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Do They Stay or Do They Go? The Switching Decisions of Individuals Who Enter Gender Atypical College Majors

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Abstract

Drawing on prior theoretical and empirical research on gender segregation within educational fields as well as occupations, we examine the pathways of college students who at least initially embark on a gender-atypical path. Specifically, we explore whether women who enter fields that are male-dominated are more likely to switch fields than their female peers who have chosen other fields, as well as whether men who enter female-dominated majors are more likely to subsequently switch fields than their male peers who have chosen a more normative field. We utilize a sample of 3702 students from a nationally representative dataset on U.S. undergraduates, the Beginning Postsecondary Students Longitudinal Study (BPS 2004/09). Logistic regression models examine the likelihood that students switch majors, controlling for students' social and academic background. Results reveal different patterns for men and women. Men who enter a female-dominated major are significantly more likely to switch majors than their male peers in other majors. By contrast, women in male-dominated fields are not more likely to switch fields compared to their female peers in other fields. The results are robust to supplementary analyses that include alternative specifications of the independent and dependent variables. The implications of our findings for the maintenance of gendered occupational segregation are discussed.

Keywords

occupational segregation; academic specialization; STEM; stereotyped attitudes; college students

Although women in the United States now attend college at higher rates than men, gender inequality remains in higher education in the form of segregation across fields of study (DiPrete and Buchmann, 2013). For example, women are strongly over-represented among those majoring in education and health fields whereas men are much more likely than

women to enter some STEM (Science, Technology, Engineering, and Math) fields (Chen, 2013; England, 2010; England and Li, 2006; Mann and DiPrete, 2013). Gender scholars have attributed such patterns to strongly held cultural beliefs that men and women possess some interests and skills that are fundamentally different so that particular fields of study and related occupations are considered highly suited for one gender but not the other (England, 2010; Ridgeway and Correll, 2004). Such gender essentialist beliefs undergird gender stereotypes about women's and girls' inferior mathematical skills that, for instance, supposedly make them less suited for fields like engineering (Correll, 2004; Gunderson, Ramirez, Levine, and Beilock, 2012; Lane, Goh, and Driver-Linn, 2012). Similarly, beliefs about men's and boys' relative lack of nurturing ability underlie the socialization processes that discourage young men from expressing an interest in caregiving or other-oriented behavior often associated with fields such as nursing (Lueptow, Garovich-Szabo, and Lueptow, 2001; Schrock and Schwalbe, 2009). Thus, cultural beliefs about gender contribute to educational and ultimately occupational segregation by discouraging multitudes of young men and women from even considering, let alone choosing, to enter certain fields of study (Correll, 2004; DiDonato and Strough, 2013; Eccles, 2007).

But what about those young men and women who make decisions at odds with prevailing gender scripts by entering nontraditional fields in college? To what extent are they dissuaded from persistence in the major that they have chosen? In order to successfully disrupt gender segregation, we need a clear understanding of whether and when those individuals who intend to follow non-normative paths are deterred from doing so (Ridgeway, 2011). Examining non-normative choices in college is particularly important because college represents a setting where gender norms are particularly salient, and the choices individuals make about their college major have strong implications for their subsequent occupations (Eccles, 2007; Xie and Shauman, 2003). Those individuals who enter fields dominated by the other gender in college have the power to decrease educational and occupational segregation only if they remain on their chosen path during college. Thus, our study focuses on a nationally representative sample of U.S. college students to determine whether or not choices to pursue gender-atypical majors are largely corrected during the college years, such that women who choose male-dominated fields of study are more likely to switch fields than their female peers in other majors. Likewise we explore whether a similar pattern exists among men, such that men who enter female-dominated majors are more likely to subsequently switch fields compared to their male peers who have chosen fields that are not atypical. By addressing these questions, our study contributes new knowledge about the extent to which college is a critical place and time for discouraging the choices of young men or young women who attempt to defy norms regarding gender-appropriate fields.

In focusing on this critical issue, our study moves beyond the limitations of previous research. Specifically, a primary focus of extant research on those who enter nontraditional majors is on women in STEM majors, typically comparing women in these fields to men in the same fields (Diekmann, Weisgram, and Belanger, 2015; Rieggle-Crumb, King, Grodsky, and Muller, 2012; Seymour and Hewitt, 1997; Wang and Degol, 2013; Xie and Shauman, 2003). Several recent national studies provide promising empirical evidence that women in many STEM fields now persist towards degrees at the same rate as men (Chen, 2013; Xie and Shauman, 2003). However, this news does not answer the question of whether women in

such male-dominated fields have higher switching rates than women in other fields. If in fact the latter is true, this finding would suggest that women in these gender-atypical fields still face strong deterrents to attaining their desired degree not encountered by their female peers who have chosen socially safer majors that do not transgress gender norms. This within-gender comparison is a primary focus of our paper.

Additionally, the pathways of men who enter female-dominated undergraduate fields in college remain mostly unexamined in the research literature, which is problematic because the choices of men are as critical as those of women for upholding (or dismantling) the structure of gender segregation (England, 2010; Hardie, 2015). Although there is a small but growing body of research exploring men's experiences and persistence within female-dominated occupations (for example, see recent studies by Cottingham, Erickson, and Diefendorff, 2013; Ko, Kotrba, and Roebuck, 2015; Shen-Miller and Smiler, 2015), research on men's persistence during the undergraduate preparatory stages for such occupations is scarce. Our paper addresses this important issue and, as such, provides new evidence regarding the extent to which college is a critical point of deterrence for the pursuit of gender-atypical fields for men. Therefore, our study improves upon the limitations of past research by examining both women's and men's persistence in postsecondary majors where they represent the minority gender, as well as considering within-gender comparisons, thus providing a more complete picture of gender inequality in U.S. higher education.

Drawing on prior theoretical and empirical research conducted on gender inequality in education as well as occupations (Kmec, McDonald, and Trimble, 2010; Williams, 1992), we expect that although men and women who choose gender-atypical majors have already had to successfully navigate many obstacles to their non-normative choices to get this far, they are still subject to the consequences of prevailing cultural beliefs about appropriate roles for men and women, and therefore face deterrents that make them more likely than their same-gender peers in more normative majors to decide to switch fields (Eccles, 2007; Ridgeway, 2001). In the following sections, we first discuss how theories of chilly climate and stereotype threat predict that women in male-dominated fields will have strong reasons to switch majors (Good, Rattan, and Dweck, 2012; Morris and Daniel, 2008), and then we turn to discuss how theories of gender devaluation predict that men in female-dominated fields also face strong obstacles that make switching a likely outcome (England, 2010). Thus we anticipate that both men and women whose choice of college major transgresses gender norms about what is appropriate are more likely to switch fields than their same-gender peers in other majors, but for different reasons.

Our empirical analysis utilizes a nationally representative dataset with a recent cohort of U.S. college students, the Beginning Postsecondary Students Longitudinal Study (Wine, Janson, and Wheelless, 2011), along with logistic regression to examine students' switching decisions. Our analyses include key controls for students' social and academic backgrounds because, as we discuss later, such factors could confound the relationship between the choice of an atypical major and subsequent decisions to switch or stay (Davis and Greenstein, 2009). To further ensure the robustness of our results, we also consider alternative specifications of both our key independent and dependent variables. Through a rigorous quantitative focus on both women and men who have initially chosen to enter a field where

they are clearly the gender minority, our study offers empirical evidence that contributes to our understanding of the maintenance of gender segregation.

Deterrents to Women's Persistence

Perhaps the most prominent explanation for why women would be likely to leave a field where they are the gender minority focuses on the idea of a chilly climate. This term was originally coined by Sandler and Hall (1982) to describe how classrooms could be uncomfortable and discouraging places for women because of differential expectations and treatment from faculty and peers in educational settings where they are highly visible as the gender minority, such as within STEM college classrooms. Prevailing cultural beliefs about women not being as well-suited to succeed in math-related fields because of their innately inferior ability or lack of competitive drive can result in a climate that is chilly because of overt and intentional acts, such as disparaging comments made about women's intellectual abilities, or less overt but nonetheless discriminatory behaviors, such as minimal effort made to include women in discussions or related class activities (Eccles, 2007; Morris and Daniel, 2008). Typically utilizing samples of college students at single universities, both quantitative and qualitative studies provide evidence of negative treatment of female students in many STEM fields (compared to male students) by faculty, as well as by their male peers, that is subsequently linked to women's lower confidence in performance or belonging (Ecklund, Lincoln, and Tansey, 2012; Heyman, Martyna, and Bhatia, 2002; Seymour and Hewitt, 1997; Starobin and Laanan, 2008). Thus there is reason to expect that women in these male-dominated fields must confront a negative classroom climate that their female peers in other fields do not have to face, thereby suggesting that women in the former group, in their search for a more hospitable and supportive learning environment, would be more likely to switch majors than those in the latter.

An additional yet related factor that might prompt women to switch out of gender-atypical fields at high rates is offered by the theory of stereotype threat (Good et al., 2012). Even if a classroom is neither hostile nor alienating, its composition or normative climate may nevertheless prime gender stereotypes about men's and women's natural abilities and predilections (Good, Aronson, and Harder, 2007; McGlone and Pfeister 2007; Spencer, Steele, and Quinn, 1999). Given the prevalence and persistence of stereotypes of women's inferior ability in math and related fields, found even among scientists at elite universities (Ecklund et al., 2012), it is likely that women in male-dominated STEM fields are either consciously or subconsciously concerned with fulfilling stereotypes of lower performance (Correll, 2004; Good et al., 2007). Stereotype threat would not necessarily result in women earning lower grades than men in such fields, and indeed there is evidence that they have comparable grades (Alon and Gelbgiser, 2011), but rather this threat could impact other important outcomes. For example, a recent study of undergraduates majoring in STEM fields found that exposure to gender-stereotypic cues led to women's lower self-efficacy and identification with STEM (Stout, Dasgupta, Hunsinger, and McManus, 2011). Similarly a study of college students at a highly selective university found that exposure to gender/STEM stereotypes decreased women's sense of belonging in math, which the authors then linked to a lower desire to pursue math in the future (Good et al., 2012). Although the literature on stereotype threat is often experimental, with cues specifically manipulated by

researchers, there is ample evidence that women who enter such male-dominated fields are very likely to be exposed to gender stereotypes that decrease their desire to persist (Diekmann et al., 2015; Shapiro and Williams, 2012), which could plausibly result in higher switching rates than those of women in other fields.

Deterrents to Men's Persistence

Whereas chilly climate and stereotype threat theories suggest that women in male-dominated majors face particular obstacles not confronted by their female peers in more gender normative majors, and subsequently may have comparatively higher switching rates, neither of these theories is likely to apply to men. Specifically, men are likely to experience a positive difference in female-dominated environments (Taylor, 2010; Wingfield and Myles, 2014). Both theoretical and empirical research supports the idea that men take their gender advantage with them when they enter female-dominated occupations, translating it into higher pay and other positive outcomes such as increased attention and support (Budig, 2002; Cognard-Black, 2004; Cottingham et al., 2013; Snyder and Green, 2008). The same is likely true in female-dominated majors; for example, male education majors may be considered desirable by classmates and faculty who feel that the legitimacy of their field is actually increased by the presence of men and who view the potentially different male perspective as something enriching in a context that values both diversity and community (Barnes, Bull, Campbell, and Perry, 2001).

Yet there are strong reasons to expect that men in female-dominated majors must confront deterrents to persistence, not faced by their male peers in other fields, as a consequence of cultural beliefs about men's comparatively higher social status (Ridgeway, 2011). Specifically, theories of gender devaluation suggest that men who have chosen female-dominated fields are stigmatized because (a) the sphere they are entering is relatively devalued and linked to lower future income, (b) they have other high-status options, and (c) they appear to be rejecting the generally higher social status attributed to men and boys (England, 2010; England and Li, 2006; Ridgeway and Correll, 2004). Evidence from research on occupations suggests that if a field is identified with women, men working there are likely to experience substantial discrimination by those outside the field (Heilman and Wallen, 2010; Lincoln, 2010). Williams (1992, p. 261) argues that the "most compelling evidence of discrimination against men in female-dominated professions is related to their dealings with the public," who view them as wimpy, asexual, feminine, or passive. These findings have clear implications for college men who have chosen a female-dominated major because they are violating dominant discourses of gender at a point in the life course where pressures to conform to hegemonic masculinity may be particularly intense (Connell and Messerschmidt, 2005; Peralta, 2007). Thus men in female-dominated majors are likely subject to comparatively greater social sanctions from peers, friends, and adults than their male peers in other fields. Even in the absence of direct sanctions, the persistence of men in predominantly female fields may be deterred by anxiety about what others think about their masculine status (Bosson, Taylor, and Prewitt-Freilino, 2006; Vandello and Bosson, 2013).

Finally, theories of gender devaluation point to the lower incomes associated with highly feminized occupations, even net of the education and skills required (England et al., 2007).

To the extent that female-dominated majors lead to lower-earning occupations (Blau and Kahn, 2006), male college students in these fields may become increasingly concerned with the financial implications of their nontraditional choice (Hardie, 2015). The salience of prevailing cultural beliefs regarding men's primary adult role as a money-earner and breadwinner are perhaps heightened as they move closer to the point of occupational entry and are reminded of this normative gender role by parents and others, thereby encouraging them to abandon their initial choice (Wray-Lake, Syvertsen, Briddell, Osgood, and Flanagan, 2011).

The Present Study

In sum, theories of chilly climate and stereotype threat suggest that women in male-dominated fields confront distinct obstacles not faced by their female peers in more typical fields and subsequently will have comparatively higher switching rates. Additionally, theories of gender devaluation suggest that compared to their male peers who enter other fields, men in female-dominated fields face particularly strong deterrents from others to persist in their chosen field. Therefore, it is likely that both men and women in atypical fields dominated by the other gender are more likely to switch fields compared to their same-gender peers in other fields—but for different reasons. In summary, we will test two hypotheses: (a) men who enter female-dominated majors will be more likely to switch fields than their male peers in other majors (Hypothesis 1) and (b) women who enter male-dominated majors will be more likely to switch fields than their female peers in other majors (Hypothesis 2).

To test these hypotheses regarding switching decisions, we utilized logistic regression analyses of a nationally representative sample of U.S. college students. To ensure the robustness of our results, we considered several aspects of students' social and academic background that have previously been identified as influencing the gender composition of students' initial major and/or their decisions to switch majors. First, some prior research finds that higher social class families tend to promote gender egalitarianism, and therefore they may raise children who are more inclined to pursue gender-atypical majors (Davis and Greenstein, 2009; Hardie, 2015). Students from higher social class families are also likely to have greater access to information before they enter college regarding the details and requirements of different fields of study, which could potentially lead to more certainty in the choice of a major and less overall likelihood of switching fields (Schneider and Stevenson, 1999). For these reasons, we include measures of parents' education and family incomes as proxies for social class in our models.

Additionally, prior research offers evidence that the endorsement of traditional gender stereotypes and, correspondingly, decisions that transgress traditional gender norms may vary by race/ethnicity (Davis and Greenstein, 2009). For example, some studies have found that Black women are more likely than their White peers to express interest in male-dominated fields such as engineering, whereas Hispanic women are less likely (Hanson, 1996, 2009). Still other recent research indicates that Black men may be more inclined than their White peers towards traditionally female occupations (Baird, 2012; Hardie, 2015). Therefore our models include controls for students' race/ethnicity.

Finally, prior research finds that students who score higher on standardized tests and earn higher grades in high school are more likely to enter male-dominated fields, such as engineering, which are often viewed as more academically competitive (King, 2015; Xie and Shauman, 2003). Furthermore, students who earn poor grades at the beginning of college may be more likely to switch fields in an effort to find a major that might better suits their skills (Cabrera, Nora, and Castaneda, 1993; King, 2015). Thus our analyses include controls for measures of academic performance in both high school and college.

In the logistic regression models that follow, we test our hypotheses by first examining the baseline association between the gender composition of students' major and their decision to switch majors. In a second model, we add controls for measures of race/ethnicity, social class, and academic performance. We conduct models separately for men and women to compare switching rates for those in gender-atypical fields to their peers of the same gender who have chosen fields that are not atypical. We also report the results of several supplementary analyses intended to further test the sensitivity of our results.

Method

Data

We used data from the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS: 04/09), which is the most contemporaneous known dataset to include information on U.S. students' academic pathways in college. Designed by the National Center of Education Statistics (NCES) for the U.S. Department of Education, BPS followed a nationally-representative sample of first-time postsecondary students in 2003–2004. (For more on the multi-stage sampling design of BPS, see Wine et al., 2011). Respondents were interviewed at the end of their first year in college in 2004 (when respondents were ages 17–23), with follow up surveys conducted in 2006 and 2009. Our analytic sample included 3,702 students who completed a degree at a four-year, not for profit, degree-granting institution. (Later we discuss the results of parallel analyses that include those who left college without a degree.). All analyses were weighted with the appropriate measures provided by BPS to ensure national representativeness by accounting for the sampling design, unequal probability of selection into the sample, and unequal probability of attrition from the sample (Wine et al., 2011). A few variables had small percentages of missing data (6.1% for SAT; 6.8% for high school GPA; 8.6% for college GPA), which we subsequently imputed using multiple imputation.

Gender Composition of Fields

To measure gender composition of students' chosen major, we used the following designation: for female students, a gender atypical major is defined as one that is male-dominated such that the composition is equal to or greater than 70% male. Likewise for male students, a gender atypical major is one that is equal to or greater than 70% female. Our coding decision and rationale followed the lead of Frome, Alfeld, Eccles, and Barber (2006), namely that a field that is 70% or greater of one gender is likely to be strongly identified with that gender in the public eye; additionally, within the college classroom, a gender ratio of 7:10 is likely to stand out visibly. Because some recent research has included a looser

categorization of 60% or greater of one gender (Alon and Gelbgeiser, 2011) whereas other research has used a more restrictive threshold of 80% or greater (Budig, 2002), we ran models using these alternative categorizations and found that the results were very consistent with those presented here. In exploratory analyses we also ran models using a linear version of percent female in the field, but model fit indicators strongly preferred the categorical indicators included in the present paper.

To ensure that our categorizations of fields captured the current composition of their major as experienced by our BPS students, as well as the societal level in terms of the history of segregation within fields, we utilized several different sources. We began with the variable from the first wave of BPS data that asked students to report their college major. The survey included 46 possible categories that we collapsed into 28 categories, due to either small cell size or to group students from very similar categories. We aggregated students' self-reported major to calculate the percentage of female and male students in each of 28 initial fields of study (see Appendix).

As a verification check, we consulted data from The American Freshman (Sax, Astin, Korn, and Mahoney, 2003), which also provides data on a nationally representative sample of college students in the United States collected at the same time as our BPS sample. The gender percentages for each major were highly comparable to BPS and in all cases fell into the same gender composition category. Finally, we wanted to ensure that there was not a discrepancy between our coding of majors using BPS (or AF) which captured the likely composition of the courses students take within their major and how the fields are plausibly perceived at a societal level due to the composition of previous generations of degree earners. Therefore we examined published reports using the nationally comprehensive Integrated Postsecondary Education Data System (IPEDS) on the percent of baccalaureate degree earners in each field that were women, beginning with 1986 (the modal year of birth for the BPS cohort) and continuing through each year up to 2003 when our sample entered college (Snyder and Dillow, 2013). Consistent with prior research on the stalling of desegregation since the mid-1980s (England, 2010; England and Li, 2006; Mann and DiPrete, 2013), we found that the gender composition of fields is quite stagnant throughout the lifetimes of the cohort in our study. Consequently, we found that our categorization of male- and female-dominated fields would be the same if instead we used IPEDS data.

Female-dominated fields included English, education, psychology, public administration and social service, foreign language, health, sociology and other social sciences, and family sciences (see Appendix). Male-dominated fields included engineering, computer science, and economics. Whereas the first two majors clearly fall within the typical definition of STEM fields and are commonly invoked in the literature on gender segregation (Mann and DiPrete, 2013; Xie and Shauman, 2003), economics also has a long history of male advantage, shares a very strong emphasis on mathematical modeling with the other fields in the category, and is included in the National Science Foundation's definition of STEM fields (Dynan and Rouse, 1997; National Science Board, 2014). To ensure that our results did not differ if we only retained the more typical STEM domains of engineering and computer science, we ran additional analyses omitting economics from the male-dominated category,

and we found that this did not change any of our analytic results. We note here that whereas 14% of men chose a gender-atypical field, only 4% of women did.

Control Variables

We included measures of students' social and academic background to better ensure that the relationship we observe between the gender composition of the field and men and women's switching patterns is robust and not confounded by such factors. Parent education level was reported by the student and measured as the higher education of either parent among the following four categories: high school diploma or less; some college; bachelor's degree; master's degree or above. We also included measures of family income (logged). The average parent education level of our sample fell between some college and a college degree, and the average family income (not logged) was approximately \$54,000 (with a range from \$0 to \$498,820). Race/ethnicity is reported by students and measured as a series of dummy variables for Black (10% of the sample), Hispanic (7%), Asian (6%), and Other (4%) compared to the reference category of non-Hispanic White (73%). These percentages are consistent with national patterns of college attendance reported elsewhere (Everett, Rogers, Hummer, and Krueger, 2011).

Academic performance was measured by four variables. From students' high school years, we included their official composite SAT score (math and verbal sections) that was collected by BPS from the Educational Testing Service (ETS), as well as students' self-reported cumulative grade point average (GPA), which was coded by BPS using the following scale: 1 (below .9 average on a 4 point scale), 2 (1.0 – 1.4 average), 3 (1.5 – 1.9 average), 4 (2.0 – 2.4 average), 5 (2.5 – 2.9 average), 6 (3.0 – 3.4 average), and 7 (3.5 – 4 average). Finally, we constructed students' GPA in their first two years of college based on information from their official university transcripts and utilized a typical four point scale where 0 = F, 1 = D, 2 = C, 3 = B, and 4 = A. . On average, students had a SAT score of well over 1000, reported a cumulative high school average between a B and an A-, and had a college GPA a little above a 3.0 in their first two years. We note that male compared to female students had a small advantage on SAT score ($M_{\text{women}} = 1053$, $SD = 175.76$; $M_{\text{men}} = 1097$, $SD = 179.16$), $t(3700) = 7.89$, $p < .001$, $\eta^2 = 0.01$, whereas women had comparatively higher grades in high school ($M_{\text{women}} = 6.43$, $SD = 0.83$; $M_{\text{men}} = 6.25$, $SD = 0.88$), $t(3515) = -4.84$, $p < .001$, $\eta^2 = 0.01$, as well as in college ($M_{\text{women}} = 3.17$, $SD = 0.51$; $M_{\text{men}} = 2.99$, $SD = 0.52$), $t(3700) = -8.48$, $p < .001$, $\eta^2 = .03$. These gender patterns are also consistent with prior research (DiPrete and Buchmann, 2013).

Switch versus Stay

Our dependent variable was a dichotomous measure that distinguishes whether students switch to a different college major (coded 1) or whether they stay in their major through college and complete a degree in that major (coded 0). This variable was constructed by using information about students' initial choice of major from the baseline survey and comparing it to the major students report completing their degree in from later follow-up surveys (which we also verified with students' postsecondary transcripts). For our analytic sample, on average, across all fields of study, 44% of students switched from their original majors, although men's average rate of 42% was somewhat lower than women's (46%),

$\chi^2(1) = 3.25, p = .071$. As we will discuss later, we also conducted supplementary analyses using a dependent variable that included a third category to capture those students who left college without a degree.

Results

Preliminary Analyses

Table 1 displays the descriptive association (separately for men and women) between our key independent variable, gender composition of initial field, and our dependent measure capturing switching decisions. Beginning with men, we note that that 63% of those who chose to enter gender-atypical majors subsequently switched majors compared to only 39% of men who began college in majors that are not gender-atypical, $\chi^2(1) = 44.84, p < .0001$. For women on the other hand, their switching rates were lower (although not statistically different) in gender-atypical (41%) than in other field types (46%), $\chi^2(1) = 0.61, p = .44$. The logistic regression that follows will further examine these descriptive patterns.

Additional descriptive analyses shown in Table 1 include percentages and means on our dependent variable for all of the control variables included in the subsequent multivariate analyses. We found significant differences in overall switching patterns by race/ethnicity for both genders. Among men, compared to the reference category of non-Hispanic White students, Black students had statistically significantly higher switching rates. Among women, Hispanic students had significantly higher switching rates than non-Hispanic White students. Regarding family social class background, among male students only, switchers came from families with significantly lower levels of education and income. Among female students, those who stayed and completed their initial major had statistically significantly higher mean SAT scores than those who switched. There was no difference between switchers and stayers in cumulative high school GPA for both genders. Among both genders, those who switched from their initial major had significantly lower college grades than those who stayed.

Finally, correlations shown in Table 2 show the association between our key independent variable of gender composition of major and all control variables; these revealed that White female students were statistically significantly less likely to choose male-dominated (gender-atypical) fields than women from other backgrounds. Male students with families that have more education and more income were significantly less likely to declare a female-dominated major; however for women there was a positive and statistically significant correlation between parent education and entering a male-dominated major. Male students with higher SAT scores were significantly less likely to enter gender-atypical fields, whereas women with higher SAT scores were actually more likely to enter a field dominated by the other gender. Thus descriptive analyses offer evidence that some aspects of students' background and academic performance were associated with both the gender-typing of major they chose as well as their switching behavior. Our multivariate analyses will subsequently assess whether the association between gender composition of individual's chosen major and switching patterns remains net of all of these control factors.

Hypothesis Testing

Because our dependent variable is dichotomous, we utilized logistic regression analyses. An odds ratio higher than one would indicate that students were more likely to switch than to stay in the major. We estimated the models separately for men and women. We focused on comparisons between gender-atypical fields (those composed of 70% or more of the other gender) versus other fields. We calculated variance inflation factors (VIFs) and confirmed that multicollinearity was not a problem (all VIFs were below 2.0). All models were calculated using robust standard errors that took into account the clustering of students within postsecondary institutions.

Hypothesis 1: Male students—To test Hypothesis 1, which predicted that men who enter female-dominated fields are more likely to switch fields than their peers in other majors, we began with a baseline model that included only the gender composition of the field for predicting the decision to switch versus stay. This procedure essentially replicated the descriptive results shown in Table 1, yet tested for statistical significance utilizing standard errors that are calculated to account for the clustered nature of the data. It expresses the results in terms of odds ratios. We found that compared to their male peers in other fields, men in female-dominated, gender-atypical fields were over two and a half times (odds ratio = 2.614) more likely to switch rather than stay in their major. Model 2 added all of the control variables to capture students' social background and academic performance. The odds ratio indicating men's greater likelihood of switching from a female-dominated major changed little and remained significant in this full model (OR = 2.628). Therefore our results clearly support our first hypothesis. In addition, Black male students were more likely to switch majors compared to non-Hispanic White youth, and men with higher college grades were less likely to switch majors (see Table 3).

Hypothesis 2: Female students—Table 3 also displays results of analyses for female students to address our second hypothesis that women who enter male-dominated majors are significantly more likely to switch fields than their female peers in other majors. Beginning with Model 1, we see a different story than we observed for male students. Specifically the odds ratios comparing the likelihood that women in male-dominated, gender atypical fields switch versus stay in their initial major are close to 1:1 and non-significant. This pattern did not change with the addition of measures of social background and academic performance (except for college grades wherein women, like men, with higher college grades were less likely to switch fields). Therefore, we do not find support for our second hypothesis because women's decision to switch was not related to whether their major is dominated by men. Additionally, interaction effects between gender composition of the field and individuals' gender in pooled models including both men and women confirmed that that the patterns were statistically different, such that only men's switching decisions were significantly related to being in a gender-atypical field.

Supplementary Findings

We conducted several supplementary analyses to ensure that the associations observed between gender composition and switching decisions were not sensitive to alternative specifications of our analytic models. First, although it is typical for research examining

decisions to switch majors in college to limit the sample to those who complete degrees (Griffith, 2010; Seymour and Hewitt, 1997), we incorporated students who left college without a degree into our analytic sample and conducted multinomial logistic regression analyses where leavers were included as a third category of the dependent variable. Results were consistent with the more parsimonious models presented here. Compared to male students in other fields, men in gender-atypical majors were significantly more likely to switch fields compared to either alternative (staying in the same major and completing the degree as well as leaving college altogether), whereas there were no differences in these three postsecondary paths by gender composition of major for women. (All results discussed in this section are available upon request to the authors.) Because our hypotheses were not explicitly designed to predict decisions to leave college and because our substantive results regarding gendered decisions to switch majors were not changed, we chose to present the more simplified comparisons of switch versus stay as shown in Table 3.

Second, we ran models where the variable for gender composition of field was further broken down to distinguish gender-atypical fields from those that are gender-balanced and those that are dominated by the same gender. Results were consistent with our more streamlined dichotomous variable; specifically male students in gender-atypical fields were significantly more likely to switch fields than their male peers in both gender-balanced and male-dominated fields, whereas there were no statistically significant differences in switching patterns among women in each of the three field types (male-dominated, female-dominated, and gender-balanced). We also note that altering the definition such that students were only defined as switching if they moved from one of these three field types to another also produced very similar results to those reported here. With regard to the destinations of those who switched majors, the average percent female of the new destination major of male students who left female-dominated majors was 57%, which is the average percent female across all fields in the sample (as well as the average gender composition of college campuses nationwide; Aud et al., 2013). Therefore, a switch for male students from a gender-atypical field represented a switch from being the exception to the rule to being well within the norm.

Finally, we conducted follow-up analyses to assess whether the association between gender composition of initial major and subsequent decisions to switch majors for male and female students varied according to students' background because gender roles and cultural definitions of masculinity and femininity are not necessarily constant across either social class or racial/ethnic backgrounds (Andersen, 2005; Ong, 2005). We thus ran models exploring the interaction of the gender composition of the initial major with students' race/ethnicity, parent education, and family income. None of these interactions was statistically significant, and their inclusion did not improve model fit.

Discussion

Building on prior theoretical and empirical research on gender segregation in education as well as in occupations, our study examined the pathways of men and women who embark on a nontraditional path by pursuing a gender-atypical major (Kmec et al., 2010; Ridgeway, 2011; Williams, 1992), with the goal of empirically examining whether they are less likely

to successfully attain a degree in their chosen fields than their peers who make more gender-normative choices. By examining within-gender differences in switching behaviors among both men and women who chose a gender-atypical field in college, our study contributes new evidence about whether non-normative choices are likely to be changed during college.

Specifically, based on theories of gender devaluation (England, 2010), we hypothesized that men in female-dominated majors would be more likely to switch fields than their male peers who chose fields that were not atypical. Additionally, drawing on theories of chilly climate and stereotype threat (Good et al., 2012; Morris and Daniel, 2008), we hypothesized that women who chose male-dominated majors would be more likely to switch fields than their female peers in more normative fields. Our analyses of nationally representative data clearly offer support for our first hypothesis because we found that men were significantly more likely to switch from a female-dominated (or gender-atypical) major. Yet we find no support for our second hypothesis because women in male-dominated majors were no more likely to switch fields than their female peers in other majors. Importantly our results are robust to the inclusion of control variables for students' social and academic background (as well as the supplementary analyses discussed above).

Our empirical results about the lower relative persistence of men in female-dominated undergraduate majors compared to their male peers in other majors provide important new evidence suggesting that college is a critical place and time where young men's choices to pursue atypical fields of study, and by extension their likely interest in entering atypical occupations after college, are corrected or policed. As mentioned before, although our data do not allow us to test the actual mechanisms behind switching decisions, this pattern is consistent with theories of gender devaluation. Specifically, men who initially choose female-dominated majors have violated status expectations that privilege men by picking a field that is strongly identified with women (Hardie, 2015; Lincoln, 2010; Snyder and Green, 2008). Such men therefore appear to be relinquishing their higher social status by pursuing a low-status and low-paying field (England, 2010; Ridgeway, 2011). Drawing on findings from research on occupational segregation, it is likely that men who enter female-dominated majors must face negative social sanctions from their peers, particularly other men (Schrock and Schwalbe, 2009; Williams, 1992), and that adult mentors and family members may encourage them to switch to fields with more status and income by telling them that they can do better (Kmec et al., 2010). As male students move closer to the time when they will begin assuming adult responsibilities, the normative pressures of adult masculinity likely act on their decision-making process, prompting them to give more weight to the potential disadvantages of their initial selection and to prioritize the corresponding advantages (including financial ones) of making a more gender-typical choice (Hardie, 2015). Furthermore the anticipation of sanctions may be sufficient on its own to lead to anxiety and stress that prompts a switching decision (Bosson et al., 2006; Vandello and Bosson, 2013).

But what about women? As noted earlier, the bulk of prior research on gender differences in switching majors concentrates on comparing women in STEM fields to men in STEM fields (Diekman et al., 2015; Mann and DiPrete, 2013; Riegle-Crumb et al., 2012; Xie and Shauman, 2003). Yet our study was specifically focused on a related but distinct issue not

addressed in this prior literature, namely whether women in male-dominated fields are more likely than their female peers in more normative majors to leave their chosen field. Whereas theories of chilly climate and stereotype threat (Good et al., 2012; Morris and Daniel, 2008) outline the deterrents that women in male-dominated majors likely encounter—factors that their female peers in other fields do not have to face, our empirical results reveal that these atypical women are nevertheless no more likely to change majors than their female peers in any other field of study.

What can explain this pattern for women? Perhaps because the jobs linked to male-dominated majors have relatively higher labor market returns (Blau and Kahn, 2006), women in these majors have an additional incentive to stay even in the midst of the many obstacles discussed here (Ridgeway and Correll, 2004). Social expectations regarding the desirability and/or necessity of women to act as wage-earners in support of their families have coincided with an increasing emphasis on extrinsic returns among recent cohorts of young women (Buchmann and DiPrete, 2006). Therefore, it is becoming more socially acceptable for women to prioritize the kinds of advantages typically attached to male-dominated fields without necessarily violating norms of femininity (DiDonato and Strough, 2013). In fact their choice to pursue and persist within a major that is linked to occupations with more status and earnings may be met with respect and encouragement from those outside their field (England, 2010), potentially providing a buffer against the obstacles they face within the field.

Stepping back, our results indicate that whereas men's choices to pursue gender atypical fields of study are corrected or thwarted in college, women's are not. From the perspective of increasing the presence of women in male-dominated occupations such as engineering and computing, this could be seen as a positive sign. Yet we note that a smaller percentage of women enter male-dominated college majors than the reverse, perhaps indicating that the processes that deter women from considering gender-atypical fields occur more powerfully at earlier ages (Eccles, 2007; Gunderson et al., 2012). Additionally, the potentially good news that women have comparable persistence patterns in male-dominated college majors as in other types of majors is further tempered by national evidence of women's high exit rates from many STEM-related occupations (Glass, Sassler, and Levitte, and Michelsmore, 2013; Xie and Shauman, 2003). Therefore it is clear that there remain many obstacles to disrupting gender segregation.

Limitations and Future Research Directions

As with any study, ours has limitations. Although our U.S. sample is nationally representative, the sample size of men and women in gender-atypical majors is nevertheless small. We also lack data that would allow us to more definitively understand why men and women make the choices they do. For example, we have no measure of certitude or how committed people are to their initially chosen field of study, nor reports of the kinds of obstacles they face both within and outside their major. Neither does our dataset include measures of gender identity or endorsement of gender egalitarian views that could be helpful in predicting individuals who are more or less likely to stay the course (Hardie, 2015). Future research could address such shortcomings, either in the form of more extensive

survey data from large samples purposively designed to examine the experiences of men and women in non-typical fields, as well as qualitative studies focused on this topic. Additionally, more in-depth work is needed to examine the potentially unique cultures within specific educational or occupational fields, or even across different college contexts, to better understand how gender inequality is constructed and maintained (Cech, 2013).

Practice Implications

Our results suggest that the factors that could work to dismantle gender segregation of majors, and likely segregation within occupations, are likely different for men than for women. We concur with scholars who argue that a shift in cultural definitions of masculinity will need to occur before men in female-dominated fields are accepted by those outside the field (Heilman and Wallen, 2010; Vandello and Bosson, 2013; Williams, 1992). Although this shift is likely slow in coming, nevertheless identifying college as a critical point of deflection in men's pursuit of atypical fields provides scholars and activists with more information about where and how to most effectively intervene. Specifically, it is possible that additional encouragement from those within the field of study might serve to buffer them from the deterrents outside the classroom. Perhaps the persistence of men in female-dominated majors would benefit from building alternative networks of support within college. For women in male-dominated majors, however, aiming efforts at increasing persistence in college majors does not appear to be a critical target. Rather, focusing on understanding the psychological, social, and interactional processes that function early in the life course to deter females from ever considering or entering such fields, and subsequently designing effective programs and interventions at earlier stages, is likely to be most effective at promoting women's presence in nontraditional fields (Cheryan, 2012).

Conclusion

Gender segregation in fields of study and related occupations severely constrains the life choices and chances of both women and men (Blau and Kahn, 2006; Charles and Bradley, 2002). Our study contributes to the prior literature on this important topic by highlighting that men's non-normative choices may be obstructed or deterred for different reasons, and at different times and places, than the choices of women. We must continue to investigate the experiences of both men and women who attempt to defy traditional gender scripts; in doing so, we will learn more about the maintenance of gender segregation and how best to disrupt it.

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Appendix: College Major Categorization and Proportion Female

Constructed Variable	Original Variables	Proportion Female	Proportion of Sample in Major
Engineering	Engineering	0.14	0.11
	Engineering technologies/technicians		
	Precision production		
	Transportation and materials moving		
Computer Science	Computer and information sciences	0.14	0.04
Economics	Economics	0.29	0.01
Philosophy and Religious Studies	Philosophy and religious studies	0.30	0.01
Natural Resources and Conversation	Natural resources and conservation	0.33	0.01
Personal and Culinary Services	Personal and culinary services	0.36	0.01
Criminal Justice	Criminal justice	0.4	0.03
Political Science	Political science and government	0.42	0.02
Physical Sciences	Physical sciences	0.45	0.01
Architecture	Architecture and related services	0.48	0.01
Business	Business, management, and marketing	0.51	0.17
Theology	Theology and religious vocations	0.54	0.01
History	History	0.54	0.01
Agriculture	Agriculture and related sciences	0.57	0.01
Mathematics and Statistics	Mathematics and statistics	0.59	0.01
Liberal Arts	Area, ethnic, and gender studies	0.64	0.02
	Liberal arts, sciences and humanities		
	Multi/interdisciplinary studies		
Biological Science	Biological and biomedical sciences	0.64	0.08
	Residency programs		
Visual and Performing Arts	Visual and performing arts	0.64	0.06
Communications	Communication and journalism	0.65	0.06
	Communications technologies/technicians		
English	English language and literature/letters	0.73	0.02
Education	Education	0.79	0.12
Psychology	Psychology	0.81	0.05
Public Admin. and Social Services	Public admin. and social services	0.81	0.01
Foreign Languages and Literatures	Foreign languages and literatures	0.82	0.01
Health	Health professions and related sciences	0.82	0.11
Sociology	Sociology	0.88	0.01
Social Sciences, other	Social sciences, other	0.87	0.01
Family Sciences	Family and consumer/human sciences	0.90	0.01

Source: Beginning Postsecondary Students Longitudinal Study 04/09

References

- Alon S, Gelbgiser D. The female advantage in college academic achievements and horizontal sex segregation. *Social Science Research*. 2011; 40(1):107–119.10.1016/j.ssresearch.2010.06.007
- Andersen ML. Thinking about women: A quarter century's view. *Gender & Society*. 2005; 19:437–455.10.1177/0891243205276756
- Aud, S.; Wilkinson-Flicker, S.; Kristapovich, P.; Rathbun, A.; Wang, X.; Zhang, J. The condition of education 2013. U.S. Department of Education, National Center for Education Statistics; Washington, DC: 2013. NCES 2013-037Retrieved from <http://nces.ed.gov/pubsearch>
- Baird CL. Going against the flow: A longitudinal study of the effects of cognitive skills and gender beliefs on occupational aspirations and outcomes. *Sociological Forum*. 2012; 27:986–1009.10.1111/j.1573-7861.2012.01365.x
- Barnes LLB, Bull KS, Campbell J, Perry KM. Effects of academic discipline and teaching goals in predicting grading beliefs among undergraduate teaching faculty. *Research in Higher Education*. 2001; 42(4):455–467.10.1023/A:1011006909774
- Blau FD, Kahn LM. The U.S. gender pay gap in the 1990s: Slowing convergence. *Industrial and Labor Relations Review*. 2006; 60(1):45–66.10.1177/001979390606000103
- Bosson JK, Taylor JN, Prewitt-Freilino JL. Gender role violations and identity misclassification: The roles of audience and actor variables. *Sex Roles*. 2006; 55:3–24.10.1007/s11199-006-9065-5
- Buchmann C, DiPrete TA. The growing female advantage in college completion: The role of family background and academic achievement. *American Sociological Review*. 2006; 71(4):515–541.10.1177/000312240607100401
- Budig MJ. Male advantage and the gender composition of jobs: Who rides the glass escalator? *Social Problems*. 2002; 49(2):258–277.10.1525/sp.2002.49.2.258
- Cabrera AE, Nora A, Castaneda MB. College persistence: Structural equation modeling test of an integrated model of student retention. *Journal of Higher Education*. 1993; 64(2):123–139.10.1037/a0026838
- Cech EA. Ideological wage inequalities? The technical/social dualism and the gender wage gap in engineering. *Social Forces*. 2013; 91(4):1147–1182.10.1093/sf/sot024
- Charles M, Bradley K. Equal but separate? A cross-national study of sex segregation in higher education. *American Sociological Review*. 2002; 67:573–599.10.2307/3088946
- Chen, X. STEM attrition: College students' paths into and out of STEM fields. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education; Washington, DC: 2013. NCES 2014-001Retrieved from <http://files.eric.ed.gov/fulltext/ED544470.pdf>
- Cheryan S. Understanding the paradox in math-related fields: Why do some gender gaps remain while others do not? *Sex Roles*. 2012; 66:184–190.10.1007/s11199-011-0060-z
- Cognard-Black AJ. Will they stay or will they go? Sex-atypical work among token men who teach. *The Sociological Quarterly*. 2004; 45:113–139.10.1111/j.1533-8525.2004.tb02400.x
- Connell RW, Messerschmidt JW. Hegemonic masculinity rethinking the concept. *Gender and Society*. 2005; 19(9):829–859.10.1177/0891243205278639
- Correll SJ. Constraints into preferences: Gender, status, and emerging career aspirations. *American Sociological Review*. 2004; 69:93–113.10.1177/000312240406900106
- Cottingham MD, Erickson RJ, Diefendorff JM. The effects of manager exclusion on nurse turnover intention and care quality. *Western Journal of Nursing Research*. 2013; 35(8):1–16.10.1177/0193945913483880
- Davis SN, Greenstein TN. Gender ideology: Components, predictors, and consequences. *Annual Review of Sociology*. 2009; 35:87–105.10.1146/annurev-soc-070308-115920
- DiDonato L, Strough J. Do college students' gender-typed attitudes about occupations predict their real-world decisions? *Sex Roles*. 2013; 68:536–549.10.1007/s11199-013-0275-2
- Diekmann AB, Weisgram ES, Belanger AL. New routes to recruiting and retaining women in STEM: Policy implications of a communal goal congruity perspective. *Social Issues and Policy Review*. 2015; 9(1):52–58.10.1111/sipr.12010

- DiPrete, T.; Buchmann, C. The rise of women: The female advantage in education and what it means for American schooling. New York, NY: Russell Sage Foundation; 2013.
- Dynan KE, Rouse CE. The underrepresentation of women in economics: A study of undergraduate economics students. *The Journal of Economic Education*. 1997; 28(4):350–368.10.1080/00220489709597939
- Eccles, JS. Where are all the women? Gender differences in participation in physical science and engineering. In: Ceci, SJ.; Williams, WM., editors. *Why aren't more women in science? Top researchers debate the evidence*. Washington, DC: American Psychological Association; 2007. p. 199-210.
- Ecklund EH, Lincoln AE, Tansey C. Gender segregation in elite academic science. *Gender and Society*. 2012; 26(5):693–717.10.1177/0891243212451904
- England P. The gender revolution: Uneven and stalled. *Gender and Society*. 2010; 24(2):149–166.10.1177/0891243210361475
- England P, Li S. Desegregation stalled: The changing gender composition of college majors, 1971–2002. *Gender and Society*. 2006; 20(5):657–677.10.1177/0891243206290753
- England P, Allison P, Li S, Mark N, Thompson J, Budig M, Sun H. Why are some academic fields tipping toward female? The sex composition of U.S. fields of doctoral degree receipt, 1971–2002. *Sociology of Education*. 2007; 80:23–42.10.1177/003804070708000102
- Everett BG, Rogers RG, Hummer RA, Krueger PM. Trends in educational attainment by race/ethnicity, nativity, and sex in the United States, 1989–2005. *Ethnic and Racial Studies*. 2011; 34(9):1543–1566.10.1080/01419870.2010.543139 [PubMed: 22649275]
- Frome PM, Alfeld CJ, Eccles JS, Barber BL. Why don't they want a male-dominated job? An investigation of young women who changed their occupational aspirations. *Educational Research and Evaluation*. 2006; 12(4):359–372.10.1080/13803610600765786
- Glass J, Sassler S, Levitte Y, Michelmores K. What's so special about STEM? A comparison of women's retention in STEM and professional occupations. *Social Forces*. 2013; 92(2):723–756.10.1093/sf/sot092
- Good C, Aronson J, Harder JA. Problems in the pipeline: Stereotype threat and women's achievement in high-level math courses. *Journal of Applied Developmental Psychology*. 2007; 29(1):17–28.10.1016/j.appdev.2007.10.004
- Good C, Rattan A, Dweck CS. Why do women opt out? Sense of belonging and women's representation in mathematics. *Journal of Personality and Social Psychology*. 2012; 102(4):700–717.10.1037/a0026659 [PubMed: 22288527]
- Griffith AL. Persistence of women and minorities in STEM field majors: Is it the school that matters? *Economics of Education Review*. 2010; 29(6):911–922.10.1016/j.econedurev.2010.06.010
- Gunderson EA, Ramirez G, Levine SC, Beilock SL. The role of parents and teachers in the development of gender-related math attitudes. *Sex Roles*. 2012; 66(3):153–166.10.1007/s11199-011-9996-2
- Hanson, S. *Lost talent: Women in the sciences*. Philadelphia, PA: Temple University Press; 1996.
- Hanson, S. *Swimming against the tide: African American girls and science education*. Philadelphia, PA: Temple University Press; 2009.
- Hardie JH. Women's work? Predictors of young men's aspirations for entering traditionally female-dominated occupations. *Sex Roles*. 2015; 72(7):349–362.10.1007/s11199-015-0449-1
- Heilman ME, Wallen AS. Wimpy and undeserving of respect: Penalties for men's gender-inconsistent success. *Journal of Experimental Social Psychology*. 2010; 46:664–667.10.1016/j.jesp.2010.01.008
- Heyman GD, Martyna B, Bhatia S. Gender and achievement-related beliefs among engineering students. *Journal of Women and Minorities in Science and Engineering*. 2002; 8:41–52.10.1615/JWomenMinorScienEng.v8.i1.30
- King B. Changing college majors: Is it more common among STEM students and do grades matter? *Journal of College Science Teaching*. 2015; 44(3):46–53.10.2505/4/jcst15_044_03_44
- Kmec JA, McDonald S, Trimble LB. Making gender fit and 'correcting' gender misfits sex segregated employment and the nonsearch process. *Gender and Society*. 2010; 24(2):213–236.10.1177/0891243209360531

- Ko I, Kotrba L, Roebuck A. Leaders as males?: The role of industry gender composition. *Sex Roles*. 2015; 72:7–8. 294–307.10.1007/s11199-015-0462-4
- Lane KA, Goh JX, Driver-Linn E. Implicit science stereotypes mediate the relationship between gender and academic participation. *Sex Roles*. 2012; 66(3):220–234.10.1007/s11199-011-0036-z
- Lincoln AE. The shifting supply of men and women to occupations: Feminization in veterinary education. *Social Forces*. 2010; 88(5):1969–1998.10.1353/sof.2010.0043
- Lueptow LB, Garovich-Szabo L, Lueptow MB. Social change and the persistence of sex typing: 1974–1997. *Social Forces*. 2001; 80:1–35.10.1353/sof.2001.0077
- Mann A, DiPrete T. Trends in gender segregation in the choice of science and engineering majors. *Social Science Research*. 2013; 42:1519–1541.10.1016/j.ssresearch.2013.07.002 [PubMed: 24090849]
- McGlone MR, Pfeister A. The generality and consequences of stereotype threat. *Sociological Compass*. 2007; 1:174–190.10.1111/j.1751-9020.2007.00021.x
- Morris LK, Daniel LG. Perceptions of a chilly climate: Differences in traditional and non-traditional majors for women. *Research in Higher Education*. 2008; 49(3):256–273.10.1007/s11162-007-9078-z
- National Science Board. Science and engineering indicators 2014. Arlington, VA: National Science Foundation; 2014. NSB 14-01Retrieved from <http://www.nsf.gov/statistics/seind14/>
- Ong M. Body projects of young women of color in physics: Intersections of gender, race and science. *Social Problems*. 2005; 52(4):593–617.10.1525/sp.2005.52.4.593
- Peralta RL. College alcohol use and the embodiment of hegemonic masculinity among European American men. *Sex Roles*. 2007; 56(11):741–756.10.1007/s11199-007-9233-1
- Ridgeway CL, Correll SJ. Unpacking the gender system: A theoretical perspective on gender beliefs and social relations. *Gender and Society*. 2004; 18(4):510–531.10.1177/0891243204265269
- Ridgeway, C. Framed by gender: How gender inequality persists in the modern world. New York, NY: Oxford University Press; 2011.
- Riegler-Crumb C, King B, Grodsky E, Muller C. The more things change, the more they stay the same? Prior achievement fails to explain gender inequality in entry into STEM majors over time. *American Educational Research Journal*. 2012; 49(6):1048–1072.10.3102/0002831211435229
- Sandler, BR.; Hall, RM. The classroom climate: A chilly one for women. Washington, DC: Association of American Colleges; 1982.
- Sax, LJ.; Astin, AW.; Korn, WS.; Mahoney, KM. The American freshman: National norms for Fall 2003. Los Angeles, CA: Higher Education Research Institute, UCLA; 2003.
- Schneider, B.; Stevenson, D. The ambitious generation: America's teenagers, motivated but directionless. New Haven, CT: Yale University Press; 1999.
- Schrock D, Schwalbe M. Men, masculinity, and manhood acts. *Annual Review of Sociology*. 2009; 35:277–295.10.1146/annurev-soc-070308-115933
- Seymour, E.; Hewitt, NM. Talking about leaving: Why undergraduates leave the sciences. Boulder, CO: Westview Press; 1997.
- Shapiro JR, Williams AM. The role of stereotype threats in undermining girls' and women's performance and interest in STEM fields. *Sex Roles*. 2012; 66(3):175–183.10.1007/s11199-011-0051-0
- Shen-Miller D, Smiler AP. Men in female-dominated vocations: A rationale for academic study and introduction to the special issue. *Sex Roles*. 2015; 72(7):269–276.10.1007/s11199-015-0471-3
- Snyder KA, Green A. Revisiting the glass escalator: The case of gender segregation in a female dominated occupation. *Social Problems*. 2008; 55(2):271–299.10.1525/sp.2008.55.2.271
- Snyder, TD.; Dillow, SA. Digest of Education Statistics 2012. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education; Washington, DC: 2013. NCES 2014-015Retrieved from nces.ed.gov/pubs2014/2014015
- Spencer SJ, Steele CM, Quinn DM. Stereotype threat and women's math performance. *Journal of Experimental Social Psychology*. 1999; 35(1):4–28.10.1006/jesp.1998.1373

- Starobin SS, Laanan FS. Broadening female participation in science, technology, engineering, and mathematics: Experiences at community colleges. *New Direction for Community Colleges*. 2008; 142:37–46.10.1002/cc.323
- Stout JG, Dasgupta N, Hunsinger M, McManus MA. STEMing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM). *Journal of Personality and Social Psychology*. 2011; 100(2):255–270.10.1037/a0021385 [PubMed: 21142376]
- Taylor CJ. Occupational sex composition and the gendered availability of workplace support. *Gender and Society*. 2010; 24(2):189–212.10.1177/0891243209359912
- Vandello JA, Bosson JK. Hard won and easily lost: A review and synthesis of theory and research on precarious manhood. *Psychology of Men and Masculinity*. 2013; 14(2):101–113.10.1037/a0089826
- Wang M, Degol J. Motivational pathways to STEM career choices: Using expectancy–value perspective to understand individual and gender differences in STEM fields. *Developmental Review*. 2013; 33(4):304–340.10.1016/j.dr.2013.08.001
- Williams CL. The glass escalator: Hidden advantages for men in the “female” professions. *Social Problems*. 1992; 39(3):253–267.10.2307/3096961
- Wingfield AH, Myles RL. Still a man's world? Revisiting men who do women's work. *Sociology Compass*. 2014; 10(8):1206–1215.10.1111/soc4.12206
- Wine, J.; Janson, N.; Wheelless, S. 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) full-scale methodology report. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education; Washington, DC: 2011. NCES 2012-246Retrieved from <http://nces.ed.gov/pubs2012/2012246.pdf>
- Wray-Lake L, Syvertsen AK, Briddell L, Osgood DW, Flanagan CA. Exploring the changing meaning of work for American high school seniors from 1976 to 2005. *Youth and Society*. 2011; 43:1110–1135.10.1177/0044118x10381367 [PubMed: 22034546]
- Xie, Y.; Shauman, KA. *Women in science: Career processes and outcomes*. Cambridge, MA: Harvard University Press; 2003.

Compliance with Ethical Standards

This statement acknowledges that the authors have no potential conflicts of interest. This research involves surveys collected from human participants (with informed consent), which was collected by the U.S. Department of Education. The researchers have a restricted data license administered by the U.S. Department of Education that allows them to analyze this data. The researchers have IRB approval from their institution to analyze this data.

Table 1

Descriptive Statistics by Gender and Switching Decision

	Men		Women	
	Switch % or <i>M</i>	Stay % or <i>M</i>	Switch % or <i>M</i>	Stay % or <i>M</i>
Gender Composition of Major				
Gender-atypical ^a	63% *	37% *	41%	59%
Other	39%	61%	46%	54%
Controls for Social Background				
Race/Ethnicity				
Non-Hispanic White (Ref)	41%	59%	44%	56%
Black	57% *	43% *	49%	51%
Hispanic	49%	51%	57% *	43% *
Asian	39%	61%	41%	59%
Other	31%	69%	48%	52%
Parent Education	2.73 *	2.88	2.63	2.67
Family Income	10.93 *	11.02	10.78	10.88
Controls for Academic Performance				
SAT Scores	1083.93	1106.01	1042.96 *	1062.39
Cumulative HS GPA	6.22	6.27	6.40	6.45
College GPA	2.89 *	3.07	3.10 *	3.23

Note. For gender composition of major, the significance tests were chi-square comparisons of percentages within switching categories; for racial/ethnic group, comparisons used the reference group of Non-Hispanic White students. For the remaining control variables, significance tests involved mean comparisons between switchers and stayers using *t*-tests. All comparisons were performed separately for men and women. Source of data: Beginning Postsecondary Students Longitudinal Study 04/09.

^aGender-atypical majors are defined as those for which their composition is equal to or greater than 70% of the other gender.

* $p < .05$.

Table 2

Correlations Among Independent Variables by Gender

	1	2a	2b	2c	2d	2e	3	4	5	6	7
1. Gender Composition of Major											
Gender-atypical (ref: other)	–	–.08*	.05*	.05*	.06*	–.04*	.04*	.02	.04*	.01	–.05*
2. Race/ethnicity											
a. White	.00	–	–	–	–	–	.18*	.21*	.25*	.14*	.17*
b. Black	.01	–	–	–	–	–	–.16*	–.17*	–.31*	–.19*	–.16*
c. Hispanic	.02	–	–	–	–	–	–.13*	–.10*	–.17*	–.09*	–.10*
d. Asian	–.01	–	–	–	–	–	.00	–.04*	.09*	.08*	.04*
e. Other	–.03*	–	–	–	–	–	.04*	–.02	.03*	.02	–.03*
3. Parent Education	–.07*	.14*	–.10*	–.14*	.02	.01	–	.25*	.35*	.20*	.14*
4. Family Income	–.05*	.17*	–.14*	–.10*	–.03*	.01	.28*	–	.21*	.11*	.11*
5. Combined SAT Score	–.08*	.23*	–.30*	–.12*	.06*	.02	.35*	.20*	–	.48*	.41*
6. Cumulative HS GPA	.00	.09*	–.18*	–.04*	.08*	.02	.13*	.09*	.46*	–	.35*
7. College GPA	–.01	.14*	–.16*	–.07*	.03*	–.02	.11*	.05*	.39*	.33*	–

Note. Correlations for female students are reported above the diagonal; for male students, below. Because racial/ethnic categories are mutually exclusive, we did not calculate correlations between categories. Source of data: Beginning Postsecondary Students Longitudinal Study 04/09

* $p < .05$, Bonferroni correction used to control for familywise error rate.

Table 3

Odds Ratios from Multinomial Regression Predicting College Pathway

Outcome	Men		Women	
	Model 1	Model 2	Model 3	Model 4
Gender Composition of Major				
Gender-atypical (ref: other)	2.614 ^{***} (0.47)	2.628 ^{***} (0.50)	0.833 (0.21)	0.771 (0.19)
Social Background				
Race/Ethnicity (ref: Non-Hispanic White)				
Black		1.676 [*] (0.42)		1.061 (0.21)
Hispanic		1.225 (0.31)		1.511 (0.33)
Asian		0.892 (0.22)		0.813 (0.18)
Other		0.641 (0.19)		1.046 (0.29)
Parent Education		0.917 (0.07)		1.017 (0.06)
Family Income		0.999 (0.05)		0.959 (0.05)
Academic Performance				
Combined SAT Score		1.001 (0.00)		1.000 (0.00)
Cumulative HS GPA		1.024 (0.09)		1.070 (0.08)
College GPA		0.500 ^{***} (0.07)		0.586 ^{***} (0.08)
Constant	0.646 ^{***} (0.05)	2.451 ^{***} (2.07)	0.850 ^{**} (0.05)	4.491 [*] (3.37)
<i>F</i>	28.17	6.24	0.51	2.64
<i>df</i>	831	825	936	930
<i>n</i>	1,523	1,523	2,179	2,179

Note. Standard errors (adjusted for the clustering of students within schools) are in parentheses. Degrees of freedom are $n - L$, where n is the total number of sampled PSUs and L is the strata in the first stage. Source of data: Beginning Postsecondary Students Longitudinal Study 04/09.

^{*}
 $p < .05$.

^{**}
 $p < .01$.

^{***}
 $p < .001$ (two-tailed tests)