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An Overview of Barriers to Women in Engineering

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AN OVERVIEW OF BARRIERS TO WOMEN IN ENGINEERING

by
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ABSTRACT

Engineering remains a heavily male-dominated field despite ongoing efforts to increase diversity. Early experiences within the U.S. education system can strongly influence women's choices to pursue engineering degrees. Many young students are introduced to engineering through pre-college programs, but these programs may give students an incomplete understanding of careers in engineering. Gender stereotyping and discrimination from teachers, counselors, and professors also strongly affect female students' majors. Students may be led to believe certain misconceptions about engineering if their teachers have inaccurate perceptions about the field. Women in engineering also face workplace discrimination at a much higher rate than women in other careers, with more than half of female engineers experiencing sexual harassment at work. Promotion and financial inequities are also a significant reason why so many women leave the engineering profession. Further, the engineering industry can make it challenging to maintain a work-life balance, especially for female rather than male parents. Women that take a temporary leave after having children are significantly less likely to be rehired and less than half return to full time employment. As many factors also contribute to gender disparities, the goal of this thesis is to provide an overview of the main reasons why there are so few women in engineering careers.

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CHAPTER 1: INTRODUCTION

Despite ongoing efforts to increase diversity, engineering remains one of the most male-dominated career fields in the United States. While other fields are more balanced, women have consistently made up only 20% of engineering degrees for the past 20 years. As engineering is a quickly growing profession, it is important to understand factors that are driving women away. Early experiences within the education system strongly influence women's choices to pursue engineering degrees. Gender stereotyping and discrimination from teachers, counselors, and professors strongly affect female students' majors. Discrimination is also present in the workplace, with more than half of female engineers experiencing sexual harassment at work. Further, the engineering industry can make it challenging to maintain a work-life balance, especially for female rather than male parents. In addition, many other factors contribute to gender disparities in engineering. The goal of this thesis is to provide an overview of the main reasons why there are so few women in engineering careers.

It is important to note that the reasons presented in this paper are not a comprehensive list. Many additional factors that may also influence the numbers of women in engineering. This research is focused primarily on the most common barriers that women face within engineering and the resulting effects on women's choices to enter and stay in engineering.

Chapter 2 will focus on the education system including pre-college programs, the role of teachers and counselors in students' choices, and experiential learning programs. Chapter 3 will discuss sexual harassment and pay inequality as common workplace issues for women in engineering. Chapter 4 will consider barriers to a work-life balance in engineering and the different ways that men and women experience parenthood as engineers. Chapter 5 summarizes each of the reasons previously discussed.

CHAPTER 2: EDUCATION

Over the past two decades, women have consistently outnumbered men in earning college degrees; however, engineering is a field that has remained heavily male-dominated despite efforts to increase the numbers of women in engineering. Following high school, roughly 625,000 students enroll in undergraduate engineering programs, with only about 20% being women [American Society for Engineering Education (web)]. As so many other career fields continue to advance the successes of female employees, it is important to consider the various reasons why engineering continues to fall behind in attracting and keeping female students.

2.1 Pre-College Programs

A quality education is foundational in being successful in the engineering industry, and this foundation begins long before college. In recent years, many schools started offering certain programs dedicated to science, technology, math, and engineering (STEM). Some schools have created an engineering career path that is intended to prepare students to enter college as an engineering major. These programs can be effective in increasing student interest in STEM, but may fail to academically prepare students for the college courses required as an engineering major.

One of the most well known programs is a project-based middle and high school curriculum called Project Lead the Way (PLTW). The PLTW curriculum has been implemented in thousands of middle and high schools and has become the focus of research on the benefits of STEM programs. According to their website, Project Lead the Way aims to develop critical skills through real-world, hands-on activities. Students reported being more interested in STEM due to PLTW, but little proof exists that participating in PLTW actually helped to improve students' grades [Tai 2012]. Several high school counselors also noted that Project Lead the Way often

caused scheduling and space issues as students needed extra time in their schedule in order to participate. Project Lead the Way, like other pre-college programs, is very costly and requires an additional $500-$700 2-week training program for teachers. Many schools cannot afford to implement these programs which creates another barrier to STEM for many minority students [Hess et al. 2016]. While pre-college engineering programs can be very beneficial when executed properly, many of the existing high school education programs are not widely accessible and do not accurately reflect the engineering profession, which can discourage women from pursuing the career.

While pre-college programs seem to offer more opportunities for students, an engineering professor who works with a local high school to develop their career path curriculum says that high schools are missing the mark on engineering education. She says that the program gives students an inaccurate idea of what a career in engineering truly encompasses and fails to recognize the need for a strong foundation in math and physics classes before learning higher-level engineering. In her experience, many students who participated in these programs are left feeling unprepared and shocked by the math- and physics-heavy course load in college [Kendricks 2021].

2.2 Teachers and Counselors

Teachers and counselors carry a strong influence over students' future education and careers. High school educators often lack a clear understanding of the engineering profession and the qualities that suggest a student would be successful in engineering. Misconceptions about engineering affect students as teachers are more likely to encourage male students and students from higher socioeconomic backgrounds to pursue engineering careers.

In a study of college-bound high school girls and guidance counselors, researchers from the Extraordinary Women in Engineering initiative found that high school girls do not really have an understanding of engineering. Their teachers and counselors also shared inaccurate perceptions of the career. During interviews, many girls and educators noted their belief that engineering is a less “people-oriented” job and does not have a direct impact on the lives of others, in comparison to other STEM fields [Sullivan 2007].

Educators’ opinions can have a major impact on students’ choices. A 2009 study published by the American Society for Engineering Education (ASEE) reported that teachers’ support for students to go into engineering was partially dependent on the students’ personal background. Teachers can be biased due to students’ personal backgrounds. The study compared two groups of students from different backgrounds, but with similar academic preparation and grade level. Despite the only difference being socioeconomic status, 50% of teachers predicted that the higher social background students “will do well in engineering” compared to only 13% for the lower background students. In another comparison of female and male students with similar GPA and grades, teachers weighted the high GPA less heavily for the girl when deciding whether or not to recommend engineering as a future career path. Teachers were more likely to encourage male students and students with higher socioeconomic status to pursue engineering [Nathan *et al.* 2010].

2.3 Internships and Co-ops

Experiential learning programs are often encouraged for undergraduate engineering students. Usually beginning the summer after a student’s freshman or sophomore year, many engineering students participate in some sort of internship or co-op to gain workplace experience. At Ole Miss, 78% of the class of 2020 and 67% of the class of 2021 participated in experiential learning [Civil Engineering Faculty Meeting 2021].

The most well-known type of experiential learning is an internship, which gives students the opportunity to develop their skills and professional experience in a formal workplace environment. Internships offer many benefits for both students and employers. Students are given the opportunity to develop important skills and workplace experience, often leading to higher grade point averages and higher self-efficacy [Raelin *et al*. 2014]. Employers also benefit from offering internships as many students who work as interns during their undergrad move into full-time positions with the company after graduation. Additionally, intern hires have a significantly higher retention rate than non-intern hires, especially if they have internal experience [National Association of Colleges and Employers (web)]. In a study of undergraduate work experiences, many engineering students spoke about how much they learned about the real world of engineering and the work that engineers do on a day-to-day basis. Almost all of the men who participated in the study had positive experiences at their internships while the women in the study had much more varied responses [Seron *et al.* 2018].

Internships offer positive learning experiences for some, but exposure to the engineering workplace creates major concerns for many women. Several female interns noted gender stereotypes present in the workplace. As men were often assigned challenging problem-solving work that helped them develop their skills, women were given administrative tasks that did not foster their engineering knowledge. As a result, female interns felt they did not benefit as much from the internship as their male counterparts. Sexual harassment was also an issue many women shared. One interviewee was reprimanded for her choice of clothing being too distracting to the men in the company and said she was “seriously offended.” Another group of female students were told they “looked like professional catalog models” and that their photo “could sell big time” when they took a group photo following a design competition [Seron *et. al* 2018].

Cooperative education, commonly referred to as a co-op, is also a common type of experiential learning seen in engineering education. While internships usually occur during the summer and are often unpaid, co-ops are almost always paid and often occur during the school year [US News and World Report (web)]. Co-ops are positions during which students alternate semesters between doing full-time co-op work and full-time academic study. In many cases, co-op students are offered full-time positions with the company upon graduation.

Similarly to internships, many women who completed engineering co-ops found them beneficial in developing their skills and introducing them to real-world engineering experiences. Several interviewees spoke highly of their co-op experience regarding personal and professional growth [Arthur and Guy 2020]. In a study published by ASEE, researchers found that students who had participated in at least one semester of engineering cooperative education had significantly higher grades than their peers who had not participated in co-op [Noyes *et al.* 2011]. Further, co-op students generally have better employment outcomes, including mentoring relationships and higher starting salaries. Positive co-op experiences may increase retention rates in STEM careers [Johnson and Main 2019].

Unfortunately, not all women found co-ops to be as enjoyable. Many women described the environment of engineering as “chilly” and said they felt isolated from their male counterparts due to being assigned different jobs, such as paperwork. Some students even shared stories of openly sexist remarks and inappropriate comments made by supervisors within the program. While many students found experiential learning programs to be helpful in gaining experience and developing workplace skills, several women also shared that they

experienced sexism in the industry, which can leave them feeling underestimated and disrespected, with little incentive to continue in the engineering field.

Disparities in education heavily contribute to the lack of women in engineering. Engineering internships and co-ops also proved to create additional barriers for women. Many female students who had completed experiential learning programs reported experiencing gender stereotyping, discrimination, and sexual harassment from other students and supervisors [Seron *et. al* 2018]. These factors make the engineering career inaccessible to many female students and discourage women from pursuing engineering.

CHAPTER 3: WORKPLACE ISSUES

Women in engineering face workplace discrimination at a much higher rate than women in other careers, including non-engineering STEM careers [Pew Research Center (web)]. This discrimination varies from sexual harassment and assault to lower salary and less opportunities for promotion. Women report becoming aware of these issues early on in engineering education and experiential learning programs, often discouraging them from continuing to pursue engineering careers. Gender discrimination proves to be rampant in industry as well.

3.1 Sexual Harassment

Sexual harassment is a widely known issue in engineering education and industry. Over half of female engineering students, academic faculty, and industry engineers report experiencing sexual harrasment in education and in the workplace. Sexual harassment negatively affects female engineering students, educators, and professionals likelihood to remain in engineering. Female students are less likely to return to their university after experiencing sexual harrassment and female engineers tend to leave their position, company, or the field of engineering entirely.

The Equal Employment Opportunity Commission (EEOC) guidelines define sexual harassment as the following [US EEOC.gov(web)]:

> Unwelcome sexual advances, request for sexual favors, and other verbal or physical conduct of a sexual nature constitute sexual harassment when this conduct explicitly or implictly affects an individual's employment, unreasonably interferes with an individual's work performance, or creates an intimidating, hostile, or offensive work environment.

The EEOC recognizes two basic types of sexual harassment: quid pro quo sexual harassment and hostile environment harassment. Quid pro quo harassment refers to a situation in which a job or educational opportunity is conditioned on some kind of sexual performance. Hostile work environment harassment is defined by pervasive sexual behavior from coworkers which can create odious conditions of employment. Both types of harassment constitute illegal discrimination [Johnson *et al.* 2018].

Two main conditions increase the risk for sexual harassment against women: organizational tolerance and male-dominated environments. These conditions tend to appear often in engineering academia, making it a common environment for harassment against both students and faculty [Johnson *et al.* 2018]. A 2017 study on sexual harassment in academic institutions found that 50% of female students experienced some kind of sexual harassment during their college years [Thakur and Paul 2017]. In a longitudinal study of engineering students at four universities to see how socialization affects future job decisions, many female students reported experiencing sexual harassment from their professors and supervisors. One student completed an internship at a military defense contractor. She said, “The environment was creepy, with older weirdo man engineers hitting on me all the time” [Silbey 2016].

The issues faced by female students are also faced by female educators. A meta-analysis on sexual harassment prevalence found that 58% of female academic faculty and staff reported experiencing sexual harassment. The study also looked into the prevalence of sexual harassment across different workplace environments including the military, government and private sector. Researchers found that the academic workplace setting had the second highest rate of sexual harassment, behind the military [Ilies *et al.* 2003]. In 2018, RTI International conducted interviews with female faculty in STEM fields and found a major issue was the inappropriate behavior of highly-ranked male faculty, which was often excused or

ignored. Many interview respondents also noted that it was common knowledge which individuals had a history of sexual harassment and the standard advice for dealing with those individuals was to avoid them rather than report them [Johnson *et al.* 2018].

In 2017, PE Magazine completed a sexual harassment survey of National Society of Professional Engineers (NSPE) members. Female respondents said that 45% had witnessed and 52% had experienced sexual harassment at work. Many female respondents shared stories of their experiences. One woman said that she would get "heckled" on job sites with men asking her about her relationship status and inviting her on dates. Another woman had been in contact with a senior engineer from a private firm about applying for a job, but after nine months of stringing her along with informal interviews, he admitted that he lied about having the authority to hire her "but had always been interested in dating." NSPE President Kodi Verhalen also noted how these behaviors are not only inappropriate but also create a sense of discouragement among women in engineering. She said, "To be told you're wanted in this field as a woman and then you get there and you hear these things, it makes one wonder, 'Am I really wanted here or were they just looking for a number?'" [Leiserson 2017].

Under federal law, workplace sexual harassment is considered a form of discrimination, so sexual harassment is illegal across the country. Title VII of the Civil Rights Act of 1964 makes it illegal for employers to allow anyone to be sexually harassed at work by anyone else, regardless of sex, gender, or sexual orientation. If an employee reports sexual harassment, the employer is under legal obligation to investigate the situation and take action in a timely manner. According to Title VII, retaliation is also illegal. Employees may not be punished for reporting a harassment case or participating in an investigation. Examples of retaliation include being fired or demoted, receiving a pay cut, being moved to a different location or position, or being asked to take unpaid leave [Equal Rights Advocates (web)].

Most large engineering companies share similar policies and procedures regarding sexual harassment in the workplace. The policy of one multinational engineering company states that any employee has the right and obligation to report harassment, whether it was directed at them or observed by them. Employees reporting harassment may do so to any of their supervisors or managers, to the human resources department, to their company integrity hotline, or to a member of the company legal team. Once an employee reports a situation to a supervisor or manager, they are required to immediately report it to Human Resources. The company handbook also lays out a set of policies for investigation of harassment claims. These policies require the company to carry out a timely and fair investigation conducted by a qualified person. If the investigation concludes that an employee has violated the company policy by either committing harassment or making a false complaint of harassment, the employee shall be subject to appropriate remedial measures and/or subject to disciplinary action. The company also includes a retaliation policy that forbids unwarranted punishment against any employee who files a complaint or participates in an investigation [Jacobs Engineering Handbook (web)].

Sexual harassment negatively affects female engineering students, educators, and professionals likelihood to remain in engineering. The more often female students experience harassment, the less likely they are to return to their college or university [Cortina *et al*. 1998]. Some students have even reported changing their class schedules, changing majors, or dropping out of school just to avoid sexual harassment [Huerta *et al.* 2006]. This may be reflected by the fact that over 32% of female engineering students change their major while in college [All Together SWE (web)]. In a study of female engineering professionals to determine how their experiences with sexual harassment affected their career decisions, researchers established three main outcomes: stepping down from their position to avoid the perpetrator, leaving their institution, and leaving the field entirely. One woman dropped out of a major

research project that was part of a mentorship program because her mentor raped her. Another woman was told to resign from her committee position when she reported to Human Resources that the chair of the committee had been harassing her. Several others left their institutions or left the engineering field altogether [Johnson *et al.* 2018]. Sexual harassment in engineering academia and in the workplace consistently drive women away from the career.

3.2 Pay and Career Advancement

Promotion and financial inequities are a significant reason why so many women leave the engineering profession. Female engineers, especially female engineers of color, make a fraction of the average salary for male engineers. The pay gap is also significantly greater in engineering academia than in industry. Further, female engineers receive fewer promotions and hold fewer leadership positions than males, a trend which has remained steady for the past 25 years despite increases in the number of women in engineering. These workplace inequities drive women out of the engineering industry and education at high rates.

The pay gap between males and females exists in every field of engineering. Although it is not as large as the general pay gap, female engineers make about 90 cents for every dollar their male counterparts earn [All Together SWE (web)]. It is important to note that this pay gap is dramatically wider between female engineers of color and male engineers. On average, Black female engineers make 62 cents and Hispanic female engineers make 61 cents for every dollar a male engineer makes. The pay gap also varies across different fields of engineering including education. The gap for those with doctorate degrees in engineering is 1.5 times bigger in academia than in industry [Ding *et al.* 2021]. Within industry, the smallest gap exists in biomedical engineering and the largest is among software, aerospace, civil, and electrical engineering [U.S. Census Bureau (web)].

In addition, women in engineering are less likely than men to be promoted to top positions. Women in industry are 15% less likely than men to occupy leadership positions, which has remained steady since 1995. In academia the gender gap for tenured positions is 28%. This gap has almost doubled since 1995 [Ding *et al* 2021].

From over 200,000 college graduates, economist Jennifer Hunt found that more than 60% of women leaving engineering did so because of issues with pay and promotion opportunities. The exit rate from engineering careers on the basis of pay and promotion is similar for men and women. However, in non-STEM fields, women are significantly less likely than men to leave their careers for pay and promotion reasons. When comparing several reasons for women leaving engineering, including family issues and working conditions, issues with pay and promotion ranked as the most important reason [Hunt 2016].

CHAPTER 4: WORK-LIFE BALANCE

Maintaining a healthy work-life balance can be extremely challenging for women in engineering, especially mothers. The 12 weeks of leave required by the Family Medical Leave Act is not a sufficient maternity leave time for many women. When new mothers return to work they are faced with disadvantages including lower wages and lower likelihood of being hired and promoted. While women are penalized for parenthood, fathers are rewarded by making more than women and men without children. Job inflexibility causes many more challenges for mothers in engineering. The demanding and rigid schedule in most engineering jobs makes it extremely difficult to balance work and family responsibilities. These factors lead many women to leaving engineering careers, often in pursuit of careers that allow for a better work-life balance.

4.1 Family Leave Policy

The Family Medical Leave Act (FMLA) gives employees up to 12 weeks of unpaid leave per year. FMLA applies to all public agencies, public and private schools, and companies with 50 or more employees. Under FMLA, employers are legally required to provide eligible employees with a minimum of 12 weeks unpaid leave each year for birth, placement of a child for adoption and foster care, or to care for an immediate family member with a serious health condition. In order for an employee to be eligible for leave, they must have worked for their employer for at least 12 months, at least 1,250 hours over those 12 months, and work at a location where the company employs 50 or more employees [US Department of Labor (web)].

It is important to note that time taken off work due to pregnancy complications can be counted against the 12 weeks of leave [U.S. Department of Labor (web)]. This means that women suffering from pregnancy complications may not have any unpaid leave available for

maternity leave. Additionally, if a woman had to use leave to care for another child at any point during the pregnancy, that time would also be counted against her available leave.

The decision to offer 12 weeks of leave has no medical basis and many studies show that a longer leave would be beneficial to the newborn and mother. Postpartum recovery studies show that physical and emotional issues can last more than 6 months after childbirth [Thompson *et al*. 2002]. Studies have also shown a negative impact on cognitive development when a child's mother is employed in the first year of their life. Children whose mothers were able to take 6 or 12 month leaves of absence tended to reach developmental milestones more quickly [Gaston *et al*. 2015]. Twelve weeks of leave is not enough time for many new mothers to feel comfortable returning to work.

4.2 Motherhood Penalty

The Motherhood Penalty refers to the fact that mothers earn less than childless women with similar qualifications. This term is also often used to refer to the fact that qualified women are significantly less likely to get a job after leaving the workforce for a short period of time after having children. These workplace barriers for women with children can cause many to leave their field.

Women with children earn less than men with children or women without children. As women's wages tend to decrease by 4% with each child that she has, men's wages tend to increase by 6% when they become parents [Glauber 2008]. Taking time off also heavily affects a woman's salary. Women who took 1-2 years off experienced a 14% decrease in salary. Three years later, the salary gap compared to women who did not leave the workforce was at 46%. Women who leave the workforce for a short period after having children are significantly less likely to get a job when returning to work. The majority of women who take a break from work

are ready to return after less than 2 years. However, only 74% get any kind of job at all and less than half return to full time employment [All Together SWE (web)].

While motherhood creates barriers for women, men with children appear to be rewarded: fathers are paid, hired, and promoted more. In a trend known as the Fatherhood Bonus, employers rate fathers as the most desirable employees and fathers are paid more than childless men (and far more than women and mothers). Note that these trends vary with income distribution. That is, men at top income levels experience greater wage increase with fatherhood than lower income groups. Additionally, women in top income groups may not experience the Motherhood Penalty; lower income mothers experience the greatest wage penalty [Budig 2014].

While women's wages and chance of being hired decrease with each child she has, men are rewarded for being fathers with higher pay and more promotions. When women temporarily leave the workforce and later try to re-enter, less than half are able to return to full time employment [All Together SWE (web)]. The disadvantages women face in the workplace as mothers discourage many women from continuing in their profession.

4.3 Job Inflexibility

Job inflexibility makes it very challenging for women to stay in engineering. Engineering can be a very demanding job and often requires working over 40 hours a week. Many women find it difficult to balance a full time engineering job with a family and other responsibilities at home. Further, very few opportunities exist for part time work or work from home jobs, leading many women to leave engineering altogether in pursuit of jobs with more flexible hours and scheduling.

A 2017 study on women's reasons for leaving the engineering field categorized their responses into 6 main categories. The category with the most responses by far was the comfort

category, which was centered on how employees perceived their work environment in regards to working conditions, pay, and security. Within this category, many of the responses were related to the work life imbalance within engineering. Several women noted that balancing a full-time engineering job while having small children at home was a major challenge. Many of the women who expressed their struggles with balancing work and family chose to leave the engineering career. The majority of these respondents said they had hoped to work part-time, but struggled to find jobs. Others expressed that they were unable to afford childcare with their salary and found that it made more sense financially to stay home with their own children [Fouad *et al.* 2017].

The inflexible work environment in engineering causes many women to leave their jobs. In an interview with one woman working as the only female in her electrical engineering company, she reported that after having a child she wanted to work from home to spend more time with her family. Her work was easily able to be done remotely, but when her boss disagreed with her idea, she made the choice to leave her job and pursue a different career [Kendricks 2021]. Another woman working as an engineer noted that at the time she had children, there was no flexibility or options for part-time engineering work. As a result, she chose to leave her career for a period of time and returned to work later for a company with more flexible scheduling and hours [Rich 2021].

CHAPTER 5: CONCLUSION

As women face so many barriers in engineering, the profession continues to remain male-dominated. Young students are introduced to engineering through pre-college programs but these programs may give students an incomplete understanding of careers in engineering. As many of these programs continue to present engineering education as fun demonstrations and hands-on projects, engineering undergraduates continue to be shocked and disappointed when their classes require them to have a strong foundation in math and science skills, something that was not a main focus in most STEM programs. Additionally, many pre-college programs can be inaccessible for students and teachers due to high costs, time commitment of training educators, and scheduling difficulties. Teachers and counselors also play an important role in introducing students to potential careers in engineering. Students are strongly influenced by their educators and may be led to believe certain misconceptions about engineering if their teachers have inaccurate perceptions about the field. Teachers are more likely to encourage male students and students from high socioeconomic backgrounds to pursue careers in engineering which can discourage women. Gender disparities continue to be present in higher education. As evidenced by the experiences of female engineering students, experiential learning programs like internships and co-ops can help students gain valuable experience in the workplace, further develop their skills and knowledge, and provide more insight into the engineering career. Students often reported that the experience confirmed their interest in the career field and helped motivate them in their future studies. These programs, however, also had downsides for female students that male students did not report experiencing. The chilly environment and gender stereotyping that many female students experienced left them feeling unwelcome in the engineering career and discouraged from continuing in the field.

Workplace issues are a major factor explaining why there are so few women in engineering. Women in engineering face workplace discrimination at a much higher rate than women in other careers, including non-engineering STEM careers. This includes unequal pay, promotion disparities and sexual harrassment. Over half of female engineering students, academic faculty, and industry engineers report experiencing sexual harrasment in education and in the workplace. This negatively affects female engineering students, educators, and professionals' likelihood to remain in engineering. Promotion and financial inequities are also a significant reason why so many women leave the engineering profession. On average, female engineers make about 90 cents for every dollar their male counterparts make. This gap increases by almost 30 cents when comparing female engineers of color to male engineers [All Together SWE (web)]. Further, women in engineering receive fewer promotions and hold fewer leadership positions than males. This is especially true for women in engineering academia, where the gender gap for tenured positions has almost doubled in the past 20 years. When comparing several reasons for women leaving engineering, including family issues and working conditions, women consistently ranked pay and promotion inequities as their main motivation for leaving the field.

The struggle to maintain a work-life balance in engineering pushes many women out of engineering, especially mothers. After a short maternity leave, female engineers return to a 4% decrease in wages, which will grow with each child she has [Glauber 2008]. This Motherhood Penalty is also reflected by the fact that women who take a temporary leave after having children are significantly less likely to be hired when they return to the workforce. While mothers are faced with these disadvantages, men are rewarded with the Fatherhood Bonus for having children. Mens' wages increase by 6% after having children and fathers are more likely to be hired and promoted than any other group [Budig 2014]. Further, engineering offers very little job flexibility with few part time or work from home positions. Engineers are often expected to work

over 40 hours a week which is not feasible for many mothers, especially when they have to pay for childcare. These barriers to having a work-life balance push many women out of engineering.

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