Origins of the Gender Gap: Pre-College and College Influences on Differences Between Men and Women

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Abstract

This study examines differences between college women and men on 42 outcomes of college and assesses the extent to which those differences are attributable to gender gaps that exist prior to college or to men's and women's differential college experiences. The data are drawn from a national longitudinal sample of college students (N = 17,637) attending 204 four-year colleges and universities who were surveyed upon entry to college in 1994 and four years later in 1998. Among the 42 outcomes, five revealed gender differences that could be accounted for by pre-college variables alone, nine demonstrated gender differences that were attributable to a combination of pre-college and college variables, eighteen produced gender gaps that were significant despite all control variables, and ten did not yield any differences between women and men.

Introduction

Historically, the notion of gender gaps in higher education has been viewed from the perspective of inequities faced by women and girls as they progress through the educational pipeline. Even today, at a time when women comprise the majority of college enrollments and have closed major longstanding gender gaps in educational attainment, the topic of gender differences continues to receive significant attention at both the institutional and national levels. However, there is little agreement about why we continue to observe differences in the characteristics, experiences, and achievements of women and men. This paper seeks to identify factors that account for a wide range of gender differences observed among male and female college students.

Discussions about gender difference are typically framed within the age-old nature vs. nurture debate which questions whether persistent differences between women and men can be attributed to inherent biological characteristics, or whether these differences are a result of socialization. One explanation of the gender gap suggests that "nurture" may actually influence "nature" in that socialization differences may cause the brain to function differently for each sex (Genova, 1988). Though the debate regarding whether the gender gap is attributable to nature, nurture, or a combination of the two may be inconclusive, research has suggested that the size of the gap among students has generally decreased over time, particularly in the areas of degree attainment and career aspirations (Chamberlain, 1988; Astin, Oseguera, Sax & Korn, 2002).

While the gender gap may have decreased among the pre-college population, the gap has not completely dissipated, causing some higher education researchers to examine this gap over the span of college. Researchers broadly examining the gender gap on a variety of outcomes have found that these differences originate prior to college entry and that they are actually

reinforced during the college years (Astin 1993, 1977; Levine & Cureton, 1998; Whitt, Edison, Pascarella, Terenzini & Nora, 2001). A recent study (Whitt, Pascarella, Elkins Nesheim, Marth, & Peirson, 2003) of 3,331 students at 18 institutions examined the net effects of sex on cognitive outcomes by tracking the coefficient for gender at each step of their analysis in order to understand "how the net impact of sex on the dependent variable changed in magnitude in the presence of different sets of control variables" (p. 593). Their results revealed that men and women had significantly different outcomes even after controlling for pre-college and college experiences. Whitt et al. (2003) were limited in their ability to identify the specific factors influencing or perpetuating the gender differences. The authors recommend further analyses on a wider variety of outcomes, controlling for additional college experiences, and utilizing a larger sample of students from a larger set of institutions; each one of these recommendations is achieved by the present study.

Background

The argument that gender differences are a result of socialization is widely studied in the field of social psychology. Research in this area points to interactions in childhood where children imitate behaviors they see, often those of their same-sex parent or other role model, and develop their self-concept accordingly; these differences are not immutable, however, and have been influenced in recent years by having increasing numbers of women pursuing higher education and entering the workforce (Anderson, 2000). Other psychologists maintain that peers are the primary source of gender socialization with parents exerting little or no influence (Barnett & Rivers, 2004). Schools are also cited as a source of gender socialization in that "curriculum materials, teachers' expectations, educational tracking, and peer relations encourage girls and boys to learn gender-related skills and self-concepts" (Anderson, p. 38).

Recent research comparing boys and girls prior to college entry reveals the early origin of gender differences on a variety of outcomes. For example, differences between women and men in physical activity are evident at an early age, as "young females are twice as likely to be inactive as young males" (AAUW, 1998, p. 20). This difference has negative implications in other areas since physical activity is associated with the chance to develop competitive and leadership skills, "higher self-esteem, positive body image, and lifelong health" (p. 20).

Even though girls "earn equal or higher grades than boys in all subjects throughout their schooling," gendered stereotypes and early tracking decisions result in differences in course-taking patterns for subjects such as math, science, and certain computer-related courses (p. 28). Research comparing changing attitudes in math and science between fourth and twelfth grades clearly illustrates a decline in interest among girls, as disinterest in taking math courses increases from 9 to 50 percent, while interest in science declines from 66 to 48 percent (Barnett & Rivers, 2004). Differences in course-taking patterns and declining interest in math and science may help explain why girls tend to score lower than boys on standardized tests, though research has not yet explicitly made this connection. The long-term impact of differential course-taking patterns is that women are less likely to pursue those majors in college, which essentially prevents them from pursuing careers in those fields (AAUW, 1998). In particular, "girls cluster in social sciences, health services, and education; boys gravitate disproportionately toward engineering and business" (p. 90).

Studies that focus on college students provide abundant evidence of gender differences, reporting that compared to men, women struggle more with developing autonomy and separating from their parents (Josselson, 1987), report more emotional distress (Sax, Bryant, & Gilmartin, 2004; Sax, Lindholm, Astin, Korn, & Mahoney, 2001), choose stereotypically "feminine" majors

(Dawson-Threat & Huba, 1996; Jacobs, 1996), express less confidence in their self-assessments (Clark & Zehr, 1993; Smith, Morrison, & Wolf, 1994), are more politically liberal (Astin, 1993; Pascarella & Terenzini, 1991; Smith, Morrison, & Wolf, 1994), and have different styles of learning and ways of knowing (Baxter Magolda, 1992; Belenky, Clinchy, Goldberger, & Tarule, 1997; Crombie, Pyke, Silverthorn, Jones, & Piccinin, 2003). Further, research on college impact has found gender to predict such college outcomes as satisfaction, G.P.A., degree completion, career choice, and earnings (Astin, 1993; Jacobs, 1996).

Given the variety of gender differences detected in numerous studies, it is important to explore whether the factors that account for these differences can be identified. Thus, this study assesses the extent to which gender differences observed at the end of college are attributable to: (a) gender differences that existed prior to college; or (b) differences in the college experiences of men and women. Further, we identify areas of gender difference that persist despite controls for students' prior characteristics and college experiences.

Methods

This study was part of a large-scale research project intended to explore gender differences in college student development. Data were drawn from a national longitudinal study of college students conducted by UCLA's Higher Education Research Institute. All participants completed the Fall 1994 Cooperative Institutional Research Program (CIRP) Freshman Survey and a Spring 1998 follow-up known as the College Student Survey (CSS). The Freshman Survey gathers information on student background characteristics, attitudes, values, educational achievements, and future goals. The CSS is similar in format to the Freshman Survey and collects data on students' college experiences and their perceptions of college. It also post-tests items that appear on the Freshman Survey.

The sample for this study includes a total of 17,637 students (10,901 women and 6,736 men) who completed both instruments at 204 four-year colleges and universities across the United States. Data were weighted to correct for the fact that high-achieving females were more likely than low-achievers and males to participate, and also to adjust the sample to reflect the proportions of students attending various types of colleges and universities across the country. Thus, with weights the institutional sample reflects the diversity of baccalaureate institutions nationwide in terms of type (four-year vs. university), control (public vs. private), selectivity, and religious affiliation. Importantly, the weight variable was normalized, such that applying it to the sample corrected for the biases indicated but did not inflate its size.

Regression analyses were conducted on combined samples of women and men across 42 different outcomes of college. These dependent variables represent a broad range of college outcomes across the following categories: (a complete list of all dependent variables is provided in Appendix A):

- Student Typologies (i.e., Scholar, Social Activist, Artist, Leader, and Status Striver; see Astin, 1993a)
- Academics (i.e., GPA)
- Political Engagement and Political Orientation
- Views (i.e., on Classic Liberalism, Women's Roles, Abortion, Sex, Gay Rights, and Date Rape)
- Confidence and Self-Perceptions (i.e., Mathematical Ability, Drive to Achieve, and Competitiveness)
- Physical and Psychological Well-Being (i.e., Physical Health, Emotional Health, and Feeling Overwhelmed)

- Life Goals (i.e., Raising a Family, Making a Contribution to Science, Developing a Meaningful Philosophy of Life, and Helping to Promote Racial Understanding)
- Degree Aspirations, Degree Attainment, and Career Choice
- Perceived Self-Changes (i.e., in Critical Thinking Skills and Knowledge, Understanding of Others, and Religious Beliefs and Convictions)
- Satisfaction (i.e., with Community on Campus, Courses and Instruction, and Faculty Contact)

We acknowledge that this is an unusually large number of dependent variables. Because the intent of this study was to identify whether there were any patterns in the types of gender differences which could be explained by pre-college versus college variables, we felt it was useful to take this somewhat global approach given how little is known on this topic.

Drawn from both the Freshman Survey and the CSS, independent variables included the following categories: pretest (if applicable); demographic characteristics; high school experiences and other pre-college variables; institutional characteristics; measures of the peer environment (determined via aggregate freshman responses per institution); major field; and college experiences (related to academics, extracurricular activities, employment, etc.).[1]

In total, 26 of the independent and 12 of the dependent variables were factor scales created through principal components factor analysis with varimax rotation. Of these, ten (the five student typologies assessed in 1994 and again in 1998) were based on prior research (Astin, 1993a). The remaining 28 scales emerged from exploratory factor analyses. We evaluated the scales resulting from exploratory analyses for their theoretical sensibility and modified them accordingly. The final versions of each of these factors were assessed through confirmatory

[1] A complete list of independent variables and their coding are available from the first author.

factor analyses and the generation of Cronbach's alphas. Alpha levels ranged from .65 to .96. Because some factors included items based on different scales of measurement, we computed standardized scores for items within a single factor that had variable measurement scales. For factors that contained items measured on the same scale, scores remained unstandardized.

Within each regression, gender (1=male, 2=female) was force-entered at the first step so as to indicate the simple correlation between gender and the outcome variable and whether that relationship is significant. Given the large sample size, we employed a fairly stringent test of statistical significance ($p<.0001$). The standardized regression coefficient for gender was then monitored at each step in the regression in order to see which independent variables' entry caused the relationship between gender and the outcome to change significantly ($t_{.01} > 2.326$). In most cases, the entry of independent variables causes the coefficient for gender to become smaller, a dynamic referred to as a "normal" effect (Astin, 1991). Normal effects occur when two independent variables share variance in predicting the dependent variable. In other words, some portion of the gender difference on the outcome variable can be explained by gender differences in the newly-entered independent variable. Identifying such explanatory variables yields information on what student characteristics account for the observed gender differences in the outcome variable.

In some cases, the standardized regression coefficient for gender becomes significantly larger when another independent variable enters the equation. This condition is known as a "suppressor effect" (Astin, 1991) and occurs under one of two conditions: (1) the two independent variables each have a positive relationship with the dependent variable, but a negative relationship with each other; or (2) the two independent variables have opposite relationships with the dependent variable (one positive, one negative), and a positive relationship

with each other. In the context of this study, a suppressor effect suggests that gender differences on an outcome would be expected to have been even larger if not for the relationship between gender and the newly-entered independent variable. Typically, this means that students of the gender scoring higher on the dependent variable have scores that are lower on an independent variable that positively predicts the outcome. This approach to studying changes in regression coefficients is demonstrated in Sax (1996).

If the strength of the coefficient for gender was significantly reduced by the entry of the pretest to the dependent variable (measured at college entry), we performed an additional regression analysis using the pretest measure as the dependent variable, and only the pre-college measures as independent variables. As in the regressions predicting their posttest counterparts, we monitored the standardized regression coefficient in order to determine which pre-college variables accounted for the gender difference on that item at college entry (noting those that significantly altered ($t_{.01} > 2.326$) the strength of the regression coefficient for gender). This approach enabled us to identify variables that indirectly explain gender differences on the outcome variable via their impact on pretest gender differences.

Results

Overall, significant gender differences ($p < .0001$) were observed for 32 of the 42 dependent variables. The results for these 32 outcomes are presented here and divided into the following categories: (a) gender differences accounted for by pre-college variables (5 outcomes); (b) gender differences accounted for by pre-college and college variables (9 outcomes); and (c) gender differences persisting past all controls (18 outcomes).

Gender differences accounted for by pre-college variables

For five outcomes, gender differences that had been significant ($p<.0001$) when only gender was included in the model ultimately became non-significant once students' precollege characteristics were controlled. In other words, differences between men and women on these outcomes were entirely attributable to differences between men and women before they started college. These include: women's lower self-ratings in physical health, but higher scores on the commitment to help promote racial understanding, self-assessed strengthening of religious beliefs, and two measures of political liberalism. Table 1 lists these outcomes along with the Beta coefficient for gender at three steps: (1) when gender enters the equation ("Beta at entry"); (2) once student background characteristics and pre-college propensities have been controlled ("Beta after pre-college variables"); and (3) after controlling for college environments and experiences ("Final Beta").

For each of the outcomes listed in Table 1, Table 2 denotes which specific independent variables, by virtue of their entering the regression, caused the regression coefficient for gender to change significantly ($p<.01$) in magnitude. The table also incorporates results from the supplemental regressions that used the pretest as the dependent variable. Independent variables causing a significant change in the predictive power of gender on the pretest are discussed as "indirect" explanations for gender differences in the outcome measure.

The regression for self-rated physical health provides a clear example of when the origin of the difference between men and women can be accounted for by variables measured prior to college entry. When gender enters the regression at the first step, the standardized regression coefficient (Beta) is -.15, signifying that at the end of college, women rate themselves significantly lower than men on physical health. The predictive power of gender is reduced by more than half after accounting for the physical health pretest, meaning that the gap between the

sexes on this item is largely attributable to the pre-existing gap that exists in high school. Gender differences on this outcome can also be attributed to other pre-college variables—self-rated emotional health (indirect), feeling overwhelmed, and time spent exercising or playing sports. Gender becomes non-significant after accounting for these pre-college variables. In more practical terms, men are more likely than women to rate themselves highly on emotional health and to exercise or play sports in high school, both of which contribute to their positive physical health self-rating in college; in contrast, women are more likely to feel overwhelmed in high school, which negatively impacts their physical health self-rating in college. These results are consistent with previous research (Rowland, 1999) attributing differences between men and women on behaviors related to physical health (physical activity) as originating prior to college.

Pre-college variables also account for differences observed between women's and men's political leanings, with women leaning more to the "left" than men (both on the "classic liberalism" factor and the political orientation scale). These gender differences are largely attributable to men's and women's differing political and social attitudes at college entry. Interestingly, the effect of gender on political orientation becomes non-significant when students' self-rated competitiveness enters the equation. In other words, part of the reason that women report a more liberal political orientation is explained by the fact that they score lower on competitiveness, a characteristic predictive of more conservative political leanings.

Women's more liberal orientation is also seen in their stronger commitment to the goal of promoting racial understanding. This gender gap is due in part to gender differences in commitment to racial understanding when these students entered college. These pre-test gender differences are, in turn, attributable to the fact that, compared to men, women enter college with more liberal attitudes on a variety of issues, are more committed to social activist goals, and

report a stronger interest in attending college for educational reasons (e.g., to gain a general education and to become more cultured).

Gender differences are also observed in students' self-reported strengthening of religious beliefs and convictions, which was slightly higher for women than men. As with the other outcomes noted above, this gender difference was accounted for primarily by differences between men and women at the start of college. Namely, women are more likely than men to volunteer in high school, an activity correlated with strengthening religious beliefs during college.

Gender differences accounted for by pre-college and college variables

Table 3 lists the nine outcomes for which gender remained a significant predictor when pre-college characteristics were controlled, but became non-significant upon controlling for students' college experiences. Specifically, these include women's greater satisfaction with faculty, curriculum, and community; women's stronger orientation towards social activism, education, and the nursing profession; and men's higher status orientation and interest in business and engineering fields. For these outcomes, pre-college variables typically did play a role in reducing the predictive power of gender, but did not entirely explain the gender gap (see Table 4).

An example of this pattern is student satisfaction with courses and instruction. The standardized regression coefficient (Beta) upon entry into the regression was .07, indicating that women tend to be more satisfied than men with their college courses and instruction. After controlling for pre-college variables, the predictive power of gender was slightly reduced after accounting for the effect of selecting a college for educational reasons. Thus, choosing a

particular college for educational reasons, which is more common among women than men, predicts higher satisfaction with courses and instruction. After accounting for the variables within the college experience block, the predictive power of gender was reduced to zero; specifically, gender became non-significant when the general faculty support variable entered. Feeling supported by faculty also accounted for the observed gender differences in two other satisfaction measures: faculty contact and community on campus. Together, these results indicate that, relative to men, women tend to feel more supported by faculty (both academically and personally), which largely contributes to their greater overall feelings of satisfaction in college.

Women also exhibit higher scores than men on a factor measuring an orientation towards social activism (e.g., helping others, influencing social values, and working in the community). Women's stronger commitment to social activism is attributable, in part, to gender differences observed on the pretest, and indirectly to women's greater involvement in volunteerism during high school and the greater importance they place on the educational benefits of college attendance. Interestingly, a suppressor effect is apparent when students' pre-college leadership ability is controlled, such that the regression coefficient for gender becomes significantly larger. This suggests that women's scores on social activism would have been even higher if it were not for their relatively lower scores than men on the leader personality. Despite the fact that the predictive power of gender becomes non-significant when the variables in the college block are controlled, no particular college variables accounted for a significant change in the predictive power of gender.

Looking at another measure of personality type, we find that a status striving orientation (i.e., interest in making money, obtaining recognition, and supervising others) is more prevalent among men than women. As with the social activist factor, gender differences in students'

status-oriented goals at the end of college are determined largely by pretest differences in status orientation. Looking further, we find that men's higher scores on pre-college status orientation are explained in part by their relatively higher self-ratings on competitiveness, and, interestingly, a greater belief in sexual entitlement. With respect to the latter variable, men are more likely than women to agree that a man is "entitled" to have sex on a date if he feels that a woman has "led him on," and an orientation toward sexual entitlement is correlated positively with the values of status and power. As with social activism, no particular college variables significantly reduced the coefficient for gender, even though gender became insignificant as college variables were controlled.

Finally, when it comes to career goals in two traditionally-male fields (business and engineering) and two traditionally-female fields (nursing and elementary education), post-college gender differences are accounted for by both pre-college and college variables. In each case, gender differences in post-college career choice are due to gender gaps in pre-college career orientation as well as major selection during college. While it is not surprising that majoring in engineering would predict career choices in engineering and that majoring in education would predict teaching aspirations, it is noteworthy that these major choices reduced the coefficient for gender even after the pre-test gender differences in career choice had been controlled. In other words, even after accounting for students' pre-college career interests, women are more likely than men to major in fields that prepare then for education and nursing, and men are more likely than women to major in fields that prepare them for business and engineering. In the case of engineering, gender differences in mathematical self-confidence also influence (indirectly) the choice to pursue engineering careers. Here, low mathematical self-confidence leads women to opt out of the engineering path early on, reducing their chances of being recruited into the field.

Indeed, Astin & Astin (1992) reported that of all STEM majors, engineering was the least likely to recruit students into the field during college.

Gender differences persisting past all controls

For eighteen outcomes, gender remained a significant predictor even after controlling for all background characteristics, college environments and experiences (see Table 5). Several of these outcomes reflect gender differences in self-concept, with women rating themselves lower than men on emotional health, competitiveness, and math ability, and scoring lower than men on self-perceptions as scholars, leaders, and artists. Women also have higher rates of degree attainment and higher college grades, but feel more frequently overwhelmed by all they have to do. In the area of life goals and career choice, women report greater interest in raising a family, while men exhibit a stronger commitment to making a contribution to science and to pursuing careers in medicine. Finally, while women report lower levels of political engagement, they report stronger support for abortion rights and gay rights, and greater opposition to traditional gender roles, casual sex, and the notion of sexual entitlement.

For each of these outcomes, gender differences could not be explained by the variables included in the study. In fact, gender differences observed at the end of college could not be explained by any independent variables for four of the outcomes—degree attainment, aspirations to become a physician, and views on abortion and casual sex—and could be explained solely by the pretest for two outcomes—views on sexual entitlement and the frequency of feeling overwhelmed. However, as shown in Table 6, variables within the pre-college and college blocks did play some role (either directly or indirectly) in explaining gender differences on the remaining outcomes in this category.

For example, gender differences in self-rated emotional health remain significant at the final step in the regression, but are explained partially by variables entering the equation. When gender enters the regression at the first step, the standardized regression coefficient is -.13, signifying that at the end of college, women rate themselves significantly lower than men on emotional health. Gender differences in students' sense of emotional well-being are accounted for by a number of pre-college variables: pretest on emotional health, time spent on exercise or sports before college, self-ratings on physical health and having felt overwhelmed in high school. In other words, women's lower self-rated emotional health at the end of college can be partially explained by the fact that, compared to men, they are more likely to feel overwhelmed by the extent of their responsibilities, start college with lower self-ratings on emotional health and physical health (indirect), and spend less time exercising or playing sports (indirect). Incidentally, the fact that women spend less time than men exercising and playing sports in high school also contributes (indirectly) to their lower self-ratings on competitiveness.

Gender differences in college GPA reveal an interesting pattern of influences. First, women's higher college grades than men can be predicted, in part, by their higher grades earned in high school. However, the "suppressor" effects noted in Table 6 indicate that the gender differential in college grades would have been even larger if it were not for the fact that men enter college with higher SAT scores an have more confidence in their scholarly abilities, since these variables independently contribute to higher levels of achievement in college. We also find that women's better grades can be explained in part by the gender differences in feeling supported by faculty and, interestingly, by gender differences in feeling overwhelmed. With respect to the latter variable, it is possible that women's higher stress levels serve to fuel their commitment to perform well academically, resulting in higher grades.

Students' self-assessed leadership orientation is another outcome for which gender differences are partially—though not completely—explained by variables entering the equation. Here, we find that men's higher self-ratings on leadership ability at the end of college are explained in part by gender differences on the pretest, but that pretest gender gaps are explained by men's higher self-ratings on competitiveness and greater political engagement. In other words, men are more likely to consider themselves to be strong leaders in part because they are more likely to view themselves as competitive and politically engaged. A suppressor effect reveals that men's self-ratings on leadership would have been even higher, relative to women's, if it were not for their relatively weaker commitment to social activism, a trait that promotes a sense of leadership confidence. Finally, one college variable—challenged a professor's ideas in class—contributes to explaining the gender difference in self-assessed leadership ability. In this case, men are more likely than women to challenge professors in the classroom, a behavior that correlates with stronger leadership abilities.

Summary and Discussion

Significant differences were observed for three-quarters of the outcomes examined in the present study. In more than half of the cases when a significant gender difference was detected, variables included in the model could not entirely "explain" that difference. In other words, even after controlling for a wide variety of pre-college characteristics, college environments, and college behaviors, significant differences between women and men were still observed. This raises the question of why such differentials exist. Are there other variables—not included in this study—that account for the gender dissimilarities in these outcomes?

For the remaining outcomes demonstrating a significant gender difference, pre-college and college variables do help to explain why the differentials are observed. Here, we learn whether statistically significant differences between women and men can be attributed to specific pre-college gender differences or to the different experiences men and women have while in college. Among the outcomes for which gender differences are accounted for by pre-college variables, the importance of pre-existing attitudes and high school experiences on shaping views and beliefs is evident. For example, gender differences in religious and political affiliations, physical health, and having the goal of promoting racial understanding are each accounted for by pre-college variables.

The outcomes for which gender differences are accounted for by pre-college and college variables include the student typologies of social activist and status striver, satisfaction measures related to various aspects of the college experience, and future career plans in elementary education, engineering, nursing, and business. These results indicate that pre-college attitudes and experiences were influential in establishing a gender difference that was maintained over the college years. With respect to the specific influence of college variables, gender differences in career plans were accounted for by the student's choice of major and in the satisfaction outcomes by the level of general faculty support they perceived. Future research is needed to help identify the specific dynamics at play within those majors and between students and faculty that contribute to reinforcing the gender differences that existed prior to college.

When examining the independent variables across multiple outcomes, several variables revealed themselves as either directly or indirectly accounting for gender differences. Among pre-college variables, the most common "explanations" for post-college gender differences were: time spent exercising, self-rated mathematical ability, and SAT scores (each of which were

higher among men), and feeling overwhelmed and attending college for educational reasons (which were more commonly reported among women). Gender differences on these pre-college variables contribute to the persistent gender differences observed four years later.

For example, lower self-ratings on mathematical ability contribute to women's underrepresentation among students who view themselves as scholars, who aspire to become engineers, and who want to make a contribution to science. Further, the fact that women spend less time exercising and playing sports and more time feeling overwhelmed contributes to their lower self-ratings on physical and emotional well-being while in college.

Gender differences in motivation for college also have longer-term implications. At college entry, women place more value than men on the educational benefits of college, a differential that predicts women's greater interest in social activism and to their stronger commitment to promoting racial understanding. These findings suggest that women may be more likely than men to view education as a means to influence social change and improve race relations.

In contrast to pre-college variables, aspects of the college experience played only a minor role in predicting gender differences on the outcome measures. The only college variable to account for gender differences across a number of outcomes was feeling supported by faculty. Women are more likely than men to feel that their faculty provide them with personal and professional support, thus accounting for women's greater satisfaction with faculty, curriculum, and the overall sense of community on campus.

Conclusion

Research in higher education has offered ample evidence of the differences between women and men on a variety of outcomes. What remains unclear, however, is the point of origin of these differences, as well as the factors that may serve to reduce or amplify the gap between the sexes. This paper extends our current understandings of the differences between men and women and the role that pre-college and college characteristics play in accounting for these differences. In addition, by focusing on the possible explanations for gender differences observed at the end of college, we are in a better position to consider strategies that may help to counteract persistent gender gaps in the college student population.

If there is one message that can be gleaned from this study, it is that gender differences observed at the end of college are largely unrelated to the college experience itself. Instead, the source of gender differences extends back into the pre-college years, where women and men develop different values, confidences, aspirations, and patterns of behavior. For the most part these gender differences persist throughout college, and may even grow larger over time. The question for colleges and universities is whether anything can be done at the postsecondary level to minimize the types of differentials that may disadvantage women later on, such as lower self-assessments of academic ability, physical health, and emotional well-being, as well as lower interest in science and engineering.

Although this study did not point to college experiences as the source of these gender differences, this is not to say that colleges are absolved from addressing persistent gender inequities. The challenge is to identify whether particular college experiences can serve to mitigate the effects of the pre-college years. It may be that existing programs and interventions do in fact play a part in reducing gender gaps, but were not assessed in the present study. Perhaps effective strategies have yet to be developed. Future research on this topic ought to test

more explicitly the role that present and future interventions play in reducing longstanding differences between women and men.

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Table 1 Outcomes for which Gender Differences are Accounted for by Pre-College Variables

	Beta for Gender		
Outcome Variable	At Entry	After Inputs	Final
Self-Rating: Physical Health	-.15*	.00	.00
Classic Liberalism	.13*	.02	.00
Political Views	.11*	.00	-.01
Goal: Help to Promote Racial Understanding	.10*	.01	-.02
Self-Change: Religious Beliefs and Convictions	.06*	.03	.00

*$p < .0001$

Table 2 Outcomes for which Gender Differences Are Accounted for by Pre-College Variables

Outcome Variable	Independent Variables Accounting for a Significant (p<.01) Change in Beta for Gender	Independent Variable Type	Type of Beta Change
Self-Rating: Physical Health	Pre-test	Input	Normal
	Emotional Health[a]	Input	Normal
	Exercising/Sports	Input	Normal
	Felt Overwhelmed	Input	Normal
Classic Liberalism	Pre-test	Input	Normal
	Political Orientation	Input	Normal
	Felt Overwhelmed	Input	Normal
Political Views	Pre-test	Input	Normal
	Married women best in home	Input	Normal
	Classic Liberalism	Input	Normal
	Competitiveness	Input	Normal
Goal: Help to Promote Racial Understanding	Pre-test	Input	Normal
	Educational Reasons for College[a]	Input	Normal
	Social Activism[a]	Input	Normal
	Liberalism[a]	Input	Normal
	Married Women Best in Home[a]	Input	Normal
Self-Change: Religious Beliefs and Convictions	High School Volunteering	Input	Normal

[a] Indirectly via the pretest

Table 3 Outcomes for which Gender Differences are Accounted for by Pre-College & College Variables

	Beta for Gender		
Outcome Variable	At Entry	After Inputs	Final
Career: Elementary Education	.17*	.08*	.03
Career: Engineering	-.14*	-.03*	-.02
Social Activist	.11*	.05*	.01
Career: Nursing	.11*	.05*	.01
Status Striver	-.08*	-.05*	-.02
Career: Business	-.07*	-.05*	-.02
Satisfaction: Courses & Instruction	.07*	.05*	.00
Satisfaction: Community on Campus	.07*	.06*	.02
Satisfaction: Faculty Contact	.06*	.05*	.00

*$p < .0001$

Table 4 Outcomes for which Gender Differences are Accounted for by Pre-College & College Variables

Outcome Variable	Independent Variables Accounting for a Significant (p<.01) Change in Beta for Gender	Independent Variable Type	Type of Beta Change
Career: Elementary Education	Pre-test	Input	Normal
	Major: Education	College	Normal
Career: Engineering	Pre-test	Input	Normal
	Math Ability[a]	Input	Normal
	Major: Engineering	College	Normal
Social Activist	Pre-test	Input	Normal
	Leader[a]	Input	Suppressor
	Educational Reasons for College[a]	Input	Normal
	High School Volunteering[a]	Input	Normal
Career: Nursing	Pre-test	Input	Normal
	Major: Health Professional	College	Normal
Status Striver	Pre-test	Input	Normal
	Competitiveness[a]	Input	Normal
	Man not entitled to sex on a date	Input	Normal
Career: Business	Pre-test	Input	Normal
	Major: Business	College	Normal
Satisfaction: Courses & Instruction	Educational Reasons for College	Input	Normal
	General Faculty Support	College	Normal
Satisfaction: Community on Campus	General Faculty Support	College	Normal
Satisfaction: Faculty Contact	General Faculty Support	College	Normal

[a] Indirectly via the pretest

Table 5 Outcomes for which Gender Differences Remain Even After Accounting for Pre-College & College Variables

	Beta for Gender		
Outcome Variable	At Entry	After Inputs	Final
Self-Rating: Competitiveness	-.24*	-.11*	-.09*
View: Homosexual relationships should not be prohibited	.22*	.14*	.12*
Felt Overwhelmed	.21*	.13*	.09*
View: Man not entitled to sex when ”led on”	.21*	.17*	.16*
View: The activities of married women are best confined to home and family	-.18*	-.11*	-.10*
Self-Rating: Mathematical Ability	-.17*	-.05*	-.05*
Self-Rating: Emotional Health	-.13*	-.07*	-.08*
Scholar	-.13*	-.06*	-.07*
View: Sex is OK between two people who really like each other	-.12*	-.10*	-.07*
Leader	-.11*	-.09*	-.08*
College GPA	.11*	.07*	.04*
Goal: Making a contribution to science	-.10*	-.07*	-.07*
Political Engagement	-.09*	-.07*	-.07*
View: Abortion should be legal	.08*	.07*	.08*
Goal: Raising a Family	.08*	.09*	.08*
Degree Attainment	.06*	.05*	.06*
Artist	-.05*	-.05*	-.07*
Career: Physician	-.04*	-.03*	-.03*

*$p < .0001$

Table 6 Outcomes for which Gender Differences Remain Even After Accounting for Pre-College & College Variables

Outcome Variable	Independent Variables Accounting for a Significant (p<.01) Change in Beta for Gender	Independent Variable Type	Type of Beta Change
Self-Rating: Competitiveness	Pre-test	Input	Normal
	Exercising/Sports[a]	Input	Normal
View: Homosexual relationships should not be prohibited	Married women best in home	Input	Normal
	Competitiveness	Input	Normal
Felt Overwhelmed	Pre-test	Input	Normal
View: Man not entitled to sex when "led on"	Pre-test	Input	Normal
View: The activities of married women are best confined to home and family	Pre-test	Input	Normal
	Man not entitled to sex on a date[a]	Input	Normal
Self-Rating: Mathematical Ability	Pre-test	Input	Normal
	High School GPA[a]	Input	Suppressor
	SAT[a]	Input	Normal
Self-Rating: Emotional Health	Pre-test	Input	Normal
	Exercising/Sports[a]	Input	Normal
	Physical Health[a]	Input	Normal
	Felt Overwhelmed	Input	Normal
Scholar	Pre-test	Input	Normal
	Political Engagement[a]	Input	Normal
	SAT[a]	Input	Normal
	Math Ability[a]	Input	Normal
	Emotional Health[a]	Input	Normal
	High School GPA[a]	Input	Suppressor
	General Faculty Support	College	Suppressor

Table 6 (continued) Outcomes for which Gender Differences Remain Even After Accounting for Pre-College & College Variables

Outcome Variable	Independent Variables Accounting for a Significant (p<.01) Change in Beta for Gender	Independent Variable Type	Type of Beta Change
View: Sex is OK between two people who really like each other	None		
Leader	Pre-test	Input	Normal
	Competitiveness[a]	Input	Normal
	Political Engagement[a]	Input	Normal
	Social Activist[a]	Input	Suppressor
	Challenged professor's ideas in class	College	Normal
College GPA	Pre-test	Input	Normal
	Scholar Pre-test[a]	Input	Suppressor
	SAT	Input	Suppressor
	Felt Overwhelmed	Input	Normal
	General Faculty Support	College	Normal
Goal: Making a contribution to science	Pre-test	Input	Normal
	Math ability[a]	Input	Normal
	Educational Reasons for College[a]	Input	Suppressor
Political Engagement	Pre-test	Input	Normal
	Leader[a]	Input	Normal
	Social Activism[a]	Input	Suppressor
View: Abortion should be legal	None		
Goal: Raising a Family	Exercise/Sports	Input	Suppressor
Degree Attainment	None		
Artist	Pre-test	Input	Normal
	Student clubs/groups[a]	Input	Suppressor
Career: Physician	None		

[a] Indirectly via the pretest

Appendix A

Dependent Variables (Arranged by Category)

Student Typologies

Scholar (Cronbach's alpha = .67)	Loading
Self-rating: Academic ability[a]	.81
Self-rating: Intellectual self-confidence[a]	.79
Self-rating: Writing ability[a]	.74

Social Activist (Cronbach's alpha = .72)	Loading
Goal: Influencing social values[b]	.81
Goal: Participating in a community action program[b]	.76
Goal: Helping others in difficulty[b]	.69
Goal: Influencing the political structure[b]	.69

Artist (Cronbach's alpha = .77)	Loading
Goal: Creating artistic work[b]	.80
Self-rating: Artistic ability[a]	.78
Self-rating: Creativity[a]	.71
Goal: Writing original works[b]	.66
Goal: Becoming accomplished in the performing arts[b]	.66

Leader (Cronbach's alpha = .73)	Loading
Self-rating: Leadership ability[a]	.84
Self-rating: Public speaking ability[a]	.81
Self-rating: Social self-confidence[a]	.77

Status Striver (Cronbach's alpha = .72)	Loading
Goal: Obtaining recognition from colleagues[b]	.73
Goal: Be very well-off financially[b]	.71
Goal: Have administrative responsibility for the work of others[b]	.71
Goal: Become an authority in my field[b]	.69
Goal: Be successful in a business of my own[b]	.60

Academics

College GPA[c]

Political Engagement and Political Orientation

Political Engagement (Cronbach's alpha = .66)	Loading
Goal: Keep up to date with political affairs[b]	.87
Discussed politics[d]	.87

Political orientation[e]

Views

Views: Classic Liberalism (Cronbach's alpha = .71)	Loading
View: Federal government is not doing enough to control pollution[f]	.71
View: National health care plan is needed[f]	.67
View: Wealthy people should pay a larger share of taxes[f]	.60
View: Federal government should do more to control sale of handguns[f]	.60
View: Federal government should do more to discourage energy consumption[f]	.60
View: Federal government is not protecting consumers from bad goods/services[f]	.56
View: Federal government should raise taxes to help reduce the deficit[f]	.48

View: The activities of married women are best confined to home and family[f]

View: Abortion should be legal[f]

View: Sex is OK between two people who really like each other[f]

View: Homosexual relationships should not be prohibited[f]

View: Man not entitled to sex when "led on"[f]

Confidence and Self-Perceptions

Self-rating: Mathematical ability[a]

Self-rating: Drive to achieve[a]

Self-rating: Competitiveness[a]

Physical and Psychological Well-Being

Self-rating: Physical health[a]
Self-rating: Emotional health[a]
Felt overwhelmed[d]

Life Goals

Goal: Raising a family[b]
Goal: Making a contribution to science[b]
Goal: Developing a meaningful philosophy of life[b]
Goal: Help to promote racial understanding[b]

Degree Aspirations, Degree Attainment, and Career Choice

Degree aspirations[g]
Degree attainment[h]
Career: Physician[i]
Career: Lawyer[i]
Career: Education (Secondary)[i]
Career: Education (Primary)[i]
Career: Nurse[i]
Career: College teacher[i]
Career: Business[i]
Career: Engineer[i]
Career: Research scientist[i]
Career: Artist[i]

Perceived Self-Changes

Change: Critical Thinking & Knowledge (Cronbach's alpha = .77)	Loading
Self-change: Ability to think critically[j]	.80
Self-change: Analytical and problem-solving skills[j]	.76
Self-change: General knowledge[j]	.71
Self-change: Writing skills[j]	.63
Self-change: Knowledge of a particular field or discipline[j]	.61
Self-change: Reading speed and comprehension[j]	.60

Change: Understanding of Others (Cronbach's alpha = .76)	Loading
Self-change: Understanding the problems facing your community[j]	.81
Self-change: Understanding social problems facing the nation[j]	.77
Self-change: Ability to get along with people of other races/cultures[j]	.75
Self-change: Knowledge of people from other races/cultures[j]	.72
Self-change: Religious beliefs and convictions[j]	

Satisfaction

Satisfaction: Community on Campus (Cronbach's alpha = .74)	Loading
Satisfaction: Interaction with other students[k]	.82
Satisfaction: Overall college experience[k]	.82
Satisfaction: Sense of community on campus[k]	.81

Satisfaction: Courses and Instruction (Cronbach's alpha = .71)	Loading
Satisfaction: Overall quality of instruction[k]	.76
Satisfaction: Relevance of coursework to everyday life[k]	.69
Satisfaction: Courses in major field[k]	.69
Satisfaction: Humanities courses[k]	.64
Satisfaction: Social science courses[k]	.63
Satisfaction: Science and mathematics courses[k]	.43

Satisfaction: Faculty Contact (Cronbach's alpha = .74)	Loading
Satisfaction: Contact with faculty and administration[k]	.89
Satisfaction: Ability to find faculty and staff[k]	.89

[a]Five-point scale: 1 = *lowest 10%* to 5 = *highest 10%*
[b]Four-point scale: 1 = *not important* to 4 = *essential*
[c]Six-point scale: 1 = *C- or less (below 1.75)* to 6 = *A (3.75-4.0)*
[d]Three-point scale: 1 = *not at all* to 3 = *frequently*
[e]Five-point scale: 1 = *far right* to 5 = *far left*
[f]Four-point scale: 1 = *disagree strongly* to 4 = *agree strongly*
[g]Six-point scale: 1 = *none* to 6 = *doctorate or professional*
[h]Two-point scale: 1 = *did not receive B.A. in four years* to 2 = *received B.A. in fours years*
[i]Two-point scale: 1 = *yes* to 2 = *no*
[j]Five-point scale: 1 = *much weaker* to 5 = *much stronger*
[k]Four-point scale: 1 = *dissatisfied* to 4 = *very satisfied*