GENDER, SELF-RATING AND ACHIEVEMENT, AND CHOICE OF COLLEGE MAJOR

by

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ABSTRACT

This paper analyzes the relationship between gender and likelihood of majoring in a Science, Technology, Engineering or Math (STEM) field in college, as well as the relationship between academic self-concepts and major. The data are derived from the CIRP College Senior Survey of 1994-2006, sponsored by UCLA's HERI, the Texas Christian University Freshman Survey results from 2012 to 2015 and an investigator-designed survey sent to all TCU students in 2017. The data include survey responses from over 450,000 college students at hundreds of institutions across the US. Results suggest a strong relationship between math ability self-rating and STEM. It is also suggested that females are less likely than males to major in STEM, and being female is correlated with a lower math self-rating. In addition, results suggest that there is a strong relationship between if a student's mother has a career and that student pursuing a STEM major.

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INTRODUCTION:

This research examines the lack of women in Science, Technology, Engineering or Math (STEM), testing the probability that a college woman is likely to choose a STEM major, while controlling for a multitude of factors, such as income, private high school and standardized testing scores. The data suggest that even with these controls in place, women are still less likely to go into STEM in college than men.

This study is relevant today because women need STEM as much as STEM needs women. Having higher equality in STEM fields can help to increase equality in other places as well. More women in STEM would produce a mentality that women can excel in typically male-dominated fields, which would likely encourage young girls to pursue these challenging fields as well. Seeing female role models in STEM would boost young girls' self-confidences because they would see that they are equal to boys. It could potentially reduce the gender wage gap, at least in STEM, because it cannot be expected that men and women would have equal wages if they are not even performing the same jobs.

And while it is easy to think of ways in which having women in STEM would benefit the female population as a whole, it is also imperative to realize that STEM fields would greatly profit as well. Having the perspectives of females would lead to better research and innovation throughout the STEM fields (Del Giudice, 2014). It would help eliminate the bias that currently exists by having a strong male majority, and companies that employ more women outperform their competitors, according to studies done by Goldman Sachs and Columbia University (Del Giudice, 2014).

Typically, men are prone to thinking about innovation in ways that benefit men, just as women do. Visions are clouded by our own needs and desires, and we often have a difficult time

thinking about what people who are different from us may think. Having women in STEM helps to alleviate this problem, just as having people from different cultural and ethnic backgrounds helps diversify perspectives.

One example of the importance of having women in STEM fields can be seen in the medical field. Men and women experience symptoms of heart disease differently. This statement may seem obvious today, but just a few years ago was unrecognized. A National Geographic article explains that up until a few years ago medical professionals assumed that men and women showed the same symptoms and required the same treatments of heart disease, because the tests were performed mainly by men, on men (Del Giudice, 2014). There was no thought that involving women in the research would change the results at all. This led to many women being misdiagnosed and sent home from hospitals, and in some cases dying, because doctors didn't realize they had heart disease (Del Giudice, 2014).

How could something this tragic occur for decades without anyone noticing? This study suggests that a lack of women in STEM can help explain this all-too-common occurrence.

It is common knowledge that women today earn more than half of all college degrees. But the Department of Commerce claims that only 24 percentage points of the STEM workforce is made up of women. This statistic seems unreal at first, but similar trends are noticed when looking at advanced STEM courses in universities.

This study examines how students' academic self-concepts can influence if they choose a STEM major. Girls are known to have lower self-concepts than their male peers, which is theorized in this study to possibly leading to them not majoring in STEM (Yong, 2017). STEM fields are known to be academically rigorous, needing a lot of innate intelligence to succeed, and

if women do not believe they have this intelligence, they may be pushed away from STEM, even at young ages.

This study is unique from prior research because it uses regression analysis to control for a variety of factors and influences when determining the relationship between gender and STEM. In addition, this study highlights the importance of self-concepts when predicting whether a student will choose a STEM major. Finally, while many studies look at younger students and working adults' attitudes and involvements with STEM, this research is focused only on college-aged students. This is significant because what students choose to do in college is often what they will continue to do throughout their lives.

Prior research suggests that females are less likely to be interested in STEM fields, even from very young ages. **This paper uses survey results from the Cooperative Institutional Research Program's College Senior Survey, the Freshman Survey and an investigator-designed TCU specific all-student survey to examine the likelihood that students choose STEM majors with a focus on females. It is hypothesized that women are less likely to choose a STEM major in college, even after controlling for many different influential variables, such as income, high school type and parents' careers, and that students with higher academic self-concepts will be more likely to choose STEM majors.**

A unique aspect of this project is that it includes a survey just of Texas Christian University students, in addition to a national survey. This is a case study, conducted to see if the results for TCU replicate the results of previous studies using national data. Findings from this research suggest that the results do align, for the most part, which increases our confidence in these results.

The results of this data support that girls are less likely to major in a STEM subject than their male counterparts by up to 14.44 percentage points, but there are inconclusive findings on the ways females and males self-rate their abilities. Results also suggest a strong positive relationship between a mother's career and her child majoring in a STEM field. It did not matter necessarily that her career be in STEM, just that she had one at all. In addition, general academic self-concepts' results suggest inconclusive relationships with STEM majors, but math ability self-rating has a very strong and positive correlation with whether a student majors in a STEM field. When looking at self-rating gaps, the math self-rating gaps were consistently positive and significant, suggesting that as students rate themselves higher, they are more likely to choose a STEM major. Overall, the academic self-confidence gaps showed negative relationships with STEM, suggesting that as academic self-confidence increases, students may be less likely to choose STEM. Finally, the academic ability self-rating gaps were often insignificant, sometimes negative and sometimes positive, thus suggesting that this gap has no relationship with choosing a STEM major. This all makes sense as there are intelligent and confident students in all majors, but those who believe they excel at math are more likely to be interested in STEM.

The remainder of this paper is organized as follows: Section two discusses findings from past literature. Section three presents an overview of the three different data sources used. Section four discusses the empirical methods employed to test relationships and the various robustness checks performed. Section five discusses findings, and section six concludes.

EVIDENCE FROM PAST RESEARCH:

Over the years, evidence suggests that there are significant differences between the way males and females self-rate their academic abilities. Ed Yong reports that the gap in self-confidence and performance in girls begins when they are as young as 6 years old (2017). At age

5, girls and boys are equally as likely to associate brilliance with their own gender, but by the time they are 6, only the boys hold this view, even though girls are outperforming their boy peers academically at this age (Yong, 2017, para. 3). Yong also argues that what drives students towards certain fields is the belief that success will depend on "raw, innate talent" and intelligence (2017, para. 7). This belief is more present in STEM fields, an idea that can also help explain the lack of females in these fields, as women may not always believe they are naturally intelligent, despite receiving good grades (Yong, 2017, para. 7).

A 2010 doctoral thesis written by Roxanne Hughes claims that there is little to no difference in the way that middle and high school students perform on standardized science tests (p. 5). Girls excel at the advanced math classes they take in high school as compared to boys. Yet, the number of girls pursuing these fields in college is staggeringly low (Hughes, 2010, p. 5-6). College women, per Hughes, tend to see the grades they receive as true indicators of their abilities, whereas men simply see grades as scores they receive, and do not necessarily let their grades discourage them (2010, p. 7). This can lead women to internalize poor grades they receive in weed-out STEM courses in which many receive failing grades, and can encourage women to drop out of STEM. Men, however, are not discouraged by the bad grades they receive, and are not dissuaded from STEM because of weed-out classes.

Hill, Corbett and St. Rose (2010) also look at self-concepts in relation to STEM They report that even when girls and boys perform about the same in math, that girls assess their math ability lower than boys (p. 44). They also find that the way a student self-rates their math ability can influence if they choose a STEM field in college (p. 44). They find that girls who believe they are good at math are more likely to enroll in a calculus class in high school, and girls that enrolled in upper level calculus were three times more likely to choose a quantitative major in

college (p. 46). Boys who enrolled were only about two times as likely to choose a quantitative major, suggesting that the relationship matters more for women (Hill, Corbett and St. Rose, 2010, p. 46).

Similarly, a study by Jayne Stake and Suzanna Rose (1985) found that while college women do not have lower grades than their male counterparts, they still are less likely to continue on to "tougher careers" (p. 16). According to Stake and Rose, this is because "educational and occupational goal-setting are related to confidence in one's abilities" (p. 16). And while men's self-confidence rises throughout college, women's stays the same or decreases (p. 16). Many women are simply unable to make the connection that their strong academic ability could lead them to succeed in other areas of their lives (Stake and Rose, 1985, 16-17). This could also be because of traditional social norms that expect women to do most of the house-hold and child-rearing responsibilities. As a result, women tend to choose careers with more flexibility, and STEM would be considered a more demanding and less flexible field than many non-STEM fields would.

In general, there are many factors that can influence the self-concepts of a student. First, the selectivity and academic toughness of a school can influence self-ratings in two ways (Sax, 1994, p. 144). The first way is in a negative light because by attending a tough school, a student is more likely to get lower grades, relative to peers of equal intelligence attending a less challenging school (Sax, 1994, p. 144). Thus, this student might compare himself to his peers at other schools and develop a lower academic self-rating than his peers. On the other hand, the fact that this student was even able to get into and attend a hard school may be enough to boost his self-confidence to higher than his peers (Sax, 1994, p. 144).

Schools can also influence a student's academic self-confidence based on socioeconomic status, a cause that applies to both the school and the student's family (Sax, 1994, p. 143; Marsh and Parker, 1984, p. 216). According to Sax, socioeconomic status is a positive predictor of academic self-confidence (1994, p. 143). The socioeconomic status of a school affects self-ratings as students in low socioeconomic schools have higher self-concept than their peers in high socioeconomic schools (Marsh and Parker, 1984, p. 229). Thus, students in lower socioeconomic status schools would be more likely to overrate their academic abilities, causing them to feel more confident in STEM areas. This, in turn, may cause income to have a negative impact on the likelihood that a student will choose a STEM major, as academic self-concept may play a role in choice of college major

In addition, self-ratings can be affected by peer opinions (Marsh and Parker, 1984, p. 214). Per Marsh and Parker, students will self-rate based on how they believe others would rate them (1984, p. 214). They conclude, however, that this is not a good measure of ability and often leads to incorrect ratings, because of humans' inability to accurately predict how others perceive them (Marsh and Parker, 1984, p. 214). Thus it can be assumed that students will underrate because they think their peers see them as less able academically.

A final factor that influences self-ratings comes from test scores and teacher ratings (Marsh and Walker, 1984, p. 221). The study conducted by Marsh and Walker suggests that teacher ratings and test scores are positively correlated with academic self-ratings (1984, p. 221). This means that the better a student does in school and the more praise received from teachers, the more likely she is to believe that she is a good student.

The self-concepts of women tend to be particularly low when it comes to STEM. Caporrimo suggests that while a direct relationship between confidence and ability to solve a

routine math problem exists for boys, the inverse is true for girls (1990, p. 12). This means that even when girls have high academic achievement, they often have low self-concept.

Another study argues that while girls have higher scores in both reading and math, that girls have lower self-confidence in math (Marsh, Smith and Barnes, 1985, p. 581). Girls report more anxiety than boys towards mathematics, "and greater mathematics anxiety is associated with a decline in performance of 34 score points - the equivalent of almost one year of school," according to the Organization of Economic Cooperation and Development (OECD, 2012, p. 64).

The OECD also reports that girls are even less likely to have confidence than boys in solving math problems based solely on the perceived "masculinity" of the subject (2012, p. 71). For example, if a math problem is about gas consumption in a car, only 44 percentage points of girls felt confident enough to answer it, compared to 67 percentage points of boys (OECD, 70-71). However, no gender difference existed when students were asked if they could solve a more typical classroom math topic, such as solving a quadratic or linear equation (OECD, p. 71).

It is also interesting and relevant to look at why women are less likely to have the confidence in their abilities to pursue STEM fields. Hughes suggests that parents, teachers and guidance counselors, known as "socializers" can influence the likelihood that a young woman will pursue STEM (2010, p. 6). She claims that these socializers often buy into the idea that men are biologically superior to women in math and sciences (Hughes, 2010, p. 6). Hughes claims that this leads parents to be less supportive of their daughters who want to go into these fields, and more supportive of their daughters who wish to drop out of the fields (2010, p. 6). This is further supported by Yong, who states parents often believe that their sons are innately smarter than their daughters (2017). He claims that parents are "2.5 times more likely to do a Google search for 'Is my son gifted?' than 'Is my daughter gifted?'" (Yong, 2017, para. 12). Stake and

Rose argue as well that women do not receive the same career support from their families that men do (1985, p. 17).

Furthermore, Hughes claims that this bias leads to STEM teachers providing more support to male students in the classrooms, and female students letting their male peers take the lead in lab experiments (2010, p. 6). This leads young women to be under-practiced and unprepared for STEM classes later on in their lives, makes them feel inferior to men in STEM, and can discourage women from choosing STEM in college (Hughes, 2010, p. 6).

Paquette claims that these socializers, including teachers, parents and even toymakers, drive the anxieties girls have about math, because of the idea that math does not fit into the traditional female role (2015). According to her, female role models in math are difficult to find, success is hard to imagine, and the anxiety and intimidation of being in STEM can overpower any curiosity for girls (Paquette, 2015). This is further supported by Miller (2015), who provides some evidence that teachers tend to overrate boys' abilities and underrate girls, which is reflected in the grades these students receive. This in turn discourages many girls from pursuing these types of courses in the future (Miller, 2015, para. 14).

Hughes also discusses how the serious lack of women role models in STEM influences the likelihood that female students will choose to study these fields (2010, p. 6-7). Women are already outnumbered by the men in their STEM classes, and the lack of female role models merely emphasizes this gender gap (p. 6). Many young women are intimidated by this and drop out of STEM after seeing that they do not fit in (p. 7). In addition, women can be persuaded to leave STEM because of the competitiveness and aggressiveness needed to succeed, which can often lead women to feel isolated and suffer a loss of confidence (Hughes, 2010, p. 40).

Hill, Corbett and St. Rose (2010) of the American Association of University Women claim that not only does a bias exist that makes it more acceptable for men to pursue STEM, but this bias can lead to women being perceived in a negative way for pursuing these "masculine subjects" (p. xvi). It is harder for a woman to be seen as successful in a STEM career unless she clearly excels above her peers (p. xvi). However, a woman who excels at a "man's job" is less likable (p. xvi). But competence and likability are both important for overall success in a career, and women are disadvantaged in both of these areas (Hill, Corbett and St. Rose, 2010, p. xvi).

Linda Sax provides similar findings; people have a preconceived notion that STEM fields are masculine, so girls are less inclined to believe that they can succeed in them (1994, p. 141). According to Caporrimo, "females buy into the predominant value system and cultural belief that females cannot or should not achieve as well in math as males (1990, p. 21). Thus, to be confident in an area in which they simply happen to achieve well is to go against a belief system that has defined proper behaviors and interests for females and males" (1990, p. 21).

A final factor that may steer women away from STEM is the desire to have a family, per Hughes. Because of a perceived conflict between success in a STEM career and having a family, many women are dissuaded from pursuing the fields (p. 18). Many women are very interested in having a family, and are not willing to give this up for a career (p. 45). Men, on the other hand, are more willing to continue with the time-consuming career path because they put less emphasis on work-family balance (Hughes, 2010, p. 45). This idea is supported in the investigator-designed survey results, as only one student reported to having chosen their major to have a good work-family balance. This student said "I chose this major because…it will still allow me to be involved with my family," and this student is a female.

The importance of understanding academic self-rating stems from the impact it has on academic achievement. Bailey argues that there needs to be better encouragement of students in classrooms because low achievement promotes a low self-rating, which in turn promotes further poor achievement, and the cycle can continue and worsen over time (1971, p. 190). Similarly, Marsh, Smith and Barnes argue that the declines in math ability in school are directly related to the socialization processes that cause a decline in math self-concept, such as students realizing that math is typically a more masculine subject (1985, p. 583). Additionally, other studies reinforce even further this idea that academic self-confidence directly affects academic achievement (Sax, 1994, p. 142). It has been shown that students who have anxiety about math underperform in the subject compared to students without such anxiety (OECD, 2012, p. 76).

MacCorquodale suggests that "the commonly held image of the scientist corresponds to the self-image of students with an interest in science insofar as intelligence, self-confidence, independence and creativity are concerned" (1984, p. 1). This could explain why mostly white men are associated with science, as they may be most likely to see themselves as creative and intelligent, and therefore would be more likely to be interested in science. His study also suggests that the discrepancies between these characteristics and the traditional sex role ideology is what leads girls to not want to be scientists (p. 4-5). He claims that girls are influenced by comments and expectations of parents and male colleagues, and they fear being considered "unfeminine" if they enter the science field (p. 5). With this in mind, it seems more likely that competitive girls, who have more competitive self-ratings, are the ones who enter the fields of STEM. Higher self-confidence leads students to be interested in math, he argues, yet girls are far less likely to be self-confident, and to believe that they are creative or intelligent (MacCorquodale, 1984, p. 12).

It is also important to consider the costs and benefits of different types of self-ratings. If a student has a high self-rating and high achievement, then she will be more likely to pursue a tougher career and major in college, because she knows her potential. Also, she is more confident in her abilities to speak up in class and meet with professors. However, if this is a student with low self-rating and achievement, then this student probably lacks a high perception of her aptitude and ability, and does not believe that she can succeed. In order to encourage more young women to pursue STEM fields, it needs to be ensured that their self-concepts are not lowered by gender biases in academics, family and society in general.

This paper explores the possibility that having higher female academic self-confidence in STEM areas would in turn promote more girls to major in STEM fields.

DATA:

The first dataset for this study come from the Cooperative Institutional Research Program's (CIRP) College Senior Survey, sponsored by UCLA's Higher Education Research Institution. The survey serves as an exit survey for college seniors before graduation. The data include over 400,000 college seniors that were surveyed from 1994 to 2006. In this survey, students were asked questions regarding their demographics, such as their home zip code and how much approximate income their families had in the last year. In addition, they were asked about academics, including their academic achievement and perceived academic abilities. Students were asked about their future plans, including the degrees they would graduate with and their plans for after college. Finally, they were asked about their satisfaction with their college experience and their values. Schools can use this survey as a follow up to the Freshman Survey, and can assess change in students over time.

Table 1: College Senior Survey Summary Statistics

Variable	*Observations*	*Mean*	*Std. Dev.*	*Min*	*Max*
STEM	442,250	0.210	0.408	0	1
Female	442,250	0.623	0.485	0	1
White	442,250	0.179	0.384	0	1
Income	222,414	15.032	5.716	1	25
First Generation College	245,366	1.170	0.375	1	2
Private HS	442,250	0.000	0.019	0	1
Mom STEM Career	442,250	0.007	0.086	0	1
Dad STEM Career	442,250	0.067	0.251	0	1
Mom Career	442,250	0.895	0.307	0	1
SAT Score	155,482	1158.972	175.285	0	1600
ACT Score	101,823	25.452	4.189	1	71
HS GPA	245,314	6.494	1.393	1	8
Academic Ability Self-Rating	432,982	3.962	0.715	1	5
Math Ability Self-Rating	432,518	3.246	0.976	1	5
Academic Self-Confidence	432,542	3.842	0.809	1	5
Academic Ability Self-Rating Gap -SAT	152,902	0.696	0.962	-4	4
Academic Ability Self-Rating Gap - ACT	100,145	-0.065	0.821	-4	4
Math Ability Self-Rating Gap - SAT	152,765	-0.020	1.217	-4	4
Math Ability Self-Rating Gap - ACT	100,103	-0.821	1.102	-4	4
Academic Self-Confidence - Gap SAT	152,758	0.517	1.162	-4	4
Academic Self-Confidence Gap - ACT	100,079	-0.244	1.036	-4	4

The second dataset is the Freshman Survey responses of Texas Christian University students from 2012 to 2015, also by UCLA's CIRP with over 5,700 student responses. This survey has been used for over 50 years by institutions as a way to find out about incoming students' high school experiences, beliefs and expectations for college. Many of the questions in this survey reflect those in the Senior Survey, as colleges can use these two surveys together. The main difference between the two surveys is that the Freshman Survey focuses on expectations and concerns about college, whereas the Senior Survey is focused on experiences students had while in school.

Table 2: The Freshman Survey Summary Statistics

Variable	*Observations*	*Mean*	*Std. Dev.*	*Min*	*Max*
STEM	5,806	0.205	0.403	0	1
Female	5,806	0.641	0.480	0	1
White	5,806	0.841	0.365	0	1
Income	5,249	11.593	2.786	1	14
Private HS	5,806	0.369	0.483	0	1
Mom STEM Career	5,806	0.090	0.286	0	1
Dad STEM Career	5,806	0.099	0.299	0	1
Mom Career	5,806	0.882	0.323	0	1
SAT Score	2,281	1207.305	132.444	400	1590
ACT Score	3,939	27.147	3.611	1	36
HS GPA	5,714	6.950	1.032	2	8
Academic Ability Self-Rating	5,564	4.013	0.683	1	5
Math Ability Self-Rating	5,567	3.452	0.936	1	5
Academic Self-Confidence	5,554	3.685	0.853	1	5
Academic Ability Self-Rating Gap -SAT	2,222	0.406	0.800	-2	4
Academic Ability Self-Rating Gap - ACT	3,802	-0.356	0.739	-4	4
Math Ability Self-Rating Gap - SAT	2,229	-0.136	1.030	-3	3
Math Ability Self-Rating Gap - ACT	3,802	-0.909	0.985	-4	3
Academic Self-Confidence - Gap SAT	2,218	0.019	1.106	-4	4
Academic Self-Confidence Gap - ACT	3,798	-0.721	1.013	-4	4

For both the Freshman Survey and the College Senior Survey, relevant variables used in regressions are nearly the same. A gender dummy variable, "female," can be interpreted as "1" if the student is a female, and "0" if not. This variable is expected to be highly significant with a negative relationship to STEM. "White" was created from a race variable, and is equal to "1" if the student is white, and "0" otherwise. This variable is expected to be significant with a positive relationship. Income is set in ranges, with "1" equaling family income of less than $10,000 and "14" as income greater than $250,000 annually. This variable is expected to be significant with a positive relationship. A first generation college variable was included to control for students who

are the first in their families to attend college. This variable is not expected to be significant. A variable indicating whether a student went to a private high school, both religious and non-religious, is included. This variable is expected to be significant with a positive relationship. There are variables for each parent having a STEM career, coded as "1" if the parent is in a STEM career and "0" if not. These variables are both expected to be significant with positive relationships. In addition, there is a variable for if the mother has a career at all. This variable is expected to be significant with a positive relationship. SAT composite scores of the math and verbal sections and ACT scores are included as composite scores for each student. High school GPA is also included, and ranges from "D" being coded as "1", up to A/A+ being coded as "8". All three academic variables are expected to be highly significant with positive relationships to STEM. There are three different academic self-concepts included: Academic Ability Self-Rating, Math Ability Self-Rating and Academic Self-Confidence. Each of these three variables asked students to rate their ability, with "1" as "Bottom 10 percentage points," "2" equals "Below Average," "3" as "Average," "4" as "Above Average" and "5" equaling "Top 10 percentage points." All three self-rating variables are expected to be highly significant with positive relationships to STEM. Finally, two self-rating gaps exist for each of the three academic self-ratings, based first on SAT scores and then ACT scores. For each survey, please note that rating gaps were achieved by subtracting the SAT/ACT rank from the student's perceived academic ability.

SAT and ACT ranks were achieved by:

Assigning SAT score ranges with numbers "1" through "5". Where:

SAT Rank 1 = SAT score <= 825

SAT Rank 2 = 825 < SAT score <=1020

SAT Rank 3 = 1020 < SAT score <=1125

SAT Rank 4 = 1125 < SAT score <=1400

SAT Rank 5 = SAT score > 1400

Assigning ACT score ranges with numbers 1 through 5. Where:

ACT Rank 1 = ACT score <= 14

ACT Rank 2 = 14 < ACT score < =19

ACT Rank 3 = 19 < ACT score <=22

ACT Rank 4 = 22 < ACT score <=27

ACT Rank 5 = ACT score > 27

Student's perceived ability was codified into numbers as follows:

Bottom 10 percentage points = 1

Below Average = 2

Average = 3

Above Average = 4

Top 10 percentage points = 5

For example, if a student scored a 1200 on the SAT, this would codify as SAT Rank "4". If this student perceived her academic ability self-rating to be below average, that would codify as "2". Thus, this student's Academic Ability Self-Rate Gap for the SAT would be "-2", or 2 – 4.

These gaps are expected to be positive and significant. For both surveys, a time dummy is included to control for any effect that time has on women in STEM because beliefs about women in STEM may have changed over time, as well as demand for STEM careers increasing over time. In the College Senior Survey, a state dummy is also included to control for differing opinions about women in STEM in different regions of the country.

Finally, a survey of all TCU students was conducted this spring to test these results against other data, and there are approximately 300 student observations. All students voluntarily participated in anonymous surveys regarding students' personal characteristics, high school experiences, how they self-rate different aspects of their lives, future plans and demographics. Questions included asking for students' home zip codes, how they perceived their academic abilities, standardized testing scores and college majors. These responses were recorded and analyzed through correlation tests and multi regression analyses to determine the effect of gender and self-ratings on choice of college major.

Table 3: TCU Survey Summary Statistics

Variable	*Observations*	*Mean*	*Std. Dev.*	*Min*	*Max*
STEM	299	0.344	0.476	0	1
Female	299	0.625	0.485	0	1
Income	260	3.712	1.100	1	5
Private HS	299	0.274	0.447	0	1
Mom STEM Career	299	0.043	0.204	0	1
Dad STEM Career	299	0.117	0.322	0	1
Mom Career	299	0.896	0.305	0	1
SAT Rank	252	3.583	2.515	0	6
ACT Rank	252	3.270	1.918	0	5
HS Rank	252	4.250	0.792	1	5
Academic Ability Self-Rating	250	4.076	0.687	2	5
Math Ability Self-Rating	250	3.656	0.919	1	5
Academic Self-Confidence	250	3.736	0.958	1	5
Academic Ability Self-Rating Gap -SAT	250	0.488	2.685	-4	5
Academic Ability Self-Rating Gap - ACT	250	0.780	1.938	-2	5
Math Ability Self-Rating Gap - SAT	250	0.068	2.737	-4	5
Math Ability Self-Rating Gap - ACT	250	0.360	1.936	-3	5
Academic Self-Confidence - Gap SAT	250	0.148	2.794	-5	5
Academic Self-Confidence Gap - ACT	250	0.440	2.073	-4	5

This survey contains many of the same questions and variables as the other two which are interpreted in the same manner, but some variables can be interpreted differently. For instance, white is not an included variable in this dataset. In addition, the income variable ranges from "1" being "Below $25,000" to "5" being "Above $250,000." Also, SAT and ACT scores are

interpreted differently. A rank of "1" corresponds to SAT score below 600 or ACT below 12. SAT scores between 600 to 900, and ACT scores between 12 to 17 are coded as a rank of "2". Rank "3" corresponds to SAT between 901 and 1100, and ACT between 18 and 23. Rank "4" includes SAT scores between 1101 to 1400, and ACT scores between 24 and 29. Finally, rank "5" corresponds to SAT composites over 1400 and ACT scores 30 and above. There were also options available for students who did not take either of these tests, or both. High school rank is also included, with "1" being "Bottom 10 percentage points" and "5" being "Top 10 percentage points." The academic scores are expected to be significant with positive relationships. The self-rating gaps for this survey look the same as the other two datasets, only the SAT and ACT score ranges are different, as stated above. Otherwise, the gaps are determined the same way and mean the same things. The self-rating gaps are expected to be significant and show a positive relationship. The time dummy for this dataset is also different from the others. A year dummy, meaning which year a student is in school, is included to control for any effect that year in school has on women in STEM because students' majors change over time.

The following table shows each variable, what it means, and its expected sign for its relationship with the likelihood a student will choose a STEM major:

Table 4: Expectations of Dependent Variables

Variable	Meaning	Expected Relationship to STEM
Female	Student's sex is female	Negative
White	Student's race is white	Positive
Income	Student's best guess of family income	Positive
First Generation College	Student is first in family to attend college	Insignificant
Private High School	Student attended private high school	Positive
Mom STEM Career	Student's mother has a career in STEM field	Positive
Dad STEM Career	Student's father has a career in STEM field	Positive
Mom Career	Student's mother has a career	Positive
SAT Score	Student's combined math and verbal SAT score	Positive
ACT Score	Student's total ACT score	Positive
High School GPA	Student's typical high school grade	Positive
Academic Ability Self-Rating	How student perceives his/her overall academic ability	Positive
Math Ability Self-Rating	How student perceives his/her math ability	Positive
Academic Self-Confidence	Student's self-confidence academically	Positive
Academic Ability Self-Rating Gap	Difference between the way a student self-rated and scored on SAT/ACT	Positive
Math Ability Self-Rating Gap	Difference between the way a student self-rated and scored on SAT/ACT	Positive
Academic Self-Confidence Gap	Difference between the way a student self-rated and scored on SAT/ACT	Positive

It is important to keep in mind that TCU data could be different from national data because students are from mainly affluent families who have access to more resources and opportunities for their children. In addition, because students are mainly white and this is reflected in opportunities they have and because TCU students are all very bright, as seen by typical test scores of incoming students. For TCU, the average score falls between 1160 to 1360

for the SAT and 26 to 30 for the ACT (Admissions Requirements, 2016). Nationally, the average SAT score falls between 1050 to 1100, and the average ACT score between 19 to 21 (Edwards, 2015; Fracchia, 2016). This could lead to bias in the results if the students do not represent a random sampling of the national population. Because of these differences, it may not be a good idea to generalize results from the TCU case study and apply them to the national population.

METHODS:

The dependent variables in these regressions are as follows: female, academic ability self-rating, math ability self-rating, academic self-confidence, SAT composite, ACT composite, high school GPA, race, parents' income, high school type, first generation college student, father's career, mother's career, academic ability self-rating gap, math ability self-rating gap and academic self-confidence gap. In addition, a time dummy and state dummy were included to test what effects were seen throughout time and regions.

The three different self-ratings are included to test which of the three has the biggest impact on a student's choice of major[1]. Female is included to test what effect that being a girl has on a student's choice of major. SAT scores and ACT scores are included to control for a student's natural intelligence. SAT scores include only verbal and math scores, so they range from 400-1600. High school GPA is incorporated to control for the school's academic toughness. The race variable controls for any systematic differences in the resources available to students of different races that is not picked up by other variables such as income. Parents' income is incorporated to control for economic class status of students. High school type is included by including dummy variables for private high schools, to help control for resources available to

[1] Other self-ratings such as social self-confidence and communication skills were originally included, but after showing no real effect on major choice, these controls were dropped.

private school students and to test whether high school type matters. First-generation college tests whether students whose parents went to college are more likely to major in STEM fields. Finally, father's career and mother's career control for the influence that these two variables may have on a child's choice of major. A separate dummy variable exists for a mother having a career at all, as a positive female role model can influence young girls to also pursue a career.

Data was analyzed for this study using both Ordinary Least Squares and Probit Regressions in Stata. The linear regressions, OLS, attempt to fit the data with a function by minimizing the sum of squared errors from data. The equation for this model is as follows:

$$Y = X\beta + S + T + \varepsilon$$

Where Y is the dependent variable, STEM, coded as either 1 if a student is a STEM major, or 0 if the student is not; $X\beta$ represents the vector of independent variables and coefficients; S represents the state dummies; T represents the time dummies; and ε represents the error term. For this model, a time dummy is included to account for unobserved trends in the data overtime. For example, perceptions about women having careers in STEM, or careers in general, have changed over time. In addition, as technology advances and people live longer, there could be more incentive to join the STEM workforce for higher returns. A state dummy is also included to account for unobserved region trends in the data. Gender roles may be different in different regions of the country, and the social norms influencing these roles likely change at different rates across regions. In addition, different states may have different laws about schooling that could influence the way students think about STEM, so it is important to include these dummies. Robust standard errors are used to control for heteroscedasticity, which is when the variance of the dependent variables is not constant.

The results of OLS are interpreted in this way: A one standard-deviation increase in any of the ordinal independent variables will lead to a change in the likelihood that a student will major in a STEM field by the amount of the coefficient, in percentage points. For example, if the coefficient for family income is equal to 0.14, then the interpretation is that if income increases by one standard deviation, there is a 14 percentage-point increase in the likelihood that a student will major in STEM. For categorical variables, such as self-ratings, as the variable increases by 1, the likelihood they major in STEM will change by the coefficient as percentage points. For example, if the coefficient for academic ability self-rating is 0.05, this translates to each time a student's self-rating increases by one category (from bottom 10 percentage points to below average, for example), the likelihood that she will major in STEM will increase by 5 percentage points. The variables are only interpreted this way if they are significant, which occurs when the P value is less than 5 percentage points.

Since the dependent variable of this study, STEM, is a binary variable coded as either "0" or "1", the data are not linear, and thus OLS regression may not be the best choice of regression. OLS results can include probability predictions being outside of the 0 to 1 range. However, it is included to compare the results from OLS and Probit regressions, and to act as a robustness check for the main Probit regressions.

Probit regressions are used when the dependent variable is a dummy, and it shows the probability that the dummy will be true given each independent variable. Probit regression will change a linear model to have a nonlinear relationship, keeping probabilities between 0 and 1, allows for varying rates of change in probabilities and can eliminate heteroscedasticity. The equation for the general Probit model looks like:

$$\Pr(Y = 1 \mid X = 0) = \Phi(X\beta + S + T)$$

Where Y is the dependent variable, STEM, coded as either 1 if a student is a STEM major, or 0 if the student is not; $X\beta$ represents the vector of independent variables and coefficients; S represents the state dummies; T represents the time dummies; Pr stands for probability; and Φ represents the cumulative distribution function. This model also includes a time dummy to account for unobserved trends in the data overtime. A state dummy is also included to account for unobserved region trends in the data. The reasons for including these are equivalent to the reasons included in the OLS discussion.

The coefficients estimated by the Probit regressions cannot be reliably interpreted as the magnitude of change in the probability of majoring in STEM. As such, marginal effects must be calculated for each independent variable for each regression specification. Once marginal effects for each variable are calculated, the results could be interpreted. A one standard-deviation increase in an independent variable will lead to a change in the likelihood that a student will major in a STEM field by the amount of the coefficient, in percentage points. For example, if the coefficient for female is equal to -0.11, then the interpretation is that if income increases by one standard deviation, there is an 11 percentage-point decrease in the likelihood that a student will major in STEM. For categorical variables, such as self-ratings, as the variable increases by 1, the likelihood they major in STEM will change by the coefficient as percentage points. For example, if the coefficient for math ability self-rating is 0.10, this translates to each time a student's self-rating increases by one (from average to above average, for example), the likelihood that she will major in STEM will increase by 10 percentage points. The variables are only interpreted if they are significant, which occurs when the P value is less than 5 percentage points.

Different robustness checks were performed to help assure that the results are as reliable as possible. First, regressions with only STEM and female as the variables were run. Then, with

each run of the regression, a new independent variable was added to test how the effects from being female changed with each new addition. Also, each academic control was included one at a time, because some students may have taken only one of the standardized tests or reported only high school GPA. In addition, regressions were run with just one academic self-concept at a time, and then with all three at once. This helped to see if the effects that each had, even when students only reported one of the three ratings. Finally, the time dummy was included alone before adding the region dummy to see how the likelihood of majoring in a STEM subject would change from adding these individually.

RESULTS:

Following is a discussion of various results from the three data sets. Please note the following characteristics about each of the regression tables:

"*" Means a value is significant at the 95% level.

"**" Means a value is significant at the 99% level.

"***" Means a value is significant at the 99.9% level.

All significant values are represented in bold.

Charts 1.1 and 1.2 represent the linear regressions and Probit regressions, respectively, run on all students who participated in the College Senior Survey from 1994 to 2006. Each of these seniors are students who also took the Freshman Survey upon entering college.

Chart 1.1 Effects on STEM, OLS College Senior Survey:

STEM	1	2	3	4	5
Female	-0.0515***	-0.0516***	-0.0597***	-0.0595***	-0.0595***
	(0.0013)	(0.0013)	(0.0019)	(0.0019)	(0.0019)
White		0.0123***	0.0266***	0.0277***	0.0276***
		(0.0016)	(0.0026)	(0.0027)	(0.0027)
Income			-0.0008***	-0.0011***	-0.0012***
			(0.0002)	(0.0002)	(0.0002)
First Generation College				-0.0183***	-0.0183***
				(0.0025)	(0.0025)
Private High School					0.0985*
					(0.0397)
Mom STEM Career					
Dad STEM Career					
Mom Career					
SAT Score					
ACT Score					
High School GPA					
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	442,250	442,250	221,773	221,773	221,773
R-Squared	0.0037	0.0039	0.0056	0.0056	0.0057
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.1 Effects on STEM, OLS College Senior Survey

STEM	6	7	8	9	10
Female	**-.0593*** **	**-.0592*** **	**-.0593*** **	**-.0438*** **	**-.0550*** **
	(.0019)	(.0019)	(.0019)	(.0023)	(.0029)
White	**.0263*** **	**.0219*** **	**.0220*** **	**.0431*** **	**0.0691*** **
	(.0027)	(.0027)	(.0027)	(.0034)	(.0046)
Income	**-.0013*** **	**-.0022*** **	**-.0021*** **	**-.0059*** **	**-0.0031*** **
	(.0002)	(.0002)	(.0002)	(.0002)	(.0003)
First Generation College	**-.0177*** **	**-.0121*** **	**-.0112*** **	**.0248*** **	**0.0107** **
	(.0025)	(.0025)	(.0025)	(.0034)	(.0039)
Private High School	**.0977***	**.0949***	**.0948** **	**.0954***	0.0939
	(.0396)	(.0389)	(.0389)	(.0427)	(.0699)
Mom STEM Career	**.0709*** **	**.0437*** **	**.0409*** **	**.0255** **	0.0117
	(.0085)	(.0085)	(.0085)	(.0098)	(0.0137)
Dad STEM Career		**.0957*** **	**.0966*** **	**.0923*** **	**0.0900*** **
		(.0030)	(.0030)	(.0036)	(0.0046)
Mom Career			**.0132*** **	**.0166*** **	**0.0224*** **
			(.0022)	(.0028)	(0.0035)
SAT Score				**.0004*** **	
				(.0000)	
ACT Score					**0.0187*** **
					(0.0003)
High School GPA					
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	221,773	221,773	221,773	142,190	94,197
R-Squared	0.006	0.0113	0.0115	0.0382	0.0431
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.1 Effects on STEM, OLS College Senior Survey

STEM	11	12	13	14	15
Female	-.0751***	-.0443***	-.0085***	-.0506***	-.0184***
	(.0018)	(.0023)	(.0023)	(.0024)	(.0023)
White	.0413***	.0438***	.0313***	.0437***	.0313***
	(.0026)	(.0034)	(.0033)	(.0034)	(.0033)
Income	-.0026***	-.0058***	-.0046***	-.0058***	-.0046***
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)
First Generation College	.0056*	.0249***	.0159***	.0248***	.0141***
	(.0025)	(.0035)	(.0034)	(.0035)	(.0034)
Private High School	.0892*	.0999*	.1064**	.0916*	.1017*
	(.0373)	(.0428)	(.0412)	(.0430)	(.0418)
Mom STEM Career	.0358***	.0257*	.0236*	.0245*	.0213*
	(.0084)	(.0100)	(.0096)	(.0100)	(.0095)
Dad STEM Career	.0892***	.0924***	.0774***	.0928***	.0767***
	(.0030)	(.0036)	(.0035)	(.0036)	(.0035)
Mom Career	.0170***	.0171***	.0177***	.0170***	.0179***
	(.0022)	(.0028)	(.0027)	(.0028)	(.0027)
SAT Score		.0004***	.0002***	.0004***	.0003***
		(.0000)	(.0000)	(.0000)	(.0000)
ACT Score					
High School GPA	.0556***				
	(.0006)				
Academic Ability Self-Rating		.0147***			-.0137***
		(.0018)			(.0020)
Math Ability Self-Rating			.1180***		.1263***
			(.0011)		(.0011)
Academic Self-Confidence				-.0181***	-.0395***
				(.0015)	(.0016)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	219,821	139,932	139,831	139,824	139,535
R-Squared	0.0442	0.0395	0.1046	0.0402	0.111
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.1 Effects on STEM, OLS College Senior Survey

STEM	**16**	**17**	**18**	**19**	**20**
Female	**-.0187*** **	**-.0186*** **	**-.0567*** **	**-.0507*** **	**-.0647*** **
	(.0023)	(.0028)	(.0038)	(.0034)	(.0038)
White	**.0311*** **	**.0460*** **	**.0407*** **	.0209	**.0502*** **
	(.0033)	(.0085)	(.0103)	(.0129)	(.0097)
Income	**-.0045*** **	**-.0045*** **	**-.0041*** **	**-.0020*** **	**-.0043*** **
	(.0002)	(.0005)	(.0005)	(.0004)	(.0005)
First Generation College	**.0156*** **	.0076	-.0024	**-.0304*** **	.0030
	(.0034)	(.0040)	(.0040)	(.0041)	(.0040)
Private High School	**.1090** **	.0933	.0897	**.1048***	.0891
	(.0420)	(.0484)	(.0577)	(.0535)	(.0548)
Mom STEM Career	**.0217***	**.0284***	**.0459*** **	**.0566*** **	**.0407** **
	(.0095)	(.0133)	(.0133)	(.0130)	(.0137)
Dad STEM Career	**.0759*** **	**.0762*** **	**.0991*** **	**.0999*** **	**.0961*** **
	(.0035)	(.0048)	(.0057)	(.0060)	(.0056)
Mom Career	**.0182*** **	**.0131*** **	**.0090***	.0049	**.0110** **
	(.0027)	(.0035)	(.0037)	(.0035)	(.0035)
SAT Score	**.0003*** **	**.0003*** **			
	(.0000)	(.0000)			
ACT Score					
High School GPA					
Academic Ability Self-Rating	**-.0141*** **	**-.0144*** **			
	(.0020)	(.0029)			
Math Ability Self-Rating	**.1255*** **	**.124*** **			
	(.0011)	(.0038)			
Academic Self-Confidence	**-.0398*** **	**-.0380*** **			
	(.0016)	(.0018)			
Academic Ability Self-Rating Gap *Based on SAT Scores			**-.0381*** **		
			(.0039)		
Math Ability Self-Rating Gap *Based on SAT Scores				**.0480*** **	
				(.0040)	
Academic Self-Confidence Gap *Based on SAT Scores					**-.0476*** **
					(.0031)
Year Dummy Included	YES	YES	YES	YES	YES
State Dummy Included		YES	YES	YES	YES
Observations	139,535	83,046	83,287	83,230	83,224
R-Squared	0.1125	0.1174	0.0288	0.0387	0.037
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.1 Effects on STEM, OLS College Senior Survey

STEM	**21**	**22**	**23**	**24**	**25**
Female	**-.0479*** **	**-.0549*** **	**-.0196*** **	**-.0610*** **	**-.0291*** **
	(.0030)	(.0029)	(.0028)	(.0030)	(.0029)
White	**.0304** **	**.0704*** **	**.0514*** **	**.0733*** **	**.0560*** **
	(.0093)	(.0047)	(.0045)	(.0047)	(.0045)
Income	**-.0031*** **	**-.0031*** **	**-.0027*** **	**-.0030*** **	**-.0025*** **
	(.0005)	(.0003)	(.0003)	(.0003)	(.0003)
First Generation College	**-.0142*** **	**.0109** **	.0048	**.0104** **	.0029
	(.0036)	(.0039)	(.0038)	(.0039)	(.0038)
Private High School	.0852	.0966	.1106	.0836	.0884
	(.0530)	(.0695)	(.0676)	(.0701)	(.0679)
Mom STEM Career	**.0406** **	.0116	.0071	.0109	.0046
	(.0138)	(.0138)	(.0134)	(.0138)	(.0133)
Dad STEM Career	**.0861*** **	**.0903*** **	**.0785*** **	**.0900*** **	**.0770*** **
	(.0049)	(.0047)	(.0045)	(.0047)	(.0045)
Mom Career	**.0091** **	**.0234*** **	**.0240*** **	**.0227*** **	**.0239*** **
	(.0035)	(.0035)	(.0034)	(.0035)	(.0034)
SAT Score					
ACT Score		**.0178*** **	**.0115*** **	**.0194*** **	**.0133*** **
		(.0004)	(.0003)	(.0004)	(.0004)
High School GPA					
Academic Ability Self-Rating		**.0132*** **			**-.0154*** **
		(.0022)			(.0024)
Math Ability Self-Rating			**.1098*** **		**.1173*** **
			(.0014)		(.0014)
Academic Self-Confidence				**-.0150*** **	**-.0330*** **
				(.0018)	(.0019)
Academic Ability Self-Rating Gap *Based on SAT Scores	**-.0489*** **				
	(.0031)				
Math Ability Self-Rating Gap *Based on SAT Scores	**.1060*** **				
	(.0040)				
Academic Self-Confidence Gap *Based on SAT Scores	**-.0746*** **				
	(.0023)				
Year Dummy Included	YES				
State Dummy Included	YES				
Observations	83,046	93107	93072	93053	92910
R-Squared	0.0895	0.0441	0.0992	0.0445	0.1042
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.1 Effects on STEM, OLS College Senior Survey

STEM	**26**	**27**	**28**	**29**	**30**
Female	**-.0290*** **	**-.0207** **	**-.0573*** **	**-.0416*** **	**-.0671*** **
	(.0029)	(.0080)	(.0087)	(.0084)	(.0087)
White	**.0542*** **	**.0560*** **	**.0433*** **	**.0174***	**.0565*** **
	(.0045)	(.0075)	(.0082)	(.0084)	(.0082)
Income	**-.0022*** **	**-.0022*** **	**-.0012***	-.0002	**-.0013** **
	(.0003)	(.0004)	(.0005)	(.0004)	(.0005)
First Generation College	.0033	.0080	-.0070	**-.0228*** **	-.0024
	(.0038)	(.0052)	(.0059)	(.0060)	(.0059)
Private High School	.1116	.1133	.1133	.1380	.1031
	(.0680)	(.0847)	(.0881)	(.0922)	(.0874)
Mom STEM Career	.0056	.0061	.0238	**.0309***	.0189
	(.0133)	(.0135)	(.0129)	(.0125)	(.0126)
Dad STEM Career	**.0759*** **	**.0771*** **	**.0976*** **	**.0985*** **	**.0947*** **
	(.0045)	(.0067)	(.0069)	(.0069)	(.0070)
Mom Career	**.0245*** **	**.0217*** **	**.0168***	**.0157***	**.0175** **
	(.0034)	(.0058)	(.0067)	(.0068)	(.0065)
SAT Score					
ACT Score	**.0134*** **	**.0127*** **			
	(.0004)	(.0010)			
High School GPA					
Academic Ability Self-Rating	**-.0146*** **	**-.0146*** **			
	(.0024)	(.0036)			
Math Ability Self-Rating	**.1162*** **	**.1124*** **			
	(.0014)	(.0043)			
Academic Self-Confidence	**-.0335*** **	**-.0314*** **			
	(.0019)	(.0033)			
Academic Ability Self-Rating Gap *Based on ACT Scores			**-.0357*** **		
			(.0031)		
Math Ability Self-Rating Gap *Based on ACT Scores				**.0490*** **	
				(.0026)	
Academic Self-Confidence Gap *Based on ACT Scores					**-.0470*** **
					(.0030)
Year Dummy Included	YES	YES	YES	YES	YES
State Dummy Included		YES	YES	YES	YES
Observations	92910	54388	54245	54222	54205
R-Squared	0.1059	0.1067	0.0284	0.0391	0.0361
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.1 Effects on STEM, OLS College Senior Survey

STEM	**31**	**32**	**33**	**34**	**35**
Female	**-.0484*** **	**-.0738*** **	**-.0321*** **	**-.0818*** **	**-.0434*** **
	(.0080)	(.0019)	(.0018)	(.0019)	(.0019)
White	**.0381*** **	**.0422*** **	**.0293*** **	**.0428*** **	**.0309*** **
	(.0076)	(.0027)	(.0026)	(.0027)	(.0026)
Income	-.0007	**-.0026*** **	**-.0025*** **	**-.0025*** **	**-.0023*** **
	(.0004)	(.0002)	(.0002)	(.0002)	(.0002)
First Generation College	**-.0147** **	**.0065** **	.0034	**.0049* **	.0004
	(.0054)	(.0025)	(.0024)	(.0025)	(.0024)
Private High School	.0885	**.0941* **	**.0908* **	**.0888* **	**.0875* **
	(.0947)	(.0376)	(.0358)	(.0378)	(.0364)
Mom STEM Career	.0166	**.0356*** **	**.0279*** **	**.0360*** **	**.0272*** **
	(.0130)	(.0085)	(.0082)	(.0085)	(.0082)
Dad STEM Career	**.0861*** **	**.0893*** **	**.0756*** **	**.0900*** **	**.0751*** **
	(.0073)	(.0030)	(.0029)	(.0030)	(.0029)
Mom Career	**.0165** **	**.0177*** **	**.0187*** **	**.0173*** **	**.0187*** **
	(.0064)	(.0022)	(.0022)	(.0022)	(.0022)
SAT Score					
ACT Score					
High School GPA		**.0532*** **	**.0365*** **	**.0573*** **	**.0405*** **
		(.0007)	(.0006)	(.0006)	(.0007)
Academic Ability Self-Rating		**.0138*** **			**-.0125*** **
		(.0014)			(.0015)
Math Ability Self-Rating			**.1052*** **		**.1128*** **
			(.0009)		(.0009)
Academic Self-Confidence				**-.0149*** **	**-.0342*** **
				(.0011)	(.0012)
Academic Ability Self-Rating Gap *Based on ACT Scores	**-.0439*** **				
	(.0037)				
Math Ability Self-Rating Gap *Based on ACT Scores	**.0948*** **				
	(.0041)				
Academic Self-Confidence Gap *Based on ACT Scores	**-.0688*** **				
	(.0036)				
Year Dummy Included	YES				
State Dummy Included	YES				
Observations	54110	216585	216458	216429	215996
R-Squared	0.077	0.045	0.0983	0.0454	0.1036
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.1 Effects on STEM, OLS College Senior Survey

STEM	**36**	**37**
Female	**-.0437*** **	**-.0395*** **
	(.0019)	(.0040)
White	**.0301*** **	**.0428*** **
	(.0026)	(.0074)
Income	**-.0021*** **	**-.0020*** **
	(.0002)	(.0004)
First Generation College	.0008	-.0005
	(.0024)	(.0041)
Private High School	**.1013** **	**.0854** *
	(.0364)	(.0425)
Mom STEM Career	**.0282*** **	**.0318** **
	(.0082)	(.0108)
Dad STEM Career	**.0746*** **	**.0748*** **
	(.0029)	(.0040)
Mom Career	**.0190*** **	**.0151*** **
	(.0022)	(.0032)
SAT Score		
ACT Score		
High School GPA	**.0409*** **	**.0415*** **
	(.0007)	(.0019)
Academic Ability Self-Rating	**-.0121*** **	**-.0125*** **
	(.0015)	(.0018)
Math Ability Self-Rating	**.1123*** **	**.1096*** **
	(.0009)	(.0029)
Academic Self-Confidence	**-.0345*** **	**-.0324*** **
	(.0012)	(.0019)
Academic Ability Self-Rating Gap		
Math Ability Self-Rating Gap		
Academic Self-Confidence Gap		
Year Dummy Included	YES	YES
State Dummy Included		YES
Observations	215996	127343
R-Squared	0.1048	0.1085
Robust Standard Errors in (), clustered around State Dummy		

Specification 1 of Chart 1.1 suggests that, controlling for nothing else, women are 5.15 percentage points less likely to choose a STEM major. This value stays approximately equal as each control variable is added, but decreases to 4.38 percentage points when SAT is included, increases to 5.50 percentage points when ACT is used and increases to 7.51 percentage points when high school GPA is controlled for. This suggests that for students with the same high school GPA, ACT score or SAT score, that females are still less likely to choose a STEM major. The dummy variable "Female" is consistently negative and significant throughout this regression analysis, suggesting that females have a much lower probability of majoring in STEM than their male peers. Ultimately, girls are 1.86 percentage points when using SAT scores, 2.07 percentage points when using ACT scores and 3.95 percentage points when using high school GPA's less likely to choose STEM than men, after all controls are included.

Income affects the likelihood that a student will major in STEM in a negative way. That is, for each increase in income, the likelihood that a student will choose STEM decreases by 0.45 percentage points when using SAT scores, 0.22 percentage points when using ACT scores, and by 0.20 percentage points when using high school GPA as the academic control. Being white increases the likelihood that a student will choose a STEM major by up to 4.60 percentage points, which occurs when SAT is the academic control, but appears to be insignificant when using the other two academic control variables. There is no significant effect when looking at if a student is the first in her family to attend college. Going to a private high school is only significant when using high school GPA as the control, and it increases the likelihood that a student will choose STEM by 8.54 percentage points. A mother having a STEM career is significant and can affect the likelihood a student will choose STEM by up to 3.18 percentage points, and a father's STEM career can increase this probability by up to 7.71 percentage points.

If a mother has a career at all, STEM likelihood increases by 2.17 percentage points. If SAT score increases by one standard deviation, the likelihood a student will major in STEM increases by 0.03 percentage points. An increase in an ACT score can increase the probability a student will choose STEM by 1.27 percentage points, and an increase in high school GPA can increase the probability a student will choose STEM by 4.15 percentage points. Academic ability self-rating has a negative relationship with STEM, by up to 1.46 percentage points, as does academic self-confidence, by up to 3.80 percentage points. However, math ability self-rating is significant and positive, and having a higher math self-rating can increase the odds that a student chooses a STEM major by up to 12.35 percentage points.

When looking at how self-rating gaps influence a student's choice of major, a similar pattern is suggested to that of the self-rating scores. All gaps are significant when looked at by themselves, but magnitudes increase when all three gaps are put in the regression together. Students' academic ability self-rating gaps and academic self-confidence gaps, when measured using SAT scores both suggest negative relationship with the likelihood a student will choose a STEM major. Academic ability gap suggests a 4.89 percentage point decrease in likelihood and academic self-confidence suggests 7.46 percentage point decrease. This means that as students' gaps increase, which happens when they rate themselves higher, they are less likely to choose a STEM major. Math self-rating gaps, however, show the opposite, that as students rate their math abilities higher, they can be up to 10.60 percentage points more likely to choose a STEM major.

When using ACT scores as the ability measure in calculating self-rating gaps, similar results are suggested. This time, academic ability self-rating gaps suggest a 4.39 percentage point decrease in STEM likelihood, and academic self-confidence gaps suggest a 6.88 percentage point

drop in STEM likelihood as gaps increase. Math ability self-rating gaps suggest a 9.48 percentage point increase in STEM likelihood as the gap increases.

Chart 1.2 Effects on STEM, Probit College Senior Survey

STEM					
	1	**2**	**3**	**4**	**5**
Female	**-0.0506*** **	**-0.0506*** **	**-0.0586*** **	**-0.0584*** **	**-0.0584*** **
	(0.0012)	(0.0012)	(0.0018)	(0.0018)	(0.0018)
White		**0.01200*** **	**0.0258*** **	**0.0268*** **	**0.0267*** **
		(0.0016)	(0.0025)	(0.0025)	(0.0025)
Income			**-0.0008*** **	**-0.0012*** **	**-0.0012*** **
			(0.0002)	(0.0002)	(0.0002)
First Generation College				**-0.0182*** **	**-0.0182*** **
				(0.0025)	(0.0025)
Private High School					**0.0881** **
					(0.0333)
Mom STEM Career					
Dad STEM Career					
Mom Career					
SAT Score					
ACT Score					
High School GPA					
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	442,250	442,250	221,773	221,773	221,773
Pseudo R-Squared	0.0036	0.0037	0.0052	0.0052	0.0052
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.2 Effects on STEM, Probit College Senior Survey

STEM					
	6	**7**	**8**	**9**	**10**
Female	**-.0582*** **	**-.0579*** **	**-.0580*** **	**-.0413*** **	**-.0513*** **
	(.0018)	(.0018)	(.0018)	(.0022)	(.0028)
White	**.0255*** **	**.0210*** **	**.0211*** **	**.0414*** **	**.0676*** **
	(.0025)	(0.0025)	(.0025)	(.0032)	(.0043)
Income	**-.0013*** **	**-.0022*** **	**-.0022*** **	**-.0058*** **	**-.0032*** **
	(.0002)	(.0002)	(.0002)	(.0002)	(.0003)
First Generation College	**-.0176*** **	**-.0118*** **	**-.0109*** **	**.0260*** **	**.0112** **
	(.0025)	(.0025)	(.0025)	(.0034)	(.0040)
Private High School	**.0872** **	**.0841* **	**.0840* **	**.0791* **	.0821
	(.0334)	(.0334)	(.0334)	(.0383)	(.06067)
Mom STEM Career	**.0652*** **	**.0395*** **	**.0367*** **	**.0210* **	.0093
	(.0073)	(.0074)	(.0074)	(.0086)	(.0120)
Dad STEM Career		**.0888*** **	**.0897*** **	**.0859*** **	**.0825*** **
		(.0026)	(.0026)	(.0032)	(.0041)
Mom Career			**.0138*** **	**.0173*** **	**.0229*** **
			(.0023)	(.0029)	(.0036)
SAT Score				**0.0004*** **	
				(0.0000)	
ACT Score					**.0187*** **
					(.0003)
High School GPA					
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	221,773	221,773	221,773	142,190	94,197
Pseudo R-Squared	0.0055	0.0102	0.0104	0.0350	0.0395
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.2 Effects on STEM, Probit College Senior Survey

STEM					
	11	**12**	**13**	**14**	**15**
Female	**-.0722*****	**-.0417*****	-0.0031	**-.0480*****	**-.0131*****
	(.0018)	(.0023)	(.0022)	(.0023)	(.0023)
White	**.0401*****	**.0425*****	**0.0306*****	**.0418*****	**.0295*****
	(.0025)	(.0032)	(0.0031)	(.0032)	(.0031)
Income	**-.0027*****	**-.0057*****	**-0.0046*****	**-.0058*****	**-.0046*****
	(.0002)	(.0002)	(0.0002)	(.0002)	(.0002)
First Generation College	**.0062***	**.0261*****	**0.0182*****	**.0260*****	**.0163*****
	(.0025)	(.0035)	(0.0033)	(.0035)	(.0033)
Private High School	**.0765***	**.0833***	**0.0920***	**.0757***	**.0856***
	(.0334)	(.0387)	(0.0371)	(.0386)	(.0371)
Mom STEM Career	**.0316*****	**.0212***	**0.0195***	**.0198***	**.0167***
	(.0073)	(.0087)	(0.0084)	(.0087)	(.0084)
Dad STEM Career	**.0821*****	**.0859*****	**0.0709*****	**.0864*****	**.0703*****
	(.0026)	(.0032)	(0.0031)	(.0032)	(.0031)
Mom Career	**.0179*****	**0.0178*****	**0.0187*****	**.0178*****	**.0189*****
	(.0023)	(.0029)	(0.0028)	(.0029)	(.0028)
SAT Score		**0.0004*****	**0.0002*****	**.0004*****	**.0003*****
		(.0000)	(0.0000)	(.0000)	(.0000)
ACT Score					
High School GPA	**.0589*****				
	(.0007)				
Academic Ability Self-Rating		**0.0150*****			**-.0172*****
		(.0018)			(.0020)
Math Ability Self-Rating			**0.1195*****		**.1306*****
			(0.0011)		(.0012)
Academic Self-Confidence				**-.0180*****	**-.0421*****
				(.0014)	(.0016)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	219,821	139,932	139,831	139,824	139,535
Pseudo R-Squared	0.0433	0.0361	0.0996	0.0366	0.1074
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.2 Effects on STEM, Probit College Senior Survey

STEM					
	16	**17**	**18**	**19**	**20**
Female	**-.0135*** **	**-.0132*** **	**-.0552*** **	**-.0492*** **	**-.0629*** **
	(.0023)	(.0025)	(.0036)	(.0031)	(.0036)
White	**.0290*** **	**.0451*** **	**.0394*** **	.0198	**.0485*** **
	(.0031)	(.0087)	(.0103)	(.0129)	(.0097)
Income	**-.0045*** **	**-.0045*** **	**-.0041*** **	**-.0021*** **	**-.0043*** **
	(.0002)	(.0005)	(.0005)	(.0004)	(.0005)
First Generation College	**.0176*** **	**.0092***	-.0023	**-.0300*** **	.0031
	(.0033)	(.0043)	(.0041)	(.0044)	(.0041)
Private High School	**.0922***	.0778	.0763	**.0917***	.0754
	(.0371)	(.0406)	(.0487)	(.0449)	(.0462)
Mom STEM Career	**.0172***	.0228	**.0403*** **	**.0518*** **	**.0350** **
	(.0084)	(.0118)	(.0116)	(.0113)	(.0121)
Dad STEM Career	**.0696*** **	**.0698*** **	**.0925*** **	**.0932*** **	**.0897*** **
	(.0031)	(.0045)	(.0055)	(.0058)	(.0053)
Mom Career	**.0189*** **	**.0140*** **	**.0093***	.0055	**.0113** **
	(.0028)	(.0035)	(.0037)	(.0035)	(.0036)
SAT Score	**.0003*** **	**.0003*** **			
	(.0000)	(.0000)			
ACT Score					
High School GPA					
Academic Ability Self-Rating	**-.0176*** **	**-.0181*** **			
	(.0020)	(.0033)			
Math Ability Self-Rating	**.1298*** **	**.1278*** **			
	(.0012)	(.0042)			
Academic Self-Confidence	**-.0423*** **	**-.0404*** **			
	(.0016)	(.0019)			
Academic Ability Self-Rating Gap *Based on SAT Scores			**-.0383*** **		
			(.0040)		
Math Ability Self-Rating Gap *Based on SAT Scores				**.0493*** **	
				(.0041)	
Academic Self-Confidence Gap *Based on SAT Scores					**-.0479*** **
					(.0031)
Year Dummy Included	YES	YES	YES	YES	YES
State Dummy Included		YES	YES	YES	YES
Observations	139,535	83,046	83,287	83,230	83,224
Pseudo R-Squared	0.1088	0.1147	0.0260	0.0357	0.0337
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.2 Effects on STEM, Probit College Senior Survey

STEM					
	21	**22**	**23**	**24**	**25**
Female	**-.0437*** **	**-.0510*** **	**-.0131*** **	**-.0571*** **	**-.0227*** **
	(.0027)	(.0028)	(.0028)	(.0029)	(.0028)
White	**.0288** **	**.0691*** **	**.0502*** **	**.0715*** **	**.0542*** **
	(.0093)	(.0044)	(.0042)	(.0044)	(.0042)
Income	**-.0032*** **	**-.0031*** **	**-.0028*** **	**-.0031*** **	**-.0026*** **
	(.0005)	(.0003)	(.0003)	(.0003)	(.0003)
First Generation College	**-.0132*** **	**.0114** **	.0066	**.0108** **	.0045
	(.0037)	(.0040)	(.0039)	(.0040)	(.0039)
Private High School	.0713	.0850	.1001	.0728	.0782
	(.0439)	(.0609)	(.0586)	(.0608)	(.0582)
Mom STEM Career	**.0340** **	.0093	.0053	.0086	.0027
	(.0124)	(.0121)	(.0117)	(.0122)	(.0117)
Dad STEM Career	**.0799*** **	**.0828*** **	**.0711*** **	**.0825*** **	**.0698*** **
	(.0046)	(.0041)	(.0040)	(.0041)	(.0040)
Mom Career	**.0097** **	**.0240*** **	**.0255*** **	**.0231*** **	**.0252*** **
	(.0034)	(.0036)	(.0035)	(.0036)	(.0035)
SAT Score					
ACT Score		**.0178*** **	**.0111*** **	**.0194*** **	**.0131*** **
		(.00041)	(.0003)	(.0003)	(.0004)
High School GPA					
Academic Ability Self-Rating		**.0137*** **			**-.0173*** **
		(.0022)			(.0024)
Math Ability Self-Rating			**.1100*** **		**.1193*** **
			(.0014)		(.0015)
Academic Self-Confidence				**-.0149*** **	**-.0349*** **
				(.0018)	(.0019)
Academic Ability Self-Rating Gap *Based on SAT Scores	**-.0525*** **				
	(.0036)				
Math Ability Self-Rating Gap *Based on SAT Scores	**.1119*** **				
	(.0046)				
Academic Self-Confidence Gap *Based on SAT Scores	**-.0754*** **				
	(.0023)				
Year Dummy Included	YES				
State Dummy Included	YES				
Observations	83,046	93107	93072	93053	92910
Pseudo R-Squared	0.0873	0.0403	0.0939	0.0407	0.0996
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.2 Effects on STEM, Probit College Senior Survey

STEM					
	26	**27**	**28**	**29**	**30**
Female	**-.0225*** **	**-.0152***	**-.0556*** **	**-.0397*** **	**-.0650*** **
	(.0028)	(.0076)	(.0080)	(.0078)	(.0080)
White	**.0522*** **	**.0544*** **	**.0415*** **	.0155	**.0543*** **
	(.0042)	(.0070)	(.0077)	(.0083)	(.0075)
Income	**-.0023*** **	**-.0023*** **	**-.0012***	-.0002	**-.0013*** **
	(.0003)	(.0004)	(.0005)	(.0004)	(.0005)
First Generation College	.0050	.0100	-.0068	**-.0220*** **	-.0021
	(.0039)	(.0053)	(.0059)	(.0059)	(.0060)
Private High School	.1009	.1017	.1005	.1253	.0898
	(.0581)	(.0688)	(.0725)	(.0771)	(.0718)
Mom STEM Career	.0034	.0038	.0204	**.0277***	.0149
	(.0117)	(.0121)	(.0114)	(.0109)	(.0114)
Dad STEM Career	**.0687*** **	**.0694*** **	**.0899*** **	**.0906*** **	**.0870*** **
	(.0040)	(.0058)	(.0056)	(.0057)	(.0057)
Mom Career	**.0257*** **	**.0231*** **	**.0169***	**.0161***	**.0176*** **
	(.0035)	(.0059)	(.0068)	(.0068)	(.0065)
SAT Score					
ACT Score	**.0131*** **	**.0124*** **			
	(.0004)	(.0009)			
High School GPA					
Academic Ability Self-Rating	**-.0166*** **	**-.0161*** **			
	(.0024)	(.0036)			
Math Ability Self-Rating	**.1182*** **	**.1142*** **			
	(.0015)	(.0031)			
Academic Self-Confidence	**-.0353*** **	**-.0334*** **			
	(.0019)	(.0031)			
Academic Ability Self-Rating Gap *Based on ACT Scores			**-.0361*** **		
			(.0030)		
Math Ability Self-Rating Gap *Based on ACT Scores				**.0499*** **	
				(.0021)	
Academic Self-Confidence Gap *Based on ACT Scores					**-.0475*** **
					(.0027)
Year Dummy Included	YES	YES	YES	YES	YES
State Dummy Included		YES	YES	YES	YES
Observations	92910	54388	54245	54222	54205
Pseudo R-Squared	0.1013	0.1028	0.0256	0.0360	0.0329
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.2 Effects on STEM, Probit College Senior Survey

STEM					
	31	**32**	**33**	**34**	**35**
Female	**-.0445*** **	**-.0710*** **	**-.0264*** **	**-.0790*** **	**-.0381*** **
	(.0073)	(.0018)	(.0018)	(.0018)	(.0018)
White	**.0357*** **	**.0412*** **	**.0293*** **	**.0413*** **	**.0299*** **
	(.0070)	(.0025)	(.0025)	(.0025)	(.0025)
Income	-.0007	**-.0027*** **	**-.0026*** **	**-.0025*** **	**-.0024*** **
	(.0004)	(.0002)	(.0002)	(.0002)	(.0002)
First Generation College	**-.0135***	**.0070** **	**.0061***	**.0053***	.0028
	(.0054)	(.0025)	(.0024)	(.0025)	(.0024)
Private High School	.0771	**.0805***	**.0768***	**.0764***	**.0730***
	(.0776)	(.0337)	(.0327)	(.0337)	(.0327)
Mom STEM Career	.0119	**.0314*** **	**.0228** **	**.0317*** **	**.0218** **
	(.0115)	(.0074)	(.0071)	(.0074)	(.0071)
Dad STEM Career	**.0787*** **	**.0822*** **	**.0683*** **	**.0828*** **	**.0680*** **
	(.0061)	(.0026)	(.0026)	(.0026)	(.0025)
Mom Career	**.0170** **	**.0185*** **	**.0200*** **	**.0181*** **	**.0199*** **
	(.0064)	(.0023)	(.0022)	(.0023)	(.0022)
SAT Score					
ACT Score					
High School GPA		**.0566*** **	**.0385*** **	**.0607*** **	**.0433*** **
		(.0007)	(.0007)	(.0007)	(.0007)
Academic Ability Self-Rating		**.0131*** **			**-.0170*** **
		(.0014)			(.0015)
Math Ability Self-Rating			**.1053*** **		**.1157*** **
			(.0009)		(.0010)
Academic Self-Confidence				**-.0152*** **	**-.0364*** **
				(.0011)	(.0012)
Academic Ability Self-Rating Gap *Based on ACT Scores	**-.0461*** **				
	(.0037)				
Math Ability Self-Rating Gap *Based on ACT Scores	**.0983*** **				
	(.0033)				
Academic Self-Confidence Gap *Based on ACT Scores	**-.0693*** **				
	(.0029)				
Year Dummy Included	YES				
State Dummy Included	YES				
Observations	54110	216585	216458	216429	215996
Pseudo R-Squared	0.0737	0.0438	0.0970	0.0442	0.1035
Robust Standard Errors in (), clustered around State Dummy					

Chart 1.2 Effects on STEM, Probit College Senior Survey

STEM		
	36	**37**
Female	**-.0385*****	**-.0345*****
	(.0018)	(.0039)
White	**.0290*****	**.0430*****
	(.0025)	(.0078)
Income	**-.0022*****	**-.0021*****
	(.0002)	(.0004)
First Generation College	.0031	.0018
	(.0024)	(.0041)
Private High School	**.0866****	**.0715***
	(.0327)	(.0351)
Mom STEM Career	**.0227****	**.0253****
	(.0071)	(.0093)
Dad STEM Career	**.0675*****	**.0674*****
	(.0025)	(.0037)
Mom Career	**.0200*****	**.0166*****
	(.0022)	(.0032)
SAT Score		
ACT Score		
High School GPA	**.0436*****	**.0447*****
	(.0007)	(.0021)
Academic Ability Self-Rating	**-.0166*****	**-.0169*****
	(.0015)	(.0022)
Math Ability Self-Rating	**.1151*****	**.1124*****
	(.0010)	(.0031)
Academic Self-Confidence	**-.0366*****	**-.0345*****
	(.0012)	(.0019)
Academic Ability Self-Rating Gap		
Math Ability Self-Rating Gap		
Academic Self-Confidence Gap		
Year Dummy Included	YES	YES
State Dummy Included		YES
Observations	215996	127343
Pseudo R-Squared	0.1048	0.1100
Robust Standard Errors in (), clustered around State Dummy		

In Chart 1.2, similar results can be seen. When STEM is tested using only female, the result is that females are 5.06 percentage points less likely to choose a STEM major than males. The minimum coefficient suggests that girls are 1.31 percentage points less likely to choose a STEM major, and this occurs when SAT scores and all three self-ratings are included, but no time or state dummies are controlled for. The maximum coefficient suggests women are 7.90 percentage points less likely to major in a STEM subject than males, and this occurs when high school GPA and academic self-confidence are the two included control groups. After controlling for each category, females are 1.32 percentage points less likely to choose STEM if SAT scores are incorporated, 1.52 percentage points less likely if ACT scores are used, and 3.45 percentage points less likely when using high school GPA as the academic ability control.

Income decreases the likelihood that a student majors in a STEM subject, by 0.45 percentage points for each increase of one standard deviation in income. Being white increases the likelihood that a student will choose a STEM major by up to 5.44 percentage points, which occurs when ACT is the academic control. There is one significant effect when looking at if a student is the first in her family to attend college, occurring when SAT is the academic control, and this increases STEM likelihood by 0.92 percentage points. Going to a private high school is only significant when using high school GPA as the control, and it increases the likelihood that a student will choose STEM by 7.15 percentage points. A mother having a STEM career is significant when high school GPA is controlled for and can affect the likelihood a student will choose STEM by up to 2.53 percentage points, and a father's STEM career can increase this probability by up to 6.98 percentage points, when controlling for SAT scores. If a mother has a career at all, STEM likelihood increases by 2.31 percentage points. If SAT score increases by one standard deviation, the likelihood a student will major in STEM increases by 0.03 percentage

points. An increase in an ACT score can increase the probability a student will choose STEM by 1.24 percentage points, and an increase in high school GPA can increase the probability a student will choose STEM by 4.47 percentage points. Academic ability self-rating has a negative relationship with STEM, by up to 1.81 percentage points, as does academic self-confidence, by up to 4.04 percentage points. However, math ability self-rating is significant and positive, up to 12.78 percentage points increase in likelihood that a student chooses a STEM major if the student's math ability self-rating increases by 1 ranking.

Academic self-rating gaps all suggest significant relationships with STEM. Once again, students' academic ability self-rating gaps and academic self-confidence gaps, when measured using SAT scores both suggest negative relationship with the likelihood a student will choose a STEM major. Academic ability gap suggests a 5.25 percentage point decrease in likelihood and academic self-confidence suggests 7.54 percentage point decrease. This means that as students' gaps increase, which happens when they rate themselves higher, they are less likely to choose a STEM major. Math self-rating gaps, however, show the opposite, that as students rate their math abilities higher, they can be up to 11.19 percentage points more likely to choose a STEM major.

When using ACT scores as the ability measure in calculating self-rating gaps, similar results are suggested. This time, academic ability self-rating gaps suggest a 4.61 percentage point decrease in STEM likelihood, and academic self-confidence gaps suggest a 6.93 percentage point drop in STEM likelihood as gaps increase. Math ability self-rating gaps suggest a 9.83 percentage point increase in STEM likelihood as the gap increases.

Charts 2.1 and 2.2 summarize results from the linear and probit regressions, respectively, for TCU students who took the Freshman Survey from years 2012-2015. These charts suggest that being white actually has a significant but negative effect on choosing a STEM major. This

may be influenced by the fact that TCU has a large majority of students who are white. Income is also negative, possibly because many of the families who send their children to TCU are affluent, so there may be skewed information. Going to a private high school does not suggest a significant relationship with the likelihood of a student choosing a STEM major based on ratings and scores, but is significant when looking at self-rating gaps. Parents' careers have no significant effects in this data. SAT scores, ACT scores and high school GPA's also suggest positive and significant effects. Academic ability self-rating and math ability self-rating both indicate positive and significant relationships to STEM, but academic self-confidence is not significant. Finally, academic ability self-rating gap is only significant when measuring it based on ACT scores, and suggests a positive relationship with STEM. Math ability gaps suggest a significant and positive relationship with STEM, and academic self-confidence gaps suggest a significant but negative relationship.

Chart 2.1 Effects on STEM, OLS The Freshman Survey, TCU

STEM	1	2	3	4	5
Female	**-0.0493*** **	**-.0461*** **	**-0.0446*** **	**-0.0460*** **	**-.0458*** **
	(0.0113)	(0.0112)	(0.0118)	(0.0118)	(.0118)
White		**-.0975*** **	**-0.1042*** **	**-0.1042*** **	**-.1043*** **
		(0.0159)	(0.0191)	(0.0191)	(.0191)
Income			**-0.0070** **	**-0.0059** **	**-.0059** **
			(0.0023)	(0.0023)	(.0023)
Private High School				**-0.0356** **	**-.0348** **
				(0.0115)	(.0115)
Mom STEM Career					.0315
					(.0200)
Dad STEM Career					
Mom Career					
SAT Score					
ACT Score					
High School GPA					
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
Observations	5806	5806	5249	5249	5249
R-Squared	0.0034	0.0112	0.0166	0.0184	0.0189
Robust Standard Errors in ()					

Chart 2.1 Effects on STEM, OLS The Freshman Survey, TCU

STEM	6	7	8	9	10
Female	**-.0462*****	**-0.0459*****	-.0311	**-.0415****	**-.0607*****
	(.0118)	(0.0118)	(.0190)	(.0145)	(.0119)
White	**-.1042*****	**-0.1032*****	**-.1283*****	**-.1426*****	**-.1095*****
	(.0191)	(0.0191)	(.0280)	(.0253)	(.0192)
Income	**-.0060****	**-0.0059****	**-.0096****	**-.0083****	**-.0051***
	(.0023)	(0.0023)	(.0037)	(.0029)	(.0023)
Private High School	**-.0345****	**-0.0349****	-.0146	**-.0387****	-.0127
	(.0116)	(0.0116)	(.0193)	(.0140)	(.0117)
Mom STEM Career	0.0291	0.0257	.0063	.0213	.0218
	(.0202)	(0.0203)	(.0291)	(.0247)	(.0203)
Dad STEM Career	0.0194	0.0205	.0342	.0068	.0223
	(0.0192)	(0.0192)	(.0300)	(.0231)	(.0193)
Mom Career		.0234	.0124	.0273	.0229
		(0.0164)	(.0273)	(.0199)	(.0162)
SAT Score			**.0005*****		
			(.0001)		
ACT Score				**.0154*****	
				(.0021)	
High School GPA					**.0500*****
					(.0052)
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
Observations	5249	5249	2147	3636	5203
R-Squared	0.0191	0.0194	0.0408	0.0364	0.034
Robust Standard Errors in ()					

Chart 2.1 Effects on STEM, OLS The Freshman Survey, TCU

STEM	11	12	13	14	15
Female	-.0288	-.0069	-.0286	-.0086	-.0070
	(.0191)	(.0191)	(.0197)	(.0195)	(.0196)
White	**-.1321*****	**-.1214*****	**-.1344*****	**-.1256*****	**-.1254*****
	(.0288)	(.0288)	(.0291)	(.0288)	(.0287)
Income	**-.0079***	**-.0096****	**-.0096***	**-.0083***	**-.0083***
	(.0037)	(.0037)	(.0038)	(.0037)	(.0037)
Private High School	-.0057	.0002	-.0120	.0014	-.0006
	(.0195)	(.0193)	(.0196)	(.0194)	(.0194)
Mom STEM Career	.0036	.0088	.0109	.0049	-.0054
	(.0294)	(.0293)	(.0297)	(.0295)	(.0296)
Dad STEM Career	.0305	.0347	.0316	.0341	.0417
	(.0300)	(.0295)	(.0303)	(.0296)	(.0295)
Mom Career	.0109	.0091	.0116	.0023	-.0120
	(.0275)	(.0267)	(.0279)	(.0274)	(.0282)
SAT Score	**.0003*****	**.0003*****	**.0005*****	**.0002****	**.0002****
	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
ACT Score					
High School GPA					
Academic Ability Self-Rating	**.0712*****			**.0385***	**.0347***
	(.0145)			(.0150)	(.0152)
Math Ability Self-Rating		**.0864*****		**.0802*****	**.0817*****
		(.0102)		(.0107)	(.0107)
Academic Self-Confidence			.0068	-.0128	-.0064
			(.0106)	(.0107)	(.0109)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					YES
Observations	2103	2109	2098	2090	2090
R-Squared	0.0512	0.0729	0.0417	0.0755	0.0807
Robust Standard Errors in ()					

Chart 2.1 Effects on STEM, OLS The Freshman Survey, TCU

STEM	16	17	18	19	20
Female	**-.0482***	**-.0380***	**-.0511****	**-.0406***	**-.0343***
	(.0192)	(.0192)	(.0194)	(.0193)	(.0148)
White	**-.1104*****	**-.0973*****	**-.1198*****	**-.1101*****	**-.1453*****
	(.0292)	(.0294)	(.0293)	(.0293)	(.0266)
Income	-.0065	-.0066	**-.0081***	-.0072	**-.0063***
	(.0038)	(.0037)	(.0038)	(.0038)	(.0029)
Private High School	-.0157	-.0080	-.0176	-.0108	**-.0291***
	(.0197)	(.0196)	(.0198)	(.0196)	(.0141)
Mom STEM Career	-.0064	-.0088	-.0053	-.0076	.0174
	(.0304)	(.0302)	(.0303)	(.0304)	(.0250)
Dad STEM Career	.0388	.0406	.0420	.0472	.0071
	(.0308)	(.0305)	(.0307)	(.0304)	(.0235)
Mom Career	-.0057	-.0076	-.0076	-.0170	.0301
	(.0287)	(.0283)	(.0288)	(.0286)	(.0199)
SAT Score					
ACT Score					**.0091*****
					(.0023)
High School GPA					
Academic Ability Self-Rating					**.0733*****
					(.0114)
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap *Based on SAT Scores	.0095			-.0034	
	(.0114)			(.0142)	
Math Ability Self-Rating Gap *Based on SAT Scores		**.0451*****		**.0666*****	
		(.0089)		(.0105)	
Academic Self-Confidence Gap *Based on SAT Scores			**-.0226****	**-.0470*****	
			(.0085)	(.0100)	
Year Dummy Included	YES	YES	YES	YES	
Observations	2103	2109	2098	2090	3545
R-Squared	0.0251	0.0368	0.0284	0.0483	0.0485
Robust Standard Errors in ()					

Chart 2.1 Effects on STEM, OLS The Freshman Survey, TCU

STEM	21	22	23	24	25
Female	-.0177	-.0417**	-.0192	-.0181	-.0476**
	(.0147)	(.0150)	(.0150)	(.0150)	(.0149)
White	-.1335***	-.1515***	-.1339***	-.1350***	-.1210***
	(.0265)	(.0267)	(.0266)	(.0266)	(.0268)
Income	-.0077**	-.0080**	-.0069*	-.0070*	-.0047
	(.0029)	(.0029)	(.0029)	(.0029)	(.0030)
Private High School	-.0241	-.0395**	-.0213	-.0216	-.0388**
	(.0139)	(.0141)	(.0140)	(.0140)	(.0143)
Mom STEM Career	.0207	.0229	.0172	.0146	.0260
	(.0245)	(.0250)	(.0248)	(.0249)	(.0253)
Dad STEM Career	.0120	.0082	.0151	.0174	.0168
	(.0230)	(.0235)	(.0232)	(.0232)	(.0238)
Mom Career	.0255	.0324	.0255	.0196	.0229
	(.0198)	(.0200)	(.0198)	(.0207)	(.0214)
SAT Score					
ACT Score	.0085***	.0151***	.0064**	.0065**	
	(.0022)	(.0022)	(.0023)	(.0023)	
High School GPA					
Academic Ability Self-Rating			.0352**	.0337**	
			(.0122)	(.0122)	
Math Ability Self-Rating	.0911***		.0859***	.0862***	
	(.0078)		(.0083)	(.0083)	
Academic Self-Confidence		.0040	-.0165	-.0134	
		(.0083)	(.0084)	(.0084)	
Academic Ability Self-Rating Gap *Based on ACT Scores					.0243**
					(.0097)
Math Ability Self-Rating Gap *Based on ACT Scores					
Academic Self-Confidence Gap *Based on ACT Scores					
Year Dummy Included				YES	YES
Observations	3545	3540	3526	3526	3541
R-Squared	0.0729	0.0372	0.0764	0.0775	0.0236
Robust Standard Errors in ()					

Chart 2.1 Effects on STEM, OLS The Freshman Survey, TCU

STEM	26	27	28	29	30
Female	**-.0350***	**-.0553*****	**-.0429****	**-.0433*****	**-.0279***
	(.0148)	(.0149)	(.0149)	(.0124)	(.0122)
White	**-.1053*****	**-.1319*****	**-.1138*****	**-.1148*****	**-.1085*****
	(.0269)	(.0268)	(.0268)	(.0198)	(.0197)
Income	-.0047	**-.0064***	-.0055	-.0045	**-.0058***
	(.0029)	(.0029)	(.0029)	(.0023)	(.0023)
Private High School	**-.0338***	**-.0442****	**-.0325***	-.0139	-.009
	(.0141)	(.0142)	(.0141)	(.0118)	(.0117)
Mom STEM Career	.0270	.0230	.0224	.0182	.0163
	(.0249)	(.0253)	(.0253)	(.0205)	(.0202)
Dad STEM Career	.0198	.0177	.0261	.0196	.0248
	(.0235)	(.0237)	(.0235)	(.0195)	(.0192)
Mom Career	.0188	.0254	.0184	.0246	.0233
	(.0214)	(.0213)	(.0212)	(.0163)	(.0161)
SAT Score					
ACT Score					
High School GPA				**.0274*****	**.0277*****
				(.0060)	(.0053)
Academic Ability Self-Rating				**.0690*****	
				(.0098)	
Math Ability Self-Rating					**.0803*****
					(.0063)
Academic Self-Confidence					
Academic Ability Self-Rating Gap *Based on ACT Scores			.0052		
			(.0117)		
Math Ability Self-Rating Gap *Based on ACT Scores	**.0567*****		**.0729*****		
	(.0070)		(.0082)		
Academic Self-Confidence Gap *Based on ACT Scores		**-.0212****	**-.0484*****		
		(.0070)	(.0078)		
Year Dummy Included	YES	YES	YES		
Observations	3541	3536	3522	5080	5082
R-Squared	0.0387	0.0245	0.05	0.0444	0.0639
Robust Standard Errors in ()					

Chart 2.1 Effects on STEM, OLS The Freshman Survey, TCU

STEM	**31**	**32**	**33**
Female	**-.0585*** **	**-.0258***	**-.0256***
	(.0125)	(.0126)	(.0126)
White	**-.1150*** **	**-.1123*** **	**-.1127*** **
	(.0200)	(.0198)	(.0198)
Income	**-.0049***	**-.0053***	**-.0054***
	(.0023)	(.0023)	(.0023)
Private High School	-.0144	-.0107	-.0111
	(.0119)	(.0117)	(.0117)
Mom STEM Career	.0215	.0146	.0094
	(.0206)	(.0204)	(.0205)
Dad STEM Career	.0219	.0254	.0292
	(.0195)	(.0193)	(.0193)
Mom Career	.0254	.0227	.0136
	(.0165)	(.0163)	(.0169)
SAT Score			
ACT Score			
High School GPA	**.0486*** **	**.0193** **	**.0196** **
	(.0053)	(.0060)	(.0060)
Academic Ability Self-Rating		**.0364*** **	**.0350*** **
		(.0104)	(.0104)
Math Ability Self-Rating		**.0747*** **	**.0750*** **
		(.0067)	(.006)
Academic Self-Confidence	.0029	**-.0156***	-.0131
	(.0069)	(.0070)	(.0070)
Academic Ability Self-Rating Gap			
Math Ability Self-Rating Gap			
Academic Self-Confidence Gap			
Year Dummy Included			YES
Observations	5068	5047	5047
R-Squared	0.0341	0.0669	0.0682
Robust Standard Errors in ()			

Chart 2.1 is the linear regression for TCU freshman. This data suggests that girls are less likely to choose STEM majors in some cases, but suggests insignificant effects in others. For example, when SAT or ACT scores are used as part of the controls, along with all other controls and dummy variables, there is no real significant difference between men and women choosing STEM majors at TCU. But when high school GPA is used as the control under the same circumstance, women are 2.56 percentage points less likely to choose STEM.

In this table, being white has a negative effect on STEM likelihood, by up to 13.50 percentage points. A one standard deviation increase in income decreases the likelihood that a student will choose STEM by 0.83 percentage points. Going to a private high school is insignificant, except when looking at the ACT self-rating gaps, where going to a private high school can decrease the likelihood a student chooses STEM by 4.42 percentage points. Either parent having a career in a STEM field is insignificant for this dataset, as is mother having a career at all. SAT score increases likelihood of STEM by 0.02 percentage points, ACT by 0.65 percentage points and high school GPA by 1.96 percentage points. Academic ability self-rating is positive this time, increasing the likelihood a student chooses STEM by up to 3.50 percentage points when using high school GPA as the control. Similarly, math ability self-rating increases STEM likelihood by an 8.62 percentage point increase each time math ability self-rating increases one category. Academic self-confidence comes out insignificant with this dataset and method.

The academic ability self-rating gap is insignificant in all cases, except when using ACT as the ability score and looking at the gap by itself. In this case, the gap suggests a positive relationship with STEM, that an increase in the gap increases the likelihood that a student chooses a STEM major by 2.43 percentage points. Math ability self-rating gap is significant and

positive throughout, by up to 7.29 percentage points, when using ACT scores as the measure. Finally, academic self-confidence gap is negative throughout, suggesting up to a 4.84 percentage point decrease in likelihood a student chooses a STEM major as the gap increases.

Chart 2.2 Effects on STEM, Probit The Freshman Survey, TCU

STEM	1	2	3	4	5
Female	**-0.0483*** **	**-0.0450*** **	**-0.0431*** **	**-0.0442*** **	**-.0439*** **
	(0.0108)	(0.0108)	(0.0114)	(0.0114)	(.0114)
White		**-0.0891*** **	**-0.0926*** **	**-0.0926*** **	**-.0928*** **
		(0.0135)	(0.0158)	(0.0158)	(.0158)
Income			**-0.0066** **	**-0.0055** **	**-.0055** **
			(0.0021)	(0.0021)	(.0021)
Private High School				**-0.0362** **	**-.0354* **
				(0.0119)	(.0119)
Mom STEM Career					.0308
					(.0185)
Dad STEM Career					
Mom Career					
SAT Score					
ACT Score					
High School GPA					
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
Observations	5806	5806	5249	5249	5249
Pseudo R-Squared	0.0033	0.0105	0.0151	0.0168	0.0173
Standard Errors in ()					

Chart 2.2 Effects on STEM, Probit The Freshman Survey, TCU

STEM	6	7	8	9	10
Female	**-.0443*****	**-.0440*****	-0.0295	**-.0390****	**-.0591*****
	(.0114)	(.0114)	(0.0184)	(.0140)	(.0115)
White	**-.0928*****	**-.0918*****	**-0.1187*****	**-.129*****	**-.0994*****
	(.0158)	(.0158)	(0.0241)	(.0210)	(.0158)
Income	**-.0056****	**-.0055****	**-0.0089****	**-.0081****	**-.0046***
	(.0021)	(.0021)	(0.0034)	(.0027)	(.0021)
Private High School	**-.0350****	**-.0354****	-0.0150	**-.0391****	-.0119
	(.0119)	(.0119)	(0.0196)	(.0144)	(.0121)
Mom STEM Career	.0284	.0249	0.0073	.0209	.0207
	(.0186)	(.0188)	(0.0286)	(.0226)	(.0187)
Dad STEM Career	.0197	.0210	0.0331	.0083	.0233
	(.0181)	(.0181)	(0.0286)	(.0222)	(.0181)
Mom Career		.0249	0.0124	.0304	.0256
		(.0177)	(0.0285)	(.0218)	(.0177)
SAT Score			**0.0005*****		
			(0.0001)		
ACT Score				**.0154*****	
				(.0019)	
High School GPA					**.0530*****
					(.0058)
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
Observations	5249	5249	2147	3636	5203
Pseudo R-Squared	0.0175	0.0179	0.037	0.0336	0.0332
Standard Errors in ()					

Chart 2.2 Effects on STEM, Probit The Freshman Survey, TCU

STEM	11	12	13	14	15
Female	-.0271	-.0046	-.0269	-.0060	-.0045
	(.0185)	(.0185)	(.0189)	(.0188)	(.0188)
White	**-.1221*** **	**-.1122*** **	**-.1238*** **	**-.1165*** **	**-.1157*** **
	(.0245)	(.0242)	(.0248)	(.0243)	(.0242)
Income	**-.0073***	**-.0087** **	**-.0089** **	**-.0077***	**-.0076***
	(.0034)	(.0034)	(.0034)	(.0034)	(.0034)
Private High School	-.0045	.0016	-.0123	.0032	.0017
	(.0198)	(.0195)	(.0199)	(.0197)	(.0196)
Mom STEM Career	.0043	.0106	.0121	.0071	-.0024
	(.0289)	(.0284)	(.0290)	(.0286)	(.0286)
Dad STEM Career	.0296	.0319	.0308	.0317	.0392
	(.0287)	(.0284)	(.0290)	(.0285)	(.0286)
Mom Career	.0103	.0108	.0116	.0024	-.0114
	(.0286)	(.0283)	(.0289)	(.0286)	(.0291)
SAT Score	**.0003*** **	**.0003*** **	**.0005*** **	**.0002** **	**.0002** **
	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
ACT Score					
High School GPA					
Academic Ability Self-Rating	**.0732*** **			**.0383***	**.0343***
	(.0152)			(.0165)	(.0166)
Math Ability Self-Rating		**.0877*** **		**.0813*** **	**.0822*** **
		(.0103)		(.0111)	(.0111)
Academic Self-Confidence			.0071	-.0135	-.0066
			(.0106)	(.0108)	(.0111)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					YES
Observations	2103	2109	2098	2090	2090
Pseudo R-Squared	0.0472	0.0687	0.0378	0.0711	0.0761
Standard Errors in ()					

Chart 2.2 Effects on STEM, Probit The Freshman Survey, TCU

STEM	16	17	18	19	20
Female	**-.0467***	-.0362	**-.0492****	**-.0377***	**-.0332***
	(.0186)	(.0186)	(.0187)	(.0187)	(.0141)
White	**-.0997*****	**-.0870*****	**-.1090*****	**-.1005*****	**-.1294*****
	(.0249)	(.0247)	(.0249)	(.0247)	(.0217)
Income	-.0060	-.0060	**-.0075***	-.0064	**-.0061***
	(.0035)	(.0034)	(.0034)	(.0034)	(.0028)
Private High School	-.0157	-.0069	-.0179	-.0098	**-.0288***
	(.0202)	(.0200)	(.0201)	(.0200)	(.0146)
Mom STEM Career	-.0051	-.0065	-.0040	-.0049	.0169
	(.0294)	(.0291)	(.0294)	(.0291)	(.0226)
Dad STEM Career	.0383	.0389	.0419	.0460	.0086
	(.0292)	(.0291)	(.0292)	(.0290)	(.0223)
Mom Career	-.0051	-.0068	-.0063	-.0154	.0338
	(.0297)	(.0294)	(.0298)	(.0297)	(.0219)
SAT Score					
ACT Score					**.0088*****
					(.0022)
High School GPA					
Academic Ability Self-Rating					**.0750*****
					(.0112)
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap *Based on SAT Scores	.0097			-.0045	
	(.0118)			(.0155)	
Math Ability Self-Rating Gap *Based on SAT Scores		**.0454*****		**.0685*****	
		(.0090)		(.0111)	
Academic Self-Confidence Gap *Based on SAT Scores			**-.0223****	**-.0470*****	
			(.0086)	(.0101)	
Year Dummy Included	YES	YES	YES	YES	
Observations	2103	2109	2098	2090	3545
Pseudo R-Squared	0.0223	0.0333	0.0252	0.0445	0.0458
Standard Errors in ()					

Chart 2.2 Effects on STEM, Probit The Freshman Survey, TCU

STEM	21	22	23	24	25
Female	-.0154	**-.0393****	-.0173	-.0162	**-.0461****
	(.0140)	(.0144)	(.0142)	(.0142)	(.0143)
White	**-.1189*****	**-.1357*****	**-.1196*****	**-.1209*****	**-.1054*****
	(.0214)	(.0219)	(.0214)	(.0214)	(.0219)
Income	**-.0073****	**-.0078****	**-.0064***	**-.0066***	-.0044
	(.0027)	(.0028)	(.0027)	(.0027)	(.0028)
Private High School	-.0232	**-.0400****	-.0204	-.0205	**-.0391****
	(.0144)	(.0146)	(.0145)	(.0145)	(.0148)
Mom STEM Career	.0204	.0222	.0178	.0153	.0248
	(.0223)	(.0228)	(.0223)	(.0224)	(.0231)
Dad STEM Career	.0113	.0093	.0147	.0178	.0179
	(.0221)	(.0225)	(.0221)	(.0222)	(.0228)
Mom Career	.0275	.0361	.0276	.0217	.0252
	(.0216)	(.0222)	(.0217)	(.0223)	(.0228)
SAT Score					
ACT Score	**.0079*****	**.0151*****	**.0058****	**.0058****	
	(.0020)	(.0020)	(.0021)	(.0021)	
High School GPA					
Academic Ability Self-Rating			**.0359****	**.0344****	
			(.0122)	(.0122)	
Math Ability Self-Rating	**.0918*****		**.0865*****	**.0866*****	
	(.0078)		(.0084)	(.0084)	
Academic Self-Confidence		.0039	**-.0175***	-.0141	
		(.0082)	(.0084)	(.0086)	
Academic Ability Self-Rating Gap *Based on ACT Scores					**.0247****
					(.0095)
Math Ability Self-Rating Gap *Based on ACT Scores					
Academic Self-Confidence Gap *Based on ACT Scores					
Year Dummy Included				YES	YES
Observations	3545	3540	3526	3526	3541
Pseudo R-Squared	0.0698	0.0343	0.0735	0.0746	0.0213
Standard Errors in ()					

Chart 2.2 Effects on STEM, Probit The Freshman Survey, TCU

STEM	26	27	28	29	30
Female	**-.0335***	**-.0529*****	**-.0404****	**-.0430*****	**-.0262***
	(.0142)	(.0144)	(.0143)	(.0118)	(.0118)
White	**-.0908*****	**-.1163*****	**-.1003*****	**-.1034*****	**-.0984*****
	(.0217)	(.0218)	(.0216)	(.0162)	(.0160)
Income	-.0042	**-.0060***	-.0050	-.0042	**-.0053***
	(.0028)	(.0028)	(.0028)	(.0021)	(.0021)
Private High School	**-.0331***	**-.0449****	**-.0318***	-.0124	-.0077
	(.0147)	(.0147)	(.0146)	(.0122)	(.0121)
Mom STEM Career	.0261	.0224	.0229	.0171	.0164
	(.0229)	(.0231)	(.0228)	(.0188)	(.0185)
Dad STEM Career	.0196	.0190	.0258	.0209	.0242
	(.0226)	(.0227)	(.0226)	(.0182)	(.0181)
Mom Career	.0204	.0285	.0211	.0272	.0250
	(.0225)	(.0229)	(.0226)	(.0178)	(.0176)
SAT Score					
ACT Score					
High School GPA				**.0304*****	**.0297*****
				(.0066)	(.0061)
Academic Ability Self-Rating				**.0685*****	
				(.0093)	
Math Ability Self-Rating					**.0806*****
					(.0063)
Academic Self-Confidence					
Academic Ability Self-Rating Gap *Based on ACT Scores			.0050		
			(.0117)		
Math Ability Self-Rating Gap *Based on ACT Scores	**.0571*****		**.0745*****		
	(.0071)		(.0085)		
Academic Self-Confidence Gap *Based on ACT Scores		**-.0211****	**-.0492*****		
		(.0070)	(.0080)		
Year Dummy Included	YES	YES	YES		
Observations	3541	3536	3522	5808	5082
Pseudo R-Squared	0.036	0.0221	0.0475	0.0436	0.0635
Standard Errors in ()					

Chart 2.2 Effects on STEM, Probit The Freshman Survey, TCU

STEM	**31**	**32**	**33**
Female	**-.0571*** **	**-.0249***	**-.0247***
	(.0119)	(.0120)	(.0120)
White	**-.1033*** **	**-.1021*** **	**-.1024*** **
	(.0164)	(.0161)	(.0161)
Income	**-.0045***	**-.0049***	**-.0050***
	(.0022)	(.0021)	(.0021)
Private High School	-.0137	-.0089	-.0092
	(.0123)	(.0121)	(.0122)
Mom STEM Career	.0205	.0151	.0099
	(.0189)	(.0186)	(.0187)
Dad STEM Career	.0227	.0253	.0298
	(.0183)	(.0181)	(.0182)
Mom Career	.0281	.0242	.0154
	(.0180)	(.0177)	(.0181)
SAT Score			
ACT Score			
High School GPA	**.0516*** **	**.0218*** **	**.0222*** **
	(.0059)	(.0066)	(.0066)
Academic Ability Self-Rating		**.0345*** **	**.0329***
		(.0102)	(.0102)
Math Ability Self-Rating		**.0752*** **	**.0755*** **
		(.0069)	(.0069)
Academic Self-Confidence	.0027	**-.0165***	-.0136
	(.0068)	(.0069)	(.0070)
Academic Ability Self-Rating Gap			
Math Ability Self-Rating Gap			
Academic Self-Confidence Gap			
Year Dummy Included			YES
Observations	5068	5047	5047
Pseudo R-Squared	0.0331	0.0663	0.0677
Standard Errors in ()			

Chart 2.2 suggests similar results to Chart 2.1. It suggests that women are 2.47 percentage points less likely to choose STEM when high school GPA is the academic ability control, but when ACT or SAT scores are used, there is no significant difference. There could be different reasons for this, which will be discussed later.

Being white reveals a negative effect on STEM likelihood, by up to 12.09 percentage points. A one standard deviation increase in income decreases the likelihood that a student will choose STEM by 0.76 percentage points. Going to a private high school is insignificant, except when looking at the ACT self-rating gaps, where going to a private high school can decrease the likelihood a student chooses STEM by 4.49 percentage points. Either parent having a career in a STEM field is insignificant for this dataset, as is mother having a career at all. SAT score increases likelihood of STEM by 0.02 percentage points, ACT by 0.58 percentage points and high school GPA by 2.22 percentage points. Academic ability self-rating is positive, increasing the likelihood a student chooses STEM by up to 3.44 percentage points when using ACT score as the control. Similarly, math ability self-rating increases STEM likelihood by an 8.66 percentage points increase each time math ability self-rating increases one category. Academic self-confidence comes out insignificant with this dataset and method.

The academic ability self-rating gap is insignificant in all cases, except when using ACT as the ability score and looking at the gap by itself. In this case, the gap suggests a positive relationship with STEM, that an increase in the gap increases the likelihood that a student chooses a STEM major by 2.47 percentage points. Math ability self-rating gap is significant and positive throughout, by up to 7.45 percentage points, when using ACT scores as the measure. Finally, academic self-confidence gap is negative throughout, suggesting up to a 4.92 percentage point decrease in likelihood a student chooses a STEM major as the gap increases.

The final two charts, Charts 3.1 and 3.2 reflect data from a TCU survey sent out this spring to students in all classes, asking very similar questions to both the College Senior Survey and the Freshman Survey. This data suggests the conclusion that income is insignificant across all runs, as is mothers' careers in STEM. Interestingly, however, data suggests students are up to 31.58 percentage points more likely to choose STEM if their mother has a career at all. Going to a private school suggests an insignificant relationship with STEM. SAT rank, ACT rank and high school GPA rank all result in insignificant relationships with STEM. This is interesting and opposite of what was discovered in the other two datasets from this study, but there could be bias since this survey was sent only to TCU students. Finally, academic ability self-ratings appear insignificant, math ability self-ratings are positive and significant, and academic self-confidence is negative and significant. The pattern of the self-rating gaps mimics that of the Freshman TCU Survey. This dataset has the smallest of the three datasets, but the conclusions are the most shocking for women in STEM because they suggest the strongest negative relationships between women and STEM, even though TCU has a strong female majority.

Chart 3.1 Effects on STEM, OLS Investigator-Designed TCU Survey

STEM	1	2	3	4	5
Female	**-0.3629*** **	**-0.1349***	**-0.1401***	**-0.1410***	**-0.1368***
	(0.0556)	(0.0634)	(0.0632)	(0.0633)	(0.0627)
Income		0.0039	0.0119	0.0140	0.0094
		(0.0223)	(0.0233)	(0.0243)	(.0242)
Private High School			-0.0855	-0.0875	-0.0909
			(0.0589)	(0.0591)	(0.0589)
Mom STEM Career				-0.0436	-0.0780
				(0.1175)	(.1124)
Dad STEM Career					0.1497
					(0.0859)
Mom Career					
SAT Rank					
ACT Rank					
High School Rank					
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	299	260	260	260	260
R-Squared	0.1366	0.0196	0.0277	0.0282	0.0416
Robust Standard Errors in (), clustered around State Dummy					

Chart 3.1 Effects on STEM, OLS Investigator-Designed TCU Survey

STEM	6	7	8	9	10
Female	**-0.1387***	**-0.1477***	**-0.1507***	**-0.1472***	**-0.1357***
	(.0622)	(0.0625)	(.0622)	(.0617)	(.0626)
Income	0.0129	0.0024	0.0001	0.0027	-0.0006
	(.0239)	(.0239)	(.0252)	(.0237)	(.0242)
Private High School	-0.0781	-0.0455	-0.0437	-0.0478	-0.0388
	(0.0582)	(.0577)	(.0580)	(.0600)	(.0583)
Mom STEM Career	-0.1037	-0.0640	-0.0562	-0.0604	-0.0354
	(.1139)	(.1155)	(.1139)	(.1134)	(.1244)
Dad STEM Career	0.1424	0.1176	0.1206	0.1171	0.1274
	(.0842)	(.0836)	(0.0849)	(.0851)	(.0852)
Mom Career	**0.1977*****	**0.1741****	**0.1747****	**0.1781***	**0.1703****
	(.0557)	(.0561)	(.0566)	(.0570)	(.0554)
SAT Rank		-0.0041			-0.0041
		(.0105)			(.0107)
ACT Rank			0.0027		
			(.0147)		
High School Rank				-0.0176	
				(.0369)	
Academic Ability Self-Rating					0.0454
					(.0403)
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	260	252	252	252	250
R-Squared	0.0633	0.0578	0.0573	0.0583	0.0613
Robust Standard Errors in (), clustered around State Dummy					

Chart 3.1 Effects on STEM, OLS Investigator-Designed TCU Survey

STEM	**11**	**12**	**13**	**14**	**15**
Female	-0.1085	**-0.1389***	-0.1164	-0.1172	-0.1647
	(.0633)	(0.0622)	(0.0626)	(.0649)	(.0979)
Income	-0.0076	0.0019	-0.0076	-0.0073	-0.0157
	(.0238)	(.0239)	(0.0236)	(.0240)	(.0298)
Private High School	-0.0432	-0.0415	-0.0369	-0.0331	-0.0322
	(.0561)	(0.0577)	(0.0566)	(.0562)	(.0815)
Mom STEM Career	-0.0278	-0.0302	-0.0089	-0.0113	0.0529
	(.1206)	(0.1185)	(.1175)	(.1193)	(0.1140)
Dad STEM Career	0.1248	0.1232	0.1160	0.1145	0.0678
	(.0818)	(0.0858)	(0.0822)	(.083)	(.0632)
Mom Career	**0.1861****	**0.1560****	**0.1623****	**0.1641****	**0.1517*****
	(.0579)	(.0577)	(0.0599)	(.0604)	(.0373)
SAT Rank	-0.0029	-0.0081	-0.0053	-0.0056	-0.0087
	(.0105)	(0.0105)	(0.0103)	(.0104)	(.0063)
ACT Rank					
High School Rank					
Academic Ability Self-Rating			0.0450	0.0442	0.0398
			(.0485)	(.0493)	(.0832)
Math Ability Self-Rating	**0.1078*****		**0.1098*****	**0.1069*****	**0.1290*****
	(.0281)		(.0318)	(.0319)	(.0382)
Academic Self-Confidence		-0.0487	**-0.0874****	**-0.0855****	**-0.1045****
		(0.0303)	(0.0317)	(.0325)	(.0396)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included				YES	YES
State Dummy Included					YES
Observations	250	250	250	250	250
R-Squared	0.1104	0.0679	0.1385	0.1418	0.3399
Robust Standard Errors in (), clustered around State Dummy					

Chart 3.1 Effects on STEM, OLS Investigator-Designed TCU Survey

STEM	**16**	**17**	**18**	**19**	**20**
Female	**-0.2012***	**-.1899***	**-.2041***	-.1629	**-.1387***
	(0.0879)	(.0883)	(.0887)	(.0967)	(.0626)
Income	0.0009	.0002	.0000	-.0141	-.0027
	(0.0287)	(.0277)	(.0300)	(.0297)	(.0252)
Private High School	-0.0237	-.0345	-.0167	-.0362	-.0368
	(0.0671)	(.0675)	(.0676)	(.0801)	(.0583)
Mom STEM Career	0.0287	.0201	.0395	.0462	-.0293
	(0.1165)	(.1211)	(.1133)	(.1205)	(0.1235)
Dad STEM Career	0.0625	.0603	.0653	.0700	.1297
	(0.0608)	(.0626)	(.0591)	(.0607)	(.0862)
Mom Career	**0.1579*****	**.1563*****	**.1640*****	**.1459*****	**.1711****
	(0.0302)	(.0294)	(.0325)	(.0400)	(0.0556)
SAT Rank					
ACT Rank					.0022
					(0.0148)
High School Rank					
Academic Ability Self-Rating					.0466
					(0.0395)
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap *Based on SAT Scores	**.0119***			.0140	
	(.0059)			(.0722)	
Math Ability Self-Rating Gap *Based on SAT Scores		**.0223*****		**.1155*****	
		(.0067)		(.0339)	
Academic Self-Confidence Gap *Based on SAT Scores			-.0006	**-.1160****	
			(.0070)	(.0450)	
Year Dummy Included	YES	YES	YES	YES	
State Dummy Included	YES	YES	YES	YES	
Observations	223	223	223	223	250
R-Squared	0.2494	0.261	0.2452	0.3348	0.0608
Robust Standard Errors in (), clustered around State Dummy					

Chart 3.1 Effects on STEM, OLS Investigator-Designed TCU Survey

STEM	**21**	**22**	**23**	**24**	**25**
Female	-.1072	**-.1451***	-.1169	-.1184	-.1640
	(0.0636)	(0.0622)	(0.0629)	(0.0653)	(0.0977)
Income	-.0046	-.0032	-.0057	-.0058	-.0127
	(0.0245)	(0.0251)	(0.0242)	(0.0242)	(0.0287)
Private High School	-.0428	-.0378	-.0353	-.0313	-.0293
	(0.0562)	(0.0580)	(0.0567)	(0.0565)	(0.0789)
Mom STEM Career	-.0298	-.0170	-.0078	-.0093	.0601
	(0.1178)	(0.1187)	(0.1154)	(0.1175)	(0.1043)
Dad STEM Career	.1212	.1291	.1137	.1127	.0615
	(0.0828)	(0.0870)	(0.0833)	(0.0847)	(0.0650)
Mom Career	**.1919****	**.1569****	**.1687****	**.1701****	**.1616*****
	(0.0583)	(0.0581)	(0.0604)	(0.0605)	(0.0367)
SAT Rank					
ACT Rank	-.0074	.0065	-.0062	-.0053	-.0090
	(0.0150)	(0.0146)	(0.0147)	(0.0149)	(0.0062)
High School Rank					
Academic Ability Self-Rating			.0469	.0464	.0400
			(0.0491)	(0.0500)	(0.0836)
Math Ability Self-Rating	**.1115*****		**.1125*****	**.1094*****	**.1337*****
	(0.0284)		(0.0325)	(0.0324)	(0.0385)
Academic Self-Confidence		-.0471	**-.0862****	**-.0843****	**-.1035***
		(0.0298)	(0.0316)	(0.0324)	(0.0403)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included				YES	YES
State Dummy Included					YES
Observations	223	250	250	250	223
R-Squared	0.111	0.0665	0.1383	0.1412	0.3391
Robust Standard Errors in (), clustered around State Dummy					

Chart 3.1 Effects on STEM, OLS Investigator-Designed TCU Survey

STEM	**26**	**27**	**28**	**29**	**30**
Female	**-.2035***	**-.1899***	**-.2081***	-.1616	**-.1344***
	(.0874)	(.0883)	(.0869)	(.0969)	(0.0621)
Income	.0011	.0094	-.0090	-.0092	.00013
	(.0282)	(.0263)	(.0330)	(.0281)	(0.0238)
Private High School	-.0175	-.0264	-.0123	-.0320	-.0429
	(.0654)	(.0637)	(.0680)	(.0773)	(0.0596)
Mom STEM Career	.0387	.0377	.0427	.0569	-.0331
	(.1083)	(.0997)	(.1163)	(.1070)	(0.1232)
Dad STEM Career	.0632	.0432	.0823	.0603	.1253
	(.0616)	(.0658)	(.0579)	(.0637)	(0.0871)
Mom Career	**.1650*****	**.1809*****	**.1496*****	**.1609*****	**.1755****
	(.0346)	(.0352)	(.0367)	(.0401)	(0.0562)
SAT Rank					
ACT Rank					
High School Rank					-.0274
					(0.0379)
Academic Ability Self-Rating					.0565
					(0.0420)
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap *Based on ACT Scores	.0022			.0099	
	(.0077)			(.0747)	
Math Ability Self-Rating Gap *Based on ACT Scores		**.0252***		**.1208*****	
		(.0098)		(.0345)	
Academic Self-Confidence Gap *Based on ACT Scores			**-.0183*****	**-.1162***	
			(.0055)	(.0452)	
Year Dummy Included	YES	YES	YES	YES	
State Dummy Included	YES	YES	YES	YES	
Observations	223	223	223	223	250
R-Squared	0.2452	0.2549	0.2515	0.3325	0.0631
Robust Standard Errors in (), clustered around State Dummy					

Chart 3.1 Effects on STEM, OLS Investigator-Designed TCU Survey

STEM	**31**	**32**	**33**	**34**	**35**
Female	-.1005	**-.1432***	-.1121	-.1138	-.1589
	(0.0629)	(0.0619)	(0.0623)	(0.0641)	(0.0926)
Income	-.0056	.0002	-.0067	-.0060	-.0113
	(0.0234)	(0.0236)	(0.0232)	(0.0236)	(0.0298)
Private High School	-.0543	-.0384	-.0440	-.0398	-.0404
	(0.0584)	(0.0601)	(0.0586)	(0.0584)	(0.0829)
Mom STEM Career	-.0282	-.0220	-.0069	-.0102	.0526
	(0.1165)	(0.118)	(0.1159)	(0.118)	(0.1022)
Dad STEM Career	.1197	.1254	.1130	.1109	.0637
	(0.0833)	(0.0869)	(0.0838)	(0.0851)	(0.0613)
Mom Career	**.1953****	**.1605****	**.1716****	**.1743****	**.1632*****
	(0.0598)	(0.0585)	(0.0613)	(0.0618)	(0.0313)
SAT Rank					
ACT Rank					
High School Rank	-.0503	.0001	-.0398	-.0422	-.0656
	(0.0346)	(0.0403)	(0.0359)	(0.0363)	(0.0446)
Academic Ability Self-Rating			.0534	.0533	.0512
			(0.0498)	(0.0508)	(0.0824)
Math Ability Self-Rating	**.1199*****		**.1160*****	**.1135*****	**.1402*****
	(0.0285)		(0.0321)	(0.0322)	(0.0378)
Academic Self-Confidence		-.0462	**-.0830****	**-.0804***	**-.0987****
		(0.0314)	(0.0320)	(0.0329)	(0.0365)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included				YES	YES
State Dummy Included					YES
Observations	250	250	250	250	250
R-Squared	0.1182	0.0657	0.1424	0.1461	0.3497
Robust Standard Errors in (), clustered around State Dummy					

Chart 3.1 suggests no real significant effects of being female on STEM when all controls and dummy variables are used. This, however, is unreliable data since this chart depicts results from a linear regression for non-linear data.

Income also suggests no significant effect, as does going to a private high school, mother having a STEM career, father having a STEM career, SAT rank, ACT Rank, high school GPA rank and academic ability self-rating. A mother having a career increases the likelihood of STEM by 16.32 percentage points when using high school GPA as the control for academic ability. A 14.02 percentage point increase in STEM likelihood occurs each time a student's perceived math self-rating increases by one rank. Finally, a 10.45 percentage point decrease in STEM likelihood occurs each time a student's academic self-confidence increases one level.

The academic ability self-rating gap is insignificant in all cases, except when using SAT as the ability score and looking at the gap by itself. In this case, the gap suggests a positive relationship with STEM, that an increase in the gap increases the likelihood that a student chooses a STEM major by 1.19 percentage points. Math ability self-rating gap is significant and positive throughout, by up to 12.08 percentage points, when using ACT scores as the measure. Finally, academic self-confidence gap is negative throughout, suggesting up to an 11.62 percentage point decrease in likelihood a student chooses a STEM major as the gap increases.

Chart 3.2 Effects on STEM, Probit Investigator-Designed TCU Survey

STEM	1	2	3	4	5
Female	**-0.3238*** **	**-0.1267***	**-0.1299***	**-.1311***	**-0.1261***
	(0.0404)	(0.0557)	(0.0558)	(.0558)	(0.0556)
Income		0.0044	0.0118	0.0141	0.0088
		(0.0246)	(0.0252)	(0.0259)	(0.0259)
Private High School			-0.0832	-0.0855	-0.0889
			(0.0589)	(0.0592)	(0.0587)
Mom STEM Career				-0.0494	-0.0849
				(0.1279)	(0.1300)
Dad STEM Career					0.1362
					(0.0730)
Mom Career					
SAT Rank					
ACT Rank					
High School Rank					
Academic Ability Self-Rating					
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	299	260	260	260	260
Pseudo R-Squared	0.1055	0.0169	0.0238	0.0243	0.0357
Standard Errors in (), clustered around State Dummy					

Chart 3.2 Effects on STEM, Probit Investigator-Designed TCU Survey

STEM	**6**	**7**	**8**	**9**	**10**
Female	**-.1283***	**-.1345***	**-.1374****	**-.1342***	**-.1251***
	(.0547)	(.0533)	(.0532)	(.0534)	(.0537)
Income	.0123	.0016	-.0004	.0021	-.0004
	(.0256)	(.0251)	(.0261)	(.0252)	(.0250)
Private High School	-.0694	-.0363	-.0338	-.0360	-.0336
	(.0585)	(.0576)	(.0573)	(.0574)	(.0574)
Mom STEM Career	-.1062	-.0661	-.0580	-.0631	-.0371
	(.1267)	(.1230)	(.1233)	(.1225)	(.1228)
Dad STEM Career	.1268	.1033	.1061	.1042	.1090
	(.0723)	(.0731)	(.0733)	(.0727)	(.0724)
Mom Career	**.2613***	**.2296***	**.2298***	**.2323***	**.2254***
	(.1061)	(.1040)	(.1041)	(.1037)	(.1035)
SAT Rank		-.0041			-.0037
		(.0103)			(.0104)
ACT Rank			.0025		
			(.0140)		
High School Rank				-.0133	
				(.0320)	
Academic Ability Self-Rating					.0476
					(.0372)
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included					
State Dummy Included					
Observations	260	252	252	252	250
Pseudo R-Squared	0.0605	0.0565	0.056	0.0565	0.0608
Standard Errors in (), clustered around State Dummy					

Chart 3.2 Effects on STEM, Probit Investigator-Designed TCU Survey

STEM	11	12	13	14	15
Female	-.0998	**-.1254***	**-.1071***	**-.1063***	**-.1406***
	(.0522)	(.0538)	(.0515)	(.0516)	(.0614)
Income	-.0026	.0002	-.0043	-.0053	-.0205
	(.0244)	(.0249)	(.0240)	(.0239)	(.0259)
Private High School	-.0339	-.0305	-.0220	-.0211	-.0271
	(.0554)	(.0572)	(.0546)	(.0553)	(.0765)
Mom STEM Career	-.0361	-.0358	-.0043	-.0038	.0764
	(.1197)	(.1245)	(.1173)	(.1170)	(.1114)
Dad STEM Career	.1023	.1097	.1022	.1012	.0728
	(.0706)	(.0723)	(.0688)	(.0686)	(.0504)
Mom Career	**.2302***	**.2096***	**.1986***	**.1961***	**.2303**
	(.0985)	(.1029)	(.0966)	(.0962)	(.0733)
SAT Rank	-.0032	-.0077	-.0049	-.0058	-.0096
	(.0099)	(.0104)	(.0099)	(.0100)	(.0066)
ACT Rank					
High School Rank					
Academic Ability Self-Rating			.0511	.0483	.0557
			(.0493)	(.0497)	(.0868)
Math Ability Self-Rating	**.1065*****		**.1083*****	**.1042*****	**.1303*****
	(.0269)		(.0305)	(.0310)	(.0354)
Academic Self-Confidence		-.0444	**-.0870****	**-.0851****	**-.1123****
		(.0259)	(.0315)	(.0315)	(.0363)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included				YES	YES
State Dummy Included					YES
Observations	250	250	250	250	186
Pseudo R-Squared	0.1101	0.0656	0.1395	0.1415	0.247
Standard Errors in (), clustered around State Dummy					

Chart 3.2 Effects on STEM, Probit Investigator-Designed TCU Survey

STEM	16	17	18	19	20
Female	**-.1965*** **	**-.1856*** **	**-.1968*** **	**-.1415***	**-.1278***
	(.0505)	(.0494)	(.0535)	(.0611)	(.0534)
Income	-.0095	-.0103	-.0090	-.0216	-.0017
	(.0281)	(.0274)	(.0283)	(.0280)	(.0261)
Private High School	-.0238	-.0357	-.0141	-.0248	-.0314
	(.0783)	(.0783)	(.0803)	(.0822)	(.0571)
Mom STEM Career	.0485	.0413	.0507	.0651	-.0320
	(.1022)	(.1036)	(.0980)	(.1182)	(.1230)
Dad STEM Career	.0584	.0542	.0646	.0740	.1107
	(.0546)	(.0573)	(.0495)	(.0486)	(.0727)
Mom Career	**.3005*** **	**.2983*** **	**.3014*** **	**.2357** **	**.2264***
	(.0634)	(.0643)	(.0653)	(.0800)	(.1038)
SAT Rank					
ACT Rank					.0014
					(.0142)
High School Rank					
Academic Ability Self-Rating					.0489
					(.0373)
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap *Based on SAT Scores	**.0155** **			.0223	
	(.0050)			(.0673)	
Math Ability Self-Rating Gap *Based on SAT Scores		**.0249*** **		**.1136** **	
		(.0063)		(.0362)	
Academic Self-Confidence Gap *Based on SAT Scores			.0020	**-.1202** **	
			(.0069)	(.0392)	
Year Dummy Included	YES	YES	YES	YES	
State Dummy Included	YES	YES	YES	YES	
Observations	186	186	186	186	250
Pseudo R-Squared	0.1323	0.1475	0.1241	0.2375	0.0604
Standard Errors in (), clustered around State Dummy					

Chart 3.2 Effects on STEM, Probit Investigator-Designed TCU Survey

STEM	**21**	**22**	**23**	**24**	**25**
Female	-.0990	**-.1315***	**-.1081***	**-.1079***	**-.1393***
	(.0520)	(.0536)	(.0514)	(.0515)	(.0621)
Income	.0011	-.0044	-.0019	-.0030	-.0152
	(.0254)	(.0258)	(.0249)	(.0250)	(.0253)
Private High School	-.0334	-.0260	-.0203	-.0188	-.0222
	(.0551)	(.0569)	(.0544)	(.0550)	(.0721)
Mom STEM Career	-.0422	-.0210	-.0060	-.0045	.0776
	(.1211)	(.1243)	(.1183)	(.1179)	(.1027)
Dad STEM Career	.0984	.1155	.0998	.0992	.0656
	(.0709)	(.0724)	(.0691)	(.0689)	(.0530)
Mom Career	**.2371***	**.2090***	**.2050***	**.2027***	**.2360*****
	(.0989)	(.1030)	(.0969)	(.0966)	(.0626)
SAT Rank					
ACT Rank	-.0079	.0067	-.0059	-.0056	-.0107
	(.0138)	(.0142)	(.0137)	(.0139)	(.0076)
High School Rank					
Academic Ability Self-Rating			.0543	.0524	.0590
			(.0489)	(.0492)	(.0891)
Math Ability Self-Rating	**.1106*****		**.1103*****	**.1065*****	**.1369*****
	(.0274)		(.0308)	(.0314)	(.0341)
Academic Self-Confidence		-.0432	**-.0859****	**-.0842****	**-.1129****
		(.0257)	(.0315)	(.0316)	(.0395)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included				YES	YES
State Dummy Included					YES
Observations	250	250	250	250	186
Pseudo R-Squared	0.1109	0.0643	0.1393	0.1409	0.2458
Standard Errors in (), clustered around State Dummy					

Chart 3.2 Effects on STEM, Probit Investigator-Designed TCU Survey

STEM	**26**	**27**	**28**	**29**	**30**
Female	**-.1963*** **	**-.1820*** **	**-.2007*** **	**-.1389***	**-.1239***
	(.0529)	(.0541)	(.0529)	(.0636)	(.0536)
Income	-.0075	.0027	-.0193	-.0137	.0011
	(.0280)	(.0270)	(.0310)	(.0263)	(.0251)
Private High School	-.0125	-.0172	-.0094	-.0157	-.0351
	(.0773)	(.0737)	(.0803)	(.0783)	(.0572)
Mom STEM Career	.0515	.0456	.0578	.0668	-.0359
	(.0939)	(.0845)	(.1043)	(.1079)	(.1222)
Dad STEM Career	.0623	.0397	**.0863***	.0650	.1084
	(.0540)	(.0585)	(.0433)	(.0516)	(.0720)
Mom Career	**.3036*** **	**.3158*** **	**.2814*** **	**.2433*** **	**.2291***
	(.0613)	(.0553)	(.0754)	(.0689)	(.1031)
SAT Rank					
ACT Rank					
High School Rank					-.0223
					(.0333)
Academic Ability Self-Rating					.0565
					(.0383)
Math Ability Self-Rating					
Academic Self-Confidence					
Academic Ability Self-Rating Gap *Based on ACT Scores	.0032			.0197	
	(.0070)			(.0753)	
Math Ability Self-Rating Gap *Based on ACT Scores		**.0246** **		**.1196*** **	
		(.0078)		(.0342)	
Academic Self-Confidence Gap *Based on ACT Scores			**-.0187** **	**-.1228** **	
			(.0059)	(.0429)	
Year Dummy Included	YES	YES	YES	YES	
State Dummy Included	YES	YES	YES	YES	
Observations	186	186	186	186	250
Pseudo R-Squared	0.1241	0.1351	0.1315	0.2325	0.062
Standard Errors in (), clustered around State Dummy					

Chart 3.2 Effects on STEM, Probit Investigator-Designed TCU Survey

STEM	31	32	33	34	35
Female	-.0922	-.1296*	-.1026*	-.1026*	-.1342*
	(.0524)	(.0538)	(.0517)	(.0517)	(.0611)
Income	.0006	-.0010	-.0019	-.0028	-.0125
	(.0244)	(.0249)	(.0240)	(.0239)	(.0243)
Private High School	-.0389	-.0266	-.0260	-.0237	-.0303
	(.0550)	(.0573)	(.0544)	(.0548)	(.0726)
Mom STEM Career	-.0399	-.0276	-.0065	-.0063	.0531
	(.1196)	(.1242)	(.1170)	(.1168)	(.0909)
Dad STEM Career	.1006	.1121	.1012	.0999	.0744
	(.0698)	(.0721)	(.0681)	(.0680)	(.0460)
Mom Career	.2385*	.2132*	.2075*	.2055*	.2372***
	(.0978)	(.1029)	(.0963)	(.0959)	(.0564)
SAT Rank					
ACT Rank					
High School Rank	-.0446	.0016	-.0373	-.0390	-.0655
	(.0323)	(.0326)	(.0328)	(.0329)	(.0378)
Academic Ability Self-Rating			.0613	.0595	.0673
			(.0493)	(.0496)	(.0901)
Math Ability Self-Rating	.1182***		.1145***	.110***	.1481***
	(.0280)		(.0309)	(.0313)	(.0344)
Academic Self-Confidence		-.0423	-.0845**	-.0821**	-.1096**
		(.0262)	(.0316)	(.0316)	(.0364)
Academic Ability Self-Rating Gap					
Math Ability Self-Rating Gap					
Academic Self-Confidence Gap					
Year Dummy Included				YES	YES
State Dummy Included					YES
Observations	250	250	250	250	186
Pseudo R-Squared	0.1168	0.0635	0.1435	0.1456	0.2598
Standard Errors in (), clustered around State Dummy					

Chart 3.2, uses probit regression and the results follow the same pattern as other data results. This data suggests that women are 32.38 percentage points less likely to major in a STEM subject when no controls are used, which is also the maximum coefficient value. The minimum coefficient suggests that females are 10.26 percentage points less likely to choose STEM, and this occurs when high school rank is used in conjuncture with all other control variables, excluding the year and state dummies. In this data, women are 14.06 percentage points less likely to major in a STEM field when SAT rank is used as the academic control, along with all other controls and dummy variables. This data also suggest that women are 13.93 percentage points less likely when ACT rank is the academic control. Finally, results from this dataset suggest that women are 13.42 percentage points less likely when high school GPA is used as the academic control variable.

Income suggests no significant effect, as does going to a private high school, either parent having a STEM career, SAT rank, ACT rank, high school rank and academic ability self-rating. A mother having a career increases the likelihood of STEM by 23.72 percentage points when using high school rank as the control for academic ability. Up to a 14.81 percentage point increase in STEM likelihood occurs each time a student's perceived math self-rating increases by one rank. When academic self-confidence increases by one rating, STEM likelihood decreases by 11.29 percentage points.

The academic ability self-rating gap is insignificant in all cases, except when using SAT as the ability score and looking at the gap by itself. In this case, the gap suggests a positive relationship with STEM, that an increase in the gap increases the likelihood that a student chooses a STEM major by 1.55 percentage points. Math ability self-rating gap is significant and positive throughout, by up to 11.96 percentage points, when using ACT scores as the measure.

Finally, academic self-confidence gap is negative throughout, suggesting up to a 12.28 percentage point decrease in likelihood a student chooses a STEM major as the gap increases.

The different results from the TCU surveys could in part be explained by the demographics at this school. Most students come from affluent families, are white, and there is a female majority. In addition, all TCU students are intelligent, as referenced earlier by the above-average test scores. Therefore, the data from this school is not representative of the national population, as the College Senior Survey is. It is important to keep these demographics in mind when looking at results. In addition, even though this population is very homogenous, there is still evidence to support that females are less likely to choose a STEM major than men.

In addition to regressions, other tests were run to test relationships between independent variables and the dependent STEM variable. These can be found in the Appendix of this paper and include Correlation Tables for each dataset, as well as graphs depicting different relationships between variables. Please note that a negative rate gap means the student underrated himself/herself.

For the College Senior Survey, the Summary Statistics highlight that there were 442,250 students included in the tests, that a majority were female and non-white. The mean SAT score was 1,159, the mean ACT score was 25 and the mean high school GPA was around a 3.7. The correlation table for this dataset suggests negative correlation between females and STEM with a correlation of -0.086, and between females and all three types of self-ratings included. Female is negatively correlated with academic ability self-rating by -0.113, with math ability self-rating by -0.192 and with academic self-confidence by -0.198. There is also a positive correlation between all three types of self-ratings and STEM. A negative correlation exists between female and all of the self-rating gaps, with the exception of the academic ability self-rating gap based on SAT

scores, which is positive. Between female and academic ability self-rating gaps, correlations were 0.026 for the SAT based gap and -0.029 for the ACT based gap. Math ability self-rating gaps and female have correlations of -0.075 for the SAT based gap and -0.123 for the ACT based gap. Between female and academic self-confidence gaps, the correlations are -0.050 for the SAT based gap and -0.103 for the ACT based gap. These suggest women were less likely in this survey to overrate abilities. A positive correlation exists between both math self-rating gaps and STEM, 0.155 for SAT gap and 0.194 for the ACT gap, suggesting that those with higher math self-concepts choose STEM more often than students with lower self-concepts in math.

Other charts suggest that males were more likely to self-rate their math ability and academic self-confidence above average or top 10 percentage points, and females were more likely to rate their academic ability as above average, but males were more likely to choose top 10 percentage points. In addition, females were slightly more likely to underrate their abilities, except when using academic ability self-ratings against SAT scores.

In the TCU Freshman Survey from 2012 to 2015, females were more likely to rate themselves as average or below average than males and less likely to rate themselves in the top 10 percentage points for all three self-rating categories. In addition, girls in this survey are more likely to underrate their abilities. For this dataset, there were 5,806 students included, most them female and white. The mean SAT score is 1207, ACT is 27 and high school GPA is an A or A plus. The correlation table suggests that there is a negative relationship between being female and choosing a STEM major with a correlation of -0.0329, as well as being female and each self-rating. Female is negatively correlated with academic ability self-rating by -0.085, math ability self-rating by -0.1937 and academic self-confidence by -0.1993. Thus, these TCU women were more likely to self-rate with low ratings. There is also a positive correlation between all three

types of self-ratings and STEM. A negative correlation exists between female and all of the self-rating gaps, with the exception of the academic ability self-rating gap based on SAT scores, which is positive. Between female and academic ability self-rating gaps, correlations were 0.003 for the SAT based gap and -0.055 for the ACT based gap. Math ability self-rating gaps and female have correlations of -0.113 for the SAT based gap and -0.160 for the ACT based gap. Between female and academic self-confidence gaps, the correlations are -0.105 for the SAT based gap and -0.151 for the ACT based gap. These suggest women were less likely in this survey to overrate abilities. A positive correlation exists between both math self-rating gaps and STEM, 0.144 for SAT gap and 0.155 for the ACT gap, suggesting that those with higher math self-concepts choose STEM more often than students with lower self-concepts in math. A negative correlation exists between STEM and income, being white and going to a private high school.

The final dataset is the TCU investigator-designed survey of all students in 2017. There were 299 student respondents, most of which were females. The mean SAT score lies between 1100 and 1400, the mean ACT score is between 18 and 23, and the mean high school rank is above average. Correlation table suggests that being female is negatively correlated to STEM, as is income, private high school SAT rank, high school rank and academic self-confidence. STEM is positively correlated with both academic ability and math ability self-ratings, as well as whether parents have STEM careers and ACT rank.

Female is negatively correlated with math ability self-rating by -0.1201 and academic self-confidence by -0.0533, but positively correlated with academic ability self-rating by 0.0051, which is different from results from the other two datasets. These correlations are important because it suggests that there may be a relationship between females and self-ratings. It suggests

women are more likely to rate themselves lower than men in two categories, but higher in academic ability self-rating.

A negative correlation exists between female and all of the self-rating gaps. Between female and academic ability self-rating gaps, correlations were -0.107 for the SAT based gap and -0.099 for the ACT based gap. Math ability self-rating gaps and female have correlations of -0.145 for the SAT based gap and -0.158 for the ACT based gap. Between female and academic self-confidence gaps, the correlations are -0.123 for the SAT based gap and -0.119 for the ACT based gap. These suggest women were less likely in this survey to overrate abilities. A positive correlation exists between both math self-rating gaps and STEM, 0.138 for SAT gap and 0.113 for the ACT gap, suggesting that those with higher math self-concepts choose STEM more often than students with lower self-concepts in math.

Females were less likely to rate themselves in the top 10 percentage points of academic self-ratings, but more or equally as likely as males to rate themselves above average. Women were also less likely to rate themselves in the bottom 10 percentage points of peers for academic self-confidence and math self-rating than men. When comparing self-ratings and SAT scores, men and women were most likely to self-rate correctly, women were more likely to underrate math ability and self-confidence, and men were more likely to underrate academic ability. When comparing self-ratings and ACT scores, students were most likely to rate themselves accurately or to underrate by one ranking, and rating gaps are about equal for both sexes.

CONCLUSION:

The findings from this research support previous studies in that girls are more likely than boys to rate their academic ability low, that there is a correlation between academic self-rating and choice of major, and that girls are less likely than boys to choose a STEM field as their

major. However, this study suggests that the relationship among self-ratings, STEM and gender are complex and require further study, as the results are incongruent in each dataset.

It is difficult to connect a general academic ability to STEM majors, as there are very intelligent students studying every subject in college. This can be seen by the different results suggested throughout the survey data for the relationships between STEM, academic ability self-rating and academic self-confidence. However, a clear positive and significant relationship is suggested to exist between math ability self-rating and STEM, which makes sense because STEM is a very math-heavy area of study. Thus, the more that students believe they can perform well in math, they more likely they are to study STEM. In the future, a good addition to this study would be continuing to look at math ability self-rating, but adding in science ability, problem solving ability and natural intelligence, such as IQ scores, as these are all often related to STEM fields.

Policy implication that arise from this study include programs that incentivize girls to choose a STEM major, and build greater academic self-confidence in young females. Perhaps schools need to push girls in more ways to select STEM classes, and make sure that teachers are treating students in ways that encourage them to believe in their abilities and to push themselves in school. In order to encourage young girls to take STEM classes, schools could implement clubs or classes that target girls and that focus on introducing them to STEM fields and insisting that the field is a perfectly suitable one for women. They could bring in female STEM professionals to speak to young children and emphasize that women can succeed in STEM. This could be costly for school systems because they would have to incentives speakers to speak and fund additional classes and clubs, but if the programs are successful, the investment would be

worth it. As seen in previous research, female students who take advanced math or science classes in high school are more likely to go on to be interested in STEM throughout college.

In addition, teachers should teach students about all stereotypes as well as ways to look past them and interact with students who may be different from them. Teachers could make performance standards clear by telling students that if they scored a certain grade that they did well. This way, girls are not discouraged by grades they perceive as bad, because the point of the class may be to weed out the weakest students.

It is important for the future of America that girls become more interested in STEM. If there is more diversity in STEM fields, there could be potential for more innovation, as diverse perspectives have been shown to improve outcomes in many fields (Del Giudice, 2014). In addition, girls are already graduating from college at a higher rate than their male counterparts; thus, girls should be majoring in STEM more often than they are, so that the labor force for the STEM fields does not deplete. With more women entering STEM fields, there would be greater chance of reducing the gender pay gap, as it cannot be expected for men and women to receive the same pay if they are not performing the same jobs. This study is a good first step into fixing the gender gap in STEM fields, as relationships between academic self-concepts, gender and choice of STEM major have been suggested, and policy implications could be introduced to improve these relationships.

In the future, studies on this subject could include some different robustness checks and include different control variables. Future studies should try to understand what causes females to have lower self-ratings, or any students to have a self-rating gap, and how does this affect the likelihood of majoring in a STEM field. A robustness check that could be included is separating the datasets into male sets and female sets and looking at the results separately. In addition, it

would be interesting to use self-concepts in conjuncture with one another, but not necessarily all of them at once, and not necessarily the three used here. Since math ability self-rating seemed to have the strongest relationship to STEM, it would be wise to use similar ratings to that in the future, such as science ability, problem solving ability or natural intelligence rating. If there were a large enough dataset that included what students went to a single-sex high school, the results could be interesting because all-girls schools have a reputation for encouraging girls to be interested in STEM (IOP, 2012, p. 15). Finally, case studies in different countries or at different universities across the United States would be an interesting addition to this study. This way, results could be compared from different schools with different types of students to TCU students. STEM fields are becoming ever popular across the nation, and as such, it is imperative that young women become more interested in studying these fields and continue on to excel in careers in these fields to increase innovation and to bridge the gaps between males and females in society.

APPENDIX:

College Senior Survey Correlation Table:

	STEM	Female	White	Income	First Generation College	Private HS	Mom STEM Career	Dad STEM Career	Mom Career	SAT Score
STEM	1.000									
Female	-0.086	1.000								
White	0.026	0.030	1.000							
Income	-0.023	-0.042	-0.198	1.000						
First Generation College	-0.011	0.019	0.140	-0.289	1.000					
Private HS	0.010	-0.014	0.005	0.010	-0.001	1.000				
Mom STEM Career	0.022	-0.009	0.043	0.076	-0.031	0.005	1.000			
Dad STEM Career	0.085	-0.007	0.012	0.193	-0.109	0.007	0.122	1.000		
Mom Career	0.017	0.006	0.012	-0.056	-0.037	-0.003	0.066	-0.062	1.000	
SAT Score	0.162	-0.127	-0.167	0.222	-0.195	0.015	0.051	0.099	-0.017	1.000
ACT Score	0.163	-0.086	-0.199	0.169	-0.173	0.007	0.041	0.088	-0.016	0.797
HS GPA	0.174	0.085	-0.088	0.022	-0.055	0.001	0.009	0.036	-0.004	0.453
Academic Ability Self-Rating	0.085	-0.114	-0.118	0.089	-0.090	-0.010	0.019	0.039	-0.006	0.429
Math Ability Self-Rating	0.320	-0.193	-0.009	0.024	-0.034	-0.005	0.024	0.060	-0.005	0.287
Academic Self-Confidence	0.008	-0.198	-0.021	0.051	-0.043	-0.014	0.006	0.012	-0.008	0.184
Academic Ability Self-Rating Gap -SAT	-0.083	0.026	0.073	-0.148	0.122	-0.021	-0.031	-0.059	0.009	-0.603
Academic Ability Self-Rating Gap - ACT	-0.055	-0.029	0.080	-0.081	0.083	-0.014	-0.017	-0.042	0.011	-0.302
Math Ability Self-Rating Gap - SAT	0.155	-0.075	0.120	-0.149	0.120	-0.015	-0.015	-0.019	0.006	-0.485
Math Ability Self-Rating Gap - ACT	0.194	-0.123	0.125	-0.095	0.087	-0.009	-0.003	-0.002	0.007	-0.236
Academic Self-Confidence - Gap SAT	-0.115	-0.050	0.118	-0.139	0.124	-0.022	-0.033	-0.064	0.005	-0.623
Academic Self-Confidence Gap - ACT	-0.096	-0.103	0.129	-0.086	0.095	-0.016	-0.022	-0.051	0.007	-0.391

College Senior Survey Correlation Table Continued:

	ACT Score	HS GPA	Academic Ability Self-Rating	Math Ability Self-Rating	Academic Self-Confidence	Academic Ability Self-Rating Gap -SAT	Academic Ability Self-Rating Gap - ACT
STEM							
Female							
White							
Income							
First Generation College							
Private HS							
Mom STEM Career							
Dad STEM Career							
Mom Career							
SAT Score							
ACT Score	1.000						
HS GPA	0.460	1.000					
Academic Ability Self-Rating	0.422	0.355	1.000				
Math Ability Self-Rating	0.265	0.237	0.358	1.000			
Academic Self-Confidence	0.186	0.124	0.478	0.239	1.000		
Academic Ability Self-Rating Gap - SAT	-0.421	-0.170	0.365	0.014	0.200	1.000	
Academic Ability Self-Rating Gap - ACT	-0.478	-0.094	0.507	0.099	0.258	0.679	1.000
Math Ability Self-Rating Gap - SAT	-0.358	-0.144	-0.008	0.642	0.074	0.578	0.313
Math Ability Self-Rating Gap - ACT	-0.381	-0.081	0.061	0.744	0.102	0.280	0.503
Academic Self-Confidence - Gap SAT	-0.470	-0.269	0.020	-0.039	0.584	0.731	0.423
Academic Self-Confidence Gap - ACT	-0.525	-0.222	0.097	0.023	0.677	0.451	0.657

College Senior Survey Correlation Table Continued:

	Math Ability Self-Rating Gap - SAT	Math Ability Self-Rating Gap - ACT	Academic Self-Confidence - Gap SAT	Academic Self-Confidence Gap - ACT
STEM				
Female				
White				
Income				
First Generation College				
Private HS				
Mom STEM Career				
Dad STEM Career				
Mom Career				
SAT Score				
ACT Score				
HS GPA				
Academic Ability Self-Rating				
Math Ability Self-Rating				
Academic Self-Confidence				
Academic Ability Self-Rating Gap -SAT				
Academic Ability Self-Rating Gap - ACT				
Math Ability Self-Rating Gap - SAT	1.000			
Math Ability Self-Rating Gap - ACT	0.812	1.000		
Academic Self-Confidence - Gap SAT	0.527	0.263	1.000	
Academic Self-Confidence Gap - ACT	0.315	0.442	0.792	1.000

TCU The Freshman Survey 2012-2015 Correlation Table:

	STEM	Female	White	Income	Private HS	Mom STEM Career	Dad STEM Career	Mom Career	SAT Score	ACT Score
STEM	1									
Female	-0.033	1.000								
White	-0.124	0.001	1.000							
Income	-0.074	-0.022	0.396	1.000						
Private HS	-0.026	-0.018	0.083	0.214	1.000					
Mom STEM Career	0.005	-0.013	-0.013	-0.045	-0.026	1.000				
Dad STEM Career	-0.014	0.070	0.018	0.030	-0.015	0.092	1.000			
Mom Career	0.032	-0.020	-0.048	-0.077	-0.002	0.131	-0.069	1.000		
SAT Score	0.122	-0.109	0.211	0.183	0.052	-0.028	-0.012	-0.048	1.000	
ACT Score	0.115	-0.047	0.203	0.193	0.040	-0.012	0.016	-0.022	0.717	1.000
HS GPA	0.108	0.141	0.009	-0.095	-0.189	0.061	-0.004	0.026	0.271	0.286
Academic Ability Self-Rating	0.155	-0.086	0.026	-0.033	-0.062	0.049	0.002	0.001	0.457	0.420
Math Ability Self-Rating	0.246	-0.193	-0.016	0.034	-0.080	-0.003	-0.009	0.033	0.304	0.268
Academic Self-Confidence	0.048	-0.200	-0.001	-0.016	-0.051	-0.038	0.068	-0.052	0.123	0.115
Academic Ability Self-Rating Gap -SAT	0.035	0.003	-0.187	-0.202	-0.109	0.071	0.002	0.049	-0.440	-0.223
Academic Ability Self-Rating Gap - ACT	0.045	-0.055	-0.148	-0.194	-0.072	0.044	-0.004	0.031	-0.145	-0.422
Math Ability Self-Rating Gap - SAT	0.144	-0.113	-0.175	-0.104	-0.115	0.021	-0.007	0.066	-0.365	-0.206
Math Ability Self-Rating Gap - ACT	0.155	-0.160	-0.145	-0.094	-0.086	-0.002	-0.012	0.053	-0.137	-0.356
Academic Self-Confidence - Gap SAT	-0.030	-0.105	-0.151	-0.139	-0.081	-0.008	0.054	-0.007	-0.495	-0.323
Academic Self-Confidence Gap - ACT	-0.025	-0.151	-0.124	-0.133	-0.055	-0.030	0.052	-0.022	-0.291	-0.474

TCU The Freshman Survey 2012-2015 Correlation Table Continued:

	HS GPA	Academic Ability Self-Rating	Math Ability Self-Rating	Academic Self-Confidence	Academic Ability Self-Rating Gap -SAT	Academic Ability Self-Rating Gap - ACT
STEM						
Female						
White						
Income						
Private HS						
Mom STEM Career						
Dad STEM Career						
Mom Career						
SAT Score						
ACT Score						
HS GPA	1.000					
Academic Ability Self-Rating	0.439	1.000				
Math Ability Self-Rating	0.251	0.419	1.000			
Academic Self-Confidence	0.109	0.259	0.194	1.000		
Academic Ability Self-Rating Gap -SAT	0.157	0.489	0.130	0.140	1.000	
Academic Ability Self-Rating Gap - ACT	0.153	0.555	0.162	0.141	0.605	1.000
Math Ability Self-Rating Gap - SAT	0.060	0.102	0.712	0.112	0.569	0.251
Math Ability Self-Rating Gap - ACT	0.053	0.140	0.753	0.111	0.254	0.539
Academic Self-Confidence - Gap SAT	-0.065	-0.045	-0.005	0.738	0.537	0.213
Academic Self-Confidence Gap - ACT	-0.076	-0.014	0.014	0.768	0.246	0.490

TCU The Freshman Survey 2012-2015 Correlation Table Continued:

	Math Ability Self-Rating Gap - SAT	Math Ability Self-Rating Gap - ACT	Academic Self-Confidence - Gap SAT	Academic Self-Confidence Gap - ACT
STEM				
Female				
White				
Income				
Private HS				
Mom STEM Career				
Dad STEM Career				
Mom Career				
SAT Score				
ACT Score				
HS GPA				
Academic Ability Self-Rating				
Math Ability Self-Rating				
Academic Self-Confidence				
Academic Ability Self-Rating Gap -SAT				
Academic Ability Self-Rating Gap - ACT				
Math Ability Self-Rating Gap - SAT	1.000			
Math Ability Self-Rating Gap - ACT	0.769	1.000		
Academic Self-Confidence - Gap SAT	0.437	0.187	1.000	
Academic Self-Confidence Gap - ACT	0.210	0.394	0.795	1.000

TCU Investigator-Designed Survey Correlation Table:

	STEM	Female	Income	Private HS	Mom STEM Career	Dad STEM Career	Mom Career	SAT Score	ACT Score
STEM	1.000								
Female	-0.151	1.000							
Income	-0.024	0.089	1.000						
Private HS	-0.048	-0.032	0.233	1.000					
Mom STEM Career	0.014	-0.025	0.214	-0.037	1.000				
Dad STEM Career	0.110	-0.051	0.117	0.064	0.138	1.000			
Mom Career	0.139	0.013	-0.058	-0.109	0.083	0.031	1.000		
SAT Rank	-0.061	0.116	0.062	-0.048	-0.083	-0.047	-0.066	1.000	
ACT Rank	0.002	0.103	0.275	0.035	-0.025	-0.079	0.064	0.203	1.000
HS Rank	-0.028	0.092	0.058	-0.130	-0.002	-0.048	0.057	-0.159	0.259
Academic Ability Self-Rating	0.080	0.005	0.031	-0.040	0.002	0.010	0.005	-0.126	0.130
Math Ability Self-Rating	0.243	-0.120	0.081	0.039	0.003	0.026	-0.058	-0.076	0.205
Academic Self-Confidence	-0.113	-0.053	0.025	0.033	0.042	-0.019	-0.089	-0.122	0.067
Academic Ability Self-Rating Gap -SAT	0.078	-0.107	-0.050	0.035	0.078	0.046	0.063	-0.967	-0.157
Academic Ability Self-Rating Gap - ACT	0.026	-0.099	-0.259	-0.048	0.026	0.081	-0.061	-0.244	-0.936
Math Ability Self-Rating Gap - SAT	0.138	-0.147	-0.030	0.058	0.077	0.052	0.041	-0.942	-0.117
Math Ability Self-Rating Gap - ACT	0.113	-0.158	-0.232	-0.016	0.026	0.090	-0.090	-0.235	-0.886
Academic Self-Confidence - Gap SAT	0.016	-0.123	-0.047	0.055	0.089	0.036	0.028	-0.940	-0.159
Academic Self-Confidence Gap - ACT	-0.054	-0.119	-0.241	-0.017	0.043	0.063	-0.100	-0.243	-0.887

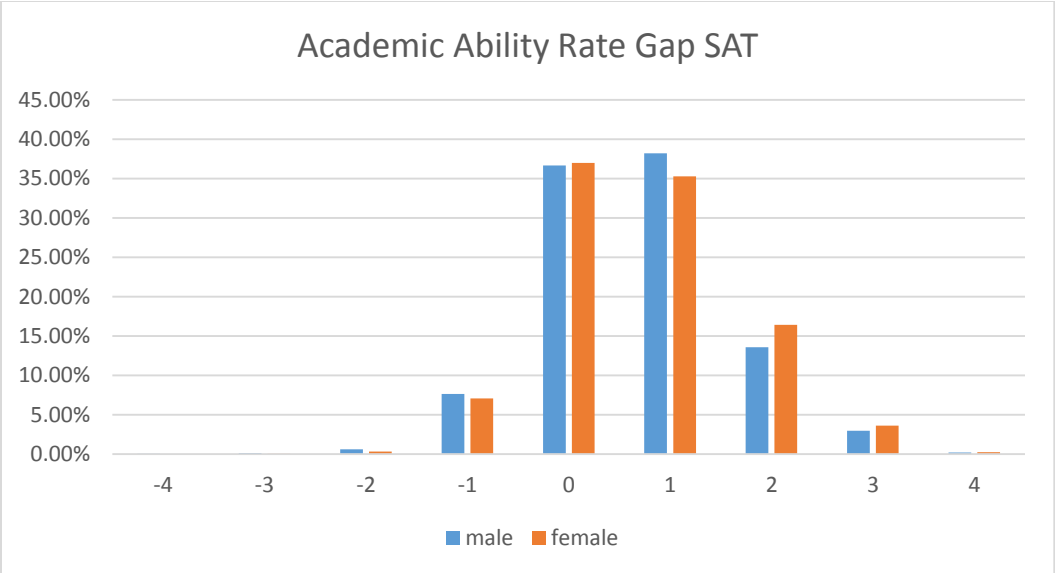
TCU Investigator-Designed Survey Correlation Table Continued:

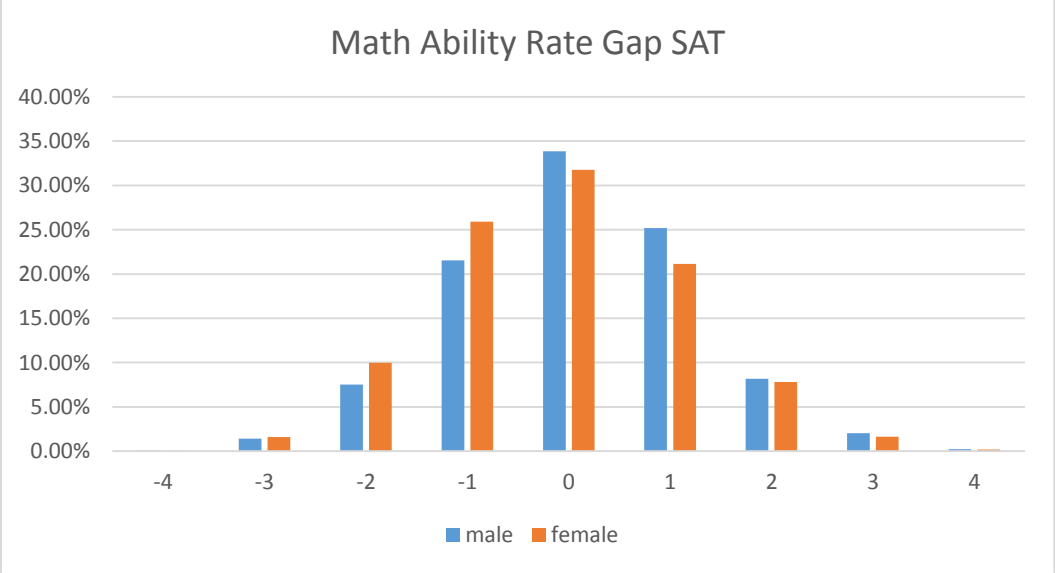
	HS GPA	Academic Ability Self-Rating	Math Ability Self-Rating	Academic Self-Confidence	Academic Ability Self-Rating Gap -SAT	Academic Ability Self-Rating Gap - ACT
STEM						
Female						
Income						
Private HS						
Mom STEM Career						
Dad STEM Career						
Mom Career						
SAT Rank						
ACT Rank						
HS Rank	1.000					
Academic Ability Self-Rating	0.297	1.000				
Math Ability Self-Rating	0.249	0.468	1.000			
Academic Self-Confidence	0.212	0.561	0.211	1.000		
Academic Ability Self-Rating Gap -SAT	0.225	0.374	0.190	0.258	1.000	
Academic Ability Self-Rating Gap - ACT	-0.149	0.227	-0.036	0.133	0.286	1.000
Math Ability Self-Rating Gap - SAT	0.230	0.273	0.405	0.183	0.951	0.212
Math Ability Self-Rating Gap - ACT	-0.137	0.094	0.273	0.034	0.244	0.903
Academic Self-Confidence - Gap SAT	0.216	0.306	0.140	0.453	0.957	0.265
Academic Self-Confidence Gap - ACT	-0.140	0.140	-0.091	0.401	0.263	0.921

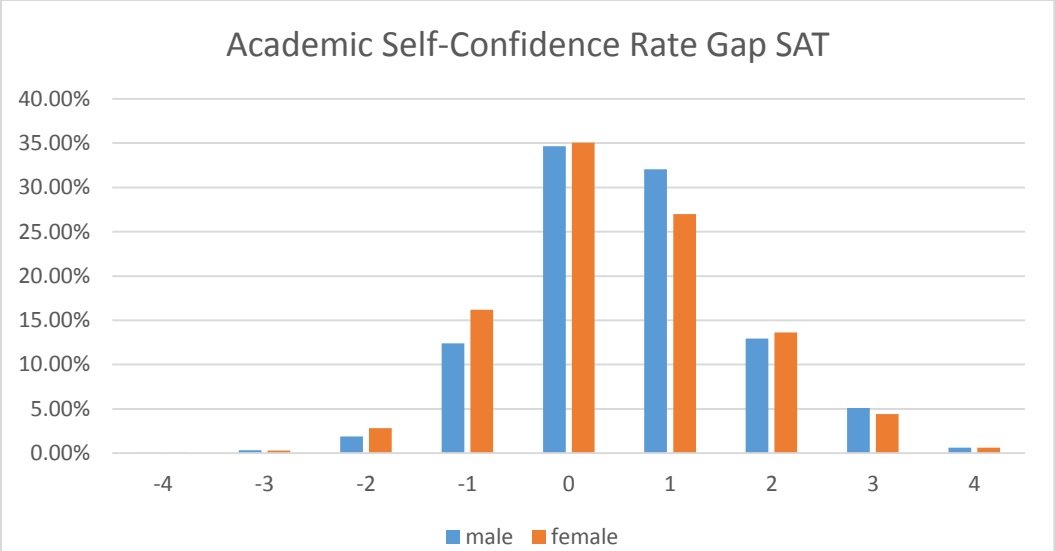
TCU Investigator-Designed Survey Correlation Table Continued:

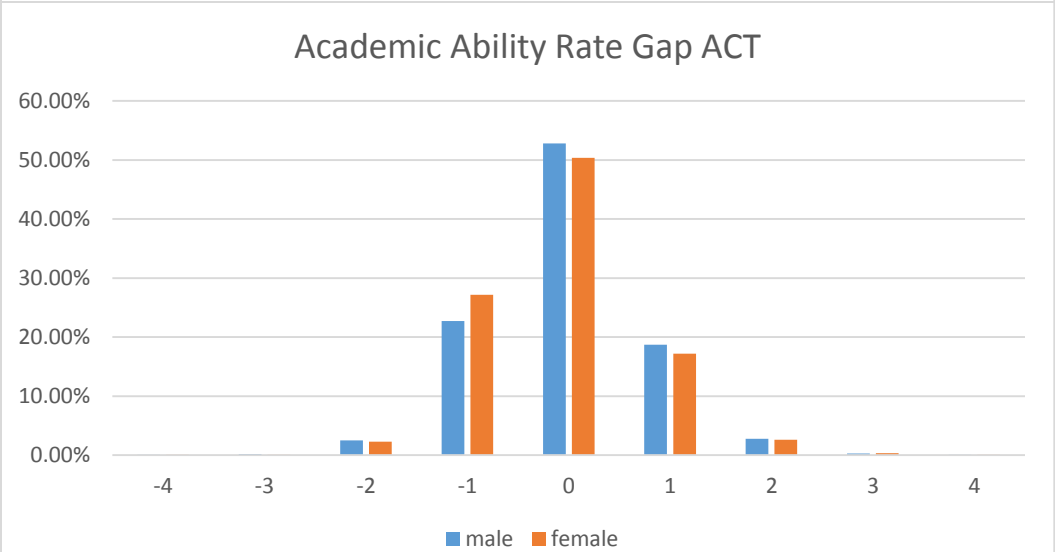
	Math Ability Self-Rating Gap - SAT	Math Ability Self-Rating Gap - ACT	Academic Self-Confidence - Gap SAT	Academic Self-Confidence Gap - ACT
STEM				
Female				
Income				
Private HS				
Mom STEM Career				
Dad STEM Career				
Mom Career				
SAT Rank				
ACT Rank				
HS Rank				
Academic Ability Self-Rating				
Math Ability Self-Rating				
Academic Self-Confidence				
Academic Ability Self-Rating Gap -SAT				
Academic Ability Self-Rating Gap - ACT				
Math Ability Self-Rating Gap - SAT	1.000			
Math Ability Self-Rating Gap - ACT	0.308	1.000		
Academic Self-Confidence - Gap SAT	0.909	0.223	1.000	
Academic Self-Confidence Gap - ACT	0.192	0.829	0.356	1.000

The following are graphs based on The College Senior Survey 1994-2006:






Academic Self-Confidence Rate Gap SAT
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
-4
-3
-2
-1
0
1
2
3
4
male
female


Academic Ability Rate Gap ACT
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
-4
-3
-2
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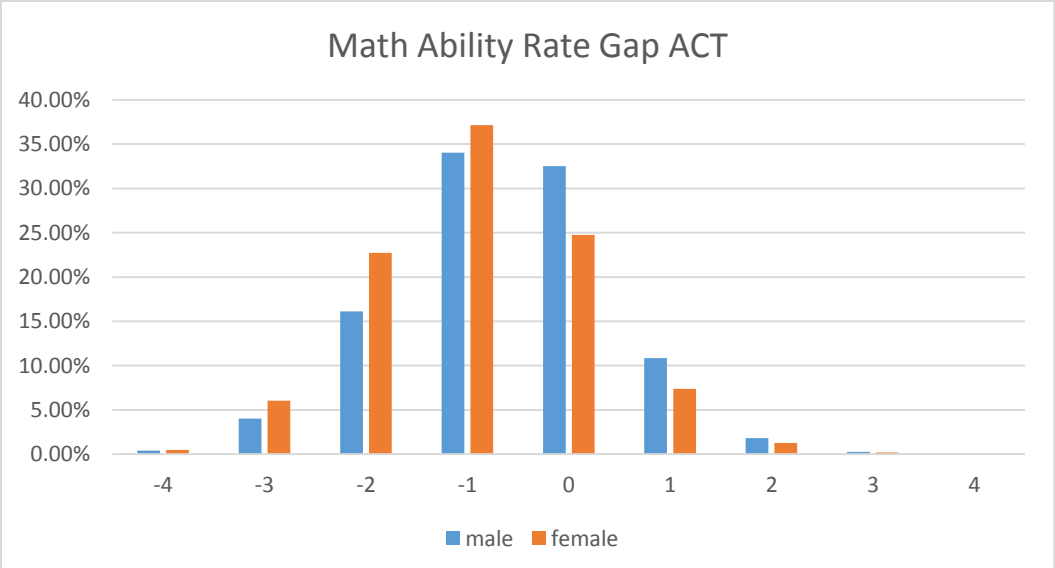
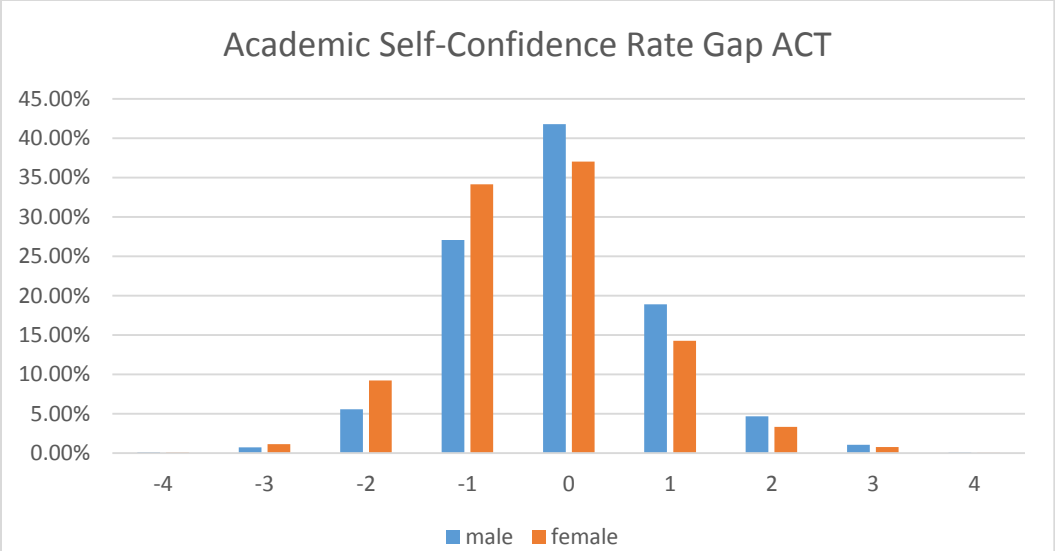
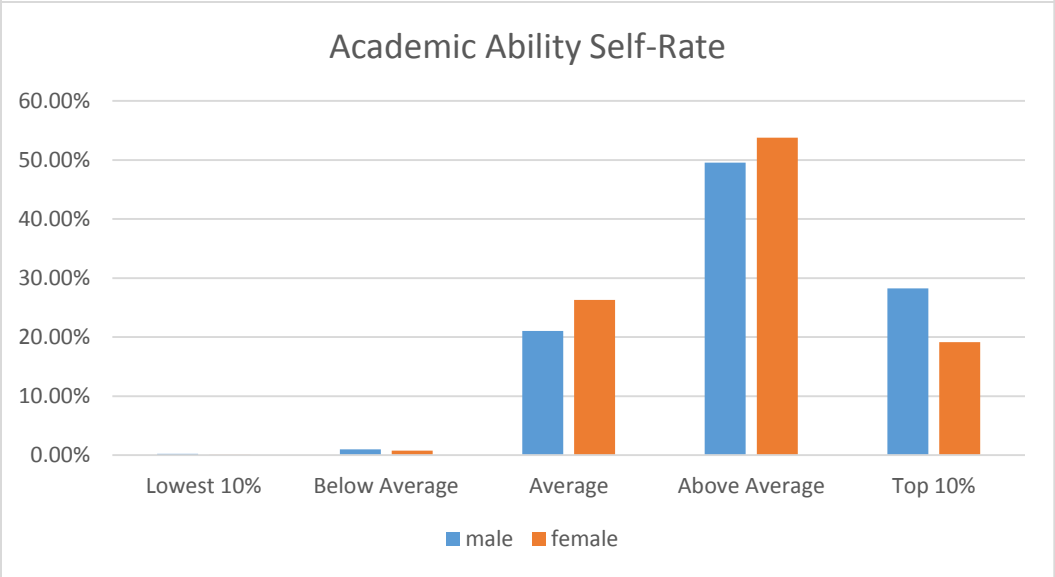
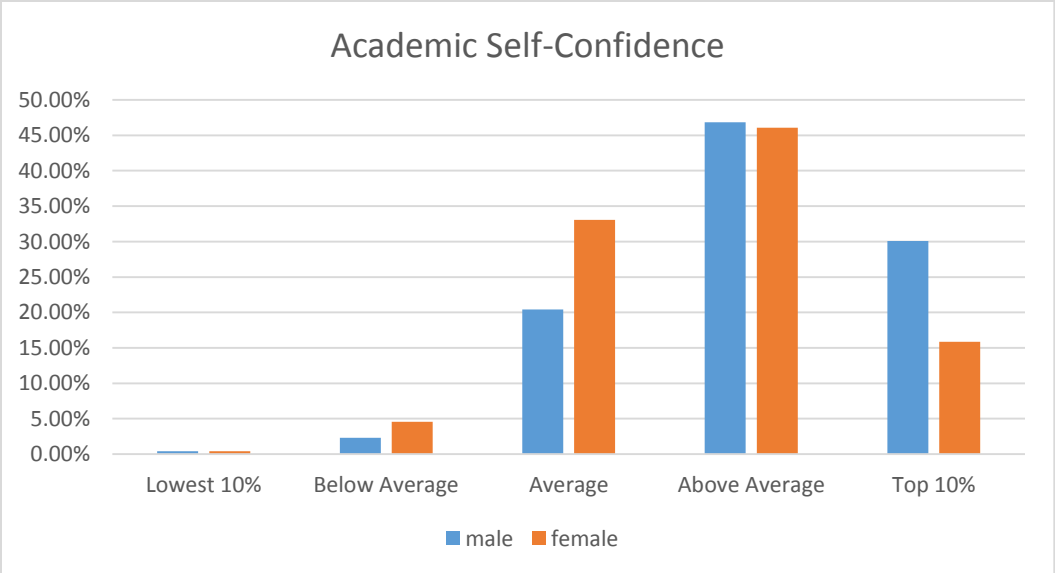
0
1
2
3
4
male
female

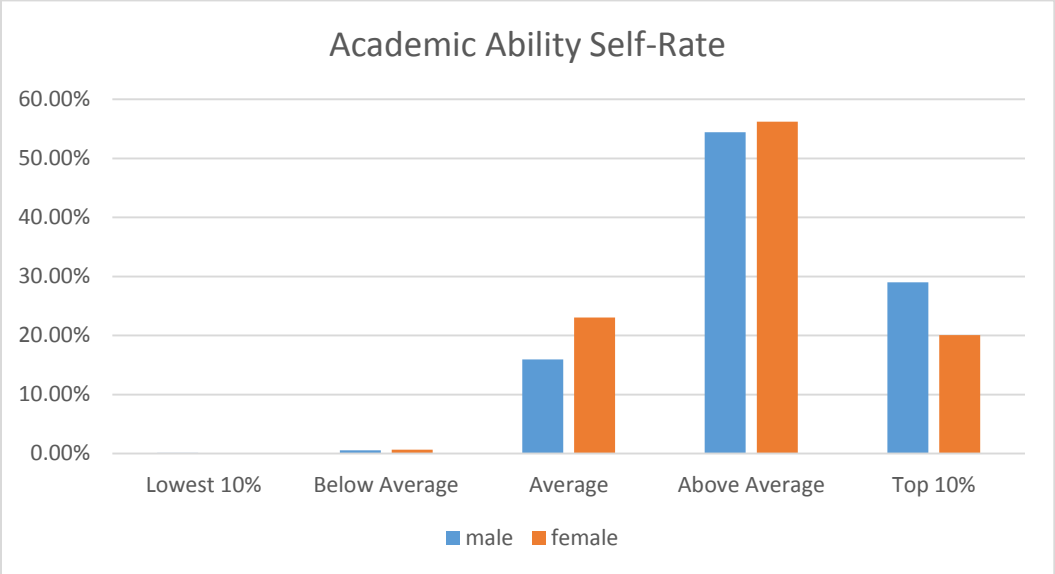

Math Ability Rate Gap ACT
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
-4
-3
-2
-1
0
1
2
3
4
male
female

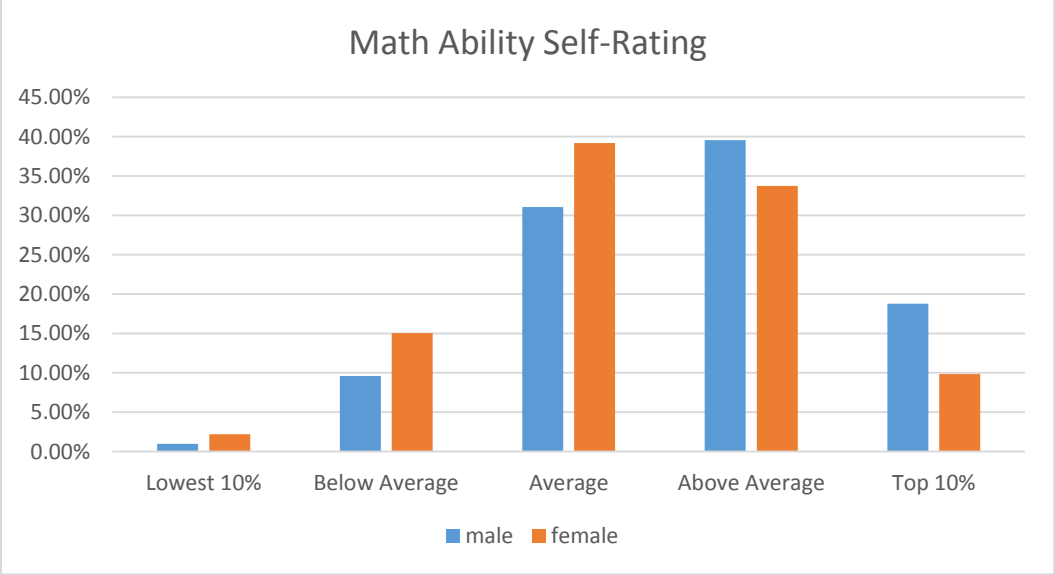

Academic Self-Confidence Rate Gap ACT
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
-4
-3
-2
-1
0
1
2
3
4
male
female

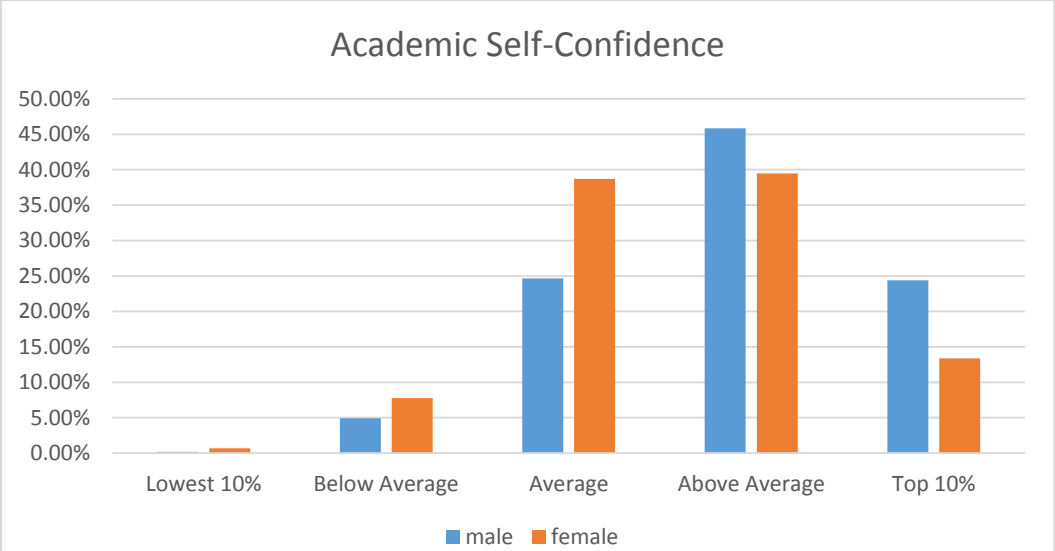

Academic Ability Self-Rate
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Lowest 10%
Below Average
Average
Above Average
Top 10%
male
female

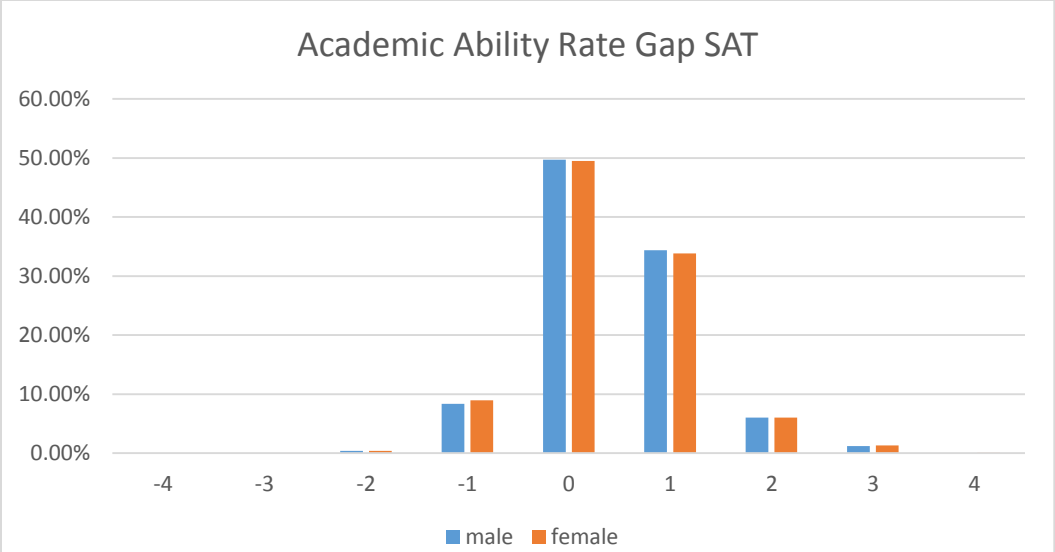

Academic Self-Confidence
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Lowest 10%
Below Average
Average
Above Average
Top 10%
male
female

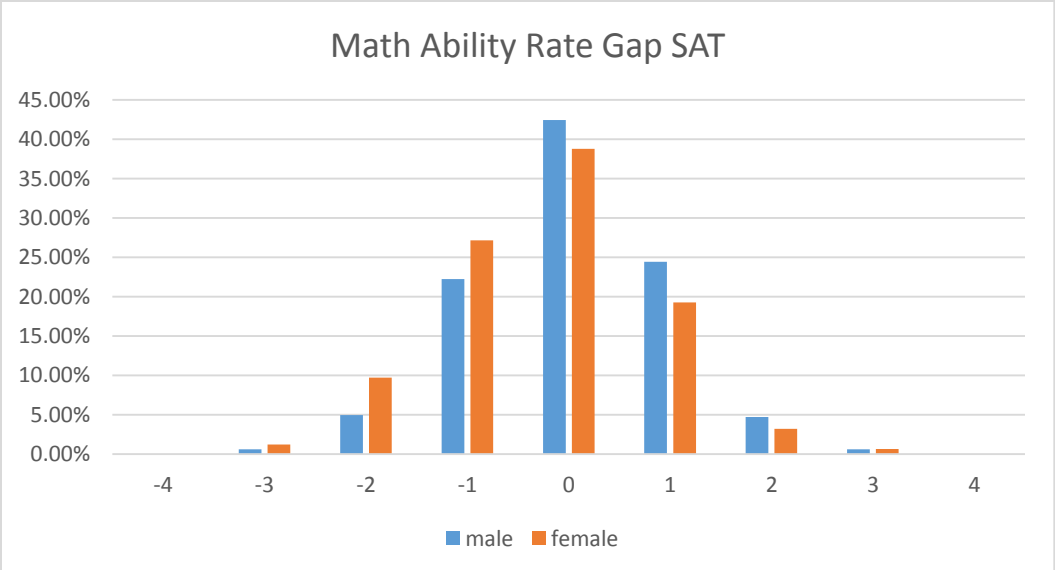
The following are graphs based on The Freshman Survey for TCU 2012-2015:






Academic Self-Confidence
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Lowest 10%
Below Average
Average
Above Average
Top 10%
male
female


Academic Ability Rate Gap SAT
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
-4
-3
-2
-1
0
1
2
3
4
male
female


Math Ability Rate Gap SAT
45.00%
40.00%
35.00%
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-4
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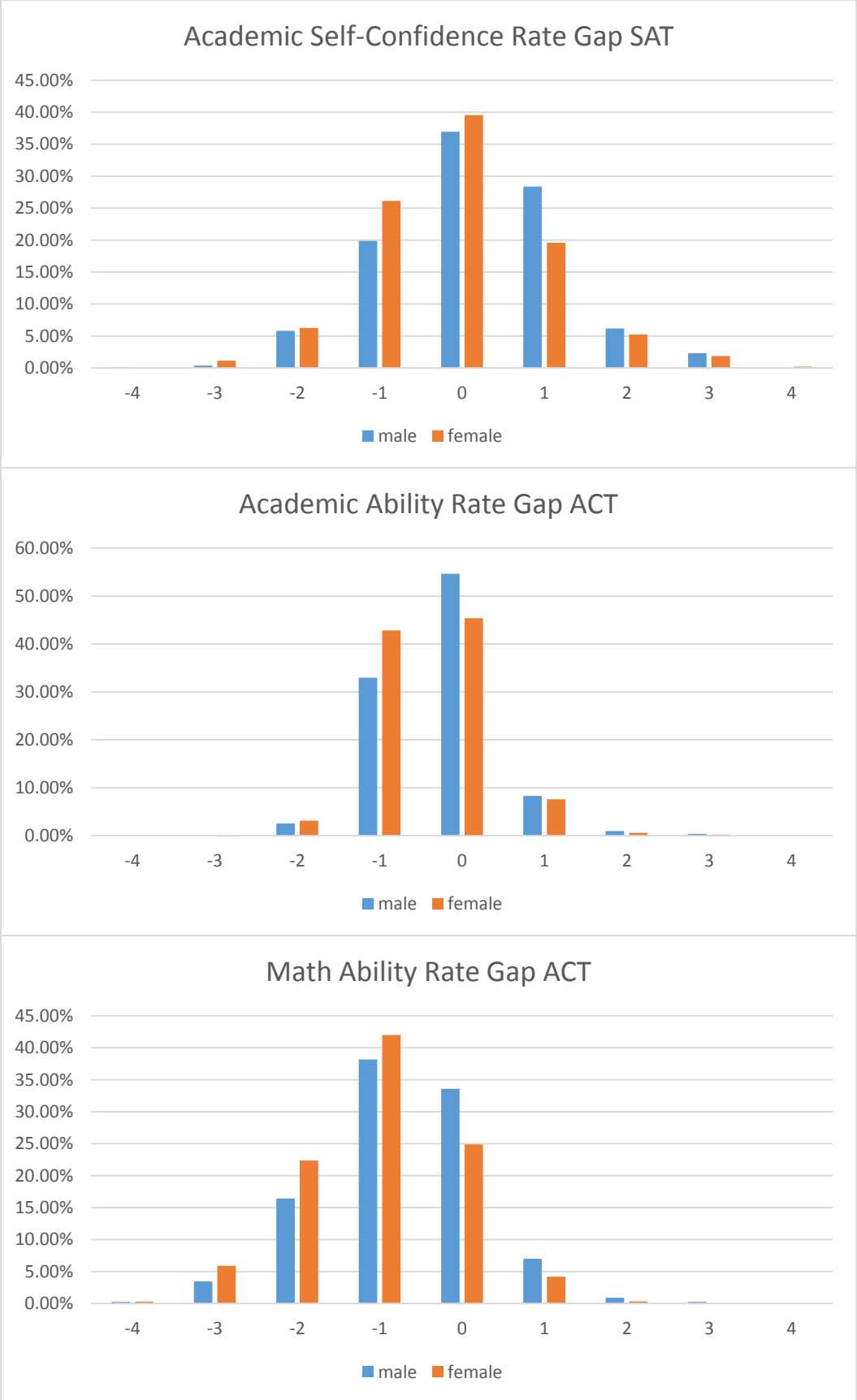
4
male
female


Academic Self-Confidence Rate Gap SAT
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40.00%
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male
female
Academic Ability Rate Gap ACT
60.00%
50.00%
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Math Ability Rate Gap ACT
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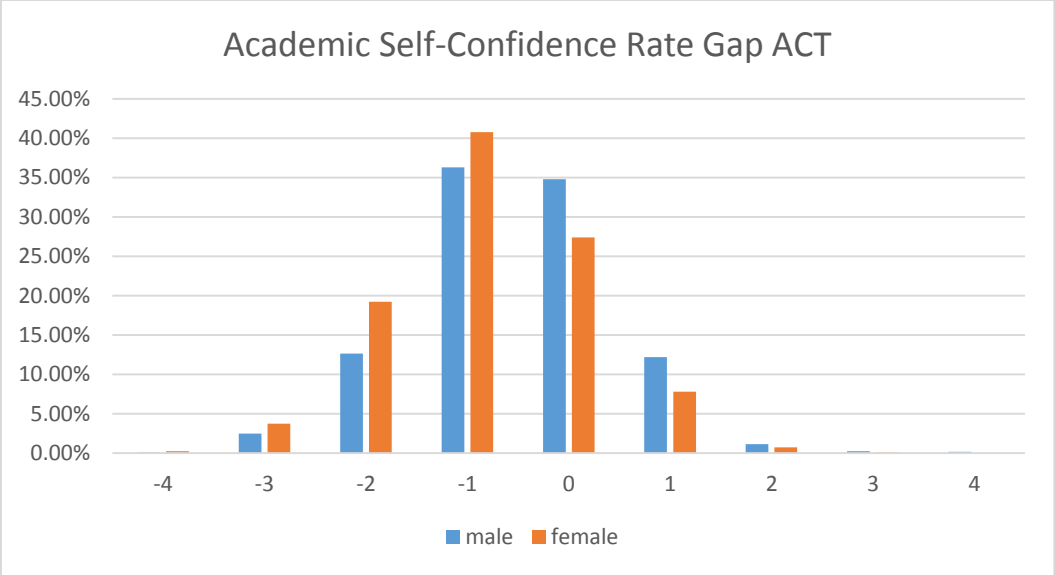
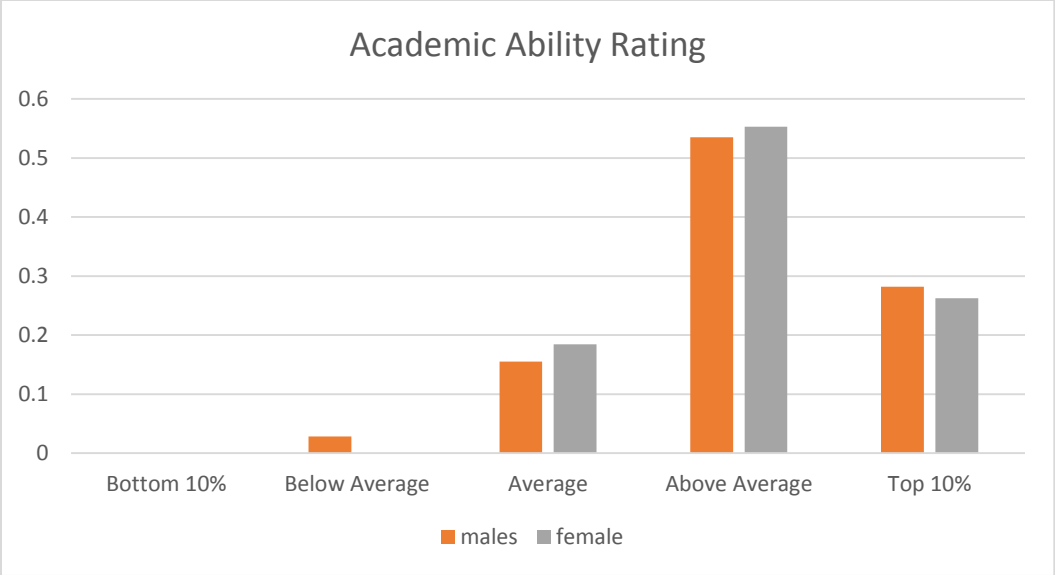
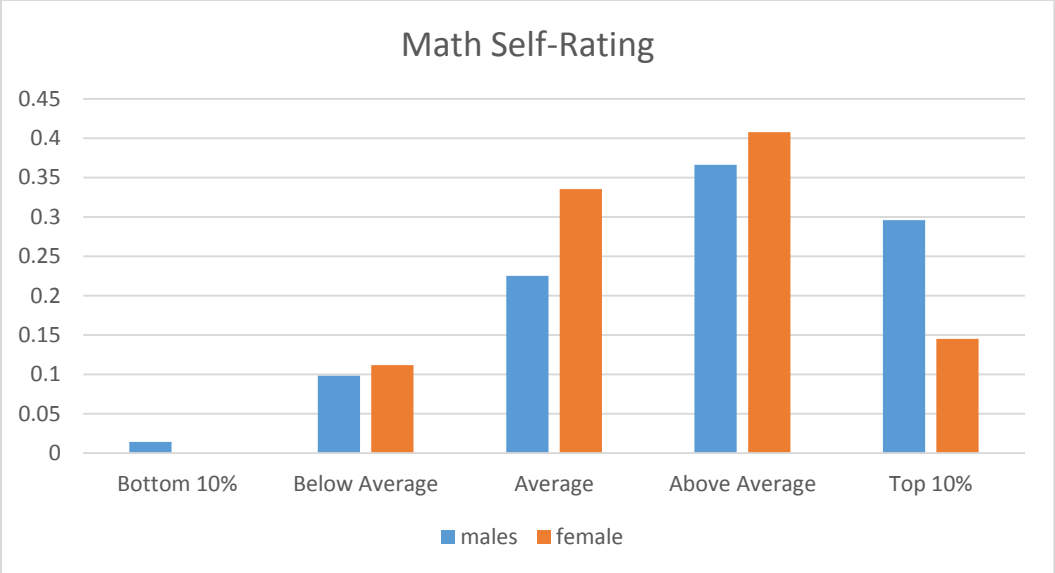
male
female



The following are graphs based on the Investigator-Designed TCU survey from 2017:




Math Self-Rating
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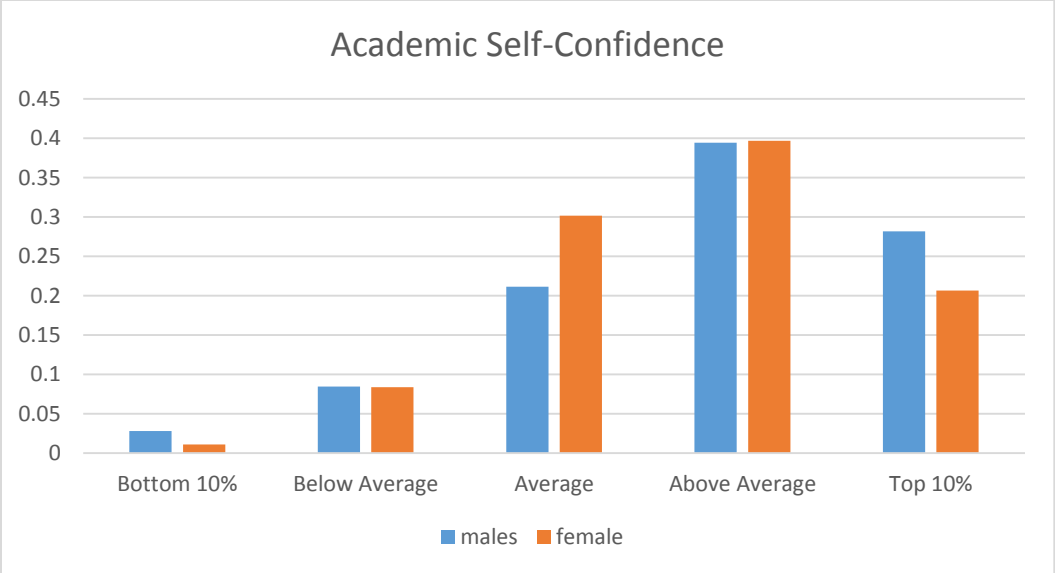
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Bottom 10%
Below Average
Average
Above Average
Top 10%
males
female


Academic Self-Confidence
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0.4
0.35
0.3
0.25
0.2
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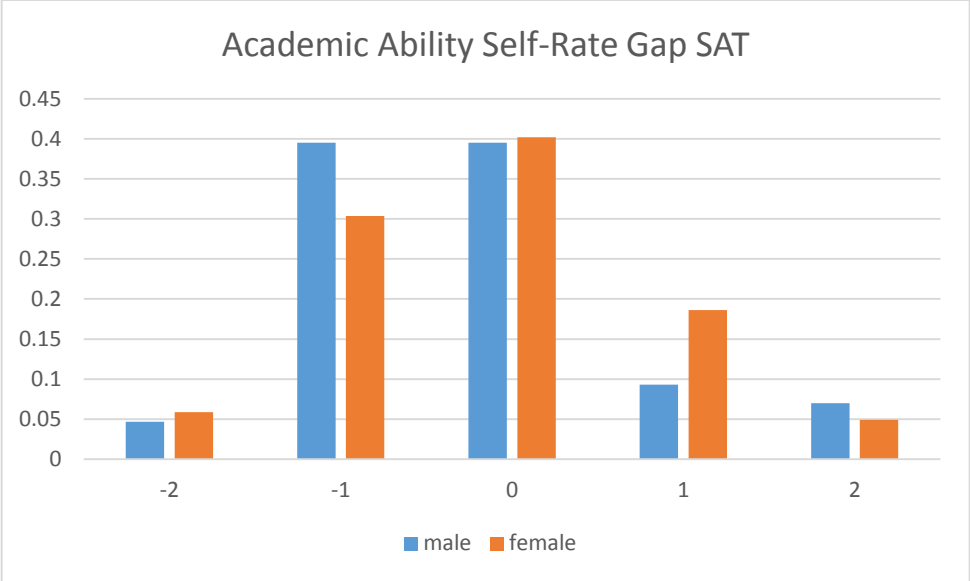
0.1
0.05
0
Bottom 10%
Below Average
Average
Above Average
Top 10%
males
female


Academic Ability Self-Rate Gap SAT
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0.4
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0.05
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-1
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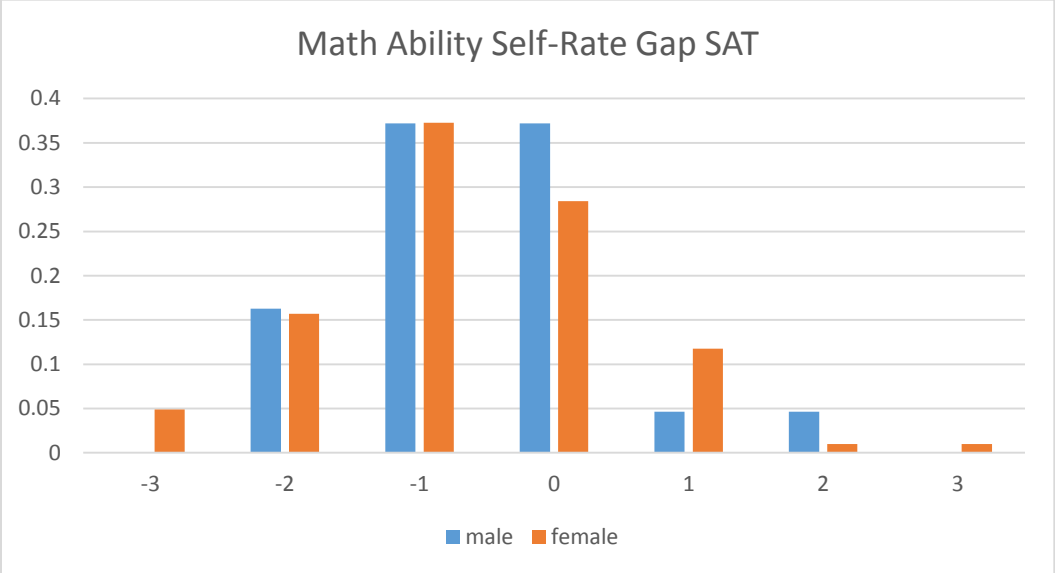
male
female


Math Ability Self-Rate Gap SAT
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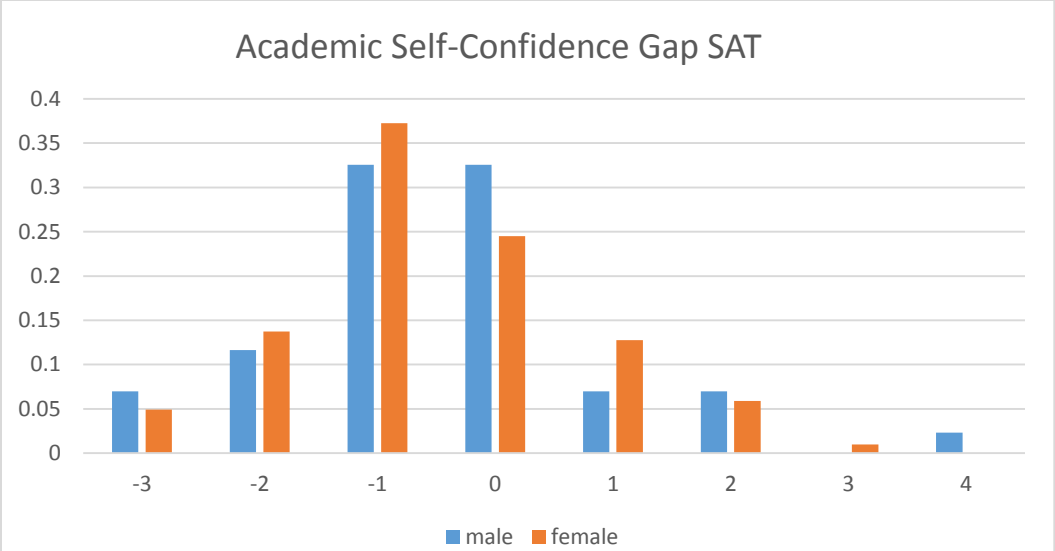
female


Academic Self-Confidence Gap SAT
0.4
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-1
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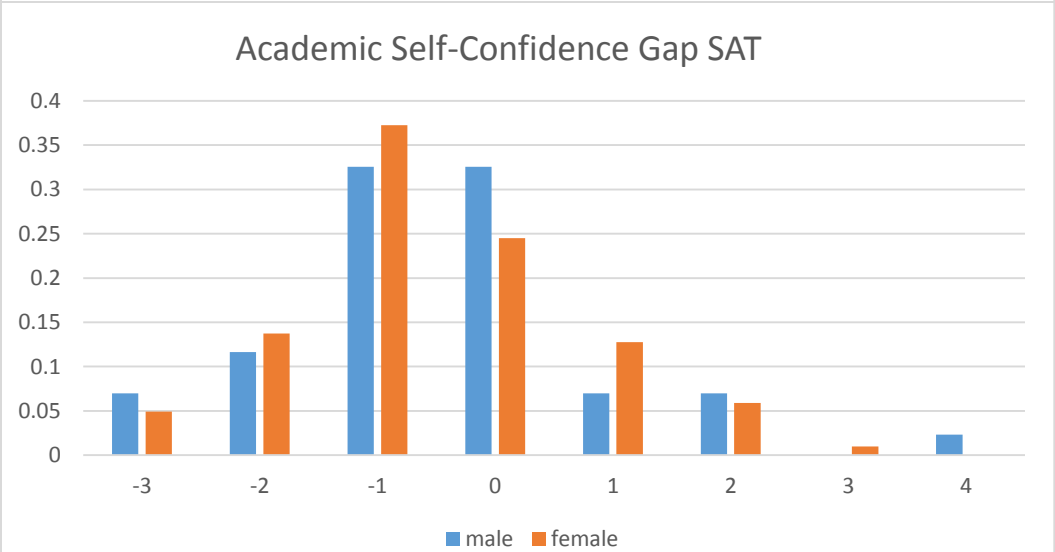
male
female


Academic Self-Confidence Gap SAT
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0.35
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-1
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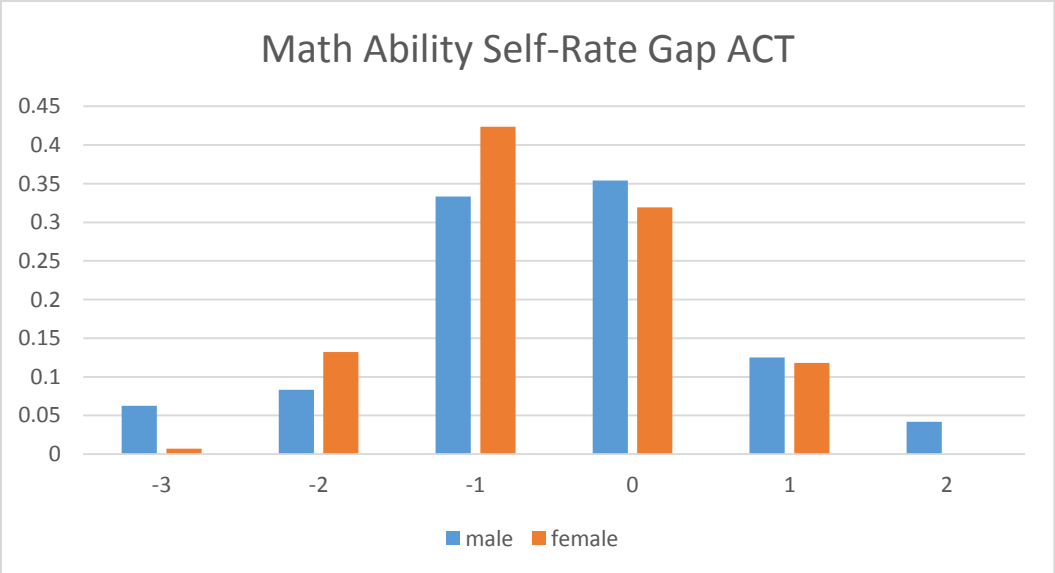
male
female


Math Ability Self-Rate Gap ACT
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0.4
0.35
0.3
0.25
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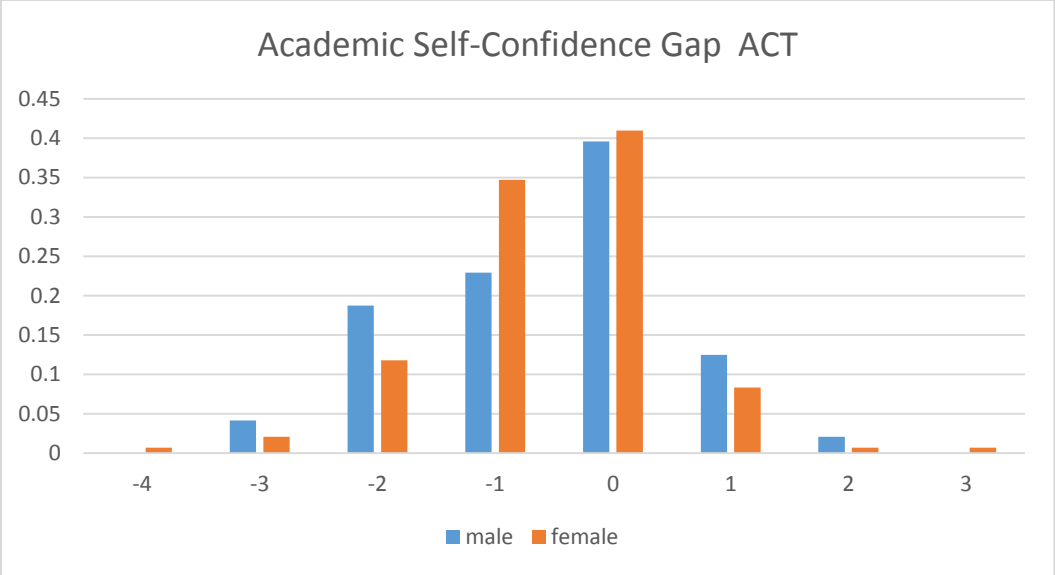
0.15
0.1
0.05
0
-3
-2
-1
0
1
2
male
female


Academic Self-Confidence Gap ACT
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0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-4
-3
-2
-1
0
1
2
3
male
female

WORKS CITED:

Admission Requirements. (2016). Retrieved May 04, 2017, from https://admissions.tcu.edu/apply/admission-requirements/

Beede, D., et al. (2011). *Women in STEM: A Gender Gap to Innovation.* Retrieved from http://www.esa.doc.gov/sites/default/files/womeninstemagaptoinnovation8311.pdf

Bailey, R. C. (1971), Self-concept differences in low and high achieving students. J. Clin. Psychol., 27: 188–191. doi:10.1002/1097-4679(197104)27:2<188::AID-JCLP2270270208>3.0.CO;2-I

Caporrimo, R. (1990). *Gender, confidence, math: Why aren't the girls "where the boys are?".* ().

Del Giudice, M. (2014, November 8). Why It's Crucial to Get More Women Into Science. Retrieved April 14, 2017, from http://news.nationalgeographic.com/news/2014/11/141107-gender-studies-women-scientific-research-feminist/

Edwards, H. (2015, February 8). SAT / ACT Prep Online Guides and Tips. Retrieved May 04, 2017, from http://blog.prepscholar.com/sat-percentiles-and-score-rankings

Fracchia, K. (2016, January 30). ACT Percentiles. Retrieved May 04, 2017, from https://magoosh.com/hs/act/about-the-act/2016/act-percentiles/

Hansford, B. C., & Hattie, J. A. (1982). The relationship between self and Achievement/Performance measures. *Review of Educational Research, 52*(1), 123-142.

Hill, C., Corbett, C., & St. Rose, A. (2010). *Why So Few? Women in Science, Technology, Engingeering and Math.* Retrieved from https://www.aauw.org/files/2013/02/Why-So-Few-Women-in-Science-Technology-Engineering-and-Mathematics.pdf.

Hughes, R. M. (2010). *The process of choosing science, technology, engineering, and*

mathematics careers by undergraduate women: A narrative life history analysis (Order No. 3458704). Available from GenderWatch. (872912695). Retrieved from http://ezproxy.tcu.edu/docview/872912695?accountid=7090

IOP (2012, October). It's Different for Girls: The Influence of Schools. *Institue of Physics.* Retrieved from http://www.iop.org/education/teacher/support/girls_physics/file_58196.pdf

MacCorquodale, P. (1984). *Self-image, science and math: Does the image of the "scientist" keep girls and minorities from pursuing science and math?*().

Marsh, H. W., & Parker, J. W. (1984). Determinants of student self-concept: Is it better to be a relatively large fish in a small pond even if you don't learn to swim as well? *Journal of Personality and Social Psychology, 47*(1), 213-231. doi:10.1037/0022-3514.47.1.213

Marsh, H. W., Smith, I. D., & Barnes, J. (1985). Multidimensional self-concepts: Relations with sex and academic achievement. *Journal of Educational Psychology, 77*(5), 581-596. doi:10.1037/0022-0663.77.5.581

Miller, C. C. (2015, February 06). How Elementary School Teachers' Biases Can Discourage Girls From Math and Science. Retrieved April 14, 2017, from https://www.nytimes.com/2015/02/07/upshot/how-elementary-school-teachers-biases-can-discourage-girls-from-math-and-science.html?_r=0

OECD. (2015). The ABC of Gender Equality in Education: Aptitude, Behaviour, Confidence. *PISA,*63-95. doi:10.1787/9789264229945-6-en

Paquette, D. (2015, March 08). How low self-esteem is killing girls' academic success around the world. Retrieved April 14, 2017, from https://www.washingtonpost.com/news/wonk/wp/2015/03/08/how-low-self-esteem-is-

killing-girls-academic-success-around-the-world/

Sax, L. J. (1994). Mathematical self-concept: How college reinforces the gender gap. *Research in Higher Education,35*(2), 141-166. doi:10.1007/bf02496699

Sherman, J. (1982). Continuing in mathematics: A longitudinal study of the attitudes of high school girls. *Psychology of Women Quarterly, 7*(2), 132-140. doi:10.1111/j.1471 6402.1982.tb00825.x

Stake, J., & Rose, S. (1985). The Development of Career Confidence: Making the Difference for College Women. *Feminist Teacher, 1*(4), 16-20. Retrieved from http://www.jstor.org/stable/40545558

Yong, E. (2017, January 26). 6-Year-Old Girls Already Have Gendered Beliefs About Intelligence. Retrieved April 14, 2017, from https://www.theatlantic.com/science/archive/2017/01/six-year-old-girls-already-have-gendered-beliefs-about-intelligence/514340/