Fostering Academic and Social Engagement:

An Investigation into the Effects of All-Girls Education in the Transition to University

Tiffani Riggers-Piehl, Ph.D., Principal Investigator

with Gloria Lim, Ph.D. and Karen King

HERI

Higher Education Research Institute at University of California, Los Angeles

HERI

The Higher Education Research Institute (HERI) serves as an interdisciplinary center for research, evaluation, data, policy studies, and research training in post-secondary education. HERI is housed in the UCLA Graduate School of Education and Information Studies (GSE&IS). HERI is home to six national surveys of college students, faculty, and staff, including the Cooperative Institutional Research Program (CIRP), also known as The Freshman Survey, which is the largest and longest-running study of higher education in the U.S. The Institute's research program covers a variety of topics including college student outcomes, leadership development, institutional transformation, faculty performance, educational equity, and issues surrounding campus climate.

Fostering Academic and Social Engagement: An Investigation into the Effects of All-Girls Education in the Transition to University analyzes the effects of attending girls' schools on students' transition to university.

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Executive Summary

The 2009 report, *Women Graduates of Single-Sex and Coeducational High Schools: Differences in their Characteristics and the Transition to College*, by Dr. Linda J. Sax and colleagues, identified several areas in which all-girls education appeared to "produce favorable outcomes for female students" as they entered university (p.9). Using data collected in 2005 from the Higher Education Research Institute (HERI) at the University of California, Los Angeles (UCLA), the study showed that when compared to their coeducated peers, graduates of girls' high schools had increased academic engagement; higher academic self-confidence, particularly in their math and science abilities; and greater political engagement. When reflecting on those results, we wondered: what differences would exist between girls' school graduates and their coeducated peers with data collected ten years later?

The present report provides valuable insight into the experiences of students at all-girls schools, specifically relating to their academic skills and engagement, science confidence, community engagement, cultural competency, and political engagement. Commissioned by the National Coalition of Girls' Schools (NCGS), it follows the model of Sax et al. (2009), employing similar methodology and using data from HERI's Freshman Survey, a national survey of students preparing to enter their first year of university. Collected in 2016, the dataset includes responses from 5,888 female incoming students, 1,134 of whom graduated from 105 independent all-girls high schools. In this report, we examine academic and social characteristics of these students and use multilevel modeling to understand how students' demographic characteristics (e.g. race/ethnicity, parent education, and family income) and high school characteristics (e.g. student-teacher ratio, enrollment size, etc.) account for differences between the two groups. Considering the recommendations and following in the footsteps of previous research of its kind, this study identifies benefits and outcomes of all-girls schooling.

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Key Findings

DESCRIPTIVE RESULTS

When comparing data between graduates from all-girls schools and those from coeducational schools, we identified over 80 statistically significant differences (p <.05). The results describe girls' school graduates who are academically engaged, confident in their science abilities, interested in political engagement, and who have high levels of cultural competency. In keeping with prior research, where differences occurred, the majority favored graduates of all-girls schools. The following section highlights the most notable findings:

Stronger Academic Skills

Alumnae from all-girls schools demonstrate stronger academic skills as measured in terms of habits of mind, which are a set of traits and behaviors associated with academic success:

- Girls' school graduates are more likely than their coeducated peers to say they frequently "sought alternative solutions to a problem" (53 percent to 48 percent). Additionally, girls' school alumnae are more likely than their peers to say they frequently "sought out solutions to a problem and explained it to others" (68 percent to 64 percent).

- Emphasizing their ability to learn independently, alumnae of all-girls schools more frequently explore topics on their own, even when not required, compared to their coeducated peers (44 percent to 39 percent).

> *"Girls' school graduates are more likely than their coeducated peers to say they frequently 'sought alternative solutions to a problem.'"*

- More than two-thirds (68 percent) of graduates from all-girls schools self report frequently supporting their arguments with logic, compared to just under two-thirds (61 percent) of coeducational school graduates.

- Providing additional evidence of important traits for academic success, about 40 percent of graduates from all-girls schools categorize their critical thinking ability as "somewhat strong" or a "major" strength compared to just over a third (37 percent) of coeducational school graduates.

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Greater Academic Engagement

Graduates of all-girls schools are more academically engaged than their coeducational peers, as measured by survey questions asking about studying and tutoring other students, and time spent on homework:

- Girls' school graduates are more likely to spend time learning with their peers. Specifically, alumnae of girls' schools are more likely than coeducational school graduates to say they frequently tutored other students (22 percent to 15 percent) and frequently studied with other students (55 percent to 49 percent).

- Emphasizing their academic engagement and supporting findings related to their stronger academic skills, alumnae from girls' schools report spending more time on homework than their coeducated peers. In particular, girls' school graduates are more likely than their peers to indicate spending 11 or more hours on homework per week (42 percent to 37 percent).

Higher Science Self-Confidence

In addition to being more academically engaged and demonstrating stronger habits of mind, graduates from girls' schools indicate higher levels of self-confidence in their science-related skills compared to graduates from coeducational schools:

- Girls' school graduates report greater confidence in their ability to use technical science skills such as tools, instruments, and techniques, with 46 percent reporting "very confident" or "absolutely confident" compared to 42 percent of coeducational school graduates.

- Over half of the girls' school alumnae surveyed were "very confident" or "absolutely confident" in their understanding of scientific concepts compared to just under half of coeducational school graduates (52 percent to 48 percent).

- When asked questions related to developing and performing research, girls' school alumnae demonstrate greater confidence in their ability to generate a research question, with 45 percent indicating "very confident" or "absolutely confident" compared to 41 percent of their coeducated peers.

> *"Girls' school graduates report greater confidence in their ability to use technical science skills such as tools, instruments, and techniques."*

- Providing additional evidence of their strong science orientation, 60 percent of graduates from girls' schools indicate greater confidence in their ability to explain the results of a study, compared to just over half (56 percent) of coeducational school graduates marking "very confident" or "absolutely confident."

- Over half of the girls' school alumnae also report being "very confident" or "absolutely confident" they could determine how to collect appropriate data compared to less than half of their coeducated peers (51 percent to 46 percent).

Stronger Community Involvement

Graduates from girls' schools are more active in volunteerism and more interested in community development compared to graduates of coeducational schools:

- Highlighting their desire to care for the environment, over a third of girls' school graduates report it is "very important" or "essential" they become involved in environmentally minded programs in the future (36 percent to 31 percent).

- Demonstrating an interest in future community engagement, graduates from all-girls schools are more likely than their coeducated peers to have a goal of participating in a community action program (50 percent to 42 percent marking "very important" or "essential").

- Notably, alumnae of all-girls schools indicate more frequent participation in volunteer work in the past year compared to their peers (52 percent to 47 percent marking "frequently").

Higher Levels of Cultural Competency

Alumnae of girls' schools feel more prepared to work and live in a diverse society compared to their coeducated counterparts. In particular, they demonstrate gains over coeducational school peers regarding their desire to understand and work with diverse people:

- Almost 60 percent of girls' school graduates hold "helping to promote racial understanding" as a "very important" or "essential" goal, compared to just half of coeducational school graduates (59 percent to 50 percent).

> *"Almost 60% of girls' school graduates hold 'helping to promote racial understanding' as a 'very important' or 'essential' goal, compared to 50% of coeducational school graduates."*

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- Graduates of girls' schools are more likely to count their "tolerance of others with different beliefs" and "ability to work cooperatively with diverse people" as "somewhat strong" or a "major" strength compared to their coeducated peers (50 percent to 45 percent, and 62 percent to 56 percent, respectively).

- Providing further evidence of their ability to actively participate in a diverse society, three-quarters of girls' school alumnae report "improving my understanding of other countries and cultures" as a "very important" or "essential" goal, compared to alumnae of coeducational schools (75 percent to 70 percent).

Increased Political Engagement

Graduates of all-girls schools are more interested in political involvement than their peers from coeducational settings:

- Students who attended all-girls schools are more likely to plan to vote in local, state, or national elections than their coeducated peers (74 percent to 69 percent).

- Considering their political aspirations, graduates from all-girls schools are more likely to rate "keep up to date with political affairs" and "influence the political structure" as "very important" or "essential" goals (54 percent to 47 percent, and 27 percent to 23 percent, respectively).

> *"Graduates from all-girls schools are more likely to rate 'keep up to date with political affairs' as a 'very important' or 'essential' goal."*

- As further evidence of their political engagement, girls' school alumnae are more likely than their coeducated peers to have publicly communicated their opinion about a cause in the past year (61 percent to 55 percent).

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RESULTS OF MULTILEVEL ANALYSES

The descriptive analysis revealed more than 80 ways in which graduates of all-girls and coeducational schools differed. Some of the differences could perhaps be explained by student-level and school-level characteristics, such as parent education, family income, school size, school affiliation (e.g. religious or non-sectarian), or urbanicity, rather than by school gender composition alone. Identifying which differences persist after accounting for students' background and school characteristics provides even stronger evidence for the ways in which all-girls schools contribute unique benefits and opportunities to their students.

"Alumnae of all-girls schools are more likely to consider themselves critical thinkers and to score higher on measures of academic habits of mind."

The second phase of analysis used multilevel modeling to reveal ways that girls' school graduates are more academically engaged and interested in political and social engagement than their female peers from coeducational schools. Specifically, after controlling for students' personal and school characteristics, alumnae of all-girls schools are more likely to consider themselves critical thinkers and to score higher on measures of academic habits of mind, demonstrate stronger study habits such as tutoring and studying with others, and show higher levels of science self-confidence. They are also more likely to demonstrate a stronger community orientation and desire for civic engagement. Finally, girls' school graduates are more likely to be involved in political activities, to demonstrate social and political agency, and to be supportive of societal improvements, compared to their female counterparts who graduated from coeducational schools.

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Conclusions

The findings identify several key areas in which all-girls schools are distinctively preparing their students for success in college and beyond. Based on the data reported in this study, we can conclude that when compared to their female peers at coeducational schools, girls' school graduates:

- **Have stronger academic skills**
- **Are more academically engaged**
- **Demonstrate higher science self-confidence**
- **Express stronger community involvement**
- **Display higher levels of cultural competency**
- **Exhibit increased political engagement**

These characteristics reveal a consistent portrait of girls' school graduates who are more engaged academically and socially than their coeducated peers, findings which align with the profile outlined by Dr. Sax and her colleagues in 2009. Though some of the findings may appear modest, these statistically significant results demonstrate differences in areas of critical importance in the twenty-first century for women as they enter university and beyond, thus emphasizing the contribution of all-girls schooling for women's success.

"These characteristics reveal a consistent portrait of girls' school graduates who are more engaged academically and socially than their coeducated peers."

These findings also lend support for future investigations, suggesting more questions to be asked, including:
How are the educational benefits of all-girls schools imparted to students? What other factors might be at work in girls' schools to provide these benefits, such as inventive pedagogies, co-curricular opportunities, or institutional mission? How might the results differ by school control or religious affiliation? With these questions and the results presented herein, the present study aims to further the discussion on the benefits of all-girls schooling, as well as provide a road map for future research to continue expanding our understanding of the topic and to inform the ongoing dialogue about the role of all-girls schools in student success.

Acknowledgments

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INTRODUCTION

Single-gender education served as the predominant form of primary and secondary education in America until the rise of mass-schooling in the late nineteenth century. Early educational opportunities were limited to wealthy families, with boys and girls receiving separate instruction (Madigan, 2009). However, these opportunities were not provided equitably between the groups; boys received additional skills and training with an expectation they would continue being educated into adulthood (Madigan, 2009). As the economy grew, both men and women were needed to work in family businesses, and opportunities for education expanded; however, the limited population in the western territories meant that separate education was expensive and difficult to maintain. Coeducation was seen as a cost-efficient response to these challenges (Madigan, 2009). Nevertheless, coeducation did not remedy the inequities that existed in education. For example, even within coeducational schools, boys were often put in an educational track for college readiness while girls were tracked for vocational training including home economics and domestic sciences (Madigan, 2009; Sadker & Sadker, 1994). Although the rise of Title IX in the late twentieth century encouraged equity in academic programs, research on girls' experiences in coeducation since the origin of Title IX continued to show gender bias in the classroom and a persistent gender gap in science and math participation (American Association of University Women, 1992; Owens, Smothers, & Love, 2003; Sadker & Sadker, 1994).

Despite the ubiquity of coeducation in the modern era, single-gender schools continue to proliferate and educate a large number of men and women today. Because of the inequities identified in coeducation by some research, a debate has continued about the role of single-sex education in helping provide more equitable experiences for young women. Proponents of all-girls and all-boys schooling articulate positive outcomes for those who participate, in particular focusing on girls' success, suggesting that all-girls schools provide more leadership opportunities and fewer negative gender dynamics and lead to increased academic confidence for their students - especially in the

realm of math and science (see Sadker & Sadker, 1994; and Leonard Sax, 2017). Detractors argue that there is a lack of data demonstrating consistent benefits of the single-gender educational context (Halpern et al., 2011; Morse, 1998; Pahlke, Hyde, & Allison, 2014). The discussion is furthered in the twenty-first century by a movement in America to provide more school choice to parents and children (Berends, 2015). School choice supporters argue parents should have more freedom to choose which schools their children attend, including all-girls and all-boys schools. Thus, in light of the continued discussion about the benefits of single-gender education in America, and in particular considering the discussion about school choice in the current educational discourse, understanding the experiences of women who attend all-girls schools is paramount.

The present study provides a unique opportunity to understand how the current generation of women graduates from all-girls high schools differ from their coeducated peers. Our investigation is guided by the following research questions:

1. In what ways are today's women graduates of girls' schools different from their coeducational-school attending peers? In what ways are they similar?

2. Does the effect of all-girls schooling remain when controlling for students' individual and high school characteristics?

Using data provided by the Higher Education Research Institute (HERI) at the University of California Los Angeles (UCLA), the present study includes 5,888 female independent school students from a national sample of students about to enter college, 1,134 of whom graduated from 105 independent all-girls high schools. In this report, we examine the data to describe academic and social characteristics of these students and use multilevel modeling to understand how students' demographic characteristics (e.g., race/ethnicity, parent education, income) and pre-college academic experiences predict differences between the two groups at the time of college entry, with a special focus on the role of school gender.

Before presenting findings for the current study, we present a literature review summarizing research on all-girls schooling in the past decade. Next, we discuss the methodology used to investigate our research questions. Following the methodology, we describe the results of the study. The report concludes with a summary of notable findings and implications for future research.

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Overview of Research on All-Girls Education

In light of previous research summarizing literature prior to 2009 (Sax, Arms, Woodruff, Riggers, & Eagan, 2009), this section presents an overview of research on all-girls schooling published after that time. However, to set the context for the present study, we first introduce the Sax et al. (2009) study, which is the predecessor of the current report.

Sax and Colleagues' Contribution

In 2009, Sax and colleagues completed a nationwide study of girls' school graduates at the point of college entry. In their review of literature, Sax et al. noted that research investigating the effects of all-girls education prior to their study showed similar or favorable outcomes compared to coeducation, but the extant research offered little consensus as to which benefits might be encountered in those settings. Prior research also suggested benefits of all-girls schooling may depend upon personal characteristics, such as race and ethnicity, with some groups receiving greater benefit (Morse, 1998; Salomone, 2006; U.S. Department of Education, 2005). While acknowledging the varied results of prior research, Sax and colleagues (2009) identified a number of ways in which women educated in all-girls settings differed from their coeducated peers at the point of college entry, including showing higher levels of academic engagement and confidence, a greater predisposition toward STEM majors and careers, and higher levels of co-curricular and political engagement. Sax et al. further identified ways that future research may investigate differences between these two populations with greater power and validity, including using more advanced statistical methods and better controls for self-selection bias. Since Dr. Sax and her colleagues (2009) completed their study on the experience of women graduates of all-girls high schools as they transition to college, the body of research examining all-girls education and its outcomes has continued to grow. The following sections summarize literature on girls' schooling published since 2009, with a particular focus on academic achievement, academic self-concept, degree attainment, and career aspirations.

Academic Achievement

Research prior to 2009 found that women from all-girls schools tended to have a stronger math and science identity, take more Advanced Placement (AP) courses (in particular related to math and science), and develop academic confidence and involvement that resulted in favorable academic outcomes, at least to the point of college entry (Sax et al., 2009). Since that time, research on academic achievement and school gender continues to show either gains for students in all-girls settings or no difference from students in coeducation (Bigler & Signorella, 2011; Else-Quest & Peterca, 2015; Park, Behrman, & Choi, 2012). These researchers argue the positive effects of all-girls schools remain substantial, even after controlling for school-level variables (Park et al., 2012).

In terms of subject achievement and behavior, research has identified some benefits to all-girls settings. In particular, Else-Quest and Peterca (2015) examined the academic attitudes and achievement of 11th grade low-income students of color attending public, urban, single-gender, and equivalent coeducational schools, and found that girls attending all-girls schools experienced higher academic achievement in math, science, reading, and writing. In keeping with these findings, Anfara and Mertens' (2008) research suggests that all-girls schooling may be more effective for low-income students and students of color. Further, Cherney and Campbell (2011) noted that after controlling for individual characteristics, such as high school GPA (HSGPA), age, and math anxiety, students from all-girls schools performed better on math tests, and girls from these contexts had higher achievement motives than their coeducational-school attending peers.

A number of international studies support Cherney and Campbell's (2011) and Else-Quest and Peterca's (2015) findings regarding increased academic achievement. For example, girls in Great Britain showed increased likelihood of taking "A-level physics" if they attended a girls' school, compared to their coeducated peers (Institute of Physics, 2012), and 12th grade German students from all-girls schools outperformed their peers in tests related to visual-spatial skills (Titze, Jansen, & Heil, 2011). Additionally, students in all-girls schools in Israel took more computer science courses than their coeducational-school attending peers but were equally likely to be placed in advanced math and science courses (Feniger, 2010). Further, students attending all-girls schools in England showed improved performance on exams (Hoffman, Badgett, & Parker, 2010; Sullivan, Joshi, & Leonard, 2017), participation in gender atypical subjects (Sullivan et al.), and increased participation in class (Hoffman et al.). In one notable exception, Jackson (2012) found that students from girls' schools in Trinidad and Tabago were less likely to take math and science classes than their coeducational school attending peers. Although international contexts and cultures vary and may not translate completely to American education, the above findings suggest that there may be distinct differences in girls' academic achievement depending on school gender context.

Some recent studies have concluded that any differences in students' performance in school might not be attributable to gender composition of the schools, but are attributable to other characteristics, such as students' personal performance and attitudes fitting with the school's mission, community contextual/environmental factors, and academic preparation prior to attending the school (Bigler & Signorella, 2011; Hayes, Pahlke, & Bigler, 2011; Jackson, 2012; Pahlke et al., 2014; Patterson & Pahlke, 2011; Wilson, Gresham, Williams, Whitley, & Partin, 2013). These authors make a case for ensuring that appropriate controls are used in statistical analysis to isolate the academic effects of all-girls contexts, as this study aims to do.

With few exceptions, the previous research on academic achievement and all-girls school education demonstrates that those in all-girls settings generally have similar or better results compared to those in coeducational settings. The present study further investigates the role of school setting in students' academic achievement by examining traditional markers of achievement (such as high school GPA and standardized test scores) as well as other characteristics such as academic habits of mind and academic engagement behaviors.

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Academic Self-Concept

Academic self-concept – how one views one's own ability compared to others – is an important trait that foretells students' success in post-secondary education and beyond (Mboya, 1989; Reynolds, 1988). For students within a girls' school setting, research provides some support for increased academic self-concept. Studying middle-grades, Simpson, Che, and Bridges (2016) found that single-gender science learning positively influenced students' perception of their abilities to learn and perform well, especially for females. These finding are echoed for high school students and incoming college freshmen in confidence related to science (Simpson et al., 2016), mathematics and computer skills (Sax et al., 2009), general academic self-confidence (Sax et al., 2009), and self-esteem overall (Cribb & Haase, 2016).

Considering differential attitudes toward math and science, Anderson and Lee (2015) noted that students from all-girls schools had the most positive attitudes toward math, higher than both boys and girls in coeducation and higher than boys in boys' schools. Further, Smyth (2010) and Kombe, Che, Carter, and Bridges (2016) found evidence that students in all-girls schools tend to have gender atypical attitudes about subject areas, such as math and sciences, which are linked to greater confidence. In contrast, Wilson et al. (2013) found that, in a rural setting, students from all-girls settings demonstrated no difference in academic self-concept compared to coeducated peers. In each of these studies, while the findings are useful, the lack of diversity in participant pool and specific characteristics of the schools studied limited their generalizability. Specifically, the limitations of the findings above underscore the value of including other contexts, such as school geographic region and student's family income, in research on the topic of all-girls and all-boys schooling. The present study addresses many of these limitations by examining a national sample and including control variables such as urbanicity, income, and parental education, among others, to provide a broader understanding of how individual characteristics may account for the effects school gender.

Degree Attainment and Career Aspirations

The majority of research on all-girls education focuses on academic performance outcomes. However, other outcomes highlighted in recent research include students' degree and career aspirations and attainment. In an Australian study, Tully and Jacobs (2010) found that "Female students [many of whom were from girls' school contexts] were primarily motivated to pursue a post-secondary engineering path because of a self-belief that they are good at mathematics" (p. 465). Further, Sax et al. (2009), investigating a national sample of American women, noted that girls from all-girls schools were slightly more likely to be interested in majors and careers in STEM-related fields, including biology and engineering.

Considering students' career attainment, Sullivan et al. (2017) found that women educated in all-girls environments were more likely to pursue gender atypical careers. However, Hoffnung (2011) found no significant differences between the career outcomes, pursuit of graduate degrees, or rates of participation in STEM careers for women in girls' and coeducational school contexts, suggesting that their outcomes may be similar across contexts. To clarify some of the findings from previous

research, the present study examines how womens' different school gender contexts may influence degree and career aspirations and notably, controls for personal and institutional characteristics to identify the role of all-girls education in these outcomes.

Limitations of Prior Research

Extant research on the role of school gender in student success includes some common limitations, including a lack of statistical controls, use of less advanced methodologies, and a self-selection bias (as identified by Arms, 2007; Bigler & Signorella, 2011; Pahlke & Hyde, 2016; and Sax et al., 2009, among others.). Authors advocate for future investigations which control for students' individual contexts, including students' race/ethnicity, religion, gender identity/expression, and age at the start of single-gender schooling (Bigler & Signorella, 2011; Pahlke & Hyde, 2016; Patterson & Pahlke, 2011), reasons for selecting all-girls or all-boys schooling, and institutional contexts, such as student-teacher ratio and urbanicity (geographic location near to or far from an urban center). Without these controls, research could attribute the benefits of all-girls schooling to other individual and school factors rather than school gender (Signorella & Hayes, 2013). The present study uses a more advanced statistical method (multilevel modeling) to address some of these concerns, by controlling for students' individual characteristics as well as the high schools' characteristics; doing so allows us to more confidently draw conclusions from the findings. The following section details the methodology used in this report.

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Methodology

Data Source

Consistent with the Sax et al. report published in 2009, this study utilizes data from the Freshman Survey conducted by the Cooperative Institutional Research Program (CIRP) at UCLA's Higher Education Research Institute. Founded in 1966 at the American Council on Education, the CIRP is the oldest and largest longitudinal study of American higher education. Typically administered as part of new student orientation on college campuses, the CIRP survey collects detailed demographic information along with a wide range of student experiences and characteristics, including high school experiences, college expectations, self-concepts, values, life goals, and aspirations. The current study examines womens' responses to the 2016 CIRP Freshman Survey (TFS), which was the most current dataset available for analysis (see Appendix A for a copy of the 2016 survey instrument). Complete details on the 2016 CIRP study can be found in Eagan, Stolzenberg, Zimmerman, Aragon, Whang Sayson, and Rios-Agular (2017).

For more rigorous analysis, data from the Private School Universe Survey (PSS) were merged with the CIRP Freshman Survey data file. Collected by the National Center for Education Statistics (NCES), the PSS data set offers a range of information on institutional characteristics of independent high schools in the U.S.[1] Using this data set, we were able to retrieve information on students' high school characteristics including: school gender (all-girls or coeducational), 12th grade enrollment (size), grade span (e.g., high school-only), high school region (Northeast, Midwest, South, and West), high school environment (city, suburb, town, and rural), student-teacher ratio, percentage of students of color, and percentage of high school graduates going to four-year colleges.

Sample

For the purposes of this study, we focused on the women graduates from independent high schools among the national sample of students entering four-year colleges and universities as first-time freshmen. This included 1,134 women who graduated from 105 all-girls high schools, and 4,754 female alumnae of 945 coeducational high schools. The independent high schools included can be categorized into three groups: Catholic-affiliated, Other Religion-affiliated, and Nonsectarian (see Table 1). For the descriptive analyses, to retain full statistical power, we made comparisons between graduates of all-girls schools and coeducational high schools. For the regression analyses, however, we further limited the sample to graduates of non-sectarian and Catholic-affiliated high schools. We excluded the graduates from the other religion-affiliated high schools for this phase of analysis because this sub-sample of schools did not have enough graduates from each high school to allow for a meaningful interpretation of results. More details on the number of students and schools by school type can be found in Table 1. Further presentation of the sample by different demographic characteristics (including race/ethnicity, parental education, family income, etc.) is located in Table B1.

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1   In the present report, we use the term "independent" to characterize any school which is not publicly-funded/operated.

TABLE 1.

COUNTS FOR STUDENTS, HIGH SCHOOLS, AND COLLEGES BY HIGH SCHOOL TYPE[a]

	NONSECTARIAN		CATHOLIC		OTHER-RELIGIOUS	
	GS	CS	GS	CS	GS	CS
Number of Students	150	1,269	922	1,928	62	1,557
Number of High Schools Represented	12	261	68	267	25	417
Number of Colleges Attended	60	151	129	171	9	173

[a] Girls' Schools (GS) and Coeducational Schools (CS)

The distribution of the girls' school and coeducational school graduates by selected high school and college characteristics is shown in Table 2. In the present study, the girls' school alumnae tended to attend schools located in urban and/or West coast settings, whereas their coeducated counterparts more often came from schools located in urban and/or South and West coast settings. For both all-girls and coeducated alumnae, respondents to the 2016 survey were more likely to attend private colleges than public colleges. Notably, and perhaps unexpectedly, all-girls high school alumnae in our sample were slightly less likely than their coeducated counterparts to have chosen to attend a women's college.

Analytic Methods

In order to answer our first research question, inquiring how students are different or similar by school context, we examined selected variables to ascertain the differences between graduates of all-girls and coeducational high schools. To do so, we utilized chi-square tests or t-tests, depending on the type of variable under consideration. In the analyses of differences using chi-square, we further used z-tests with a Bonferonni correction to identify significant differences between the two groups. To answer the second research question, inquiring if the results remain after controlling for institutional and individual characteristics, we employed multilevel modeling, which is widely used to analyze nested data such as students within schools or classes. With multilevel modeling, it is possible to isolate the effect of a school characteristic (such as school gender) and the effects related to differences among students enrolled in these schools (Lee, 2000). This technique appropriately partitions variation in the outcome variable to the individual and school levels (Raudenbush & Bryk, 2002). In the case of the present study, students are nested within high schools, so multilevel modeling may better account for the unique contribution made by all-girls schools while holding other student- and school-level characteristics constant. For all data analyses, statistical significance was set at $p < .05$.

TABLE 2.

DISTRIBUTION OF THE SAMPLE BY HIGH SCHOOL AND COLLEGE CHARACTERISTICS

	OVERALL GIRLS' SCHOOLS N = 105	OVERALL COEDUCATIONAL N = 945
HIGH SCHOOL VARIABLES		
Median 12th grade enrollment	121.0	107.0
Mean Student-Teacher Ratio	11.9	12.6
Percent with Library	96.1	93.7
Region		
Northeast	16.7%	8.1%
Midwest	15.5%	18.8%
South	19.1%	34.6%
West	48.8%	38.5%
Urbanicity		
Urban	58.5%	53.3%
Suburban	40.5%	35.2%
Town and rural	1.0%	11.5%
Grade span: High school only	77.0%	49.0%
COLLEGE VARIABLES		
Median selectivity (SAT composite or equivalent ACT scores)	1215.0	1211.0
Control and type		
Public university	13.9%	16.1%
Public four-year college	11.5%	10.6%
Private university	24.4%	19.2%
Private four-year college	32.4%	39.4%
Institutional gender		
Women's college	1.9%	3.0%
Coeducational college	98.1%	97.0%

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Variables

To offer a comprehensive analysis of the current data, this study explored a great number of variables that are available from the CIRP Freshman Survey, following the analytic models used by Sax et al. (2009). Consequently, the current study includes most of the variables that were considered in Sax et al. (2009) with a few exceptions. Specifically, variables asked in 2009 but not asked in 2016 were necessarily omitted completely. Additionally, variables used in 2009 were omitted from the inferential models or replaced with other new variables in the current study when the variable did not show statistically significant differences (between girls' school and coeducational school graduates) in the new analysis. For example, self-ratings of computer skills and religiousness are not examined in the current study because they were not asked in the 2016 survey; and self-rating on physical health was omitted as a dependent variable in the current study's inferential models because this measure's difference between girls' school and coeducational school graduates was not statistically significant in the 2016 data. However, the present study examines more recent additions to the CIRP Freshman Survey, such as survey items asking about students' science identity, habits of mind, and ability to work with diverse people. A complete list of variables examined in the present study is listed in Appendix B.

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Differences between Girls' School and Coeducational School Graduates

With our first research question, "In what ways are today's women graduates of girls' schools different from their coeducational-school attending peers?," we aim to create a portrait of girls' school graduates in the early 21st century. In particular, we examine how these women might differ from their coeducated peers in terms of family education and income, college decision-making, aspirations, and goals. We also review academic habits and experiences to understand how these students' high school experiences may have differently prepared them for college and beyond. This section uses data from the 2016 Freshman Survey to identify differences between independent all-girls school graduates and women graduates from independent coeducational schools.

In this section, we present our findings related to students' demographic backgrounds, their reasons for attending college, academic engagement, science self-confidence, degree aspirations, community engagement, global citizenship, political engagement, use of free time, and well-being and spirituality. The results in the following sections reveal areas in which the graduates are different and highlight notable areas of similarity. As noted in the methods section, differences were examined using chi-square tests (for dichotomous variables), z-tests with Bonferonni post-hoc corrections (for variables with more than two response options, e.g., "hours per week"), and t-tests (for continuous variables). All differences presented in this section are statistically significant at $p <$ .05. A full presentation of the results is available in Appendix B.

Demographic Background

Before discussing the differences in girls' high school experiences and outcomes, an examination of how girls' school and coeducational school graduates in this study differ in terms of demographic background is in order. This section answers the question, "How do girls' school graduates in this study differ from their coeducated peers in terms of race/ethnicity, parental education, financial background, and high school academics?"

Race and ethnicity differences. Respondents from girls' schools differed slightly in terms of race/ethnicity from those respondents who graduated from coeducational schools. For both groups, the majority of respondents identified as White or Caucasian. However, White respondents from coeducational schools made up almost three-quarters of their sample, while White students comprised just under two-thirds of the girls' school sample (GS = 64.1 percent, Coed = 71.8 percent). Additionally, among the respondents, there were slightly more East Asian-identifying students (GS = 6.3 percent, Coed = 8.8 percent) and Native Hawaiian/Pacific Islander-identifying students (GS = 0.6 percent, Coed = 1.7 percent) in the coeducational school sample, and slightly

more students identifying as Mexican American/Chicano (GS = 14.1 percent, Coed = 8.5 percent), "Other" Latino (GS = 10.3 percent, Coed = 7.7 percent), and Filipino (GS = 6.0 percent, Coed = 3.5 percent) among the girls' school sample. For the remaining categories of race/ethnicity, the racial composition of respondents from all-girls schools roughly resembled the racial composition of respondents from coeducational schools. A full description of the study sample by race/ethnicity is located in Table B1.

Family education. Pertaining to students' outcomes as they leave high school and pursue college education, one important factor to examine is parental education. Parental education is widely found to be a key indicator of students' academic success in high school and also a predictor of students' degree aspirations in college (Mayhew et al., 2016). In particular, research shows that students whose parents have higher levels of education are more likely to aspire to higher levels of education themselves (e.g., graduate degrees; see Mayhew et al., 2016) and are likely to have higher academic achievement in high school and college (e.g., GPA). Previous studies of girls' school graduates found that graduates of girls' schools were somewhat more likely to have college educated parents (Sax et al., 2009). In the present study, girls' school graduates were equally as likely as their coeducated peers to have parents with college degrees (GS = 37.8 percent, Coed = 35.7 percent); however, girls' school graduates were somewhat less likely than their peers to have parents with graduate degrees (GS = 42.7 percent, Coed = 46.7 percent).

Financial backgrounds. As noted above, students' parental education is a commonly cited predictor of student achievement in high school and college. Likewise, students' economic backgrounds are also frequently found to be related to their achievement in high school, choice of college, and use of free time (Bozick, 2007; Renn & Reason, 2013). In the present study, the two groups of respondents, those from all-girls schools and those from coeducational schools, were remarkably similar in terms of family income. In fact, there were no statistical differences in income between the two groups. Just over 20 percent of the participants in the current study reported a family income of over $250,000 annually, while slightly less than 20 percent reported annual family income of less than $60,000. Most of the students were distributed in the middle of the range, reporting a family income of $60,000 to $150,000 annually. See Table B1 for specific distributions by income level.

Because there is no family income differential, we might posit that there would be no difference in extracurricular employment between the two groups of respondents – and in fact, that is what we found. Graduates of girls' schools were similar to their coeducated peers in terms of time spent working, with about 30 percent of both groups working between one and ten hours per week. Interestingly, among both groups, over 50 percent of the sample did not have a job at all in the past year2. Respondents were also equally likely to say that they had a "very good chance" of getting a job to pay for college, another measure that is likely related to their similar family incomes (see Table B1).

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2   When comparing these results to the national results from the 2016 Freshman Survey (TFS), they are fairly similar. For example, among TFS respondents, 43% indicate that they did not work at all in the past year with 28% indicating they worked between 1-10 hours per week (Eagan, Stolzenberg, Zimmerman, Aragon, Whang Sayson, & Rios-Agular, 2017).

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Despite the similarities in employment rates and employment expectations, among our respondents, graduates from all-girls schools were more cost conscious about the college experience than their coeducated peers. In particular, when asked if they had concerns about paying for college, 66.5 percent of girls' school graduates indicated "some or major concerns" compared to only 59.4 percent of their peers. Additionally, girls' school graduates were more likely than their coeducated peers to say they chose their college because of low tuition cost (GS = 43.6 percent, Coed = 37.5 percent) and because graduates of their intended college get good jobs (GS = 64.6 percent, Coed = 59.8 percent). However, the two groups of women were equally likely to attribute their college choice to financial aid packages offered by the college. These findings paint a portrait of a girls' high school graduate who is cost-conscious and aware of the financial impact of college for herself and her family.

High school academics. Finally, to gain further understanding of how those responding to the survey may be different in terms of demographic characteristics, we examined their academic performance in high school in terms of their grade point average (GPA) and standardized test scores. In the present study, the majority of graduates in both groups were most likely to have an A- or higher GPA, with female graduates of coeducational independent schools slightly more likely to have A or A+ grades (GS = 25.6 percent, Coed = 34.4 percent) and those from all-girls schools more likely to have earned an A- average (GS = 36.9 percent, Coed = 33.2 percent). These findings are not surprising, as some research has highlighted the rigorous nature of all-girls education, including suggesting that students at all-girls schools are being more academically challenged and that girls' schools have a stronger emphasis on academic engagement and rigor (Holmgren, 2014; Lee & Marks, 1990). Higher levels of rigor may be reflected in slightly lower GPAs as well as more time spent on school work. This appears in the present study, girls' school alumnae were five percentage points more likely than their coeducated peers to say they spent 11 or more hours per week studying and doing homework (GS = 41.9 percent, Coed = 36.7 percent), whereas coeducated graduates were slightly more likely to report spending only one to two hours on homework (GS = 10.0 percent, Coed = 13.2 percent).

In terms of reported standardized test scores, there were no statistical differences between the two groups. Women from all-girls contexts reported scoring just over 600 points on their SAT verbal and nearly 600 on SAT math, and their coeducated counterparts were about the same. These findings held true on ACT performance as well, with graduates from both groups reportedly scoring 27. See Table B1 for more information related to standardized test scores and GPA.

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College Choice

Taking into account the above differences and similarities in students' demographic characteristics at the point of college entry, as well as their varying financial concerns regarding college attendance, the following section examines differences in students' college-going patterns by school context. Specifically, we present students' reasons for going to college, in general, and their reasons for choosing their specific college, and examine differences and similarities between graduates of all-girls schools and coeducational schools. Within this set of variables, we note a number of significant differences.

College plans. When looking at students' plans to attend college, we found a few notable differences regarding where they planned to attend and where they planned to live. Most of the women in the study, regardless of school context, planned to live more than 100 miles away from their family home (57-65 percent of both groups; see Table B2), and most planned to live on campus (82-88 percent of both groups). However, women from all-girls independent high schools were more likely to say that their intended college was within 100 miles of their home compared to their coeducated peers (GS = 42.0 percent, Coed = 35.9 percent). Accordingly, coeducated graduates were about seven percentage points more likely to say they would attend college between 101 and 500 miles from home (GS = 22.0 percent, Coed = 28.8 percent). The two cohorts were equally likely to say they would attend college more than 500 miles away. Considering that graduates from all-girls high schools plan to attend college somewhat closer to home, it is not therefore surprising that while most planned to live on campus, a greater proportion of girls-school graduates plan to live with family or relatives while in college (GS = 15.9 percent, Coed = 9.6 percent). As expected based on these findings, coeducated alumnae indicated slightly more expectation of living on campus than their peers (GS = 82.8 percent, Coed = 88.3 percent). See Table B2 for more information related to students' college choice.

Reasons for going to college. Almost all the graduates in our study said that they wanted to attend college to learn more about things that interest them and to gain a general education and appreciation of ideas. There were no significant differences between the two groups for these variables (see Table B2). However, more women from all-girls schools said that the reason they were attending college was to get a better job (GS = 84.5 percent, Coed = 81.1 percent), to become a more cultured person (GS = 67.4 percent, Coed = 63.5 percent), or to prepare for graduate school (GS = 67.4 percent, Coed = 62.6 percent). Finally, graduates of all-girls schools were more likely than their coeducated peers to say that pleasing their family was a very important reason for attending college (GS = 34.6 percent, Coed = 31.2 percent). The cohorts were equally likely to attribute their reasons for attending college to making more money and getting training for a specific career (see Table B2).

Reasons for choosing their college. Knowing why students choose to go to college provides insight into college-going behaviors in general. The following section delves more deeply into why students chose to attend their specific college, helping us to understand ideas behind college attendance decision-making. Results in this section highlight the financial position and concern of graduates from girls' schools and mirror some of the previous findings regarding financial concerns (see above). For example, graduates from all-girls school contexts were more likely to say that the "cost of attending this college" explains the reason for their college choice (GS = 43.6 percent, Coed = 37.5 percent) and that they were either not offered financial aid by their first-choice college (GS = 14.4 percent, Coed = 11.2 percent) or could not afford their first-choice college (GS =16.3 percent, Coed = 13.0 percent). Likewise, echoing the forward thinking highlighted in the previous section, women from all-girls high schools are more likely than their counterparts to choose a college because its graduates get admitted to top graduate schools (GS = 43.4 percent, Coed = 39.3 percent) and/or because its graduates get good jobs following college (GS = 64.6 percent, Coed = 59.8 percent). Unlike their coeducated peers, graduates of all-girls schools are less likely to choose a college based on social and extracurricular reputation than other reasons - though about half of both groups indicated this was a reason for their college choice (GS = 50.5 percent, Coed = 55.1 percent). Finally, graduates of girls' schools were less likely to choose a college because of its religious affiliation (GS = 13.1 percent, Coed = 20.1 percent). See Table B2 for more information.

In all, the two groups of women were more alike than different in terms of their college choice process. For example, almost half of the women in both groups indicated that they chose their college because they were offered financial assistance or because the "college's graduates make a difference in the world," and over two-thirds of both groups said they chose their college because of its academic reputation. Early admittance programs influenced about 20 percent of all respondents, who said the reason they chose their college was that they were admitted through such a program (see Table B2). A majority of the students in both groups indicated the size of the school was an important factor in their choice ("I wanted to go to a college this size"), and a visit to campus was an important factor in college choice for about 60 percent of each group (see Table B2). Finally, about 20 percent of each group indicated that national college rankings played a role in their decision-making process.

Many scholars and administrators attribute college choice to the influence of family or high school counselors (Renn & Reason, 2013). In contrast to prevailing research, in this study, familial and counselor influence was no stronger than the influence of college rankings or early admittance programs. For example, just under 20 percent of all respondents reported they chose their college because their parents or relatives wanted them to attend and/or because they wanted to live near home. External advisors influenced the college decision for a small portion of respondents in both groups, with about 15 percent of the graduates marking high school guidance counselors as a reason for their college choice, about 10 percent noting private college counselors, and about 8 percent acknowledging teachers. These external advisors were similarly influential across school contexts. See Table B2 for distributions by school type.
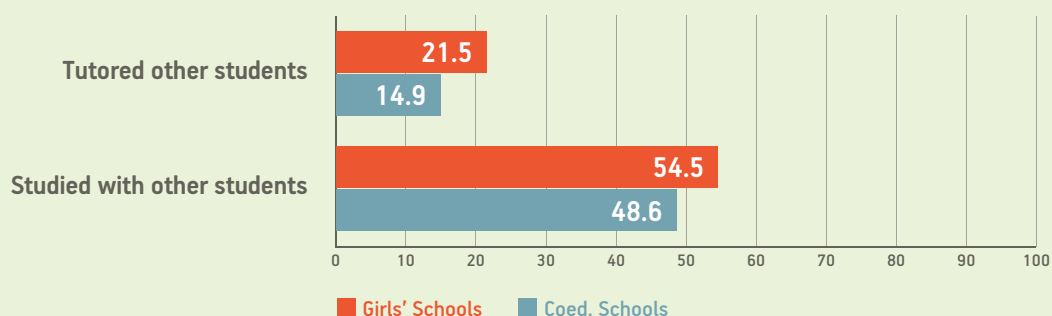
Academic Engagement

Self-confidence. One of the benefits of all-girls education, as noted by prior research (e.g., Sax et al., 2009; Sax, Riggers & Eagan, 2013), is the difference in various areas of self-confidence between the two groups favoring all-girls settings. However, within the present study, we found no differences in students' self-rated intellectual self-confidence, mathematical ability, academic ability, drive to achieve, or writing ability. These findings were unexpected considering the findings of previous studies; however, the results may be attributable to a number of factors. For example, since the question asks students to compare themselves to their peers, it is possible that the ratings are reflecting a perceived change in ability of all students in their school or grade (the expected referent community), such that everyone around them seems smarter. Alternatively, it is possible that respondents' referent group has changed compared to previous research. Specifically, the increasing prevalence of social media may change students' referent groups, such that they are not just comparing themselves to the students in their class or school, but also to their connections on social media. Further, the population of respondents may have changed in a substantive way in the ten years between the two studies or the population of students attending girls' schools may have changed in a significant way.

Despite similarities in the areas of self-confidence now observed between the two groups, graduates of all-girls schools exhibited a number of differences in how they engage with other students and in their academic habits of mind. The next sections discuss results in these two categories.

Engaging with other students. In examining academic engagement, we found that women from all-girls schools participate in cooperative learning more often than their coeducated peers. In particular, they are at least six percentage points more likely to say they "frequently" tutored other students (GS = 21.5 percent, Coed = 14.9 percent; Figure 1) or studied with other students (GS = 54.5 percent, Coed = 48.6 percent; Figure 1) in the past year (see Table B3). They also spent more time in student clubs and groups than their coeducated counterparts. Specifically, 27.5 percent of girls' school alumnae spent "6 or more hours" per week participating in clubs or groups compared to 25.1 percent of coeducational school alumnae. Coeducated women were somewhat more likely to say they spent no time in student clubs/groups (GS = 8.3 percent, Coed = 12.5 percent). See Table B3 for more information on these variables.
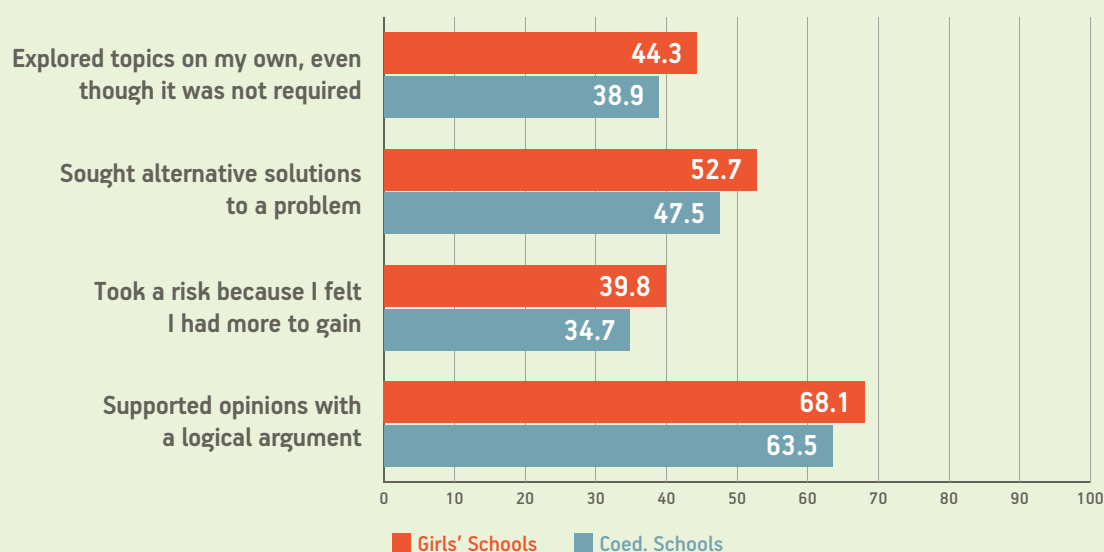

FIGURE 1. *In the last year, I frequently...*

Tutored other students — Girls' Schools: 21.5, Coed. Schools: 14.9

Studied with other students — Girls' Schools: 54.5, Coed. Schools: 48.6

Girls' Schools   Coed. Schools

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Habits of mind. Habits of mind represent "a group of behaviors and traits associated with academic success" (Sharkness, DeAngelo, & Pryor, 2010, p. 23). These variables include behaviors such as asking questions in class, supporting arguments with logic, risk-taking, and accepting mistakes as part of the learning process. In short, these behaviors are typically associated with lifelong learning. Girls' school alumnae demonstrated advantages in a number of areas compared with their coeducated peers in this group of variables, although they shared similar characteristics as well.

Considering how they approach learning, alumnae from girls' schools were more likely to take risks and seek alternative solutions (Figure 2). For example, 39.8 percent of girls' school alumnae said they "frequently" took a risk because they felt they had more to gain, compared to 34.7 percent of their coeducated peers. Likewise, they were five percentage points more likely to say they "frequently" sought alternative solutions to a problem (GS = 52.7 percent, Coed = 47.5 percent) and that they "frequently" explored topics on their own, even when not required (GS = 44.3 percent, Coed = 38.9 percent). Supporting these risk-taking and exploratory behaviors, 40.4 percent of girls' school alumnae said they "frequently" took on a challenge that scared them compared to 36.1 percent of their coeducated peers (see Table B3). Graduates of all-girls schools were also about four percentage points more likely to report "frequently" supporting their opinions with logical arguments (GS = 68.1 percent, Coed = 63.5 percent). Girls' school alumnae were also somewhat more likely to say they "frequently" sought out solutions to a problem and explained them to others (GS = 64.9 percent, Coed = 61.1 percent). These results highlight an important difference in girls' school students' willingness to explore topics and take risks at higher rates than their peers in coeducational settings. Girls' school graduates' proclivity to explore topics and take risks is further supported by the finding that, in this sample, girls from girls' schools were more likely to classify their critical thinking ability as "somewhat strong" or a "major strength" (GS =41.0 percent, Coed

FIGURE 2. *In the last year, I frequently...*

	Girls' Schools	Coed. Schools
Explored topics on my own, even though it was not required	44.3	38.9
Sought alternative solutions to a problem	52.7	47.5
Took a risk because I felt I had more to gain	39.8	34.7
Supported opinions with a logical argument	68.1	63.5

= 37.2 percent) and to report their risk-taking ability as "above average" or in the "top 10%" more often than their coeducated peers (GS = 41.5 percent, Coed = 37.7 percent; see Table B3).
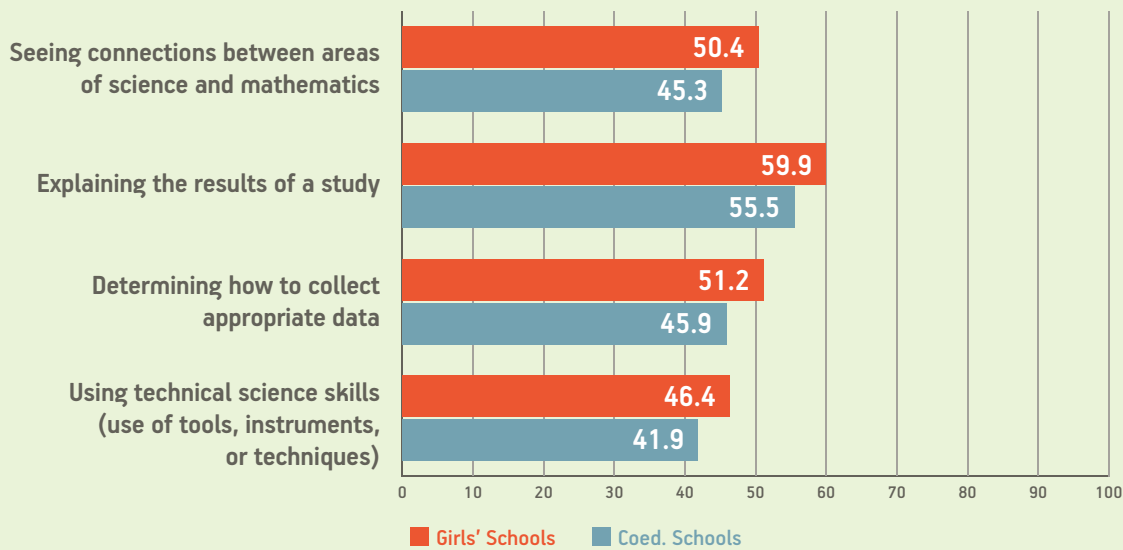
When it comes to moments of uncertainty, graduates from all-girls schools were as likely as their coeducated peers to "frequently" ask questions in class and to accept mistakes as part of the learning process. The two groups were also equally likely to say that they "frequently" evaluate the quality of information they receive and analyze multiple sources of information before coming to a conclusion. About half of students in both groups said they "frequently" evaluated the quality or reliability of information they received in the last year, and only a small portion, just under 30 percent for both groups, said they "frequently" looked up scientific research articles and resources. In these ways, girls' school alumnae are similar to their coeducated peers in being willing to source answers to their questions and critically examine evidence presented to them. More details related to academic self-confidence and engagement are located in Table B3.

Science Self-Confidence and Identity

One area in which advocates believe all-girls schools and classrooms provide an advantage to students is in the realm of science self-confidence and preparation. In particular, scholars have consistently noticed a chilly-climate effect within mixed-gender classrooms in high school and college (Whitt, Edison, Pascarella, Nora, & Terenzini, 1999), in which young women are offered fewer opportunities to contribute verbally or physically in the science classroom or are discouraged when they attempt to contribute. The following set of variables examines students' self-confidence in science-related skills and the extent to which they perceive themselves as scientists.

Science self-efficacy. First, we examined variables related to science self-confidence, specifically investigating whether women graduates of all-girls high schools felt differently from their coeducated peers with respect to their confidence in a set of science-related skills. Within this group of variables, we noted a number of advantages to graduates of girls' high schools. For example, alumnae from girls' high schools expressed greater confidence in their ability to explain the results of a study compared to their counterparts from coeducational high schools (59.9 percent vs. 55.5 percent; see Table B4). Additionally, 51.2 percent of girls' school alumnae were "very" or "absolutely confident" they could "determine how to collect appropriate data" compared to 45.9 percent of their coeducated peers. Girls' school graduates were also more likely to say they were "very" or "absolutely confident" in their "understanding of scientific concepts" (GS = 51.7 percent, Coed = 47.8 percent), "use of technical science skills (e.g., use of tools, instruments, and techniques)" (GS = 46.4 percent, Coed = 41.9 percent), and their knowledge of how to generate a research question (GS = 44.9 percent, Coed = 41.2 percent). Notably, girls' school alumnae were four percentage points more likely to say they see connections between different areas of math and science (GS = 50.4 percent, Coed = 45.3 percent). Students educated in all-girls high schools were also more likely, by about four percent, to believe that math skills are malleable; that people can become better at math - a chief aspect of a growth mindset, which will help them persevere when they encounter difficulties in math courses (Boaler, 2013; Hill, Corbett, & St. Rose, 2010).

FIGURE 3. *Science Skills (% indicating "confident" or "very confident")*

Category	Girls' Schools	Coed. Schools
Seeing connections between areas of science and mathematics	50.4	45.3
Explaining the results of a study	59.9	55.5
Determining how to collect appropriate data	51.2	45.9
Using technical science skills (use of tools, instruments, or techniques)	46.4	41.9

■ Girls' Schools   ■ Coed. Schools

While there were a number of areas in which girls' school alumnae felt more confident than their coeducated counterparts, there were also a number of aspects of science in which the two groups were similarly confident. For example, about three-quarters of both groups felt confident they knew how to ask relevant questions, about two-thirds reported being confident in identifying what is known or not known about a problem, and about half indicated confidence in their ability to integrate results from multiple studies. Table B4 provides full results for students' science skills by school type.

Science identity. Considering that graduates of all-girls high schools demonstrate more self-confidence in many of their science skills than their coeducated peers, we next look at how these students view their identity as scientists. About one-fifth of girls' school alumnae (19.5 percent) said they think of themselves as scientists compared to just 16.4 percent of coeducated graduates (see Table B4). Not only were these alumnae more likely to see themselves as scientists, but girls'

FIGURE 4. *I feel like I belong in the field of science (% noting "somewhat" or "strongly agree")*

	Girls' Schools	Coed. Schools
	38.0	31.3

■ Girls' Schools   ■ Coed. Schools
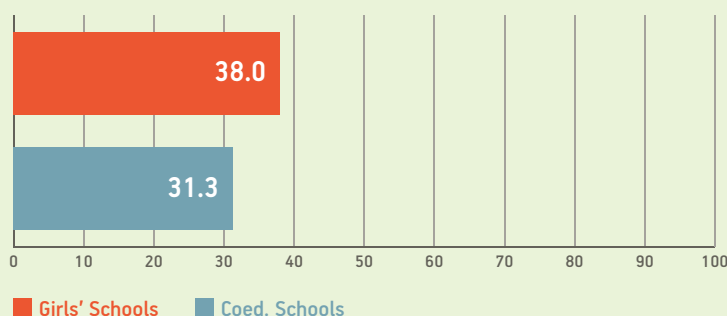
school graduates were also about seven percentage points more likely to say they "feel like they belong in the field of science" compared to their peers (GS = 38.0 percent, Coed = 31.3 percent; Figure 4), and these students reported a stronger sense of belonging to a community of scientists (GS = 26.4 percent, Coed = 22.5 percent).

Additionally, just over half of the graduates from girls' schools reported that they "derive great satisfaction from working on a team that is doing important research" compared to just under half of their peers from coeducational schools (GS = 53.9 percent, Coed = 46.7 percent). A smaller group from both contexts indicated making a theoretical contribution to science as a "very important" or "essential" goal, with graduates from all-girls schools slightly more likely to aspire to this goal (GS = 23.9 percent, Coed = 20.3 percent). See Table B4 for more information regarding students' science identity by school type.

Planned Academic Major

In light of the above findings, it is perhaps not surprising that alumnae from all-girls high schools planned to major in STEM in college at higher rates than their counterparts (GS = 29.7 percent, Coed = 24.1 percent; see Table B5). Analyses of sub-disciplines within STEM provided additional insight into these differences. Specifically, these women were more likely to plan to major in biology/health professions (GS = 32.9 percent, Coed = 28.3 percent) and to plan to major in mathematics or computer science (GS = 4.4 percent, Coed = 2.6 percent) than their coeducated counterparts (see Table B5). These findings were similar to those found in prior research (Sax et al., 2009), in particular as they relate to science, technology, engineering, and mathematics/statistics (STEM) in general and mathematics/computer science specifically. Considering the persistent under-representation of women in STEM fields – and in mathematics/statistics and computer science in particular (Sax et al., 2017; Sax, Kanny, Riggers-Piehl, Whang, & Paulson, 2015) – the fact that women from all-girls' high schools were more interested in these majors points to an interesting area to explore further.

While women from girls' schools were more likely to plan to major in STEM, their peers from coeducational schools were more likely to indicate planned majors in education and the arts. Specifically, women from coeducational contexts were slightly more likely to choose either education (GS = 2.7 percent, Coed = 4.9 percent) or the fine arts (GS = 4.1 percent, Coed = 6.6 percent) than their peers from girls' schools. These findings align with a greater interest on the part of graduates from coeducational schools, in becoming accomplished in the performing arts, writing original works, and creating artistic works, differences which are discussed further in the upcoming section on career aspirations.

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Degree and Career Aspirations

Career aspirations. Women from girls' school contexts seemed to be somewhat more career-minded than their peers, specifically when considering how their college participation may help them secure a good career. For example, 84.5 percent considered college attendance an important tool to help them get a better job compared to 81.1 percent of their coed peers (see Table B6). Additionally, 81.5 percent aspired to be well-off financially compared to 76.3 percent of their coeducational school attending counterparts. Noting that over three-quarters of both groups aspired to be financially well-off, it is perhaps not surprising that just over 60 percent of both groups shared a belief that college attendance would help them be wealthier in the future (see Table B6). They were also equally interested in being successful in their own business. Finally, in keeping with research on the current generation of college students (Seemiller & Grace, 2016), respondents were also equally interested in raising a family. In the present study, about three-quarters of both groups reported raising a family in the future as a "very important" or "essential" goal (see Table B6).

In keeping with their focus on having a good job and being more financially secure, women from all-girls schools also indicated greater desire for their good work to be acknowledged. While both groups aspired equally to be an authority in their field, graduates from all-girls schools were about four percentage points more likely to say that obtaining recognition from their colleagues was an "essential" or "very important" goal (GS = 59.0 percent, Coed = 54.7 percent). See Table B6 for more information on students' career-related goals.

STEM career aspirations. As noted in the section on academic majors, graduates of girls' schools were more likely to plan to major in STEM. In the present study, we found that while both groups were equally likely to consider most STEM careers, girls' school alumnae were more likely to aspire to careers in Engineering (GS = 4.1 percent, Coed = 2.1 percent). They were also more likely to aspire to careers in the health professions (GS = 11.3 percent, Coed = 9.1 percent; see Table B6).

Artistic and educational career aspirations. Graduates of all-girls schools were not only less likely to intend to major in the arts or education, they were also less likely to pursue careers in arts and education (Artist: GS = 6.2 percent, Coed = 9.4 percent; Education (PK-12): GS = 2.8 percent, Coed = 6.5 percent). The greater interest shown by coeducated women in arts, in particular, was confirmed in strong goals related to careers in the arts. Specifically, women graduates of coeducational schools were more likely to say they hope to become accomplished in the performing arts (GS = 16.9 percent, Coed = 19.8 percent), more likely to "desire to write original works (e.g., poems, novels, etc.)" (GS = 16.4 percent, Coed = 21.1 percent) and to "desire to create artistic works (e.g., painting, sculpture, etc.)" (GS = 16.7 percent, Coed = 21.4 percent). In keeping with these results, graduates of all-girls schools also indicated somewhat lower levels of self-confidence in their artistic ability (GS = 32.5 percent, Coed = 37.4 percent), although about half of the respondents in both groups tended to rate themselves as "above average" or in the "top 10%" in creativity compared to their peers (see Table B6).

Degree aspirations. We next examined how graduates from all-girls high schools may differ from alumnae from coeducational high schools in terms of their collegiate degree aspirations. In the present study, graduates from all-girls high schools were four percentage points more likely to aspire to a terminal graduate degree - for example, a doctorate, law, or medical degree (GS = 44.4 percent, Coed = 39.0 percent), whereas graduates of coeducational high schools were slightly more likely to say they were aspiring to an undergraduate degree (BA/BS; GS = 18.5 percent, Coed = 22.4 percent). Girls' school graduates' interest in graduate education is particularly notable in light of the differences in their parental education. In particular, as noted above, girls' school alumnae in the present study were less likely to have parents with graduate degrees than their coeducated counterparts. Typically, the relationship between graduate degree aspirations and parental education is positively correlated (Mayhew et al., 2016), so this finding is particularly important in thinking about how school context might be helping students overcome this barrier.

Community Engagement

As with previous reporting (see Sax et al., 2009), graduates from all-girls schools exhibit some differences from their coeducated peers when it comes to volunteerism and community engagement. Considering volunteering activities, graduates of all-girls schools were slightly more likely to have performed volunteer work in the past year, with just over half (51.5 percent) saying they had "frequently" done so compared just under half (47.0 percent) of coeducated graduates. However, considering their plans for the future, about half of the graduates from both contexts reported a "very good chance" that they will participate in volunteer or community service in the future (see Table B7).

Examining their attitudes toward community engagement, there were a few notable differences for women by school gender context. In particular, women from girls' schools were four percentage points more likely to say that becoming involved in cleaning the environment was a "very important" or "essential" goal (GS = 35.5 percent, Coed = 30.8 percent; Figure 5), and they were eight percentage points more likely to say the same about participation in community action programs (GS = 49.7 percent, Coed = 41.5 percent). They were just as likely as their coeducated peers to say they have a goal of helping others who are in difficulty and becoming a community

FIGURE 5. *Community Engagement (% indicating "very important" or "essential" goal)*

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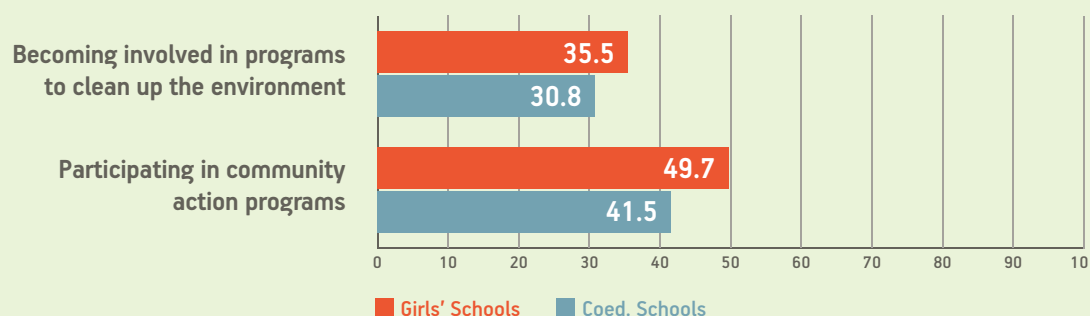
leader. Likewise, just over half of the women from both groups rated influencing social values as a "very important" or "essential" personal goal (see Table B7).

Global Citizenship and Diverse Interactions

In addition to their approach to community engagement, some differences showed in how students from girls' school contexts diverge from their coeducated peers in terms of their desire to participate in diverse interactions and to promote global citizenship (see Table B8). The 2016 survey included a series of questions that investigated students' cooperative strengths, or students' self-rated abilities in working cooperatively, openness to new ideas, and abilities to discuss controversial issues. This section explores students' strengths in addition to questions related to their behaviors and goals of increasing diverse interactions and cultural understanding.

Girls' school graduates indicated more frequent interactions with people of different ethnic groups compared to their coeducational-school attending peers (GS = 84.9 percent, Coed = 79.8 percent). Perhaps because of these frequent interactions, about three-quarters of the graduates from all-girls schools said they considered improving their understanding of other cultures a "very important" or "essential" goal, compared to just under 70 percent of their peers (GS = 74.9 percent, Coed = 69.7 percent; Figure 6). Additionally, they were almost 10 percent more likely than their coeducated peers to have goals of helping to promote racial understanding (GS = 59.1 percent, Coed = 50.3 percent).

Graduates from all-girls high schools were more likely than their coeducated peers to characterize their "tolerance of others with different beliefs" as "somewhat strong" or "a major strength" (GS = 50.3 percent, Coed = 45.2 percent; Figure 7). Girls' school graduates also indicated their ability to work cooperatively with diverse people as "somewhat strong" or "a major strength" (GS = 61.8 percent, Coed = 56.1 percent). However, graduates from both contexts similarly rated their abilities to see the world from someone else's perspective and to discuss and negotiate controversial issues, with about a third of both groups indicating these were somewhat strong or major strengths. Finally, about a quarter of respondents in both groups agreed that their openness to having their views challenged was "somewhat strong" or "a major strength." Table B8 provides more detailed information on students' interest in global and diverse interactions.

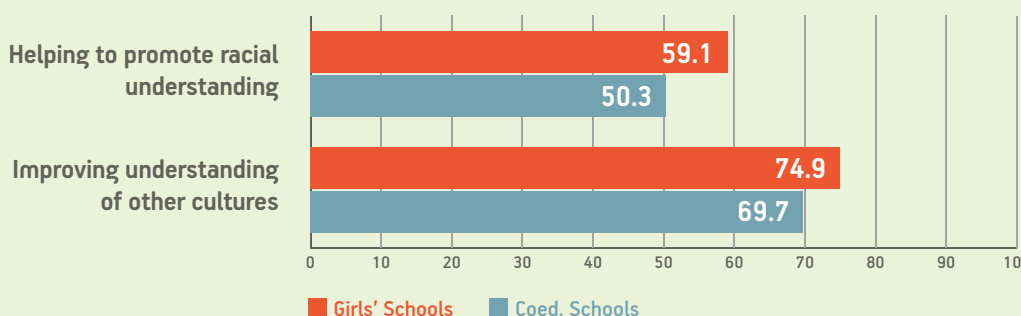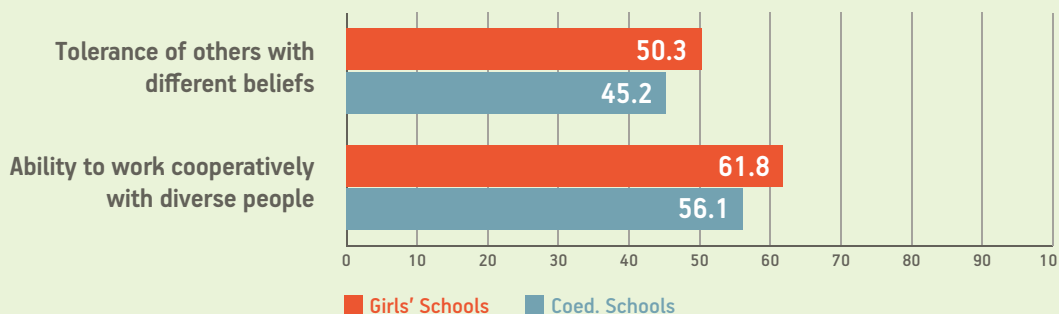FIGURE 6. *Global Citizenship and Diverse Interaction (% marking "very imp." or "essential")*

Helping to promote racial understanding: Girls' Schools 59.1, Coed. Schools 50.3

Improving understanding of other cultures: Girls' Schools 74.9, Coed. Schools 69.7

■ Girls' Schools   ■ Coed. Schools

FIGURE 7. *Diverse Interaction (% marking "somewhat strong" or "a major strength")*

Leadership and Political Engagement

In previous research, there were marked differences between the political beliefs of those who attended all-girls schools and their peers. In particular, graduates of all-girls schools were more likely to be politically liberal and to tend to hold more socially liberal political views (Sax et al., 2009). Many of these traits remained true in the present study. For example, the women in the present study who attended girls' schools were more likely to identify as "liberal" or "far left" than their coeducated peers (GS = 44.2 percent, Coed = 35.4 percent). Those who attended coeducational schools were about eight percentage points more likely to identify as "conservative" or "far right" (GS = 19.3 percent, Coed = 27.0 percent).

In terms of political interest and engagement, girls' school graduates were more likely to say they had political goals and experiences. In particular, graduates from all-girls schools were seven percentage points more likely to consider keeping up with political affairs a "very important" or "essential" goal (GS = 53.9 percent, Coed = 46.9 percent; Figure 8) and four percentage points more likely to desire to influence the political structure (GS = 26.8 percent, Coed = 23.2 percent). Women who attended girls' schools were also more likely to plan to vote in a local, state, or national election in the future (GS = 74.2 percent, Coed = 68.6 percent; Figure 9).

FIGURE 8. *Political Engagement (% indicating "very important" or "essential" goal)*
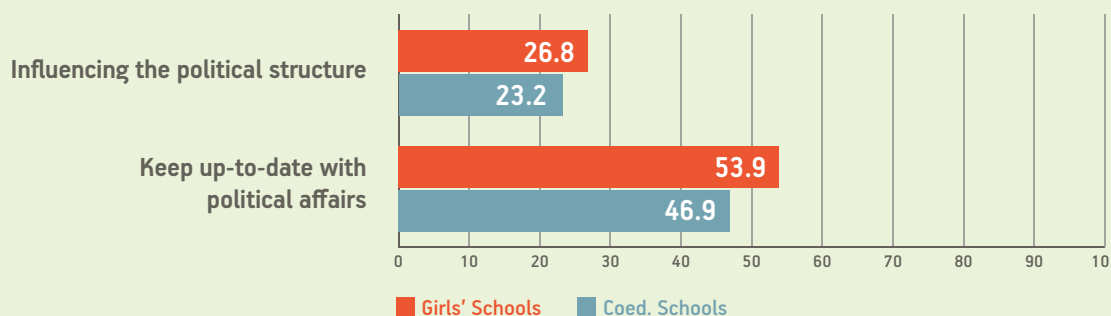
The difference in students' planned political participation is perhaps not surprising in light of the fact that, in the present sample, girls' school graduates were ten percentage points more likely to say they had "frequently" voted in a student election in the past year (GS = 38.7 percent, Coed = 28.8 percent). They were also more likely to say they had "frequently" discussed politics in the past year, with almost half of girls' school graduates reporting this behavior (49.2 percent) compared to just over 40 percent of coeducational graduates (44.1 percent). However, when it comes to active political involvement, including protesting and fundraising, the two groups were similarly inclined to participate. About 20 percent of each group said they had "frequently" publicly communicated their opinion about a cause in the last year, a slightly smaller percentage of them had frequently helped raise money for a cause, and only about five percent of either group had "frequently" participated in a boycott, rally, or protest in the past year (see Table B9).

Examining how these students may differ in terms of their views about political and social issues, there were a number of notable differences. In particular, in line with their stronger identification with the political left, graduates of girls' schools were more likely to agree that wealthy people should pay a larger share of taxes than they do now (GS = 71.5 percent, Coed = 60.4 percent), that addressing global climate change should be a federal priority (GS = 89.6 percent, Coed = 76.4 percent), and that the federal government should have stricter gun control laws (GS = 86.0 percent, Coed = 73.3 percent). Interestingly, these women also were slightly more likely to believe that affirmative action in college admissions should be abolished (GS = 50.6 percent, Coed = 44.3 percent). However, graduates from all-girls schools were just as likely as their peers from coeducational schools to agree that the federal government should raise taxes to reduce the deficit (just over a third of both groups), and almost all the women in both groups agree that sexual activity without affirmative consent is assault or rape (over 90 percent in both groups). Despite some differential beliefs in their political perspectives, graduates from both groups rated themselves "above average" or in the "top 10% compared to the average person" when it comes to understanding of others and compassion (see Table B9).

FIGURE 9. *"Very good chance" will Vote in a Local, State, or National Election in Future*

Girls' Schools: 74.2
Coed. Schools: 68.6

■ Girls' Schools ■ Coed. Schools
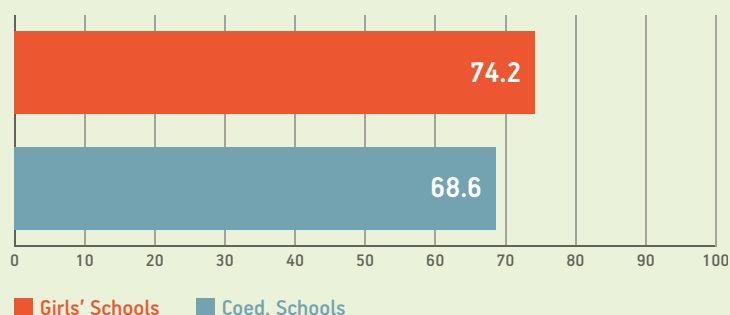
Finally, considering their leadership skills, graduates of girls' schools rated themselves fairly similarly to their peers on the three variables considered for this group, with one notable difference. Almost two-thirds of both groups rated their leadership ability as "above average" or in the "top 10%," and just under half indicated that they were "above average" or in the "top 10%" when it came to social self-confidence. However, Girls' school graduates showed higher confidence in their public speaking ability, as they were about four percentage points more likely than their coeducated peers to say that their speaking ability was "above average" or in the "top 10%" compared to an average peer (GS = 42.5 percent, Coed = 38.9 percent). See Table B9 for more information.

Free Time

Regarding how these two groups of women spend their free time, they were remarkably similar. In particular, the two groups spent about the same amount of time socializing with friends or using online social networks (see Table B10). They also spent about the same amount of time doing household chores or childcare. The time they spent exercising was mostly the same, with almost 30 percent of both groups indicating they spend "eleven hours or more" exercising per week, but slightly more graduates from all-girls schools reported that they spent between 0-2 hours per week exercising compared to their coeducated peers (GS = 26.5 percent, Coed = 21.7 percent). The most notable difference between the two groups was the proclivity of graduates from girls' schools to indicate they spend more time partying than their coeducated peers. In particular, coeducational school graduates were seven percentage points more likely to say they spent no time partying (GS = 33.3 percent, Coed = 40.5 percent), while girls' school graduates were more likely to say they spent between 3 and 10 hours per week partying (GS = 29.7 percent, Coed = 21.8 percent). In this study, girls' school graduates, were more likely than their coeducated peers to say they "occasionally" or "frequently" drank beer (GS = 36.0 percent, Coed = 30.6 percent) or wine or liquor (GS = 46.9 percent, Coed = 39.4 percent). These findings echo those from research on previous cohorts (e.g., Sax et al., 2009).

When asked about how they might use their free time when they get to college, about 20 percent of graduates from girls' schools indicated there was a "very good chance" they would join a sorority, a finding that also held true with their coeducated counterparts. A larger percentage, about two-thirds, of both groups said there was a "very good chance" they would participate in student clubs or groups in the future (see Table B9).

Well-Being and Spirituality

One area on which research is increasingly focused in the 21st century is the well-being of our high school and college students (Beiter et al., 2015; Buchanan, 2012; Duan, 2016). In many cases, this focus includes students' spiritual pursuits as well (Reymann, Fialkowski, Stewart-Sicking, 2015; Wilt, Grubbs, Exline, & Pargament, 2016). In the present study, students from both school contexts reported similar self-ratings about their emotional and physical well-being as well as their spiritual and religious engagement. Notably, about 40 percent of the students in both groups said they considered their emotional health "above average" or in the "top 10%" compared to their same-age peers (see Table B11). However, coeducated alumnae were slightly more likely to say the

same of their physical health (GS = 46.0 percent, Coed = 49.5 percent). Additionally, while over half of both groups indicated they "frequently" felt overwhelmed by all they had to do in the last year, graduates from all-girls schools were even more likely to report this than coeducated graduates (GS = 57.5 percent, Coed = 53.3 percent). Further, about half of each group indicated they frequently felt anxious in the past year, with just under 15 percent of each group saying they frequently felt depressed in the past year. In keeping with research about the current generation of students (Seemiller & Grace, 2016), who seem more aware of their mental health needs, almost 20 percent of the respondents in each group noted that there was a "very good chance" they would seek personal counseling in the future (see Table B11).

Lastly, regarding religious and spiritual engagement, previous research identified a few differences between coeducational and girls' school graduates (see Sax et al., 2009). In the present study, these two groups were similar in their self-ratings and spiritual goals. For example, just over 40 percent of both groups rated themselves in the "top 10%" or "above average" in terms of their spirituality. And about half of the respondents in each group indicated that developing a meaningful philosophy of life and integrating spirituality into their lives were "very important" or "essential" goals for the future (see Table B11). However, there were some differences in how engaged these students were in their religious practice in the past year. In particular, while about half of the respondents in both groups indicated they "frequently" attended religious services, when we consider those students who said they "occasionally" did so, participation in religious services favors graduates of all-girls schools (GS = 90.6 percent, Coed = 84.6 percent). In terms of frequency of discussing religion, almost all the participants said they did so at least occasionally. However, when comparing students who said they discussed religion "occasionally" or "frequently," graduates of all-girls schools were slightly more likely to do so compared to their coeducated peers (GS = 94.5 percent, Coed = 91.7 percent). In the present sample, as noted in Table 1, most of the participants in the survey were graduates of Catholic schools, and thus the results from this question may be reflective of this academic context.

Summary of Descriptive Findings

Our first research question asked how women graduates of all-girls high schools differed from their coeducated peers at the point of college entry. The preceding results offer a number of differences between students in the different academic contexts. In some cases, the differences were moderate; however, they were notable in identifying areas that girls' schools may be helping young women develop important characteristics that lead to academic, social, and professional success. In particular, girls' school alumnae were more likely to demonstrate science self-efficacy and STEM interests, political engagement, an interest in fostering diverse interactions and community engagement, and to practice academic habits of mind. To better understand the specific role of school gender in the differences identified, the next section uses multilevel modeling to control for individual and institutional characteristics, effectively isolating the effect of school gender.

The Role of School Gender Net of Individual and Institutional Effects

Thus far, we have highlighted the areas in which women from all-girls and coeducational schools demonstrated statistical differences. However, some differences could be explained by various student-level and school-level characteristics such as parental education or school size. To tackle our second research question on the effect of school's gender, net of other possible factors, we used multilevel modeling to account for the differences across students and schools as mentioned in earlier section. The following section details how we selected variables for this phase of analysis, our analytic approach, and the results.

Selection of Outcome Variables

To determine our outcomes variables, we first identified variables from phase one, which showed statistical differences between the two groups (all-girls and coeducational high school graduates). Of the 214 variables3 examined in the first phase, 98 met this criterion (see Appendix B). We excluded from the list of dependent variables those items that were not deemed an outcome of schooling. For example, variables that represent respondents' demographic information (such as race/ethnicity, family income, and distance of current college from home) were not considered. Next, we used factor analysis to reduce the number of variables (as described in methods, above) by creating composite measures (factors). Among the factors created, only the ones that showed significant differences by school gender were selected to be included in the outcome variable list. Additionally, we identified constructs4 created by HERI

("The Freshman Survey (TFS) constructs") and tested differences for these where appropriate, in particular testing the TFS constructs that showed statistical differences between all-girls and coeducational school graduates.

Through this process, the total number of variables was reduced to 37 (see Table 3). The final list of 37 dependent variables included 28 individual items and 9 factors organized across the eight categories considered in this report: College Choice (four measures), Academic Self-Confidence and Engagement (eight measures), Science Skills and Identity (five measures), Academic Major, Degree, and Career Aspirations (seven measures), Community Engagement (one measure), Global Citizenship and Diverse Interactions (three measures), Leadership and Political Engagement (seven measures), and Free Time (two measures).

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3   "Hours per week" variables, family income, high school grade point average, distance from home, and students' race/ethnicity were counted as one variable each.

4   The constructs provided by The Freshman Survey data ("TFS Constructs") were developed by HERI using Item Response Theory and included many of the variables we had identified as significant. Where possible, we used the TFS constructs in phase 2 to ensure that we were using the most statistically rigorous composite measures. More information about these constructs and their creation is available from Sharkness, DeAngelo, & Pryor (2010).

TABLE 3.

LIST OF DEPENDENT VARIABLES BY CATEGORY

COLLEGE CHOICE

- College reason: to make me a more cultured person is very important
- College reason: to get a better job
- College reason: to prepare myself for graduate or professional school
- Attending first choice college
- Academic Self-Confidence and Engagement
- Critical thinking skills are somewhat or major strength
- Habits of Mind Score (TFS)
- Self-rated mathematical ability is above average or highest 10%
- Self-rated risk-taking ability is above average or highest 10%
- Frequently studied with other students
- Frequently tutored another student
- Hours per week studying or doing homework (6+ hrs.)
- Hours per week in student clubs and groups (6+ hrs.)

SCIENCE SKILLS AND IDENTITY

- Somewhat or strongly agree: I derive great personal satisfaction from working on a team that is doing important research
- Somewhat or strongly agree: I feel like I belong in the field of science
- Somewhat or strongly agree: There is little that a person can do to be better at math - you are either "good" or "bad" at math
- Science Self-Efficacy Score (TFS)
- Goal of making a theoretical contribution to science is very important or essential
- Academic Major, Degree, Career Aspirations

PROBABLE MAJOR IS A STEM MAJOR

- Probable major is a Biological Sciences major
- Probable major is a Math/Computer Science major
- Probable career is Education (elementary, secondary)
- Probable career is Engineer
- Probable career is a Health Profession
- Aspires terminal degrees
- Community Engagement

COMMUNITY ORIENTATION (FACTOR)

- Global Citizenship and Diverse Interactions

CIVIC ENGAGEMENT SCORE (TFS)

- Pluralistic Orientation Score (TFS)
- Frequently socialized with someone of another ethnic group
- Leadership and Political Engagement

FREQUENTLY DISCUSSED POLITICS (RECODE: OCCASIONALLY OR FREQUENTLY DISCUSSED POLITICS)

- Liberal social views (factor)
- Political engagement (factor)
- Social Agency Score (TFS)
- Political view is Liberal or Far Left
- Very good chance to vote in a local, state, or national election
- Frequently voted in a student election
- Free Time

HEDONISM (FACTOR)

- Hours per week spent exercising or playing sports (6+ hrs.)

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Selection of Independent Variables

Using prior research, we identified 13 control variables to make the all-girls and coeducational samples as comparable as possible in terms of students' demographic backgrounds and the characteristics of their alma maters. At the student level (level-one), these included: race/ethnicity, students' religious preference, family income, parental education level, and high school grade point average. At the high school level (level-two), these included: school gender, religious affiliation, size of 12th grade enrollment, geographic region, grade span (e.g., high school only), student-teacher ratios, percentage of students of color, and urbanicity (a measure of proximity to a metropolitan area). By accounting for these differences between all-girls and coeducational school graduates, we are able to better understand the unique role played by school gender composition. Table 4 lists the independent variables and their coding.

TABLE 4.

INDEPENDENT VARIABLES

VARIABLE	CODING SCHEME
STUDENT DEMOGRAPHICS (LEVEL-ONE)	
Race/Ethnicity: Black, American Indian, Asian, Latino, Other, White/Caucasian	All dichotomous: 0 (not marked), 1 (marked)
Student Religion: Catholic, Protestant, Agnostic/Atheist, Other Christian, Other Religion	All dichotomous: 0 (not marked), 1 (marked)
Family Income	12-pt scale: 1 (Less than $15K) to 12 ($500K +)
Parents' Education Level	3-pt scale: 1 (Below college) to 3 (Graduate degree)
High School GPA	5-pt scale: 1 (C+ or below) to 5 (A/A+)
HIGH SCHOOL CHARACTERISTICS (LEVEL-TWO)	
School Gender	Dichotomous: 0 (coed), 1 (girls' only)
Religious Affiliation: Catholic High School	Dichotomous: 0 (Not Catholic), (Catholic)
12th Grade Enrollment	Continuous
School Region: North East, Midwest, South, West	All dichotomous: 1 (not marked), 2 (marked)
Grade Span: High school only	Dichotomous: 0 (K-12), 1 (9-12)
Student-teacher Ratio	Continuous
Percent Students of Color	Continuous
School Environment: Urban, Suburban, Rural/Town	All dichotomous: 1 (not marked), 2 (marked)

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Analytic Approach

Sample. As mentioned previously, we excluded the graduates from the "other religion"-affiliated high schools (e.g., Protestant Christian, Jewish) from the multilevel analyses because this sub-sample of schools did not comprise enough graduates from each high school to ensure variation within each school as required by this technique (Raudenbush & Bryk, 2002). For the same reason, we eliminated respondents from high schools with fewer than five respondents. This resulted in a total of 3,610 graduates from 302 all-girls and coeducational high schools included in the multilevel model.

Methods. For each outcome variable, we began by calculating the intra-class correlation coefficient (ICC), which indicates the proportion of total variability in the outcome variable that is attributable to students being nested within schools. Then following the model of Sax et al. (2009), we designed two analytic models for each of the 37 outcome measures. For each outcome, model 1 included all student-level (level-one) control variables as well as school gender (all-girls and coeducational) modeled at level-two. Model 2 included all variables from model 1 with the addition of high school (level-two) characteristics. As noted previously, for continuous variables, we used multilevel linear regression and for dichotomous outcomes (e.g., intent to major in engineering), we used multilevel mixed-effects logistic regression to account for the dichotomous nature of the dependent variable.

In each analysis, we focused on the predictive power of the school gender variable (coded as 1 = all-girls and 0 = coeducational). The significance of school gender was examined after controlling for all independent variables in the two categories of variables as described above: (1) student demographics and academics (level-one); and (2) high school characteristics (level-two). Where the school gender coefficient remained statistically significant after both levels of controls were accounted for, the results suggest evidence of an all-girls education effect on that particular outcome variable under consideration.

Multilevel Modeling Analyses Results

Table 5 offers a summary of results from the multilevel analyses. In Table 5, we list each outcome measure with a number of notable statistics, including the intra-class correlation (ICC; i.e., how much of the variance in the outcome is attributable to school gender), regression coefficients, and related statistics (e.g., standard errors (S.E.), odds ratios for dichotomous DVs, and a significance notation). Specifically, Table 5 shows the regression coefficient for school gender for each dependent variable, for each model; first, where only student background traits have been controlled (model 1); and second, where student and high school level characteristics have been controlled (model 2). Model 2 represents the most stringent test of the "school gender effect," as it essentially isolates the effect of school gender after controlling for a number of other possible explanations for the differences between the two groups (e.g., race/ethnicity, parental education).

Intra-class correlation (ICC) analysis. The ICCs for the dependent variables ranged from a high of 18.99% (Probable Major: Math/Computer Science) to a low of approximately 0% (Degree Aspiration: JD, MD, PhD)[5]. Seven variables had ICCs higher than 10% including: Probable major in Math/Computer Science; HPW: Homework/Studying (6+ hours/wk.); Liberal Social Views; Political Orientation: Liberal or Far Left; Probable Career is Health Professions; and Hedonism. For these items, between-school differences explain a significant portion of the variation. In other words, almost 20% of the variance in students' decision to major in math/computer science is attributable to differences between schools (e.g., school gender, urbanicity, size), in contrast to variation in students' self-rated risk taking which has only a negligible relationship with school context (ICC = 0.12%).

Significant effects of school gender. The most effective way to investigate whether all-girls schooling has an effect on students' pre-college characteristics is to control for students' background characteristics (level-one) and high school characteristics (level two), effectively isolating the predictive power of school gender (level two). In the present study, model 2 tested to determine whether the predictive power of school gender remained significant even when student characteristics (level-one) *and* high school characteristics (level two) were held constant. For 16 of the 37 outcome variables examined, school gender remained statistically significant net of other control variables, thus indicating an "effect" of school gender.

The results indicated that all-girls schooling has a statistically significant effect on graduates' development as students and citizens (see Table 5). Specifically, girls' school graduates were more likely to consider themselves as critical thinkers and to score higher on academic habits of mind, even after controlling for students' individual characteristics and school variables. Additionally, graduation from all-girls schools was positively associated with increased likelihood of showing positive study habits, such as studying with or tutoring other students (by more than six hours per week). Specifically, girls' school graduates were 1.3 times more likely to study with other students more than six hours per week and 1.3 times more likely to tutor other students more than six hours per week, holding all else constant. Additionally, girls' school alumnae showed an advantage in science self-efficacy, even after controlling for personal and school characteristics.

All-girls schools appear to benefit students' citizenship skills as well. For example, girls' school graduates were more likely than their coeducational school counterparts to have socialized with someone of a different ethnic group, to be community-oriented, to evidence greater civic engagement, and to have more social agency (a construct including behaviors such as being active in community organizations, keeping up to date with political affairs, and promoting racial understanding), holding all else constant (see Table 5). Further, attendance at all-girls schools was associated with an increased likelihood of involvement in political activities such as frequently discussing politics (by 91.6 percent or almost two times as likely), voting in student elections

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5   Of note, the ICCs for most of the dependent variables were lower than 10%, and some argue that multilevel modeling is unnecessary for such cases (e.g., Lee, 2000). However, we continued with multilevel modeling as it is deemed wise for distinguishing between school-level and student-level effects when data is nested (e.g., students within schools; Hoffman, 1997).

(41.5 percent more likely), and planning to frequently vote in local, state, or national elections (53.8 percent more likely) than their coeducated peers. Lastly, all-girls school graduates were more likely to have liberal social views than their coeducated peers, even after controlling for personal and school characteristics.

Summary of Inferential Findings

Our second research question probed the effect of school gender net of other possible factors. As discussed above, all-girls schooling appears to have an impact on a number of outcome measures, and they seem to cluster around graduates' academic self-confidence (in terms of critical thinking skills) and engagement, community and global citizenship, and political engagement. Attendance at a girls' school was associated with an increased likelihood of positive academic behaviors such as studying with or tutoring other students more than six hours per week, considering themselves to be critical thinkers, and having proactive habits of mind. Girls' school graduates also showed more positive attitudes than their coeducational counterparts in terms of community orientation and civic engagement. These findings support previous research which suggests that all-girls schooling may help students develop certain academic and social characteristics, such as self-confidence (Anderson & Lee, 2015; Cribb & Haase, 2016).

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TABLE 5.

MULTILEVEL REGRESSION RESULTS

OUTCOME MEASURE	ICC[a]	MODEL 1				MODEL 2			
		COEFFICIENT	S.E.	SIG.	ODDS RATIO	COEFFICIENT	S.E.	SIG.	ODDS RATIO
COLLEGE CHOICE									
College reason: to make me a more cultured person is very important	0.53%	0.040	0.092		1.041	0.119	0.104		1.127
College reason: to get a better job	5.02%	0.136	0.133		1.146	0.074	0.143		1.077
College reason: to prepare myself for graduate or professional school	3.54%	-0.015	0.102		0.985	0.074	0.143		1.077
Attending first choice college	5.07%	-0.091	0.099		0.913	-0.067	0.106		0.935
ACADEMIC SELF-CONFIDENCE AND ENGAGEMENT									
Critical thinking skills are somewhat or major strength	4.49%	0.229	0.113	*	1.258	0.262	0.120	*	1.300
Habits of Mind Score (TFS)	4.00%	1.111	0.382	**	n/a	1.174	0.408	**	n/a
Self-rated mathematical ability is above average or highest 10%	2.57%	0.105	0.100		1.110	0.119	0.108		1.127
Self-rated risk-taking ability is above average or highest 10%	0.12%	0.041	0.088		1.041	0.135	0.100		1.145
Frequently studied with other students	1.59%	0.162	0.095		1.176	0.266	0.102	**	1.305
Frequently tutored another student	5.13%	0.478	0.132	***	1.613	0.296	0.145	*	1.345
6+ hours per week studying or doing homework	10.73%	0.274	0.123	*	1.315	0.287	0.124	*	1.332
6+ hours per week in student clubs and groups	2.54%	0.067	0.111		1.069	0.003	0.121		1.003

[a] ICC calculated with graduates from Other Religion-affiliated schools in the sample.

* p < .05; ** p < .001; *** p < .000

TABLE 5. *(continued)*

MULTILEVEL REGRESSION RESULTS

OUTCOME MEASURE	ICC[a]	MODEL 1				MODEL 2			
		COEFFICIENT	S.E.	SIG.	ODDS RATIO	COEFFICIENT	S.E.	SIG.	ODDS RATIO
SCIENCE SKILLS AND IDENTITY									
Somewhat or strongly agree: I derive great personal satisfaction from working on a team that is doing important research	0.66%	0.090	0.090		1.095	0.041	0.101		1.042
Somewhat or strongly agree: I feel like I belong in the field of science	1.84%	0.156	0.107		1.169	0.124	0.113		1.132
Somewhat or strongly agree: There is little that a person can do to be better at math - you are either "good" or "bad" at math	1.20%	-0.187	0.101		0.830	-0.195	0.113		0.823
Science Self-Efficacy Score (TFS)	4.60%	0.733	0.456		n/a	1.138	0.467	*	n/a
Very important or essential: Making a theoretical contribution to science	0.75%	0.082	0.115		1.086	0.157	0.120		1.170
ACADEMIC MAJOR, DEGREE, CAREER ASPIRATIONS									
Probable major is a STEM major	1.93%	0.148	0.110		1.160	0.074	0.120		1.077
Probable major is a Biological Sciences major	3.87%	0.128	0.130		1.136	0.051	0.138		1.052
Probable major is a Math/Computer Science	18.99%	0.624	0.287	*	1.867	0.295	0.320		1.343
Probable career is Education (elementary, secondary)	3.02%	-0.540	0.251	*	0.583	-0.454	0.274		0.635
Probable career is Engineer	6.63%	0.432	0.258		1.540	0.567	0.294		1.763
Probable career is Health Profession	11.95%	0.275	0.181		1.317	0.038	0.183		1.039
Aspires terminal degrees	0.00%	0.129	0.091		1.137	0.140	0.102		1.151
COMMUNITY ENGAGEMENT									
Community Orientation (factor)	0.70%	0.089	0.042	*	n/a	0.109	0.047	*	n/a

[a] ICC calculated with graduates from Other Religion-affiliated schools in the sample.

* p < .05; ** p < .001; *** p < .000

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TABLE 5. *(continued)*

MULTILEVEL REGRESSION RESULTS

OUTCOME MEASURE	ICC[a]	MODEL 1				MODEL 2			
		COEFFICIENT	S.E.	SIG.	ODDS RATIO	COEFFICIENT	S.E.	SIG.	ODDS RATIO
GLOBAL CITIZENSHIP AND DIVERSE INTERACTIONS									
Civic Engagement Score (TFS)	3.40%	1.069	0.400	**	n/a	1.033	0.431	*	n/a
Pluralistic Orientation Score (TFS)	2.05%a	0.176	0.344		n/a	0.276	0.385		n/a
Frequently socialized with someone of another ethnic group	9.21%	0.267	0.145	*	1.306	0.324	0.155	*	1.383
LEADERSHIP AND POLITICAL ENGAGEMENT									
Frequently discussed politics (Recode: Occasionally or Frequently discussed politics)	9.20%	0.556	0.184	**	1.743	0.650	0.198	**	1.916
Liberal social views (factor)	17.20%	0.190	0.063	**	n/a	0.178	0.066	**	n/a
Political engagement (factor)	1.14%	0.145	0.043	**	n/a	0.168	0.047	***	n/a
Social Agency Score (TFS)	0.62%	0.819	0.383	*	n/a	0.924	0.429	*	n/a
Political view is Liberal or Far Left	14.89%	0.173	0.133		1.189	0.144	0.140		1.154
Very good chance to vote in a local, state, or national election	6.01%	0.324	0.124	**	1.383	0.431	0.135	**	1.538
Frequently voted in a student election	6.22%	0.409	0.116	***	1.505	0.347	0.124	**	1.415
FREE TIME									
Hedonism (factor)	11.17%	0.064	0.061		1.066	0.102	0.062		1.107
6+ hours per week spent exercising or playing sports	5.67%	-0.364	0.112	**	0.695	-0.327	0.118	**	0.721

[a] *ICC calculated with graduates from Other Religion-affiliated schools in the sample.*

* p < .05; ** p < .001; *** p < .000

Discussion and Implications
for Future Research

With an eye toward informing the discourse on the current educational landscape and extending the research on the effects of school gender, the present study explores how women from all-girls high schools may differ from their coeducated peers at the point of college entry. Drawing from a national sample, the study investigates differences between the two groups on a number of characteristics, including demographics, high school involvement and academics, college choice processes, and future plans. Following the model of previous research (e.g., Sax et al., 2009), this study goes past examining simple differences between the two groups and endeavors to identify which differences remain once students' demographics and other characteristics are controlled, thus highlighting specific effects of all-girls schooling. Ultimately, this report provides support for some benefits of all-girls schooling while also suggesting directions for future research.

Review of Findings

The present study took two approaches to examining differences between women who attended girls' schools and those who attended coeducational schools to identify specific outcomes attributable to school gender. Across both approaches, we noted – in keeping with previous research (e.g., Bigler & Signorella, 2011; Sax et al., 2009; among others) – that all-girls education either provides unique benefits to participating students or provides similar benefits to coeducational schooling. Notably, when reviewing descriptive differences between the groups, we found a number of ways that graduates of all-girls schools differed from their coeducated counterparts, including being more oriented toward science and having a greater science self-confidence, being more likely to utilize academic habits of mind, engaging other students academically (through studying and tutoring) more frequently, and being more community engaged and globally-minded. In our study, girls' school graduates were also more likely to be politically liberal and hold liberal social views than their peers, and they appeared more likely to plan to engage in politics in the future. While these results pointed to interesting differences between the two groups, a second phase of analysis was necessary to draw conclusions that the differences identified in the first phase of analysis are attributable to the school gender context. Thus, following the model of Sax et al. (2009), we employed multilevel modeling to better ascertain the role of school gender in the differences described above.

Our phase two investigation into over 30 variables further highlighted benefits that students from all-girls schools may expect to receive. In general, we found gains for girls' school graduates in terms of academic thinking and engagement, community engagement, and global citizenship, as well as political engagement. Specifically, graduates of girls' schools showed larger gains in critical

thinking and academic habits of mind than their coeducated peers, after controlling for personal and institutional characteristics. Further, girls' school alumnae were more likely to be involved in community action and interact with diverse populations than women with similar backgrounds from coeducational schools. Finally, even after controlling for students' personal and school characteristics, graduates from all-girls schools were more likely to be engaged in politics than their coeducated peers.

Above, we documented the areas in which women graduates of all-girls and coeducational schools have shown differences, many with statistically robust advantages to girls' schools. However, there were also areas in which the two groups showed no difference after controlling for individual and school-level characteristics. For example, in phase two, girls' school graduates and coeducational school graduates did not differ in their likelihood of having a science identity or political orientation, and, unlike previous research (e.g., Sax et al., 2009), once we controlled for individual and school characteristics, students from all-girls schools were as likely as their coeducated peers to aspire to a graduate degree or a career in engineering and had similar levels of academic self-confidence.

The findings from the present study suggest that even after controlling for student characteristics and high school contexts, there is evidence of benefits for women attending all-girls schools and in this study, no evidence of harm in doing so. Thus, as previous research suggested, to argue that all-girls schooling is either "'favorable' or 'unfavorable' to female students" (Sax et al., 2009, p. 62) is to take a far too dualistic approach to the question. Indeed, it appears from this study that an all-girls school context often has a positive effect on girls' development, and with regard to the variables we considered, we see a number of beneficial outcomes for students at both girls' schools and coeducational schools. While this report emphasizes that there are a variety of factors influencing women's development in high school, it also demonstrates a relationship between school gender context and a number of particularly strong outcomes in important aspects of student development (including academic engagement and skills, science confidence, and community and political engagement) for girls' school graduates.

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Directions for Future Research

While the findings in this report indicate a number benefits of all-girl schooling, there are limitations in the present study that can be used to improve future research. First, although the sample size in this study is large enough to run reliable statistical tests, it should be noted that girls' school graduates in the current sample represent a small subset of students attending girls' schools nationwide. Efforts to examine larger samples could provide additional evidence supporting the outcomes in this study. Second, our dataset does not include questions asking students why they chose to attend their school type; thus, selection bias may be present in the sample. Specifically, some of the differences exhibited between girls' school graduates and coeducational school graduates in phase one of our analysis are likely attributable to characteristics of who chooses to attend these schools and the resources available to the schools themselves. Future researchers could ask questions related to school choice (e.g., how long the student has been in all-girls education and why that format was chosen) to better understand students' reasons for participation. Methodologically, the present study controlled for a number of characteristics to account for the effect of selection bias; however, there are other methods that might further do this, including propensity score matching. We did not utilize propensity score matching in the present study because we intentionally followed the model of the Sax et al. (2009) report in order to better consider our results alongside theirs. However, future studies might consider using propensity score matching to further control for the effect of selection bias.

Finally, there may be some additional differences in the sample that we did not examine. For example, Sax et al. (2009) examined differences within all-girls contexts (Catholic and non-sectarian) and found notable differences by context. We did not follow this example for two reasons. First, by bifurcating the sample into two smaller groups, it would have made differences more difficult to identify; and second, the nature of school organization is complicated, with some Catholic high schools being independent and others being organized under a Diocese. We did not have the data to distinguish between these controls, and thus it would have been difficult to separate out school effects between those Catholic schools organized under a Diocese and those outside of that system. As such, we kept the present analysis to differences at the higher level, between all-girl and coeducational schools. Future research could further investigate how school control (e.g., independent non-sectarian, independent religious, public) may differently benefit students in the all-girls context.

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Conclusion

The present study sought to understand more about the role of school gender in the preparation of high school women as they enter college. Our research questions asked how girls' school graduates differed from their coeducated peers at the time of college entry, and how school gender might be responsible for those differences. Through our investigation, we found many areas in which students benefited from participating in all-girls schooling and some similarities to students' experiences in the coeducational school context.

In particular, the findings identify several key areas in which all-girls schools are distinctively preparing their students for success in college and beyond. Based on the data reported in this study, we can conclude that when compared to their female peers at coeducational schools, girls' school graduates:

- **Have stronger academic skills**
- **Are more academically engaged**
- **Demonstrate higher science self-confidence**
- **Express stronger community involvement**
- **Display higher levels of cultural competency**
- **Exhibit increased political engagement**

These characteristics reveal a consistent portrait of girls' school graduates who are more engaged academically and socially than their coeducated peers, findings which align with the profile outlined by Dr. Sax and her colleagues in 2009. Though some of the findings may appear modest, these statistically significant results demonstrate differences in areas of critical importance in the 21st century for women as they enter university and beyond, thus emphasizing the contribution of all-girls schooling for women's success.

This study does not demonstrate that all-girls education is unilaterally better than coeducation; however, it does suggest that for many women, girls' schools may provide significant benefits. The findings from the present report also lend support for future investigations that take additional institutional contexts into account, including school control and religious affiliation. This study aims to further the discussion on the benefits of all-girls schooling, as well as provide a road map for future research to continue expanding our understanding of the topic and to inform the ongoing dialogue about the role of all-girls schools in student success. In providing evidence of the benefits of all-girls schooling, we hope this study is used as guide to highlight how girls' schools are helping young women in their growth and development as scholars and citizens.

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References

American Association of University Women. (1992). *How schools shortchange girls.* New York, NY: Marlowe and Company.

Anderson, J., & Lee, K. (2015). *Gender differences in mathematics attitudes in coeducational and single sex secondary education.* Sydney, Australia: Mathematics Education Research Group for Australasia.

Anfara, V. A., Jr., & Mertens, S. B. (2008). What research says: Do single-sex classes and schools make a difference? *Middle School Journal, 40*(2), 52-59. Retrieved from http://www.jstor.org/stable/23047369

Arms, E. (2007). Gender equity in coeducational and single-sex environments. In S. S. Klein, B. Richardson, D. A. Grayson, L. H. Fox, C. Kramarae, & D. S. Pollard, et al. (Eds.), *Handbook for achieving gender equity through education* (2nd ed., pp. 171-190). Mahweh, NJ: Lawrence Erlbaum Associates.

Beiter, R., Nash, R., McCrady, M., Rhoades, D., Linscomb, M., Clarahan, M., & Sammut, S. (2015). The prevalence and correlates of depression, anxiety, and stress in a sample of college students. *Journal of Affective Disorders, 173*, 90-96. doi: 10.1016/j.jad.2014.10.054

Berends, M. (2015). Sociology and school choice: What we know after two decades of charter schools. *Annual Review of Sociology, 41*, 159-180.

Bigler, R. S. & Signorella, M. L. (2011). Single-sex education: New perspectives and evidence on a continuing controversy. *Sex Roles, 65*, 659-669. doi: 10.1007/s11199-011-0046-x

Boaler, J. (2013). Ability and mathematics: The mindset revolution that is reshaping education. *Forum, 55*(1), 143-152.

Bozick, R. (2007). Making it through the first year of college: The role of students' economic resources, employment, and living arrangements. *Sociology of Education, 80*(3), 261-285.

Buchanan, J. L. (2012). Prevention of depression in the college student population: A review of the literature. *Archives of Psychiatric Nursing, 26*(1), 21-42. doi: 10.1016/j.apnu.2011.03.003

Cherney, I. D., & Campbell, K. L. (2011). A league of their own: Do single-sex schools increase girls' participation in the physical sciences? *Sex Roles, 65*, 712-724. doi: 10.1007/s11199-011-0013-6

Cribb, V. L., & Haase, A. M. (2016). Girls feeling good at school: School gender environment, internalization and awareness of socio-cultural attitudes associations with self-esteem in adolescent girls. *Journal of Adolescence, 46*, 107-114.

Duan, W. (2016). The benefits of personal strengths in mental health of stressed students: A longitudinal investigation. *Quality of Life Research, 25*(11), 2879-2888.

Eagan, K., Stolzenberg, E. B., Zimmerman, H. B., Aragon, M. C., Whang Sayson, H., & RiosAguilar, C. (2017). *The American freshman: National norms fall 2016.* Los Angeles, CA: Higher Education Research Institute, UCLA.

FOSTERING ACADEMIC AND SOCIAL ENGAGEMENT | TIFFANI RIGGERS-PIEHL, PH.D.

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Else-Quest, N. M., & Peterca, O. (2015). Academic attitudes and achievement in students of urban public single-sex and mixed-sex high schools. *American Educational Research Journal, 52*(4), 693-718. doi:10.3102/0002831215591660

Feniger, Y. (2010). The gender gap in advanced math and science course taking: Does same-sex education make a difference? *Sex Roles, 65*, 670-679. doi: 10.1007/s/11199-010-9851-x

Halpern, D. F., Eliot, L., Bigler, R. S., Fabes, R. A., Hanish, L. D., Hyde, J.,…Martin, C. L. (2011). The pseudoscience of single-sex schooling. *Science, 333*(6050), 1706-1707. doi: 10.1126/science.1205031

Hayes, A. R., Pahlke, E. E., & Bigler, R. S. (2011). The efficacy of single-sex education: Testing for selection and peer quality effects. *Sex Roles, 65*, 693-703. doi: 10.1007/s11199-010-9903-2

Hill, C., Corbett, C., & St. Rose, A. (2010). *Why so few? Women in science, technology, engineering, and mathematics.* Washington, DC: American Association of University Women (AAUW). Retrieved from https://files.eric.ed.gov/fulltext/ED509653.pdf

Hoffman, B. H., Badgett, B. A., & Parker, R. P. (2010). The effect of single-sex instruction in a large, urban, at-risk high school. *The Journal of Educational Research, 102*(1), 15-36, doi: 10.3200/JOER.102.1.15-36

Hoffnung, M. (2011). Career and family outcomes for women graduates of single-sex versus coed colleges. *Sex Roles, 65*, 680-692. doi: 10.1007/s11199-010-9914-z

Holmgren, R. A. (2014). *Steeped in learning: The student experience at all-girls schools.* Charlottesville, VA: National Coalition of Girls' Schools

Institute of Physics. (2012). *It's different for girls: The influence of schools.* London, England: Institute of Physics.

Jackson, C. K. (2012). Single-sex schools, student achievement, and course selection: Evidence from rule-based student assignments in Trinidad and Tobago. *Journal of Public Economics, 96*, 173-187. doi: 10.1016/j.jpubeco.2011.09.002

Kombe, D., Che, S. M., Carter, T. L., & Bridges, W. (2016). Student academic self-concept and perception of classroom environment in single-sex and coeducational middle grades mathematics classes. *School Science and Mathematics, 116*(5), 265-275.

Lee, V. E. (2000). Using hierarchical linear modeling to study social contexts: The case of school effects. *Educational Psychologist, 35*(2), 125-141.

Lee, V. E., & Marks, H. M. (1990). Sustained effects of the single-sex secondary school experience on attitudes, behaviors, and values in college. *Journal of Educational Psychology, 82*(3), 578-592. doi: 10.1037/0022-0663.82.3.578

Madigan, J. C. (2009). The education of girls and women in the United States: A historical perspective. *Advances in Gender and Education 1*, 11-13.

Mayhew, M. J., Rockenbach, A. N., Bowman, N. A., Seifert, T. A., Wolniak, G. C., Pascarella, E. T., & Terenzini, P. T. (2016). *How college affects students: 21st Century Evidence that higher education works* (3rd ed.). San Francisco, CA: Jossey-Bass.

Mboya, M. M. (1989). The relative importance of global self-concept and self-concept of academic ability in predicting academic achievement. *Adolescence, 24*, 39-45.

FOSTERING ACADEMIC AND SOCIAL ENGAGEMENT | TIFFANI RIGGERS-PIEHL, PH.D.

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Morse, S. (Ed.). (1998). *Separated by sex: A critical look at single-sex education for girls.* Washington, DC: American Association of University Women Educational Foundation.

Owens, S. L., Smothers, B, C., & Love, F. E. (2003). Are girls victims of gender bias in our schools? *Journal of Instructional Psychology, 30*(3), 131-136.

Pahlke, E., & Hyde, J. S. (2016). The debate over single-sex schooling. *Child Development Perspectives, 10*(2), 81-86.

Pahlke, E., Hyde, J. S., & Allison, C. M. (2014). The effects of single-sex compared with coeducational schooling on students' performance and attitudes: A meta-analysis. *Psychological Bulletin, 140*(4), 1042-1072. doi: 10.1037/a0035740.Je

Park, H., Behrman, J., & Choi, J. (2012). *Causal effects of single-sex schools on college entrance exams and college attendance: Random assignment in Seoul high schools.* Philadelphia, PA: The University of Pennsylvania.

Patterson, M. M., & Pahlke, E. (2011). Student characteristics associated with girls' success in a single-sex school. *Sex Roles, 65*, 737-750. doi: 10.1007/s11199-010-9904-1

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Newbury Park, CA: Sage Publications, Inc.

Renn, K. A., & Reason, R. D. (2013). *College students in the United States: Characteristics, experiences and outcomes.* San Francisco, CA: Jossey-Bass.

Reymann, L. S., Fialkowski, G. M., & Stewart-Sicking, J. A. (2015). Exploratory study of spirituality and psychosocial growth in college students. *Journal of College Counseling, 18*, 103-115. doi:10.1002/jocc.12008

Reynolds, W. M. (1988). Measurement of academic self-concept in college students. *Journal of Personality Assessment, 52*, 223-240.

Sadker, M., & Sadker, D. (1994). *Failing at fairness: How our schools cheat girls.* New York, NY: Simon and Schuster.

Salomone, R. C. (2006). Single-sex programs: Resolving the research conundrum. *Teachers College Record 108*(4), 778-802.

Sax, Leonard. (2017). *Why gender matters: What parents and teachers need to know about the emergence science of sex differences.* New York, NY: Harmony Books.

Sax, Linda J., Arms, E., Woodruff, M., Riggers, T., & Eagan, K. (2009). *Women graduates of single-sex and coeducational high schools: Differences in their characteristics and the transition to college.* Los Angeles, CA: The Sudikoff Family Institute for Education & New Media, UCLA Graduate School of Education & Information Studies.

Sax, Linda J., Kanny, M. A., Riggers-Piehl, T. A., Whang, H., & Paulson, L. N. (2015). Research in Higher Education 56: 813. doi: 10.1007/s11162-015-9375-x

Sax, Linda J., Lehman, K. J., Jacobs, J. A, Kanny, M. A., Lim, G., Monje-Peterson, Zimmerman, H. B. (2017). Anatomy of an Enduring Gender Gap: The Evolution of Women's Participation in Computer Science, The Journal of Higher Education, 88:2, 258-293, doi: 10.1080/00221546.2016.1257306

FOSTERING ACADEMIC AND SOCIAL ENGAGEMENT | TIFFANI RIGGERS-PIEHL, PH.D.

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Sax, Linda J., Riggers, T. A., & Eagan, M. K. (2013). The role of single-sex education in the academic engagement of college-bound women: A multilevel analysis. *Teachers College Record, 115*(1), 1-27.

Seemiller, C., & Grace, M. (2016). *Generation Z goes to college.* San Francisco, CA: Jossey-Bass.

Sharkness, J., DeAngelo, L., & Pryor, J. (2010). *CIRP construct technical report.* Los Angeles, CA: Higher Education Research Institute, UCLA. Retrieved from https://www.heri.ucla.edu/PDFs/constructs/technicalreport.pdf

Signorella, M. L., Hayes, A. R., Li, Y. (2013). A meta-analytic critique of Mael et al.'s (2005) review of single-sex schooling. *Sex Roles, 69*, 423-441. doi: 10.1007/211199-013-0288-x)

Simpson, A., Che, M., & Bridges, W. C., Jr. (2016). Girls' and boys' academic self-concept in science in single-sex and coeducational classes. *International Journal of Science and Mathematics Education, 14*, 1407-1418. doi: 10.1007/s10763-015-9676-8

Smyth, E. (2010). Single-sex education: What does research tell us? *Revue française de pédagogie* [En ligne], 171 | avril-juin 2010, mis en ligne le 01 juin 2014, consulté le 22 mars 2018. Retrieved from http://journals.openedition.org/rfp/1896. doi: 10.4000/rfp.1896

Sullivan, A., Joshi, H., & Leonard, D. (2017). Single-sex schooling and academic attainment at school through the lifecourse. *American Educational Research Journal, 47*(1), 6-36. Retrieved from https://doi.org/10.3102/0002831209350106

Titze, C., Jansen, P., & Heil, M. (2011). Single-sex school girls outperform girls attending a coeducative school in mental rotation accuracy. *Sex Roles, 65*, 704-711. doi: 10.1007/s11199-011-9947-y

Tully, D., & Jacobs, B. (2010). Effects of single-gender mathematics classrooms on self-perception of mathematical ability and post-secondary engineering paths: An Australian case study. *European Journal of Engineering and Education, 35*(4), 465-467. Retrieved from http://dx.doi.org/10.1080/03043797.2010.489940

U.S. Department of Education. (2005). *Single-sex versus coeducational schooling: A systematic review.* Washington, DC: Office of Planning, Evaluation and Policy Development.

Whitt, E. J., Edison, M. I., Pascarella, E. T., Nora, A., & Terenzini, P. T. (1999). Women's perceptions of a "chilly climate" and cognitive outcomes in college: Additional evidence. *Journal of College Student Development, 40*(2), 163-177.

Wilson, H. E., Gresham, J., Williams, M., Whitley, C., & Partin, J. (2013). Female-only classes in a rural context: Self-concept, achievement, and discourse. *Journal of Research in Rural Education, 28*(9).

Wilt, J. A., Grubbs, J. B., Exline, J. J., & Pargament, K. I. (2016). Personality, religious and spiritual struggles, and well-being. *Psychology of Religion and Spirituality, 8*(4), 341-351. doi: 10.1037/rel0000054

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Appendix A

2016 CIRP Freshman Survey

CIRP

PLEASE PRINT IN ALL CAPS YOUR NAME AND PERMANENT/HOME ADDRESS (one letter or number per box).

FIRST   MI   LAST

When were you born?

NAME: ☐

ADDRESS: ☐

Month (01-12)   Day (01-31)   Year

CITY: ☐   STATE: ☐   ZIP: ☐   COUNTRY, if NOT USA: ☐

STUDENT ID# *(as instructed):* ☐   EMAIL *(print letters carefully):* ☐

SERIAL #

MARKING DIRECTIONS
- Use a black or blue pen.
- Fill in your response completely. Mark out any answer you wish to change with an "X".

CORRECT MARK   INCORRECT MARKS

Group Code A ☐ B ☐

1. Your sex: ○ Male   ○ Female

2. Is English your primary language?
○ Yes   ○ No

3. In what year did you graduate from high school? (Mark one)
○ 2016   ○ Did not graduate but passed G.E.D. test
○ 2015
○ 2014   ○ Never completed high school
○ 2013 or earlier

4. Are you enrolled (or enrolling) as a: (Mark one)
○ Full-time student
○ Part-time student

5. How many miles is this college from your permanent home? (Mark one)
○ 5 or less   ○ 11-50   ○ 101-500
○ 6-10   ○ 51-100   ○ Over 500

6. What was your average grade in high school? (Mark one)
○ A or A+   ○ B   ○ C
○ A–   ○ B–   ○ D
○ B+   ○ C+

7. What were your scores on the SAT I and/or ACT?
SAT Reading and Writing... ☐
SAT Mathematics .... ☐
ACT Composite .... ☐

8. Where do you plan to live during the fall term? (Mark one)
○ With my family or other relatives
○ Other private home, apartment, or room
○ College residence hall
○ Fraternity or sorority house
○ Other campus student housing
○ Other

9. From what high school did you graduate?

Name of high school

City   State

10. Are you: (Mark all that apply)
○ White/Caucasian
○ African American/Black
○ American Indian/Alaska Native
○ East Asian (e.g., Chinese, Japanese, Korean, Taiwanese)
○ Filipino
○ Southeast Asian (e.g., Cambodian, Vietnamese, Hmong)
○ South Asian (e.g., Indian, Pakistani, Nepalese, Sri Lankan)
○ Other Asian
○ Native Hawaiian/Pacific Islander
○ Mexican American/Chicano
○ Puerto Rican
○ Other Latino
○ Other

11. Prior to this term, have you ever taken courses for credit at this institution?
○ Yes   ○ No

12. Since leaving high school, have you ever taken courses, whether or not for credit, at any other institution (university, 4- or 2-year college, technical, vocational, or business school)?
○ Yes   ○ No

13. To how many colleges other than this one did you apply for admission this year?
○ None   ○ 3   ○ 6   ○ 11 or more
○ 1   ○ 4   ○ 7-8
○ 2   ○ 5   ○ 9-10

14. Were you accepted by your first choice college?
○ Yes   ○ No

15. Is this college your: (Mark one)
○ First choice   ○ Third choice
○ Second choice   ○ Less than third choice

16. Citizenship status: (Mark one)
○ U.S. citizen
○ Permanent resident (green card)
○ International student (i.e., F-1, J-1, or M-1 visa)
○ None of the above

17. Please mark which of the following courses you have completed:
Ⓨ Ⓝ Algebra II
Ⓨ Ⓝ Pre-calculus/Trigonometry
Ⓨ Ⓝ Probability & Statistics
Ⓨ Ⓝ Calculus
Ⓨ Ⓝ AP Probability & Statistics
Ⓨ Ⓝ AP Calculus
Ⓨ Ⓝ AP Computer Science A

18. How many weeks this summer did you participate in a bridge program at this institution?
○ 0   ○ 3-4   ○ 7+
○ 1-2   ○ 5-6

19. During high school (grades 9-12) how many years did you study each of the following subjects? (Mark one for each item)

	None	1/2	1	2	3	4	5 or more
Mathematics	○	○	○	○	○	○	○
Foreign Language	○	○	○	○	○	○	○
Physical Science	○	○	○	○	○	○	○
Biological Science	○	○	○	○	○	○	○
History/Am. Gov't	○	○	○	○	○	○	○
Computer Science	○	○	○	○	○	○	○
Arts and/or Music	○	○	○	○	○	○	○

20. How many Advanced Placement/International Baccalaureate courses did you take in high school? (Mark one in each row)

	Not offered at my high school	None	1-4	5-9	10-14	15+
AP Courses	○	○	○	○	○	○
IB Courses	○	○	○	○	○	○

21. Please refer to the same Parent/Guardian throughout this survey. Please mark the sex of your parent(s) or guardian(s).

	Male	Female
Parent/Guardian 1	○	○
Parent/Guardian 2	○	○

22. At any time since you turned 13, were you in foster care or were you a dependent of the court?
○ Yes   ○ No   ○ I don't know

23. Do you consider yourself: (Mark Yes or No for each item)

	Yes	No
Pre-Med	○	○
Pre-Law	○	○

24. Please indicate your intended major using the codes provided on the attached fold out. ☐

24. Below is a list of different undergraduate major fields grouped into general categories. *(Fill in appropriate two-digit code on your survey)*

ARTS AND HUMANITIES
01 Art, fine and applied
02 English (language and literature)
03 History
04 Journalism/Communication
05 Classical and Modern Languages and Literature
06 Media/Film Studies
07 Music
08 Philosophy
09 Theatre/Drama
10 Theology/ Religion
11 Other Arts and Humanities

BIOLOGICAL & LIFE SCIENCES
12 Biology (general)
13 Animal Biology (zoology)
14 Ecology & Evolutionary Biology
15 Marine Biology
16 Microbiology
17 Molecular, Cellular, & Developmental Biology
18 Neurobiology/Neuroscience
19 Plant Biology (botany)
20 Agriculture/Natural Resources
21 Biochemistry/Biophysics
22 Environmental Science
23 Other Biological Science

BUSINESS
24 Accounting
25 Business Admin. (general)
26 Entrepreneurship
27 Finance
28 Hospitality/Tourism
29 Human Resources Management
30 International Business
31 Marketing
32 Management
33 Computer/Management Information Systems
34 Real Estate
35 Other Business

EDUCATION
36 Elementary Education
37 Music/Art Education
38 Physical Education/Recreation
39 Secondary Education
40 Special Education
41 Other Education

ENGINEERING
42 Aerospace/Aeronautical/ Astronautical Engineering
43 Biological/Agricultural Engineering
44 Biomedical Engineering
45 Chemical Engineering
46 Civil Engineering
47 Computer Engineering
48 Electrical/ Electronic/ Communications Engineering
49 Engineering Science/ Engineering Physics
50 Environmental/Environmental Health Engineering
51 Industrial/Manufacturing Engineering
52 Materials Engineering
53 Mechanical Engineering
54 Other Engineering

HEALTH PROFESSIONS
55 Clinical Laboratory Science
56 Health Care Administration/ Studies
57 Health Technology
58 Kinesiology
59 Nursing
60 Pharmacy
61 Therapy (occupational, physical, speech)
62 Other Health Profession

MATH AND COMPUTER SCIENCE
63 Computer Science
64 Mathematics/Statistics
65 Other Math and Computer Science

PHYSICAL SCIENCE
66 Astronomy & Astrophysics
67 Atmospheric Sciences
68 Chemistry
69 Earth & Planetary Sciences
70 Marine Sciences
71 Physics
72 Other Physical Science

SOCIAL SCIENCE
73 Anthropology
74 Economics
75 Ethnic/Cultural Studies
76 Geography
77 Political Science (gov't., international relations)
78 Psychology
79 Public Policy
80 Social Work
81 Sociology
82 Women's/Gender Studies
83 Other Social Science

OTHER MAJORS
84 Architecture/Urban Planning
85 Criminal Justice
86 Library Science
87 Security & Protective Services
88 Military Sciences/ Technology/Operations

89 OTHER

90 UNDECIDED

25. Below is a list of different careers grouped into general categories. *(Fill in appropriate two-digit codes on your survey)*

ARTS
01 Actor or Entertainer
02 Artist
03 Graphic Designer
04 Musician
05 Writer/Producer/Director

AGRICULTURE
06 Farmer or Forester
07 Natural Resource Specialist/Environmentalist

BUSINESS
08 Accountant
09 Administrative Assistant
10 Business Manager/Executive
11 Business Owner/Entrepreneur
12 Retail Sales
13 Sales/Marketing
14 Human Resources
15 Finance (e.g., Actuary, Banking, Loan Officer, Planner)
16 Management Consultant
17 Real Estate Agent/Realtor/ Appraiser/Developer
18 Sports Management

COMMUNICATIONS
19 Journalist
20 Public Relations/Media Relations
21 Advertising

EDUCATION
22 College Administrator/Staff
23 College Faculty
24 Early Childcare Provider
25 Elementary School Teacher
26 Secondary School Teacher in Science, Technology, Engineering, or Math (STEM)
27 Secondary School Teacher in a non-STEM subject
28 Librarian
29 Teacher's Assistant/ Paraprofessional
30 K-12 Administrator
31 Other K-12 Professional

GOVERNMENT
32 Military
33 Federal/State/Local Government Official
34 Protective Services (e.g., Homeland Security, Law Enforcement, Firefighter)
35 Postal Worker

HEALTHCARE SUPPORT
36 Dietician/Nutritionist
37 Home Health Worker
38 Medical/Dental Assistant (e.g., Hygienist, Lab Tech, Nursing Asst.)
39 Registered Nurse
40 Therapist (e.g., Physical, Occupational, Speech)

INFORMATION TECHNOLOGY
41 Computer Programmer/Developer
42 Computer/Systems Analyst
43 Web Designer

LAW
44 Lawyer/Judge
45 Paralegal

MEDICAL PRACTITIONERS
46 Clinical Psychologist
47 Dentist/Orthodontist
48 Medical Doctor/Surgeon
49 Optometrist
50 Pharmacist
51 Veterinarian

SCIENCE AND ENGINEERING
52 Engineer
53 Research Scientist (e.g., Biologist, Chemist, Physicist)
54 Urban Planner/Architect

SERVICE INDUSTRY
55 Custodian/Janitor/Housekeeper
56 Food Service (e.g., Chef/Cook, Server)
57 Hair Stylist/Aesthetician/ Manicurist
58 Interior Designer
59 Skilled Trades (e.g., Plumber, Electrician, Construction)
60 Social/Non-Profit Services

61 CLERGY

62 HOMEMAKER/STAY AT HOME PARENT

63 OTHER

64 UNDECIDED

25. Please indicate your intended career as well as the careers of your parents/guardians, using the codes provided on the attached fold out. (Your intended career, Parent/Guardian 1 career, Parent/Guardian 2 career)

Your intended career ☐☐

Parent/Guardian 1 career ☐☐

Parent/Guardian 2 career ☐☐

26. Current employment status:
(Mark one in each row)

	Employed	Seasonally Employed	Unemployed	Retired
Parent/Guardian 1	○	○	○	○
Parent/Guardian 2	○	○	○	○

27. How much of your first year's educational expenses (room, board, tuition, and fees) do you expect to cover from each of the sources listed below? (Mark one answer for each possible source)

	None	$1-$2,999	$3,000-$5,999	$6,000-$9,999	$10,000-$14,999	$15,000+
Family resources (parents, relatives, spouse, etc.)	○	○	○	○	○	○
My own resources (savings from work, work-study, other income)	○	○	○	○	○	○
Aid which need not be repaid (grants, scholarships, military funding, etc.)..........	○	○	○	○	○	○
Aid which must be repaid (loans, etc.)	○	○	○	○	○	○

28. Did you receive any of the following forms of financial aid? (Mark Yes or No for each item)

	Yes	No
Military grants	○	○
Work-study	○	○
Pell Grant	○	○
Need-based grants or scholarships..	○	○
Merit-based grants or scholarships..	○	○

29. What is your best estimate of your parents'/guardians' total income last year? Consider income from all sources before taxes. (Mark one)

○ Less than $15,000 ○ $100,000-124,999
○ $15,000-24,999 ○ $125,000-149,999
○ $25,000-29,999 ○ $150,000-199,999
○ $30,000-59,999 ○ $200,000-249,999
○ $60,000-74,999 ○ $250,000-499,999
○ $75,000-99,999 ○ $500,000 or higher

30. Please select how many individuals in your household (including yourself) are dependent on your parent(s)/guardian(s) for financial support. (Mark one)

○ I am not dependent on my parent(s)/guardian(s) ○ 3
                                  ○ 4
○ 1 ○ 5
○ 2 ○ 6 or more

31. Do you have any concern about your ability to finance your college education? (Mark one)

○ None (I am confident that I will have sufficient funds)

○ Some (but I probably will have enough funds)

○ Major (not sure I will have enough funds to complete college)

32. Current religious preference:
(Mark one in each column)

	Yours	Parent/Guardian 1	Parent/Guardian 2
Agnostic.....................................	Y	1	2
Atheist.......................................	Y	1	2
Baptist.......................................	Y	1	2
Buddhist....................................	Y	1	2
Church of Christ	Y	1	2
Eastern Orthodox	Y	1	2
Episcopalian	Y	1	2
Hindu	Y	1	2
Jewish.......................................	Y	1	2
LDS (Mormon)...........................	Y	1	2
Lutheran	Y	1	2
Methodist	Y	1	2
Muslim	Y	1	2
Presbyterian	Y	1	2
Quaker......................................	Y	1	2
Roman Catholic.........................	Y	1	2
Seventh-day Adventist	Y	1	2
United Church of Christ/ Congregational..........................	Y	1	2
Other Christian	Y	1	2
Other Religion	Y	1	2
None...	Y	1	2

33. What is the highest academic degree that you intend to obtain?
(Mark one in each column)

	Highest Planned	Highest Planned at This College
None..	○ ...	○
Vocational certificate	○ ...	○
Associate (A.A. or equivalent)...	○ ...	○
Bachelor's (B.A., B.S., B.D., etc.).	○ ...	○
Master's (M.A., M.S., M.B.A., etc.).	○ ...	○
J.D. (Law)	○ ...	○
M.D., D.D.S., D.V.M., etc. (Medical).	○ ...	○
Ph.D..	○ ...	○
Professional Doctorate (Ed.D., Psy.D., etc.).............................	○ ...	○
Other...	○ ...	○

34. In the past year, how often have you: (Mark one for each item)

	Frequently	Occasionally	Not at All
Attended a religious service	F	O	N
Been bored in class....................	F	O	N
Demonstrated for a cause (e.g., boycott, rally, protest).............	F	O	N
Tutored another student............	F	O	N
Studied with other students.......	F	O	N
Consumed beer.........................	F	O	N
Consumed wine or liquor	F	O	N

34. Continued. In the past year, how often have you: (Mark one for each item)

	Frequently	Occasionally	Not at All
Felt overwhelmed by all I had to do	F	O	N
Felt depressed......................	F	O	N
Performed volunteer work	F	O	N
Asked a teacher for advice after class.........................	F	O	N
Voted in a student election...	F	O	N
Socialized with someone of another racial/ethnic group..	F	O	N
Been late to class.................	F	O	N
Discussed religion	F	O	N
Discussed politics.................	F	O	N
Skipped school/class............	F	O	N
Publicly communicated my opinion about a cause (e.g., blog, email, petition)..........	F	O	N
Helped raise money for a cause or campaign.............	F	O	N
Fallen asleep in class...........	F	O	N
Failed to complete homework on time..............	F	O	N
Felt anxious	F	O	N

35. How would you rate yourself in the following areas:
(Mark one for each item)

	A Major Strength	Somewhat Strong	Average	Somewhat Weak	A Major Weakness
Ability to see the world from someone else's perspective	○	○	○	○	○
Tolerance of others with different beliefs .	○	○	○	○	○
Openness to having my own views challenged................	○	○	○	○	○
Ability to discuss and negotiate controversial issues.......................	○	○	○	○	○
Ability to work cooperatively with diverse people..........	○	○	○	○	○
Critical thinking skills ..	○	○	○	○	○
Ability to manage your time effectively	○	○	○	○	○

36. What is the highest level of formal education obtained by your parents/guardians? (Mark one in each column)

	Parent/Guardian 1	Parent/Guardian 2
Junior high/Middle school or less	○	○
Some high school..........	○	○
High school graduate	○	○
Postsecondary school other than college........	○	○
Some college................	○	○
College degree	○	○
Some graduate school ..	○	○
Graduate degree	○	○

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37. How often in the past year did you:
(Mark one for each item)

	Frequently	Occasionally	Not at All
Ask questions in class	F	O	N
Support your opinions with a logical argument	F	O	N
Seek solutions to problems and explain them to others	F	O	N
Evaluate the quality or reliability of information you received	F	O	N
Take a risk because you feel you have more to gain	F	O	N
Seek alternative solutions to a problem	F	O	N
Look up scientific research articles and resources	F	O	N
Explore topics on your own, even though it was not required for a class	F	O	N
Accept mistakes as part of the learning process	F	O	N
Analyze multiple sources of information before coming to a conclusion	F	O	N
Take on a challenge that scares you	F	O	N

38. How confident are you that you can: (Mark one in each row)

	Absolutely	Very	Moderately	Somewhat	Not at All
Use technical science skills (use of tools, instruments, and/or techniques)	A	V	M	S	N
Generate a research question	A	V	M	S	N
Determine how to collect appropriate data	A	V	M	S	N
Explain the results of a study	A	V	M	S	N
Use scientific literature to guide research	A	V	M	S	N
Integrate results from multiple studies	A	V	M	S	N
Ask relevant questions	A	V	M	S	N
Identify what is known and not known about a problem	A	V	M	S	N
Understand scientific concepts	A	V	M	S	N
See connections between different areas of science and mathematics	A	V	M	S	N

39. How would you characterize your political views? (Mark one)

- ○ Far left
- ○ Liberal
- ○ Middle-of-the-road
- ○ Conservative
- ○ Far right

40. In deciding to go to college, how important to you was each of the following reasons? (Mark one answer for each possible reason)

	Very Important	Somewhat Important	Not Important
To be able to get a better job	V	S	N
To gain a general education and appreciation of ideas	V	S	N
To make me a more cultured person	V	S	N
To be able to make more money	V	S	N
To learn more about things that interest me	V	S	N
To get training for a specific career	V	S	N
To prepare myself for graduate or professional school	V	S	N
To please my family	V	S	N

41. Rate yourself on each of the following traits as compared with the average person your age. We want the most accurate estimate of how you see yourself. (Mark one in each row)

	Highest 10%	Above Average	Average	Below Average	Lowest 10%
Academic ability	○	○	○	○	○
Artistic ability	○	○	○	○	○
Compassion	○	○	○	○	○
Creativity	○	○	○	○	○
Drive to achieve	○	○	○	○	○
Emotional health	○	○	○	○	○
Leadership ability	○	○	○	○	○
Mathematical ability	○	○	○	○	○
Physical health	○	○	○	○	○
Public speaking ability	○	○	○	○	○
Risk-taking	○	○	○	○	○
Self-confidence (intellectual)	○	○	○	○	○
Self-confidence (social)	○	○	○	○	○
Spirituality	○	○	○	○	○
Understanding of others	○	○	○	○	○
Writing ability	○	○	○	○	○

① Strongly Disagree
② Disagree Somewhat
③ Agree Somewhat
④ Strongly Agree

42. Mark one in each row:

Wealthy people should pay a larger share of taxes than they do now	④	③	②	①
Addressing global climate change should be a federal priority	④	③	②	①
The federal government should have stricter gun control laws	④	③	②	①
Affirmative action in college admissions should be abolished	④	③	②	①
The federal government should raise taxes to reduce the deficit	④	③	②	①
Sexual activity that occurs without the presence of explicit, affirmative consent (i.e., "yes means yes") is considered sexual assault	④	③	②	①
There is little that a person can do to be better at math – you are either "good" or "bad" at math	④	③	②	①
Intelligence is something that can be improved by studying or working harder	④	③	②	①

43. Below are some reasons that might have influenced your decision to attend this particular college. How important was each reason in your decision to come here? (Mark one answer for each possible reason)

	Very Important	Somewhat Important	Not Important
My parents/relatives wanted me to come here	V	S	N
My teacher advised me	V	S	N
This college has a very good academic reputation	V	S	N
This college has a good reputation for its social and extracurricular activities	V	S	N
I was offered financial assistance	V	S	N
The cost of attending this college	V	S	N
High school counselor advised me	V	S	N
Private college counselor advised me	V	S	N
I wanted to live near home	V	S	N
Not offered aid by first choice	V	S	N
Could not afford first choice	V	S	N
This college's graduates gain admission to top graduate/professional schools	V	S	N
This college's graduates get good jobs	V	S	N
I was attracted by the religious affiliation/orientation of this college	V	S	N
I wanted to go to a school about the size of this college	V	S	N
Rankings in national magazines	V	S	N
I was admitted through an Early Action or Early Decision program	V	S	N
A visit to this campus	V	S	N
This college's graduates make a difference in the world	V	S	N

44. During your last year in high school, how much time did you spend during a typical week doing the following activities?

Hours per week:	None	Less than 1 hour	1-2	3-5	6-10	11-15	16-20	Over 20
Studying/homework	○	○	○	○	○	○	○	○
Socializing with friends in person	○	○	○	○	○	○	○	○
Online social networks (Facebook, Twitter, etc.)	○	○	○	○	○	○	○	○
Partying	○	○	○	○	○	○	○	○
Student clubs/groups	○	○	○	○	○	○	○	○
Exercise or sports	○	○	○	○	○	○	○	○
Working (for pay)	○	○	○	○	○	○	○	○
Household/childcare duties	○	○	○	○	○	○	○	○

45. Military Status: (Mark one)
- ○ None
- ○ ROTC, cadet, or midshipman at a service academy
- ○ In the Reserves or National Guard
- ○ On Active Duty
- ○ A discharged veteran **NOT** serving on Active Duty, in Reserves, or in National Guard

46. How many years do you expect it will take you to graduate from this college?
- ○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6+
- ○ I do not plan to graduate from this college.

47. What is your sexual orientation?
- ○ Heterosexual/Straight
- ○ Gay
- ○ Lesbian
- ○ Bisexual
- ○ Queer
- ○ Other

48. Do you identify as transgender?
- ○ Yes ○ No

49. Do you have any of the following disabilities or medical conditions? (Mark Yes or No for each item)

	Yes	No
Learning disability (dyslexia, etc.)	○	○
Attention deficit hyperactivity disorder (ADHD)	○	○
Autism spectrum disorder	○	○
Physical disability (speech, sight, mobility, hearing, etc.)	○	○
Chronic illness (cancer, diabetes, autoimmune disorders, etc.)	○	○
Psychological disorder (depression, etc.)	○	○
Other	○	○

50. Will you pursue a science-related research career? (Mark one)
- ○ Definitely yes
- ○ Probably yes
- ○ Uncertain
- ○ Probably no
- ○ Definitely no

51. To what extent are the following statements true of you: (Mark one in each row)

① Strongly Disagree
② Disagree Somewhat
③ Neutral
④ Agree Somewhat
⑤ Strongly Agree

I have a strong sense of belonging to a community of scientists	⑤④③②①
I derive great personal satisfaction from working on a team that is doing important research	⑤④③②①
I think of myself as a scientist	⑤④③②①
I feel like I belong in the field of science	⑤④③②①

52. Please indicate the importance to you personally of each of the following: (Mark one for each item)

Ⓝ Not Important
Ⓢ Somewhat Important
Ⓥ Very Important
Ⓔ Essential

Becoming accomplished in one of the performing arts (acting, dancing, etc.)	ⒺⓋⓈⓃ
Becoming an authority in my field	ⒺⓋⓈⓃ
Obtaining recognition from my colleagues for contributions to my special field	ⒺⓋⓈⓃ
Influencing the political structure	ⒺⓋⓈⓃ
Influencing social values	ⒺⓋⓈⓃ
Raising a family	ⒺⓋⓈⓃ
Being very well off financially	ⒺⓋⓈⓃ
Helping others who are in difficulty	ⒺⓋⓈⓃ
Making a theoretical contribution to science	ⒺⓋⓈⓃ
Writing original works (poems, novels, etc.)	ⒺⓋⓈⓃ
Creating artistic works (painting, sculpture, etc.)	ⒺⓋⓈⓃ
Becoming successful in a business of my own	ⒺⓋⓈⓃ
Becoming involved in programs to clean up the environment	ⒺⓋⓈⓃ
Developing a meaningful philosophy of life	ⒺⓋⓈⓃ
Participating in a community action program	ⒺⓋⓈⓃ
Helping to promote racial understanding	ⒺⓋⓈⓃ
Keeping up to date with political affairs	ⒺⓋⓈⓃ
Becoming a community leader	ⒺⓋⓈⓃ
Improving my understanding of other countries and cultures	ⒺⓋⓈⓃ
Integrating spirituality into my life	ⒺⓋⓈⓃ

53. What is your best guess as to the chances that you will: (Mark one for each item)

Ⓝ No Chance
Ⓛ Very Little Chance
Ⓢ Some Chance
Ⓥ Very Good Chance

Change major field	ⓋⓈⓁⓃ
Change career choice	ⓋⓈⓁⓃ
Participate in student government	ⓋⓈⓁⓃ
Get a job to help pay for college expenses	ⓋⓈⓁⓃ
Join a social fraternity or sorority	ⓋⓈⓁⓃ
Transfer to another college before graduating	ⓋⓈⓁⓃ
Participate in volunteer or community service work	ⓋⓈⓁⓃ
Seek personal counseling	ⓋⓈⓁⓃ
Communicate regularly with your professors	ⓋⓈⓁⓃ
Participate in student clubs/groups	ⓋⓈⓁⓃ
Participate in a study abroad program	ⓋⓈⓁⓃ
Work on a professor's research project	ⓋⓈⓁⓃ
Get tutoring help in specific courses	ⓋⓈⓁⓃ
Take courses from more than one college simultaneously	ⓋⓈⓁⓃ
Take a leave of absence from this college temporarily	ⓋⓈⓁⓃ
Take a course exclusively online	ⓋⓈⓁⓃ
Vote in a local, state, or national election	ⓋⓈⓁⓃ

The remaining ovals are provided for questions specifically designed by your college rather than the Higher Education Research Institute. If your college has chosen to use the ovals, please observe carefully the supplemental directions given to you.

54. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	58. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	62. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	66. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	70. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
55. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	59. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	63. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	67. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	71. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
56. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	60. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	64. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	68. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	72. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
57. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	61. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	65. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	69. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	73. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

THANK YOU!

Data Recognition Corp.-6G6144-15767-54321

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Appendix B

Descriptive Analysis Results

TABLE B1.

DEMOGRAPHICS, FINANCIAL, AND ACADEMIC BACKGROUND BY SCHOOL TYPE[a]

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
RACE/ETHNICITY[b]				
White/Caucasian	64.1	71.8*	67.7	60.0
African American/Black	9.6	7.8	7.4	13.0
American Indian/Alaska Native	1.7	1.7	0.7	1.8
East Asian	6.3	8.8*	9.5	7.0
Filipino	6.0*	3.5	6.3	3.0
Southeast Asian	1.2	1.3	0.7	2.4
South Asian	1.9	1.7	1.8	2.8
Other Asian	0.2	0.4	0.4	0.5
Native Hawaiian/Pacific Islander	0.6	1.7*	0.4	1.0
Mexican American/Chicano	14.1*	8.5	11.9	13.5
Puerto Rican	1.7	2.0	1.1	2.2
Other Latino	10.3*	7.7	9.5	6.9
Other	2.8	2.4	2.8	2.0
PARENTAL EDUCATION (BACHELOR'S DEGREE OR HIGHER)				
Bachelor's Degree	37.8	35.7	42.7	29.1
Graduate Degree or higher	42.7	46.7*	43.0	22.2
FAMILY INCOME				
Over $250,000	21.3	23.4	29.1	8.0
$200,000 – 249,999	10.5	8.6	13.0	5.3
$150,000 - $199,999	7.8	8.8	9.1	7.3
$100,000 - $149,999	22.5	21.3	17.7	19.4
$60,000 – 99,999	18.9	19.6	14.1	22.9
$30,000 – 59,999	10.1	9.6	9.4	17.0
Less than $30,000	9.0	8.8	7.5	20.3

[a] *For all appendix tables, schools are grouped by Girls' Schools (GS), Coeducational Schools (CS), NCGS member schools (NCGS) and public coeducational schools (Public)*

[b] *Students were allowed to "mark all that apply" thus these columns may sum to more than 100%.*

* *p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).*

TABLE B1. *(continued)*

DEMOGRAPHICS, FINANCIAL, AND ACADEMIC BACKGROUND BY SCHOOL TYPE[a]

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
HOURS PER WEEK WORKING FOR PAY				
None	55.6	51.2	58.7	41.5
1 to 5	20.5	20.4	24.5	15.8
6 to 10	10.2	11.0	7.1	12.2
11 to 15	7.1	7.7	3.7	10.5
16 to 20	3.6	5.2	4.1	9.4
Over 20	2.9	4.4	1.9	10.4
FUTURE ACTIVITY (VERY GOOD CHANCE)				
Get a job to help pay for college expenses	46.2	45.5	39.2	59.0
CONCERNS ABOUT FINANCING COLLEGE				
Some or major concerns	66.5*	59.4	62.2	77.8
REASONS FOR COLLEGE CHOICE (VERY IMPORTANT)				
Low tuition cost	43.6*	37.5	37.0	48.4
Financial aid offers	49.6	46.8	43.5	54.2
Graduates get "good jobs"	64.6*	59.8	63.6	58.5
HOURS PER WEEK STUDYING OR DOING HOMEWORK				
None	0.0	0.4	0.0	1.0
Any to 2	10.0	13.2*	6.3	22.6
3 to 5	21.3	24.2	20.3	27.8
6 to 10	26.7	25.5	25.8	23.0
11 or more	41.9*	36.7	47.7	25.6
HIGH SCHOOL GPA				
A or A+	25.6	34.4*	22.6	32.1
A-	36.9*	33.2	42.0	28.1
B+	21.4*	18.3	21.9	18.7
B or B-	15.6	13.2	13.1	19.1
C+ or lower	0.5	1.0	0.4	1.9
STANDARDIZED TEST SCORES (REPRESENTED AS AVERAGES)				
SAT Verbal	612	622	618	584
SAT Math	583	590	618	562
ACT composite	27	27	28	25

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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TABLE B2.

COLLEGE CHOICE BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
MILES FROM HOME				
Within 10 miles	13.6*	10.2	9.5	14.7
11 to 100 miles	28.4	25.7	27.3	42.9
101 to 500 miles	22.0	28.8*	19.9	26.2
Over 500 miles	35.3	36.0	43.4	16.2
WHERE DO YOU PLAN TO LIVE?				
With my family or relatives	15.9*	9.6	10.0	20.5
On campus	82.8	88.3*	88.6	77.2
Other	1.3	2.1	1.4	2.3
REASONS FOR ATTENDING COLLEGE (VERY IMPORTANT)				
To please my family	34.6*	31.2	27.0	35.5
To be able to get a better job	84.5*	81.1	83.2	85.7
To gain a general education and appreciation of ideas	84.6	82.2	82.1	80.4
To make me a more cultured person	67.4*	63.5	68.8	58.3
To be able to make more money	65.1	62.2	59.5	70.9
To learn more about things that interest me	89.7	88.8	91.0	87.4
To prepare myself for graduate school	67.4*	62.6	57.7	67.5
To get training for a specific career	74.3	74.9	64.2	79.8
REASONS FOR CHOOSING THIS COLLEGE (VERY IMPORTANT)				
My parents/relatives wanted me to come here	18.4	18.0	19.3	16.9
My teacher advised me	7.5	7.6	5.8	6.9
This college has a very good academic reputation	70.4	70.7	72.3	68.9
This college has a good reputation for social and extracurricular activities	50.5	55.1*	51.1	51.7
I was offered financial assistance	49.6	46.8	43.5	54.2
The cost of attending this college	43.6*	37.5	37.0	48.4
High school guidance counselor advised me	14.9	13.1	14.8	9.5
Private college counselor advised me	9.7	7.8	8.9	4.9
I wanted to live near home	19.4	16.9	15.6	23.8
Not offered aid by first choice	14.4*	11.2	13.0	12.3
Could not afford first choice	16.3*	13.0	15.3	15.9
This college's graduates admitted to top graduate schools	43.4*	39.3	40.9	37.5
This college's graduates get good jobs	64.6*	59.8	63.6	58.5
REASONS FOR CHOOSING THIS COLLEGE (VERY IMPORTANT)				
I was attracted by the religious affiliation of the school	13.1	20.1*	7.4	10.3
I wanted to go to a school this size	52.0	53.6	48.1	43.1
Rankings in national magazine	19.2	20.1	21.9	18.5
Admitted through Early Decision or Early Action	21.2	21.1	26.7	17.7
A visit to campus	58.3	60.3	53.7	53.1
This college's graduates make a difference in the world	51.5	50.6	51.1	44.8

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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TABLE B3.

ACADEMIC SELF-CONFIDENCE AND ENGAGEMENT BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
SELF-RATINGS (ABOVE AVERAGE OR HIGHEST 10 PERCENT)				
Intellectual self-confidence	53.2	50.9	51.4	49.5
Mathematical ability	38.7	36.6	41.3	40.5
Academic ability	69.5	70.7	62.5	70.2
Drive to achieve	76.1	75.6	74.1	77.8
Writing ability	53.5	55.3	58.7	48.9
Risk-Taking	41.5*	37.7	30.6	33.0
HOURS PER WEEK IN STUDENT CLUBS AND GROUPS				
None	8.3	12.5*	8.1	15.3
Any to 2	37.7	37.6	38.5	34.3
3 to 5	26.6	24.8	25.6	23.0
6 to 10	16.9*	13.7	16.3	13.8
11 or more	10.6	11.4	11.5	13.6
ADDITIONAL HIGH SCHOOL BEHAVIORS (FREQUENTLY)				
Tutored another student	21.5*	14.9	23.7	15.9
Been late to class	8.1	8.1	8.2	8.5
Skipped class	1.5	1.8	1.4	2.9
Fell asleep in class	4.1	5.1	5.3	5.6
Was bored in class	37.5	37.6	36.9	40.1
Failed to complete homework on time	3.5	3.9	3.5	3.9
Studied with other students	54.5*	48.6	55.7	39.9
Asked a teacher for advice after class	44.7	44.1	45.6	33.5
FUTURE ACTIVITIES (VERY GOOD CHANCE)				
Change major field	18.6	15.9	19.9	13.2
Transfer to another college before graduating	4.1	4.2	4.2	4.9
Communicate regularly with your professors	57.8	59.7	59.1	52.4
Participate in a study abroad program	52.1	50.6	56.8	43.1
Work on a professor's research project	26.0	22.5	25.0	25.1
Get tutoring help in specific courses	40.8	38.8	34.5	41.0
Take courses from more than one college simultaneously	5.9	7.4	4.5	6.9
Take a leave of absence (temporarily)	1.9	1.9	1.5	1.8
Take a course exclusively online	3.4	5.0	1.1	5.4
SELF-RATED STRENGTHS (SOMEWHAT STRONG OR A MAJOR STRENGTH)				
Critical thinking skills	41.0*	37.2	79.5	74.0
Ability to manage your time effectively	25.2	27.2	53.9	54.3

p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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TABLE B3. *(continued)*

ACADEMIC SELF-CONFIDENCE AND ENGAGEMENT BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
HABITS OF MIND (FREQUENTLY)				
Ask questions in class	61.8	58.9	65.1	50.1
Support your opinions with a logical argument	68.1*	63.5	71.9	59.3
Seek solutions to problems and explain them to others	64.9*	61.1	65.6	56.0
Evaluate the quality or reliability of information you receive	51.3	50.8	52.5	47.2
Take a risk because you feel you have more to gain	39.8*	34.7	38.2	32.9
Seek alternative solutions to a problem	52.7*	47.5	48.2	44.7
Look up scientific research articles and resources	29.6	26.4	35.6	25.2
Explore topics on your own, even though it was not required	44.3*	38.9	48.2	36.3
Accept mistakes as part of the learning process	57.4	54.3	56.0	54.3
Analyze multiple sources of information before coming to a conclusion	50.2	47.3	51.4	45.4
Take on a challenge that scares you	40.4*	36.1	43.0	34.1
ACADEMIC VIEWS (SOMEWHAT OR STRONGLY AGREE)				
Intelligence is something that can be improved by studying	90.0	90.7	88.1	91.8

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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TABLE B4.

SCIENCE SKILLS AND IDENTITY BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
SCIENCE SKILLS (VERY OR ABSOLUTELY CONFIDENT)				
Use technical science skills (use of tools, instruments, or techniques)	46.4*	41.9	41.5	41.6
Generate a research question	44.9*	41.2	45.9	39.5
Determine how to collect appropriate data	51.2*	45.9	52.4	43.1
Explain the results of a study	59.9*	55.5	59.7	43.6
Use scientific literature to guide research	39.3	36.8	40.0	35.5
Integrate results from multiple studies	53.3	49.7	52.0	46.5
Ask relevant questions	77.0	76.1	76.9	71.3
Identify what is known or not known about a problem	66.5	65.9	66.9	62.9
Understand scientific concepts	51.7*	47.8	51.1	47.0
See connections between different areas of science and mathematics	50.4*	45.3	48.2	46.8
ACADEMIC VIEWS (SOMEWHAT OR STRONGLY AGREE)				
There is little that a person can do to be better at math	23.2	27.5*	22.7	27.1
SCIENCE IDENTITY (SOMEWHAT OR STRONGLY AGREE)				
I have a strong sense of belonging to a community of scientists	26.4*	22.5	20.5	26.1
I derive great personal satisfaction from working on a team that is doing important research	53.9*	46.7	48.9	48.5
I think of myself as a scientist	19.5*	16.4	19.2	18.7
I feel like I belong in the field of science	38.0*	31.3	29.5	35.8
FUTURE GOALS (VERY IMPORTANT OR ESSENTIAL)				
Make a theoretical contribution to science	23.9*	20.3	18.8	25.1

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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TABLE B5.

PLANNED ACADEMIC MAJOR BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
SCIENCE-RELATED ACADEMICS				
STEM[a] major	29.7*	24.1	25.5	28.9
Biology/Health Professions major	32.9*	28.3	21.9	34.7
ALL MAJORS				
Agriculture or Forestry	0.3	0.4	0.0	0.4
Biological Sciences	18.9*	15.7	14.7	18.7
Business	12.2	12.4	14.4	9.6
Education	2.7	4.9*	2.5	5.8
Engineering	4.7	3.6	4.3	5.0
English	2.1	2.5	4.0	1.8
Fine Arts	4.1	6.6*	5.0	4.7
Health Professions	14.0	12.6	7.2	16.1
History or Political Science	4.6	4.4	6.8	3.8
Humanities	5.9	5.8	6.1	4.7
Mathematics or Computer Science	4.4*	2.6	5.4	3.0
Physical Sciences	1.6	2.2	1.1	2.2
Social Sciences	11.2	10.8	14.0	10.3
Justice and Security	0.8	0.9	1.1	2.4
Undecided	10.2	12.2	10.1	9.1

[a] *In this study, STEM majors included biological and physical sciences, engineering, computer sciences, and mathematics/statistics.*

* *$p<.05$; proportions compared between students at girls' schools (GS) and coeducational schools (CS).*

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TABLE B6.

MAJOR, DEGREE, AND CAREER ASPIRATIONS BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
REASON FOR GOING TO COLLEGE (VERY IMPORTANT)				
Make more money	65.1	62.2	59.5	70.9
Get better job	84.5*	81.1	83.2	85.7
FUTURE ACTIVITIES (VERY GOOD CHANCE)				
Change career choice	18.8	17.4	20.7	13.9
GOALS (VERY IMPORTANT OR ESSENTIAL)				
Being very well-off financially	81.5	76.3	79.8	84.4
Becoming successful in a business of my own	40.8	38.8	37.6	37.6
Raising a family	73.4	74.8	71.2	69.8
Becoming an authority in my field	60.5	57.9	60.3	56.9
Obtaining recognition from my colleagues for contributions to my field	59.0*	54.7	60.0	57.3
Becoming accomplished in one of the performing arts	16.9	19.8*	12.5	17.6
Writing orig. works (poems, novels, etc.)	16.4	21.1*	17.3	17.1
Creating artistic work (painting, sculpture, etc.)	16.7	21.4*	18.0	18.1
SELF-RATINGS (ABOVE AVERAGE OR HIGHEST 10%)				
Artistic ability	32.5	37.4*	30.7	32.8
Creativity	50.7	53.9	53.5	50.2

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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MAJOR, DEGREE, AND CAREER ASPIRATIONS BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
CAREER ASPIRATIONS				
Agriculture/Natural Resources	0.7	0.8	1.1	0.9
Artist	6.2	9.4*	8.4	6.7
Business	12.3	11.8	14.1	9.5
Business Clerical	0.3	0.2	0.0	0.3
Clergy	0.3	0.5	0.4	0.7
College Teacher	0.2	0.4	0.0	0.3
Communications	3.3	4.0	4.2	3.1
IT Professional	1.4	0.8	1.9	1.3
Doctor/Dentist/Physician	15.7	13.7	11.4	14.2
Education (PK-12)	2.8	6.5*	4.2	6.9
Engineer	4.1*	2.1	3.8	3.0
Government	2.2	2.0	2.7	2.8
Health Professional	11.3*	9.1	8.4	11.4
Homemaker/Stay-at-Home Parent	0.5	0.5	0.0	0.5
Lawyer	5.7	4.6	6.8	3.8
Military	0.2	0.7	0.0	0.7
Nurse	6.4	5.3	4.2	6.3
Research Scientist	2.1	2.8	1.1	3.6
Social Worker	1.0	0.9	1.5	0.8
Trade/Skilled Worker	1.7	1.6	1.1	2.4
Undecided	14.2	14.2	17.1	11.4
DEGREE ASPIRATIONS				
Undergraduate Degree (BA, BS)	18.5	22.4*	21.2	21.2
Graduate Degree (MA, MS)	37.1	38.6	39.8	39.3
Terminal Degree (MD, JD, PhD)	44.4*	39.0	39.0	39.5

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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TABLE B7.

COMMUNITY ENGAGEMENT BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
PAST ACTIVITIES (FREQUENTLY)				
Performed volunteer work	51.5*	47.0	52.0	40.7
PAST ACTIVITIES (FREQUENTLY OR OCCASIONALLY)				
Performed volunteer work	96.7*	94.3	94.7	89.6
FUTURE ACTIVITIES (VERY GOOD CHANCE)				
Participate in volunteer or community service work	53.3	51.6	53.8	46.8
GOALS (VERY IMPORTANT OR ESSENTIAL)				
Influencing social values	57.3	55.8	52.1	51.5
Helping others who are in difficulty	84.6	83.9	84.3	82.6
Becoming involved in programs to clean up the environment	35.5*	30.8	31.8	36.1
Participating in community action programs	49.7*	41.5	45.9	41.3
Becoming a community leader	50.0	46.9	51.9	44.2

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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TABLE B8.

GLOBAL CITIZENSHIP AND DIVERSE INTERACTIONS BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
GOALS (VERY IMPORTANT OR ESSENTIAL)				
Helping to promote racial understanding	59.1*	50.3	50.6	52.6
Improving my understanding of other countries and cultures	74.9*	69.7	72.9	65.6
SELF-RATED STRENGTHS (SOMEWHAT STRONG OR A MAJOR STRENGTH)				
Ability to see the world from someone else's perspective	36.8	36.8	82.2	77.8
Tolerance of others with different beliefs	50.3*	45.2	86.4	81.5
Openness to having my view challenged	25.4	25.9	60.4	62.8
Ability to discuss and negotiate controversial issues	34.4	32.9	68.4	77.0
Ability to work cooperatively with diverse people.	61.8*	56.1	90.0	88.0
PAST ACTIVITIES (FREQUENTLY)				
Socialized with someone of another ethnic group	84.9*	79.8	98.2	97.0

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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TABLE B9.

LEADERSHIP AND POLITICAL ENGAGEMENT BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
POLITICAL ORIENTATION				
Far right or Conservative	19.3	27.0*	17.3	15.9
Middle of the road	36.5	37.5	37.3	39.4
Liberal or Far left	44.2*	35.4	45.4	44.6
POLITICAL VIEWS (AGREE SOMEWHAT OR STRONGLY)				
Wealthy people should pay a larger share of taxes than they do now	71.5*	60.4	68.0	76.5
Addressing global climate change should be a federal priority	89.6*	76.4	91.5	84.5
The federal government should have stricter gun control laws	86.0*	73.3	85.7	78.4
Affirmative action in college admissions should be abolished	50.6*	44.3	45.4	48.4
The federal government should raise taxes to reduce the deficit	39.3	34.2	37.4	38.3
Sexual activity that occurs without the presence of explicit, affirmative consent is considered sexual assault	92.2	91.4	91.4	90.8
GOALS RELATED TO POLITICS (VERY IMPORTANT OR ESSENTIAL)				
Keep up to date with political affairs	53.9*	46.9	54.1	44.1
Influencing the political structure	26.8*	23.2	23.2	24.7
POLITICAL ACTIVITIES IN PAST YEAR (FREQUENTLY)				
Voted in a student election	38.7*	28.8	38.1	19.8
Discussed politics	49.2*	44.1	47.3	35.3
Demonstrated for a cause (e.g., boycott, rally, protest, etc)	4.9	4.0	6.4	3.8
Publicly communicated my opinion about a cause	21.7	20.1	22.4	19.2
Helped raise money for a cause or campaign	20.4	17.8	17.5	15.9
ACTIVITIES IN THE PAST YEAR (FREQUENTLY OR OCCASIONALLY)				
Discussed politics	93.6*	89.6	95.7	84.6
Publicly communicated my opinion about a cause	60.8*	55.2	59.8	53.0
Helped raise money for a cause or campaign	66.2	62.9	66.8	59.4
FUTURE ACTIVITIES (VERY GOOD CHANCE)				
Participate in student government	9.5	8.2	11.7	9.2
Vote in a local, state, or national election	74.2*	68.6	69.5	63.9
SELF-RATINGS (ABOVE AVERAGE OR HIGHEST 10%)				
Leadership ability	60.3	61.2	62.1	58.9
Public speaking ability	42.5*	38.9	46.6	34.8
Social self-confidence	42.9	43.0	42.2	39.7
Understanding of others	79.5	79.6	80.4	76.1
Compassion	76.2	78.9	75.0	74.5

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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TABLE B10.

FREE TIME BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
HOURS PER WEEK SPENT SOCIALIZING WITH FRIENDS				
None	0.6	0.3	0.4	0.6
Any to 2	10.9	10.0	10.7	15.2
3 to 5	26.4	25.0	25.2	28.1
6 to 10	27.5	28.3	29.3	27.0
11 or more	34.5	36.3	34.4	29.2
HOURS PER WEEK SPENT ON ONLINE SOCIAL NETWORKS (FACEBOOK, TWITTER, ETC.)				
None	1.8	1.8	1.9	2.2
Any to 2	20.7	23.1	19.6	23.8
3 to 5	30.9	31.2	32.2	27.9
6 to 10	23.6	22.8	24.1	12.5
11 or more	23.0	21.1	22.2	24.7
HOURS PER WEEK SPENT EXERCISING OR PLAYING SPORTS				
None	7.4	6.4	6.3	11.9
Any to 2	26.5*	21.7	19.0	27.8
3 to 5	19.1	20.0	20.5	18.1
6 to 10	20.4	22.1	20.9	16.9
11 or more	26.6	29.7	33.2	25.3
HOURS PER WEEK SPENT PARTYING				
None	33.3	40.5*	31.0	45.9
Any to 2	33.6	34.8	35.4	33.6
3 to 5	21.7*	16.2	23.6	12.9
6 to 10	8.0*	5.6	7.4	5.0
11 or more	3.4	2.9	2.6	2.6
HOURS PER WEEK SPENT ON HOUSEHOLD/CHILDCARE				
None	21.7	23.5	28.0	18.5
Any to 2	47.2	45.2	47.2	45.3
3 to 5	19.7	20.2	16.6	19.9
6 to 10	6.8	6.6	4.4	8.6
11 or more	4.8	4.3	3.7	7.7
PAST ACTIVITIES (FREQUENTLY PLUS OCCASIONALLY)				
Drank beer	36.0*	30.6	42.1	24.5
Drank wine/liquor	46.9*	39.4	54.3	34.0
FUTURE ACTIVITIES (VERY GOOD CHANCE)				
Join a social fraternity or sorority	21.1	19.1	21.1	13.7
Participate in student clubs or groups	63.5	61.4	65.2	57.7

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

TABLE B11.

WELL-BEING, RELIGION, AND SPIRITUALITY BY SCHOOL TYPE

CATEGORY	PERCENT BY SCHOOL TYPE			
	GS	CS	NCGS	PUBLIC
SELF-RATINGS (ABOVE AVERAGE OR HIGHEST 10%)				
Emotional health	39.5	42.1	36.3	39.4
Physical health	46.0	49.5*	50.0	42.8
Spirituality	44.1	44.2	32.1	32.3
ACTIVITIES PAST YEAR (FREQUENTLY)				
Felt overwhelmed by all I had to do	57.5*	53.3	58.0	53.2
Felt depressed	14.4	14.6	15.3	14.6
Felt anxious	44.9	46.0	48.0	43.6
Attended religious service	49.0	50.3	40.3	31.7
Discussed religion	50.4*	48.4	41.6	24.9
ACTIVITIES IN THE PAST YEAR (OCCASIONALLY OR FREQUENTLY)				
Attended religious service	90.6*	84.6	69.4	69.4
Discussed religion	94.5*	91.7	78.2	78.2
FUTURE ACTIVITIES (VERY GOOD CHANCE)				
Seek personal counseling	17.9	19.5	17.7	16.8
GOALS (VERY IMPORTANT OR ESSENTIAL)				
Developing a meaningful philosophy of life	54.8	51.6	53.6	45.7
Integrating spirituality into my life	53.4	55.7	40.8	44.3

* p<.05; proportions compared between students at girls' schools (GS) and coeducational schools (CS).

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Appendix C

Dependent Variables

TABLE C1.

DESCRIPTION OF DEPENDENT VARIABLES WITH CODING SCHEME

VARIABLE	CODING SCHEME
COLLEGE CHOICE	
College reason: to make me a more cultured person is very important	Dichotomous: 0 (not marked), 1 (marked)
College reason: to get a better job	Dichotomous: 0 (not marked), 1 (marked)
College reason: to prepare myself for graduate or professional school	Dichotomous: 0 (not marked), 1 (marked)
Attending first choice college	Dichotomous: 0 (not marked), 1 (marked)
ACADEMIC SELF-CONFIDENCE AND ENGAGEMENT	
Critical thinking skills are somewhat or major strength	Dichotomous: 0 (not marked), 1 (marked)
Habits of Mind Score (TFS)	Composite Measure: 11 items (see Table C3)
Self-rated mathematical ability is above average or highest 10%	Dichotomous: 0 (not marked), 1 (marked)
Self-rated risk-taking ability if above average or highest 10%	Dichotomous: 0 (not marked), 1 (marked)
Frequently studied with other students	Dichotomous: 0 (not marked), 1 (marked)
Frequently tutored another student	Dichotomous: 0 (not marked), 1 (marked)
Spent time studying or doing homework for more than 6 hours per week	Dichotomous: 0 (not marked), 1 (marked)
Spent time in student clubs and groups for more than 6 hours per week	Dichotomous: 0 (not marked), 1 (marked)
SCIENCE SKILLS AND IDENTITY	
Somewhat or strongly agree: I derive great personal satisfaction from working on a team that is doing important research	Dichotomous: 0 (not marked), 1 (marked)
Somewhat or strongly agree: I feel like I belong in the field of science	Dichotomous: 0 (not marked), 1 (marked)
Somewhat or strongly agree: There is little that a person can do to be better at math – you are either "good" or "bad" at math	Dichotomous: 0 (not marked), 1 (marked)
Science Self-Efficacy Score (TFS)	Composite Measure: 10 items (see Table C3)
Goal of making theoretical contribution to science is very important or essential	Dichotomous: 0 (not marked), 1 (marked)

TABLE C1. *(continued)*

DESCRIPTION OF DEPENDENT VARIABLES WITH CODING SCHEME

VARIABLE	CODING SCHEME
ACADEMIC MAJOR, DEGREE, CAREER ASPIRATIONS	
Probable major is a STEM major	Dichotomous: 0 (not marked), 1 (marked)
Probable major is a Biological Sciences major	Dichotomous: 0 (not marked), 1 (marked)
Probable major is a Math/Computer Science major	Dichotomous: 0 (not marked), 1 (marked)
Probable career is Education (elementary, secondary)	Dichotomous: 0 (not marked), 1 (marked)
Probable career is Engineer	Dichotomous: 0 (not marked), 1 (marked)
Probable career is a Health Profession	Dichotomous: 0 (not marked), 1 (marked
Aspires terminal degrees	Dichotomous: 0 (not marked), 1 (marked)
COMMUNITY ENGAGEMENT	
Community Orientation	Composite Measure: 6 items (see Table C2)
GLOBAL CITIZENSHIP AND DIVERSE INTERACTIONS	
Civic Engagement Score (TFS)	Composite Measure: 7 items (see Table C3)
Pluralistic Orientation Score (TFS)	Composite Measure: 5 items (see Table C3)
Frequently socialized with someone of another ethnic group	Dichotomous: 0 (not marked), 1 (marked)
LEADERSHIP AND POLITICAL ENGAGEMENT	
Occasionally or frequently discussed politics	Dichotomous: 0 (not marked), 1 (marked)
Liberal social views	Composite Measure: 5 items (see Table C2)
Political engagement	Composite Measure: 3 items (see Table C2)
Social Agency Score (TFS)	Composite Measure: 6 items (see Table C3)
Political view is Liberal or Far Left	Dichotomous: 0 (not marked), 1 (marked)
Very good chance to vote in a local, state, or national election	Dichotomous: 0 (not marked), 1 (marked)
Frequently voted in a student election	Dichotomous: 0 (not marked), 1 (marked)
FREE TIME	
Hedonism	Composite Measure: 3 items (see Table C2)
Spent time exercising or playing sports for more than 6 hours per week	Dichotomous: 0 (not marked), 1 (marked)

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TABLE C2.

DEPENDENT COMPOSITE MEASURES WITH RELIABILITY SCORES AND FACTOR LOADINGS

COMPOSITE MEASURE NAME	VARIABLE LOADING
COMMUNITY ORIENTATION (CRONBACH'S ALPHA = 0.80)	
Goal: Becoming involved in programs to clean up the environment[a]	0.67
Goal: Participating in a community action program[a]	0.81
Goal: Helping to promote racial understanding[a]	0.76
Goal: Becoming a community leader[a]	0.72
Goal: Improving my understanding of other countries and cultures[a]	0.74
Future activity: Participate in volunteer or community service work[b]	0.52
LIBERAL SOCIAL VIEWS (CRONBACH'S ALPHA = 0.75)	
View: Wealthy people should pay a larger share of taxes than they do now[c]	0.74
View: Addressing global climate change should be a federal priority[c]	0.74
View: The federal government should have stricter gun control laws[c]	0.75
View: The federal government should raise taxes to reduce the deficit[c]	0.54
Political view (How would you characterize your political views?)[d]	0.75
POLITICAL ENGAGEMENT (CRONBACH'S ALPHA = 0.70)	
Goal: Influencing the political structure[a]	0.79
Goal: Keep up to date with political affairs[a]	0.87
Past activity: Discussed politics in class[e]	0.70
HEDONISM (CRONBACH'S ALPHA = 0.62)	
Past activity: Drank beer[e]	0.89
Past activity: Drank wine or liquor[e]	0.90
Hours per week: Partying[f]	0.71

[a] *Four-point scale: 1 = not important to 4 = essential*

[b] *Four-point scale: 1 = no chance to 4 = very good chance*

[c] *Four-point scale: 1 = strongly disagree to 4 = strongly agree*

[d] *Five-point scale: 1 = far right to 5 = far left*

[e] *Three-point scale: 1 = not at all to 3 = frequently*

[f] *Eight-point scale: 1 = none to 8 = Over 20 hours*

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TABLE C3.

TFS CONSTRUCTS WITH DEFINITIONS AND FACTOR WEIGHTS

TFS CONSTRUCT DEFINITIONS AND CORRESPONDING SURVEY ITEMS	WEIGHTS

HABITS OF MIND is a unified measure of the behaviors and traits associated with academic success. These learning behaviors are seen as the foundation for lifelong learning.

How often in the past year did you:

• Seek solutions to problems and explain them to others	1.99
• Ask questions in class	1.20
• Support your opinions with a logical argument	1.74
• Look up scientific research articles and resources	1.05
• Seek alternative solutions to a problem	1.61
• Revise your papers to improve your writing	1.04
• Evaluate the quality or reliability of information you received	1.58
• Take a risk because you feel you have more to gain	1.03
• Explore topics on your own, even though it was not required for a class	1.27
• Accept mistakes as part of the learning process	0.95
• Seek feedback on your academic work	1.24

PLURALISTIC ORIENTATION measures skills and dispositions appropriate for living and working in a diverse society.

Rate yourself on each of the following traits as compared with the average person your age:

• Ability to work cooperatively with diverse people	2.39
• Ability to discuss and negotiate controversial issues	2.03
• Tolerance of others with different beliefs	2.35
• Ability to see the world from someone else's perspective	1.78
• Openness to having my views challenged	2.13

SOCIAL AGENCY measures the extent to which students value political and social involvement as a personal goal.

Indicate the importance to you personally of each of the following:

• Participating in a community action program	2.42
• Influencing social values	1.58
• Helping to promote racial understanding	2.05
• Helping others who are in difficulty	1.36
• Becoming a community leader	2.01
• Keeping up to date with political affairs	1.35

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TFS CONSTRUCTS WITH DEFINITIONS AND FACTOR WEIGHTS

TFS CONSTRUCT DEFINITIONS AND CORRESPONDING SURVEY ITEMS	WEIGHTS

CIVIC ENGAGEMENT measures the extent to which students are motivated and involved in civic, electoral, and political activities.

Indicate activities you did in the past year:

• Demonstrated for a cause (e.g., boycott, rally, protest)	1.46
• Worked on a local, state, or national political campaign	1.42
• Publicly communicated my opinion about a cause (e.g., blog, email, petition)	1.35
• Helped raise money for a cause or campaign	1.11
• Performed volunteer work	0.80

Indicate the importance to you personally of each of the following:

• Influencing social values	0.97
• Keeping up to date with political affairs	0.86

SCIENCE SELF-EFFICACY measures students' sense of confidence to engage with the scientific method.

How confident are you that you can:

• Use technical science skills (use of tools, instruments, and/or techniques)	1.48
• Integrate results from multiple studies	2.79
• Generate a research question	2.33
• Ask relevant questions	1.73
• Determine how to collect appropriate data	2.82
• Identify what is known and not known about a problem	1.95
• Explain the results of a study	2.87
• Understand scientific concepts	2.40
• Use scientific literature to guide research	2.70
• See connections between different areas of science and mathematics	1.90

Note: This table is adapted from Table A2. of the American Freshman 2016 *(Eagan et al., 2017), retrieved from https://www.heri.ucla.edu/monographs/TheAmericanFreshman2016.pdf. Table used with permission.*

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