*(4), 369-386.

Ceci, S. J., Ginther, D. K., Kahn, S., & Williams, W. M. (2014). Women in Academic Science A Changing Landscape. *Psychological Scie Interest*, *15*(3), 75–141.

Chen, X. (2009). *Students Who Study Science, Technology, Engineering, and Mathematics (STEM) in Postsecondary Education* (NCES 2 National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Dale, S. B., & Krueger, A. B. (2002). Estimating the payoff to attending a more selective college: An application of selection on obse unobservables. *Quarterly Journal of Economics, 107*(4), 1491–1527.

Davies, S., & Guppy, N. (1997). Fields of study, college selectivity, and student inequalities in higher education. *Social Forces, 75*(4),

Dweck, C. (2007). Is math a gift? Beliefs that put females at risk. In S. C. Ceci & W. M. Williams (Eds.), *Why aren't more women in sc debate the evidence* (pp. 47–55). Washington, DC.: American Psychological Association.

Eccles, J. S. (1994). Understanding women's educational and occupational choices: Applying the Eccles et al. Model of achievement- *of Women Quarterly, 18*(4), 585–609.

Engberg, M. E., & Wolniak, G. C. (2013). College student pathways to the STEM disciplines. *Teachers College Record, 115*(1), 1–27.

Espinosa, L. L. (2011). Pipelines and pathways: Women of color in undergraduate STEM majors and the college experiences that cont persistence. *Harvard Educational Review*, *81*(2), 209–241.

Griffith, A. L. (2010). Persistence of women and minorities in STEM field majors: Is it the school that matters?. *Economics of Educati*

Ingels, S. J., Pratt, D. J., Wilson, D., Burns, L. J., Currivan, D., Rogers, J. E., & Hubbard-Bednasz, S. (2007). *Education Longitudinal to second follow-up data file documentation* (NCES 2008-347). Washington, DC: U.S. Department of Education.

Jones, J. I., (2014) An overview of employment and wages in science, technology, engineering, and math (STEM) groups. *Beyond the Unemployment*, *3*(8). US Bureau of Labor Statistics.

Langdon, D., McKittrick, G., Beede, D., Khan, B., & Doms, M. (2011). *STEM: Good jobs now and for the future. ESA Issue Brief# 03-1* Department of Commerce.

Lockard, C. B., & Wolf, M. (2012). Occupational employment projections to 2020. *Monthly Labor Review*, *135*(1), 84–108

Long, M. C. (2008). College quality and early adult outcomes. *Economics of Education Review*, *27*(5), 588–602.

Ma, Y. (2011). Gender differences in the paths leading to a STEM baccalaureate. *Social Science Quarterly*, *92*(5), 1169–1190.

Marra, R. M., Rodgers, K. A., Shen, D., & Bogue, B. (2009). Women engineering students and self-efficacy: A multi-year, multi-institu engineering student self-efficacy. *Journal of Engineering Education*, *98*(1), 27–38.

Nicholls, G. M., Wolfe, H., Besterfield-Sacre, M., Shuman, L. J., & Larpkiattaworn, S. (2007). A method for identifying variables for p enrollment. *Journal of Engineering Education*, *96*(1), 33–44.

Perez-Felkner, L., McDonald, S.-K., Schneider, B., & Grogan, E. (2012). Female and male adolescents' subjective orientations to mat influence on postsecondary majors. *Developmental Psychology, 48*(6), 1658–1673.

Riegle-Crumb, C., Moore, C., & Ramos-Wada, A. (2011). Who wants to have a career in science or math? Exploring adolescents' futur race/ethnicity. *Science Education*, *95*(3), 458–476.

Smyth, F. L., & McArdle, J. J. (2004). Ethnic and gender differences in science graduation at selective colleges with implications for college choice. *Research in Higher Education, 45*(4), 353–381.

Steidl, C. R. (2012). *Intersectionality, Institutions, & Inequality: STEM Majors and Status Competition Processes in the US Higher Edu* dissertation, Emory University). Retrieved from https://etd.library.emory.edu/view/record/pid/emory:bsr06

Taylor, D. (2007). Employment preferences and salary expectations of students in science and engineering. *BioScience*, *57*(2), 175–18

Wai, J., Cacchio, M., Putallaz, M., & Makel, M. C. (2010). Sex differences in the right tail of cognitive abilities: A 30 year examinatio 412–423.

Webber, D. A. (2014). The lifetime earnings premia of different majors: Correcting for selection based on cognitive, noncognitive, ar factors. *Labour Economics*, *28*, 14–23.

Zhang, L. (2005). Do measures of college quality matter? The effect of college quality on graduates' earnings. *The Review of Higher*

Cite This Article as: *Teachers College Record*, Date Published: July 16, 2015
http://www.tcrecord.org ID Number: 18026, Date Accessed: 2/5/2018 12:18:46 AM

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

by Barbara Schneider, Carolina Milesi, Lara Perez-Felkner, Kevin Brown & Iliya Gutin — July 16, 2015

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.

Many have argued that securing a good job is less about *if* you completed a postsecondary degree than *where* you attended college and *what* you studied. The ranking and reputation of the most competitive universities often serve as powerful signifiers to the most desirable employers, while the institutions themselves provide invaluable networking resources for future advancement. Numerous studies have demonstrated the payoff in career earnings and continued graduate education that results from attending such selective colleges (Long, 2008; Dale & Krueger, 1999; Zhang, 2005). It then comes as no surprise that the students entering these top-tier universities are, for the most part, highly talented males and females at or near the top of their class, having put in the requisite training and intensive preparation during high school to guarantee admission to these institutions.

Further, the economic advantages of majoring in science, technology, engineering, or mathematics (STEM) are well-established (Jones, 2014; Webber, 2014; Langdon, McKittrick, Beede, Khan, & Doms, 2011; Arcidiacono, 2004); thus we would expect many of the most accomplished students to pursue a STEM degree at those institutions which offer the best chance of obtaining a lucrative job (Chen, 2009; Nicholls, Wolfe, Besterfield-Sacre, Shuman, & Larpkiattaworn, 2007). One approach to increasing the number of women in the STEM workforce is to focus on reducing the gender gap at these highly competitive institutions. Indeed, many elite colleges and universities already offer resources and programs designed to support women in STEM majors. The question then is whether such institutions are doing a better job at closing the gender gap in STEM relative to their less selective counterparts.[1] Our study examines the prevalence of gender inequalities within STEM across types of institutions, taking into account the comparable skills, values, career orientations, and college majors of the male and female students who attend them.

To better understand the mechanisms underlying gender discrepancies in certain STEM fields, researchers have considered mathematics ability (Benbow & Stanley, 1980; Wai et al, 2010); mindset and interest in mathematics (Dweck, 2007; Perez-Felkner, McDonald, Schneider, & Grogan, 2012); and career attainment values (Eccles, 1994). However, little research has looked at how the choice of postsecondary institution affects careers in STEM. The research that does examine institutional selectivity tends neither to distinguish among STEM majors nor compare women to men (e.g., Smyth & McArdyle, 2004; Engberg & Wolniak, 2013; Davies & Guppy, 1997). Given that postsecondary institutions have different concerns when it comes to fostering environments that provide social and academic support to females pursuing science and engineering degrees (Marra, Rodgers, Shen, & Bogue, 2009; Amelink & Creamer, 2010), one of our priorities is to add institutional selectivity to the growing list of factors that may account for any gender gaps in STEM fields, especially the physical sciences, engineering, mathematics and computer sciences (PEMC) where female underrepresentation in degrees and careers is most problematic (Ceci, Ginther, Kahn, & Williams 2014; Blickenstaff, 2005; Riegle-Crumb, Moore, & Ramos-Wada, 2011).

DATA AND METHODS

STUDY SAMPLE

This analysis employs restricted-use data from the Education Longitudinal Study of 2002 (ELS:2002), the most recent U.S. nationally representative study conducted by the National Center for Education Statistics following a cohort of students from high school to postsecondary education (Bozick & Lauff, 2007). ELS:2002 reports on the females and males who declared majors in STEM fields by the second follow-up wave, which took place in 2006, when the overwhelming majority of students in the analytic sample were sophomores in college (Ingels, Pratt, Wilson, Burns, Currivan, Rogers, & Hubbard-Bednasz, 2007). Our analytic sample of 1,660 is weighted to 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.

MEASURES

The dependent variable is postsecondary major, which corresponds to a self-reported measure while students were enrolled in their sophomore year of college.[2] Our categories of interest are the four basic STEM fields: social and behavioral sciences; clinical and health sciences; biological sciences; and physical sciences, engineering, mathematics, and computer sciences (PEMC). Our analysis includes the following covariates:

Student Background Characteristics

To control for individual and family characteristics, we used the following independent measures: gender (1 = *female*, 0 = *male*); parents' education (1 = *at least one parent attended or completed postsecondary education,* 0 = *otherwise*); and race-ethnicity (*Asian, African American, Latino,* and *white*), with non-Hispanic white as the reference category.

Academic Ability

We assessed students' academic ability using college entrance examination scores in mathematics. Given regional variation in U.S. students' test preference and general equivalencies between the exams, the National Center for Education Statistics (NCES) measures we used included students who had completed the SAT I examination as well as those who had completed the ACT examination, normalized to fit the SAT scale for mathematics ability (numeric: 200–800).

Subjective Orientations to Mathematics

Tenth-grade high school students were presented with a series of items tapping the extent to which they agreed with statements regarding their perceived mathematics ability (ability to master math skills); mathematics mindset (belief that most people can learn to be good in math); and mathematics value (belief that math is important). The strength and direction of their subjective orientations was measured from most negative (1 = *strongly disagree*) to most positive (4 = *strongly agree*).

Career Attainment Values

Tenth-grade students were asked to evaluate the importance of the following items about their careers from low (1 = *not important*) to high (3 = *very important*): steady work (being able to find steady work), family (importance of having children), and altruism (helping others in community).

Postsecondary Experience

Here, we used student enrollment (1 = *enrolled in a four-year college;* 0 = *enrolled in a two-year college*) and an institutional selectivity construct from the ELS: 2002 Restricted-Use Second Follow-up Data Files and the NCES-Barron's Admissions Competitiveness Index. We aggregated the seven categories in Barron's into three mutually exclusive categories (1 = *most competitive* and *highly competitive*; 2 = *very competitive* and *competitive*; and 3 = *less competitive*, *noncompetitive*, *special*, and *missing*, which predominantly includes two-year postsecondary institutions).

ANALYTIC PLAN

All estimates account for the ELS:2002 complex design. Percentages, regression coefficients, and predicted probabilities all are weighted by a panel weight that applies to all sample members who responded in the base year and the second follow-up. This weight allows projections to the population of students who were 10th graders in spring 2002. Estimates presented in tables and figures also take into account clustering and strata information embedded in the series of replicate weights (F2BYP1 through F2BYP200, also developed by NCES).

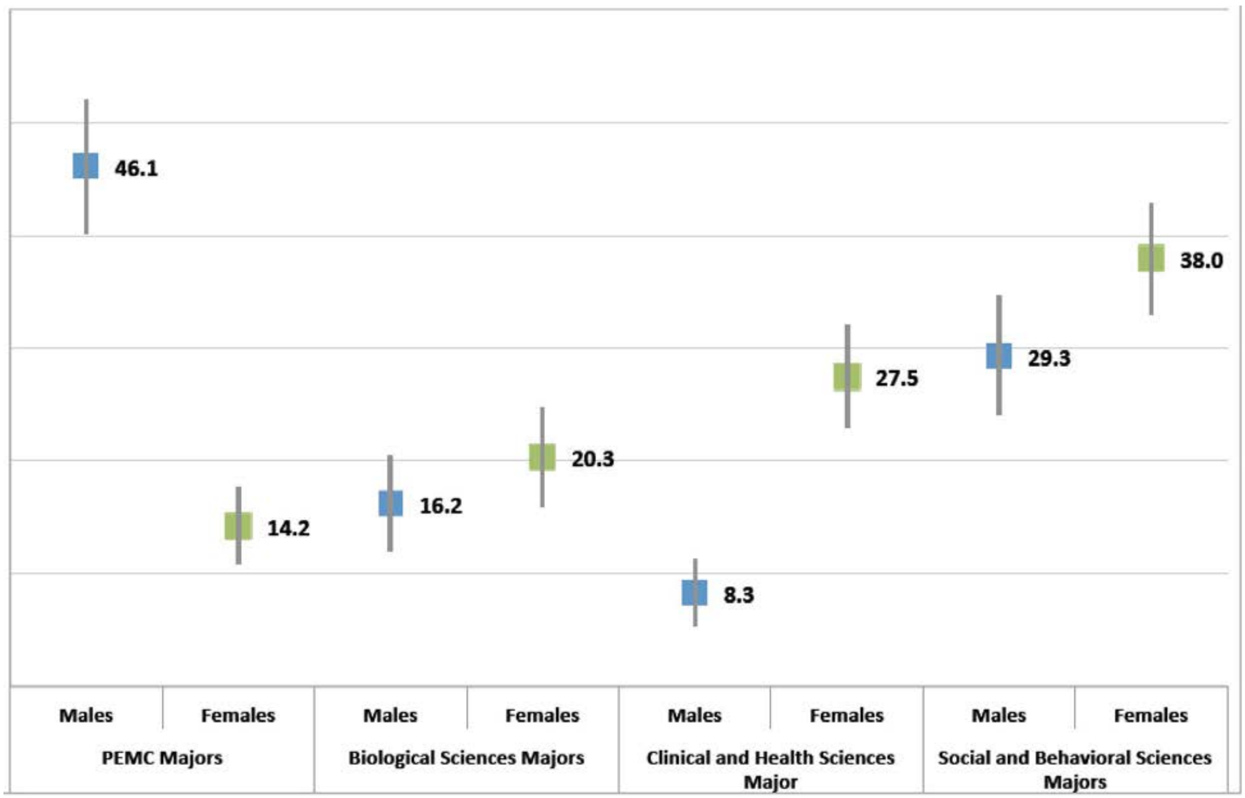
We estimated a series of multinomial logistic regression models to examine the associations between student, family, and postsecondary institutional characteristics and the selection of specific STEM majors. The dependent variable consists of the four specific STEM fields mentioned above, and the reference category corresponds to PEMC. We estimated models with different sets of covariates. Our initial models include student's gender, race-ethnicity, parents' education, SAT scores, and a variable indicating whether the student was enrolled in a four-year college (as opposed to a two-year college). A second set of models adds to this set of covariates career attainment values and subjective orientations toward mathematics. Finally, we add measures of postsecondary institutional selectivity.

To facilitate the interpretation of multinomial regression coefficients, we estimated a series of predicted values using the "margins" command in Stata. Specifically, we estimated the predicted probability that females and males would select a particular STEM field given a relevant level or value for each of the individual- and institutional-level covariates. We indicate the specific levels and values used in predicted probabilities as we describe the results (see note #3 for more information about data and methods, repression estimates, and predicted probabilities based on these regression models).

HOW DO STEM STUDENTS DIFFER IN ABILITIES AND ORIENTATIONS?

As others have shown when comparing students across STEM fields (Ceci et al, 2014), we find no significant difference between males and females majoring in PEMC with regard to subjective orientations, career attainment values, and mathematical ability (see note #3). However, if we take this analysis one step further such gender parity is not maintained. Figure 1 shows the predicted probability 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.

Figure 1. Probability of Declaring Specific STEM Majors for Students in 75th percentile of Mathematics SAT Scores, by Gender (Predicted Probability and 95% Confidence Interval)



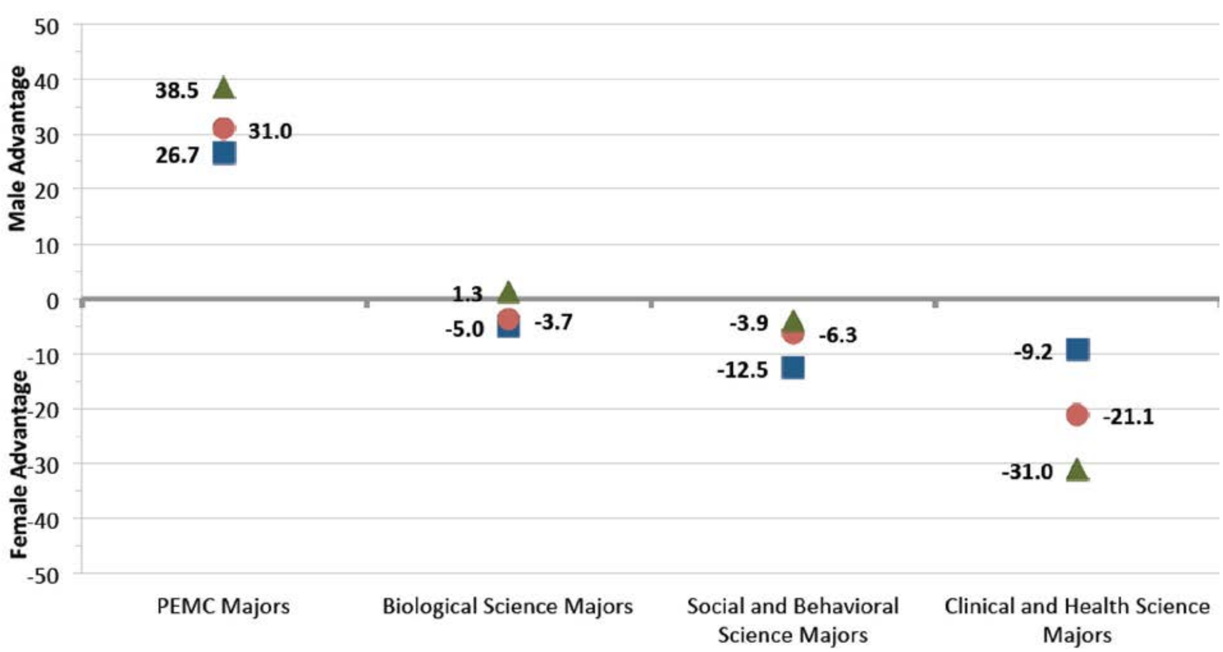
Note: Estimates correspond to the probability of declaring a specific STEM major for males and females who are non-Hispanic white, whose parents attended or graduated from college, who are attending a four-year institution, and were at the 75th percentile of SAT math scores. Predicted probabilities are based on regression estimates presented in Table S2.

Figure 1 shows that nearly half (46.1%) of high-achieving males who declare a STEM major are in PEMC compared to only 14.2% of females, indicating that men are more than three times as likely as equally talented women to pursue PEMC. In contrast, high-achieving females are equally represented in biological sciences (20.3% of females vs. 16.2% of males), have a modest advantage in social and behavioral sciences (38.0% of females vs. 29.3% of males), and are three times more likely to pursue clinical and health sciences (27.5% of females vs. 8.3% of males). This means that 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.

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? We estimated a second model that adds as a covariate the selectivity of the college or university attended as measured by the NCES-Barron's Admissions Competitive Index.[3] Figure 2 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 percent of high-achieving males who declare a STEM major and attend highly or most competitive institutions are in PEMC, as opposed to 13.0 percent of equivalent females. Figure 2 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. Conversely, 41.1 percent of high-achieving STEM males and 53.6 percent of high-achieving STEM females attending highly or most competitive institutions are in Social and Behavioral Science. Figure 2 displays this gender gap (41.1 – 53.6 = -12.5) and that estimate can be interpreted as the male disadvantage or female advantage in Social and Behavioral Science among students attending highly or most competitive institutions. Figure 2 reveals perhaps the most troubling result, that males are nearly 3 times more likely to major in PEMC than similarly qualified females even at the most selective institutions (26.7).

Figure 2. Gender Gap in College Students' Likelihood of Declaring Specific STEM Majors by Institutional Selectivity, for Majors for Students in 75th percentile of Mathematics SAT Scores



SEALING ANOTHER LEAK IN THE STEM PIPELINE

Though women have a representative advantage over men in three of the STEM areas (see Figure 1), they are critically underrepresented in the PEMC disciplines, which encompass some of the most lucrative and fastest-growing career fields (Lockard & Wolf, 2012; Taylor, 2007). This is true even at the "Ivies," where highly talented women still choose to pursue STEM majors *other* than PEMC.

The first three waves of ELS:2002 analyzed here do not allow us to know the extent to which the reported gender gaps in specific STEM fields represent differences in students' initial selection of majors or differences in women's attrition from majors. Although our data does not allow us to explore the direct causes underlying this gender gap, we propose two possible causal mechanisms that warrant further investigation. The underrepresentation of women in PEMC may be attributed to 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. Or it may be that "institutional" factors are also at play. 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 these highly selective institutions provide, we believe that the PEMC gender gap is being perpetuated in the workforce, especially at the most sought-after companies within the science and technology-focused industries. Indeed, our study suggests that all colleges and universities, even the most elite, should be working harder to attract women into PEMC and support their persistence.

Notes

1. Highly selective and private institutions have been found to improve the likelihood of women from minority and lower socioeconomic backgrounds to pursue a STEM degree (Espinosa, 2011; Steidl, 2012); however, there is no research to our knowledge that either compares supports for women in STEM across types of institutions or looks at how the effectiveness of supports for females varies by type of STEM field, specifically for physical sciences, engineering, mathematics, and computer science (PEMC).

2. While declared majors may seem less robust a measure than degree field at graduation, research suggests that women's attrition from STEM fields occurs early rather than late in their postsecondary studies (Griffith, 2010; Ma, 2011). Importantly, our measure uses the latest wave of ELS:2002 data, as college transcript data pertaining to field of study will not be released for analysis until 2015.

3. An online supplement can be downloaded here: https://arc.uchicago.edu/TCR-2015-Online-Supplement. Supplement includes study sample, measures, analytic plan, Figure S1, Tables S1-S6.

Acknowledgment

This material is based upon work supported by the National Science Foundation under Grant Numbers HRD-1232139 and DRL-0815295. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation. We would also like to acknowledge and thank Sarah-Kathryn McDonald for her contributions in the early stages of this work.

References

Amelink, C. T., & Creamer, E. G. (2010). Gender differences in elements of the undergraduate experience that influence satisfaction with the engineering major and the intent to pursue engineering as a career. *Journal of Engineering Education*, *99*(1), 81–92.

Arcidiacono, P. (2004). Ability sorting and the returns to college major. *Journal of Econometrics*, *121*(1), 343–375.

Benbow, C., & Stanley, J. (1980). Sex differences in mathematical ability: Fact or artifact? *Science, 210*(4475), 1262–1264.

Bozick, R., & Lauff, E. (2007). *Education Longitudinal Study of 2002 (ELS:2002): A First Look at the Initial Postsecondary Experiences of the Sophomore Class of 2002 (NCES 2008-308).* Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

Blickenstaff, J. C. (2005). Women and science careers: leaky pipeline or gender filter? *Gender and Education, 17*(4), 369-386.

Ceci, S. J., Ginther, D. K., Kahn, S., & Williams, W. M. (2014). Women in Academic Science A Changing Landscape. *Psychological Science in the Public Interest*, *15*(3), 75–141.

Chen, X. (2009). *Students Who Study Science, Technology, Engineering, and Mathematics (STEM) in Postsecondary Education* (NCES 2009-161). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Dale, S. B., & Krueger, A. B. (2002). Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables. *Quarterly Journal of Economics, 107*(4), 1491–1527.

Davies, S., & Guppy, N. (1997). Fields of study, college selectivity, and student inequalities in higher education. *Social Forces*, *75*(4), 1417–1438.

Dweck, C. (2007). Is math a gift? Beliefs that put females at risk. In S. C. Ceci & W. M. Williams (Eds.), *Why aren't more women in science? Top researchers debate the evidence* (pp. 47–55). Washington, DC.: American Psychological Association.

Eccles, J. S. (1994). Understanding women's educational and occupational choices: Applying the Eccles et al. Model of achievement-related choices. *Psychology of Women Quarterly, 18*(4), 585–609.

Engberg, M. E., & Wolniak, G. C. (2013). College student pathways to the STEM disciplines. *Teachers College Record, 115*(1), 1–27.

Espinosa, L. L. (2011). Pipelines and pathways: Women of color in undergraduate STEM majors and the college experiences that contribute to persistence. *Harvard Educational Review*, *81*(2), 209–241.

Griffith, A. L. (2010). Persistence of women and minorities in STEM field majors: Is it the school that matters?. *Economics of Education Review*, *29*(6), 911–922.

Ingels, S. J., Pratt, D. J., Wilson, D., Burns, L. J., Currivan, D., Rogers, J. E., & Hubbard-Bednasz, S. (2007). *Education Longitudinal Study of 2002: Base-year to second follow-up data file documentation* (NCES 2008-347). Washington, DC: U.S. Department of Education.

Jones, J. I., (2014) An overview of employment and wages in science, technology, engineering, and math (STEM) groups. *Beyond the Numbers: Employment and Unemployment*, *3*(8). US Bureau of Labor Statistics.

Langdon, D., McKittrick, G., Beede, D., Khan, B., & Doms, M. (2011). *STEM: Good jobs now and for the future. ESA Issue Brief# 03-11.* Washington, DC: US Department of Commerce.

Lockard, C. B., & Wolf, M. (2012). Occupational employment projections to 2020. *Monthly Labor Review*, *135*(1), 84–108

Long, M. C. (2008). College quality and early adult outcomes. *Economics of Education Review*, *27*(5), 588–602.

Ma, Y. (2011). Gender differences in the paths leading to a STEM baccalaureate. *Social Science Quarterly*, *92*(5), 1169–1190.

Marra, R. M., Rodgers, K. A., Shen, D., & Bogue, B. (2009). Women engineering students and self-efficacy: A multi-year, multi-institution study of women engineering student self-efficacy. *Journal of Engineering Education*, *98*(1), 27–38.

Nicholls, G. M., Wolfe, H., Besterfield-Sacre, M., Shuman, L. J., & Larpkiattaworn, S. (2007). A method for identifying variables for predicting STEM enrollment. *Journal of Engineering Education*, *96*(1), 33–44.

Perez-Felkner, L., McDonald, S.-K., Schneider, B., & Grogan, E. (2012). Female and male adolescents' subjective orientations to mathematics and their influence on postsecondary majors. *Developmental Psychology, 48*(6), 1658–1673.

Riegle-Crumb, C., Moore, C., & Ramos-Wada, A. (2011). Who wants to have a career in science or math? Exploring adolescents' future aspirations by gender and race/ethnicity. *Science Education*, *95*(3), 458–476.

Smyth, F. L., & McArdle, J. J. (2004). Ethnic and gender differences in science graduation at selective colleges with implications for admission policy and college choice. *Research in Higher Education, 45*(4), 353–381.

Steidl, C. R. (2012). *Intersectionality, Institutions, & Inequality: STEM Majors and Status Competition Processes in the US Higher Education System* (Doctoral dissertation, Emory University). Retrieved from https://etd.library.emory.edu/view/record/pid/emory:bsr06

Taylor, D. (2007). Employment preferences and salary expectations of students in science and engineering. *BioScience*, *57*(2), 175–185.

Wai, J., Cacchio, M., Putallaz, M., & Makel, M. C. (2010). Sex differences in the right tail of cognitive abilities: A 30 year examination. *Intelligence, 38*(4), 412–423.

Webber, D. A. (2014). The lifetime earnings premia of different majors: Correcting for selection based on cognitive, noncognitive, and unobserved factors. *Labour Economics*, *28*, 14–23.

Zhang, L. (2005). Do measures of college quality matter? The effect of college quality on graduates' earnings. *The Review of Higher Education*, *28*(4), 571–596.

Supplementary Materials for

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

This file includes:

Study Sample

Measures

Analytic Plan

Figure S1

Tables S1 to S6

Study Sample

This analysis employs restricted-use data from the Education Longitudinal Study of 2002 (ELS:2002), the most recent U.S. nationally representative study conducted by the National Center for Education Statistics following a cohort of students from high school to postsecondary education. It reports on the females and males who declared majors in STEM fields by the second follow-up wave, which took place in 2006, when the overwhelming majority of students in the analytic sample were sophomores in college. Our analytic sample of 1,660 is weighted to (a) represent 342,742 students nationwide who selected a STEM major two years after entering postsecondary school, and (b) have valid information on key covariates. The sample includes females and males who first enrolled in both two- and four-year postsecondary institutions.

Measures

Dependent Measure

The dependent measure is STEM major. Postsecondary majors are self-reported. Our categories of interest are the four most popular STEM fields:

1. social and behavioral sciences;
2. clinical and health sciences;
3. biological sciences; and
4. physical sciences, engineering, mathematics, and computer sciences (PEMC).

Figure S1 displays weighted raw percentage of male and females who declared each of these four specific STEM majors. Figure S1 shows that females had higher rates of participation than males in several STEM fields: 61% in biological sciences, 64% in social and behavioral sciences, and 84% in clinical and health sciences. Only a quarter of PEMC students were female.

Independent Predictors

As detailed in Table S1, our analysis includes the following measures:

Student background characteristics. To control for individual and family characteristics, we used the following independent measures: gender (1 = *female*, 0 = *male*); parents' education (1 = *at least one parent attended or completed postsecondary education,* 0 = *otherwise*); and race-ethnicity (*Asian, African American, Latino,* and *white*), with non-Hispanic white as the reference category.

Academic ability. We assessed students' academic ability using college entrance examination scores in mathematics. Given regional variation in U.S. students' test preference and general equivalencies between the exams, the National Center for Education Statistics (NCES) measures we used included students who had completed the SAT I examination as well as those who had completed the ACT examination, normalized to fit the SAT scale for mathematics ability (numeric: 200–800).

Subjective orientations to mathematics. Tenth-grade high school students were presented with a series of items tapping the extent to which they agreed with statements regarding their perceived mathematics ability (ability to master math skills); mathematics mindset (belief that most people can learn to be good in math); and mathematics value (belief that math is important). The strength and direction of their subjective orientations was measured from most negative (1 = *strongly disagree*) to most positive (4 = *strongly agree*).

Career attainment values. Tenth-grade students were asked to evaluate the importance of the following items about their careers from low (1 = *not important*) to high (3 = *very important*): steady work (being able to find steady work), family (importance of having children), and altruism (helping others in community).

Postsecondary experience. Here, we used student enrollment (1 = *enrolled in a four-year college;* 0 = *enrolled in a two-year college*) and an institutional selectivity construct from the ELS:2002 Restricted-Use Second Follow-up Data Files and the NCES-Barron's Admissions Competitiveness Index. We aggregated the seven categories in Barron's into three mutually exclusive categories (1 = *most competitive* and *highly competitive*; 2 = *very competitive* and *competitive*; and 3 = *less competitive, noncompetitive, special*, and *missing*, which largely includes two-year postsecondary institutions).

Analytic Plan

All estimates account for the ELS:2002 complex design. Percentages, regression coefficients, and predicted probabilities all are weighted by a panel weight that applies to all sample members who responded in the base year and the second follow-up. This weight allows projections to the population of students who were 10th graders in spring 2002. Estimates presented in the tables and figures also take into account clustering and strata information embedded in the series of replicate weights (F2BYP1 through F2BYP200, also developed by NCES).

We estimated a series of multinomial logistic regression models to examine the associations between student, family, and postsecondary institutional characteristics and the selection of specific STEM majors. The dependent variable consists of the four specific STEM fields mentioned above, and the reference category corresponds to PEMC. Tables S2, S3, and S5 present regression coefficients and odds ratios derived from these models, along with their respective standard errors. Each table includes a slightly different set of covariates. Table S2 includes student's gender, race-ethnicity, parents' education, SAT math scores, and a variable indicating whether the student was enrolled in a four-year college (as opposed to a two-year college). Table S3 adds to this set of covariates career attainment values and subjective orientations toward mathematics. Table S5 includes the same covariates as Table S2 plus postsecondary institutional selectivity.

To facilitate the interpretation of multinomial regression coefficients, we estimated a series of predicted values using the "margins" command in Stata. Specifically, we estimated the predicted probability that females and males would select a particular STEM field given a relevant level or value for each of the individual- and institutional-level covariates. Based on the estimates shown in Table S2, Figure 1 (in main text) displays the probability 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. Based on the estimates shown in Table S3, Table S4 displays the probability 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, were at the 75th percentile of SAT math scores, and have strong positive orientation to mathematics or report valuing steady work, family, and altruism as "very important." Based on the estimates shown in Table S5, Table S6 displays the probability 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, are at the 75th percentile of SAT math scores, and are enrolled in institutions of different selectivity levels, according to the Barron's

Admissions Competitive Index. Predicted probabilities are estimated separately for males and females and also for each level of institutional selectivity. These predicted probabilities are used to create Figure 2 (in the main text). For instance, the square in column “PEMC majors” (first column on the left of Figure 2) is associated with a male advantage of 26.7 percentage points. This estimate represents a difference in the probability of male and female students declaring PEMC in highly and most competitive institutions (39.6 [males] – 13.0 [females] = 26.7).

Figure S1.
Percentage of Female and Male Students Declaring Specific Undergraduate STEM Majors Two Years After Enrolling in Postsecondary Education

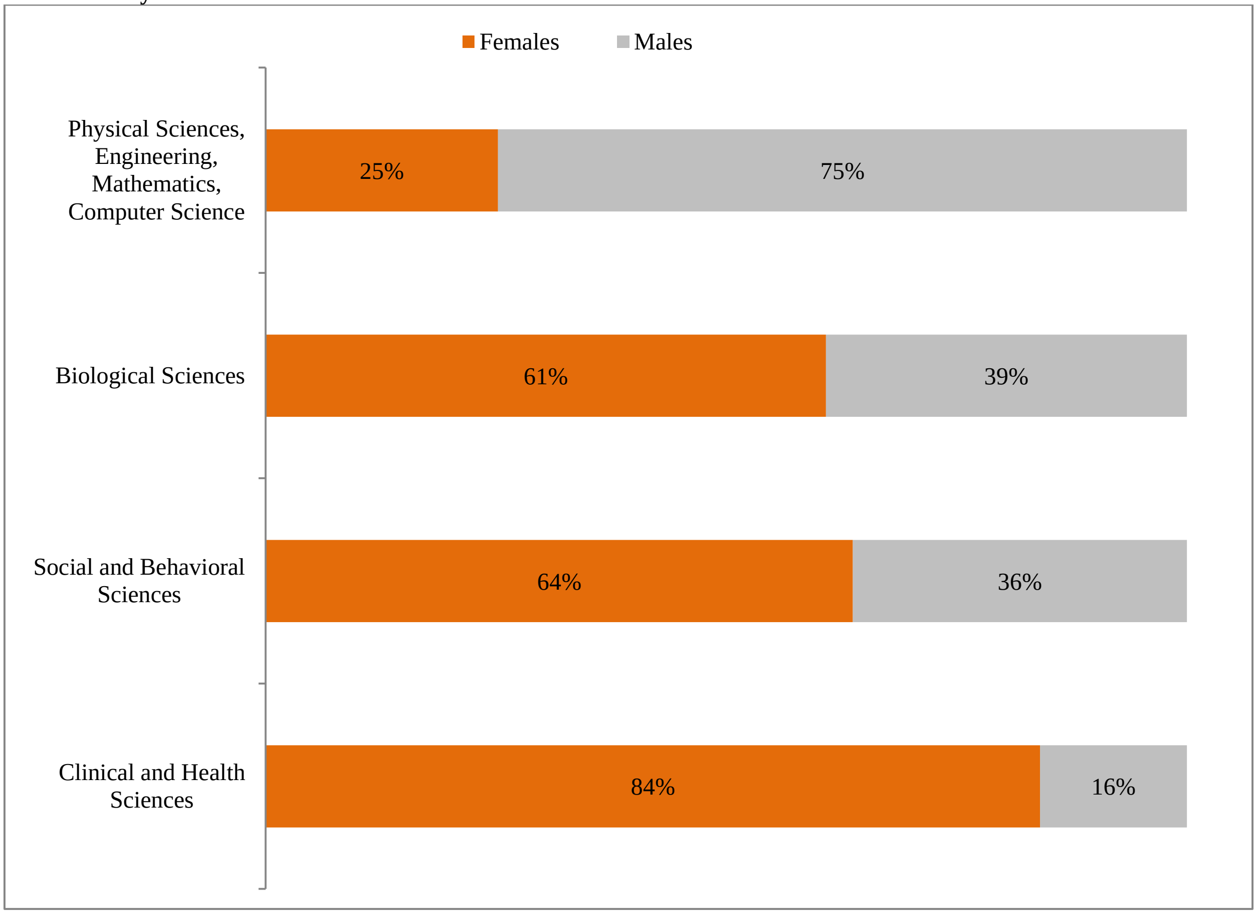


Table S1.
Characteristics of the Analytic Sample: Descriptions and Weighted Means

Predictor Variables	Definition and Range	Weighted Means
Student background characteristics		
Female (reference = male)	Dummy variable = 1 if female	0.59
Parents' education	Dummy variable = 1 if at least one parent attended or completed postsecondary school	0.68
Race-ethnicity		
White	Dummy variable = 1 if white	0.73
Asian	Dummy variable = 1 if Asian/Asian American	0.07
African American	Dummy variable = 1 if black/African American	0.12
Latino	Dummy variable = 1 if Hispanic/Latino	0.08
Mathematics ability	NCES variable based on SAT and ACT mathematics test scores, normalized to fit the SAT scale; 200–800	547
Career attainment values (10th grade)		
Steady work (importance of being able to find steady work)	Unstandardized scale range 1–3; 3 = very important	2.89
Family (importance of having children)	Unstandardized scale range 1–3; 3 = very important	2.40
Altruism (importance of helping others in community)	Unstandardized scale range 1–3; 3 = very important	2.34
Subjective orientations (10th grade)		
Mathematics perceived ability (belief that one can master math skills)	Unstandardized scale range 1–4; 4 = strongly agree	3.02

Mindset toward math ability (belief that most people can learn to be good in math)	Unstandardized scale range 1–4; 4 = strongly agree	2.97
Mathematics value (belief that math is important)	Unstandardized scale range 1–4; 4 = strongly agree	2.65
Postsecondary experience		
Enrollment in a four-year institution	Dummy variable = 1 if highest level of education attempted was at a four-year institution	0.86
Institutional selectivity	Unstandardized scale based on Barron's Admissions Competitiveness Index, range 1–7; aggregated the seven categories in Barron's into three mutually exclusive categories (1 = *most competitive* and *highly competitive*; 2 = *very competitive* and *competitive*; 3 = *less competitive*, *noncompetitive*, *special*, and *missing*)	
Most competitive or highly competitive	Dummy variable = 1 if attended most competitive or highly competitive postsecondary institution	0.19
Very competitive or competitive	Dummy variable = 1 if attended very competitive or competitive postsecondary institution	0.48
Less competitive, noncompetitive, special or missing	Dummy variable = 1 if attended less competitive, noncompetitive, special or missing postsecondary institution	0.32

Table S2.
Multinomial Logistic Regression Results of Declaring Specific STEM Major Among Undergraduate Students on Student and Family Characteristics

	Biological vs. PEMC				Clinical and Health vs. PEMC				Social and Behavioral vs. PEMC			
	Coefficient	*SE*	Odds Ratio	*SE*	Coefficient	*SE*	Odds Ratio	*SE*	Coefficient	*SE*	Odds Ratio	*SE*
Gender (dummy for female)	1.44***	0.23	4.21	0.96	2.45***	0.25	11.58	2.86	1.49***	0.19	4.43	0.83
Race-ethnicity												
Asian	0.94**	0.30	2.55	0.77	0.55^	0.31	1.74	0.54	0.21	0.28	1.23	0.35
African American	-0.44	0.37	0.64	0.24	-1.38***	0.37	0.25	0.09	-1.21***	0.32	0.30	0.09
Hispanic	-0.32	0.51	0.73	0.37	-1.18*	0.46	0.31	0.14	-0.11	0.35	0.89	0.31
Parents' education (at least one parent attended or completed college)	0.41	0.27	1.51	0.41	0.05	0.23	1.05	0.24	0.23	0.23	1.26	0.29
SAT mathematics score	0.00*	0.00	1.00	0.00	-0.01***	0.00	0.99	0.00	-0.01***	0.00	0.99	0.00
Attended four-year college	0.89*	0.43	2.44	1.05	-0.40	0.31	0.67	0.21	0.98*	0.38	2.66	1.01

Source. U.S. Department of Education, National Center for Education Statistics. Education Longitudinal Study of 2002 (ELS:2002).
^ $p < 0.10$. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. P-values for coefficients also apply to odds ratio.

Table S3.
Multinomial Logistic Regression Results of Declaring Specific STEM Major Among Undergraduate Students on Student and Family Characteristics, Career Attainment Values, and Subjective Orientation Toward Mathematics

	Biological vs. PEMC				Clinical and Health vs. PEMC				Social and Behavioral vs. PEMC			
	Coefficient	*SE*	Odds Ratio	*SE*	Coefficient	*SE*	Odds Ratio	*SE*	Coefficient	*SE*	Odds Ratio	*SE*
Female	1.36***	0.23	3.90	0.89	2.37***	0.26	10.67	2.75	1.40***	0.19	4.04	0.78
Race-ethnicity												
Asian	0.99**	0.31	2.68	0.84	0.63*	0.32	1.87	0.59	0.28	0.28	1.32	0.37
African American	-0.32	0.39	0.73	0.28	-1.16**	0.39	0.31	0.12	-0.93**	0.34	0.39	0.13
Hispanic	-0.17	0.51	0.84	0.43	-0.96*	0.47	0.38	0.18	0.13	0.38	1.13	0.43
Parents' education (at least one parent attended or completed college)	0.40	0.27	1.49	0.41	0.02	0.24	1.02	0.24	0.16	0.24	1.18	0.28
SAT mathematics score	0.00**	0.00	1.00	0.00	-0.01***	0.00	0.99	0.00	0.00***	0.00	1.00	0.00
Attended four-year college	0.83^	0.45	2.30	1.03	-0.43	0.34	0.65	0.22	0.95*	0.41	2.59	1.06
Career attainment values												
Steady work	0.10	0.32	1.11	0.35	-0.03	0.31	0.97	0.30	-0.35	0.28	0.70	0.19
Family	0.38*	0.18	1.46	0.26	0.62**	0.18	1.86	0.33	0.47**	0.15	1.59	0.24
Altruism	0.22	0.22	1.25	0.28	0.17	0.20	1.19	0.23	0.23	0.20	1.26	0.25
Subjective orientations												
Math perceived ability	0.01	0.16	1.01	0.16	-0.18	0.16	0.84	0.13	-0.09	0.14	0.91	0.13
Math mindset	-0.09	0.19	0.91	0.18	0.04	0.19	1.04	0.19	-0.06	0.17	0.94	0.16
Math importance	-0.26	0.18	0.77	0.14	-0.32*	0.15	0.73	0.11	-0.56***	0.15	0.57	0.09

Source. U.S. Department of Education, National Center for Education Statistics. Education Longitudinal Study of 2002 (ELS:2002).
^ $p < 0.10$. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. P-values for coefficients also apply to odds ratio.

Table S4.
Predicted Probability of Declaring Specific STEM Major for Undergraduate Students With Strong Subjective Orientations to Mathematics and Strong Career Attainment Values, by Gender

	PEMC Majors				Biological Sciences Majors				Clinical and Health Sciences Majors				Social and Behavioral Sciences Majors			
	Male		Female		Male		Female		Male		Female		Male		Female	
	Prob.	*SE*	Prob.	*SE*	Prob.	*SE*	Prob.	*SE*	Prob.	*SE*	Prob.	*SE*	Prob.	*SE*	Prob.	*SE*
All students	0.426	0.032	0.144	0.018	0.162	0.023	0.196	0.022	0.086	0.017	0.269	0.024	0.326	0.030	0.392	0.027
Subjective orientations																
Perceived math ability	0.446	0.038	0.156	0.022	0.173	0.029	0.217	0.037	0.073	0.015	0.240	0.029	0.308	0.036	0.387	0.034
Mindset toward math ability	0.439	0.047	0.148	0.028	0.152	0.031	0.184	0.034	0.092	0.022	0.288	0.039	0.317	0.039	0.380	0.041
Mathematics value	0.574	0.056	0.222	0.039	0.156	0.034	0.220	0.034	0.076	0.020	0.280	0.044	0.193	0.035	0.278	0.042
Career attainment values																
Steady work	0.432	0.034	0.146	0.018	0.166	0.024	0.201	0.023	0.086	0.017	0.272	0.024	0.316	0.030	0.380	0.028
Family	0.362	0.037	0.108	0.018	0.173	0.026	0.192	0.025	0.102	0.020	0.299	0.031	0.363	0.037	0.402	0.033
Altruism	0.392	0.041	0.127	0.020	0.172	0.034	0.202	0.032	0.088	0.020	0.267	0.030	0.348	0.042	0.404	0.034

Note. Prob. = Predicted probability, based on regression estimates presented in Table S3.
Source. U.S. Department of Education, National Center for Education Statistics. Education Longitudinal Study of 2002 (ELS:2002).

Table S5.
Multinomial Logistic Regression Results of Selection of Specific STEM Major Among Undergraduate Students on Student and Family Characteristics and Postsecondary Institutional Selectivity

	Biological vs. PEMC				Clinical and Health vs. PEMC				Social and Behavioral vs. PEMC			
	Coefficient	*SE*	Odds Ratio	*SE*	Coefficient	*SE*	Odds Ratio	*SE*	Coefficient	*SE*	Odds Ratio	*SE*
Female	1.42***	0.23	4.14	0.96	2.50***	0.25	12.16	3.06	1.43***	0.19	4.18	0.80
Race-ethnicity												
Asian	0.92**	0.30	2.51	0.76	0.60^	0.32	1.83	0.58	0.15	0.29	1.16	0.34
African American	-0.44	0.38	0.64	0.24	-1.40***	0.38	0.25	0.09	-1.21***	0.32	0.30	0.10
Hispanic	-0.32	0.51	0.73	0.37	-1.27**	0.45	0.28	0.13	-0.08	0.34	0.92	0.31
Parents' education (at least one parent attended or completed college)	0.41	0.27	1.51	0.41	0.08	0.23	1.08	0.25	0.20	0.23	1.23	0.29
SAT mathematics score	0.00***	0.00	1.00	0.00	-0.01***	0.00	0.99	0.00	-0.01***	0.00	0.99	0.00
Attended four-year college	0.64	0.50	1.90	0.94	-0.32	0.34	0.73	0.25	0.41	0.42	1.51	0.64
Institutional selectivity												
No Barron's available, special, noncompetitive, or less competitive	-0.44	0.45	0.64	0.29	0.97*	0.38	2.63	0.99	-1.28***	0.31	0.28	0.09
Highly or most competitive	-0.06	0.31	0.94	0.29	0.83*	0.33	2.28	0.76	-0.45*	0.23	0.64	0.14

Source. U.S. Department of Education, National Center for Education Statistics. Education Longitudinal Study of 2002 (ELS:2002).
^ $p < 0.10$. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. P-values for coefficients also apply to odds ratio.

Table S6.
Predicted Probability of Declaring Specific STEM Major for Undergraduate Students Enrolled in Postsecondary Institutions with Different Selectivity Levels, by Gender

	PEMC Majors				Biological Sciences Majors				Clinical and Health Sciences Majors				Social and Behavioral Sciences Majors			
	Male		Female		Male		Female		Male		Female		Male		Female	
	Prob.	SE	Prob.	SE	Prob.	SE	Prob.	SE	Prob.	SE	Prob.	SE	Prob.	SE	Prob.	SE
Highly Competitive or Most Competitive	0.396	0.050	0.130	0.024	0.159	0.038	0.209	0.042	0.033	0.009	0.125	0.028	0.411	0.044	0.536	0.047
Competitive or Very Competitive	0.447	0.036	0.137	0.019	0.169	0.025	0.206	0.028	0.087	0.018	0.297	0.030	0.297	0.034	0.360	0.027
Less Competitive, Noncompetitive, Special, or No Barron's Available	0.562	0.057	0.177	0.035	0.146	0.037	0.181	0.037	0.126	0.029	0.437	0.046	0.166	0.028	0.205	0.038

Note. Prob. = Predicted probability, based on regression estimates presented in Table S5.
Source. U.S. Department of Education, National Center for Education Statistics. Education Longitudinal Study of 2002 (ELS:2002).