

An Investigation of the Return to Work Experiences of Women Engineers

Katherine Drinkwater Gregg, Virginia Polytechnic Institute and State University

Katie Drinkwater Gregg is a PhD Candidate in Engineering Education at Virginia Tech. She holds a BSE and MS in Mechanical Engineering. Katie's research interests include decision-making in engineering design, peer feedback literacy, design methodologies and pedagogy, engineering extracurriculars, and women in engineering.

Olivia Ryan, Virginia Polytechnic Institute and State University

Olivia Ryan is a Ph.D. student in Engineering Education at Virginia Tech. She holds a B.S. in engineering with a specialization in electrical engineering from Roger Williams University. Her research interests include developing professional skills for engineering students and understanding mathematics barriers that exist within engineering.

Dr. Susan Sajadi, Virginia Polytechnic Institute and State University

Susan Sajadi is an assistant professor at Virginia Tech in the department of engineering education. She has a BS and MS in Biomedical Engineering and a Ph.D. in Engineering Education Systems and Design from Arizona State University. Prior, she worked as an engineer in the medical device industry.

An Investigation of the Return to Work Experiences for Women Engineers

1. Introduction

Persistent calls for more engineers in the workforce arise from both public and private sectors [1], [2], but the conversation about growing and diversifying the engineering field often focuses on new graduates. Unfortunately, this strategy has not moved the needle as quickly for women in the engineering workforce. The number of women engineering graduates has grown to over 23% in the last decade [3], but the percentage of women engineers working in engineering remains at 15% [4]. The attrition of women engineers can be attributed to the chilly climate in engineering [5], [6], [7], [8], moves to management [9], and women who take career breaks and never return to the field [10].

According to the Society of Women Engineers, 25% of women who leave engineering do so to spend more time with family [11]. If their reason for a career break disappears (e.g., children are grown, health challenges improve, etc.), many women may wish to return to the workplace. Women engineers who have taken a career break have significant, valuable experience, but several barriers prevent them from returning to work [12], [13], [14]. For example, marketing an atypical career path, regaining necessary skills, and maintaining a desired work-life balance are all challenges faced by women returning to professional fields [15]. Furthermore, the engineering field poses unique technical requirements for career returners.

Only focusing on new graduates to fill workforce needs is akin to trying to fill a leaking bucket. The engineering field must consider pathways to reroute engineers back into the workforce to improve technical capacity. Identifying and increasing pathways for engineers taking a career break to return to the engineering workforce is a valuable opportunity to retain experienced women engineers. Some engineering companies have recognized this potential by starting ‘returnship programs’ for individuals returning after a break [16]. While the private sector has taken action, research on women engineers returning to work has lagged. Extant literature focuses on reasons why women leave the workforce, rather than how they can return [9], [17], [18], [19], [20], [21]. This exploratory study takes an asset-based approach to examine how women engineers utilize their unique experiences to return to the technical workforce. To achieve these aims, we ask the following research question: ***How do women engineers navigate the transition of returning to an engineering career after a career break?***

2. Literature Review

In the following section, we will highlight why women leave the workplace, share the challenges of returning to work after time away, provide information on workplace returnship programs, and synthesize prior work career break theories and models.

2.1 Women Leaving the STEM Workplace

In engineering, workforce retention for women is significantly lower than that of men after 10 years in the field [11]. This statistic leads to concerns and questions about the factors influencing women’s career paths. One common reason women choose to leave the workforce is due to family responsibilities, such as having children. In general, many women leave the workforce because it becomes too difficult to balance home and work responsibilities [17], [18]. For example, in STEM, nearly 50% of new mothers leave the workforce, compared with only 25% of new fathers, contributing to the gender gap in the field [22]. Moreover, although many women leave the workforce due to family responsibilities, STEM women are significantly more

likely to leave the field compared to women in other professions [23]. These statistics are particularly troubling for the field's future.

Women leave engineering for reasons beyond family responsibilities, including limited opportunities for advancement [19], lack of mentorship [21], dislike of the workplace environment [9], and misalignment between their values and job roles [20]. Further, other research has highlighted that women engineers left the field due to inequitable, inflexible, and demanding working conditions, lack of recognition, and underutilized technical skills [19]. Collectively, this research illustrates the many factors that influence women engineers' choice to leave the engineering workplace.

2.2 Return to Work Challenges

Anyone who leaves the workforce and attempts to return can find their return challenging. Women who leave the workforce for family responsibilities have both driving forces and filters that help them decide what is best for them, and ultimately impact their decision to return to work [12]. It has been found that women in STEM and engineering fields follow three paths upon returning to work: returning to their original career, making a career pivot, or continuing not to work [10].

Engineering is a fast-paced field, and skills, technology, and expertise are constantly evolving. For women specifically, the barriers to returning include perceived out-of-date skills and industry knowledge. Further, they cite the length of their break, older age, and limited work flexibility as other barriers they face in their return to the engineering workforce [15]. However, during a career break for childcare, women have been found to develop professional skills that can help them in the workplace, such as compassion, empathy, and multitasking [24]. Although women may perceive skill deficiencies when returning to work, they often have improved skills in other areas that can be used to their advantage in the interview process. Furthermore, the gendered nature of STEM and engineering leads to barriers in their return for women who left the workforce to fulfill gendered childcare roles [13]. Women engineers who return to work are found to be balancing incongruent identities in the workplace. They are simultaneously trying to be “one of the boys” in engineering and a mother [14]. The gendered environment of engineering can make it difficult for women to want to return to the field, causing them to continue to stay home or make a career pivot.

2.3 Return to Work Programs

There has been a rise in support and programs that help women return to engineering after a career break. A significant number of return-to-work programs occur outside the United States [25], [26], [27]. In the United States, engineering companies such as Ford, Johnson & Johnson, and Northrop Grumman have developed their own return-to-work programs [16]. Each program varies across companies, but their overall purpose is to help women re-enter the workforce after a career break, thereby positively impacting gender diversity among mid-level engineers in engineering companies. Many companies offer a period during which returners work in an “intern” capacity, learning about the company and different business sectors, honing their engineering skills again, and receiving support from mentors. At the end of the program, the returners may be offered jobs or apply for positions that interest them.

The Society of Women Engineers (SWE) collaborates with iRelaunch, a company that seeks to normalize career breaks and help people return to work after them. They have a variety of resources and events to support returners entering the workforce after a career break [28]. The

SWE and iRelaunch collaboration began in 2015 and has included 34 companies and benefited over 1000 returners [29], [30]. This approach helps identify a hidden talent pool that can help diversify the workforce in mid-level positions and beyond.

3. Theory

There have been a handful of theoretical and conceptual frameworks that have been used to describe non-traditional career paths or trajectories, such as the boundaryless career theory [10], [31], the protean career model [32], the kaleidoscope career model [33], and the opting-in/opting-out framework [34]. These theories are becoming common ways to think about career paths.

In our search for theories and conceptual models of women in engineering returning to work after a career break, we did not find anything specifically conceptualized for engineering. However, a recent dissertation interviewed women in STEM who had taken a career break and returned to the workforce. They identify the challenges women face when returning to the workplace and how they navigate the transition of returning to their STEM careers [35]. The author also developed a Career Break Model, which “allows individuals to systematise the stages of moving into, through and out of a career break” [35, p. 98], which was derived from Schlossberg’s transition theory.

This paper will also be conceptualized through the lens of Schlossberg’s transition theory. Schlossberg’s transition theory, initially developed for adult development, focuses on how individuals experience and cope with change [36]. In a later work, Schlossberg and colleagues described a model of work transitions organized through three phases: *moving in*, *moving through*, and *moving out* [37]. This model captures the dynamic nature of career transitions and the adjustments individuals make over time. People in the *moving in* phase need to become familiar with the new norms, rules, or expectations related to their transition. In our study, the *moving in* phase refers to what it takes for women engineers to prepare to return to a technical field after time away. The *moving through* phase is a liminal time of adjustment and uncertainty where individuals navigate their ongoing transition. In our study, the *moving through* phase refers to women’s experiences actually applying for jobs and returning to the workforce. Finally, the *moving out* phase refers to the conclusion of the transition and can be a period of new beginnings. In our study, this refers to the women’s experiences in the workplace once they have landed their new jobs. Together, these three phases can help us highlight the lifecycle of returning to the workforce after a career break.

To better understand an individual’s capacity to navigate and cope with change, Schlossberg introduces the four S’s - *situation*, *self*, *support*, and *strategies*, which are the key resources an individual uses to cope with change [38], [39]. *Situation* “refers to a person’s situation at the time of transition.” *Self* refers to the characteristics of the person during the time of transition and their ability to cope with the situation. *Support* refers to “support available at the time of transition is critical to one’s sense of well-being.” *Strategies* are the coping strategies a person experiencing transition uses to change or reframe the situation or reduce the stress they are experiencing because of the transition [39]. The four S’s can provide insight into how women manage their transition back to engineering after a career break and how their personal factors shaped their experiences.

4. Methods

This exploratory qualitative study analyzed interview data from a career reentry podcast to investigate the experiences and strategies of women engineers reentering the technical workforce. Because podcast interviews are an unconventional data source in engineering education research, we documented our methodological approach in a conference paper. We will provide a high-level summary of our methods in this section, but more details about the data analysis process and limitations can be found in [40]. Our methods featured three main steps: podcast and episode selection, ethical considerations, and data coding and analysis (See Figure 1 in the Appendix). This methodology aligns with a recent paper outlining a seven-step methodology for utilizing podcast data in qualitative research [41].

To study authentic stories of career returners in engineering, we utilized interview data from the “3,2,1...iRelaunch” podcast [42]. The “3,2,1...iRelaunch” podcast is part of the parent company iRelaunch that implements return-to-work programs at other companies and promotes resources and opportunities for individuals looking to relaunch their careers after a break. The Successful Relaunchers series on the podcast features 30-minute interviews with an employed relauncher. The series shares strategies and advice from post-returners to an audience of returners, which adds credibility and genuineness to the data. Using the episode descriptions and transcripts available on the iRelaunch website, we identified 14 episodes published between 2018 and 2024 that feature women engineer relaunchers. Episodes were selected if they featured a successful relauncher interview with a woman who had taken a career break of over two years, held an engineering degree, and/or had prior work experience in the engineering industry.

The research team engaged in the six-step thematic analysis process outlined by Braun and Clarke [43]. To familiarize ourselves with the interview structure and prominent patterns of experience, two authors listened to podcast episodes. The interview structure was similar across episodes, allowing us to continue the analysis. The second author performed open coding, drawing on the literature on career theories and experiences returning to work [44] to construct a codebook. The first author subsequently returned to the transcripts to deductively code and refine the codebook. Codes were reorganized into themes collaboratively. Our final step was to organize the themes so we could answer our research questions. We chose to focus on the phases of women engineers' transition into the workplace after a career break.

5. Findings

To represent the full transition back to work for women engineers, we organized our findings into the three phases of transition from Schlossberg: *moving in*, *moving through*, and *moving out*. First, we briefly describe the returners' experiences during their break (pre-transition). As women engineers begin the transition process, they *move in* to evaluate their qualifications and discover the challenges of a job search. As returners *move through* the transition, they leverage opportunities from past and future work environments to navigate the hiring process. After beginning a new job, returners *move out* of the transitional stage and into a new phase of their career.

5.1 Pre-transition

The experiences of the 14 women engineers follow existing research on career breaks. The majority of participants left the workforce for childcare reasons, but a few left for health, education, or eldercare. Break lengths ranged from 2.5 to 31 years, and they were generally

longer than the interviewee expected. It was very common for participants to engage in volunteer or work activities outside of their families during their breaks, which aligns with established trends [10], [35]. Table 1 in the appendix summarizes the career breaks of the participants. Even before deciding to return to work, the activities and relationships built by returners impacted their transitions back to engineering, and their connection with their technical fields had the most impact on their future transition.

A prominent source of technical connection was family and community. Spouses and children provided information and networking to the woman on a career break, and the surrounding community often provided resources and opportunities. Shweta found that her husband's coworkers were a key support system during her career break:

I think I was very blessed because most of the ladies that worked with [my husband] knew I was also an engineer and they would bring me into events and conversations...So I had a lot of support from the system around me that, for the most part, they saw me as still doing engineering...So I really had that support in my community.

Like Shweta, a few interviewees had spouses who were also engineers, which helped them maintain up-to-date knowledge of the industry. For example, Samantha's husband worked at her previous company, so she was able to maintain her industry knowledge through her husband:

I am an absolute super nerd, and I will be the first to admit it. So when my husband and I talk about work, I heard all about everything that was going on at [our company] that he could talk about since I stopped working, so I knew who was doing what, what programs were still going, what of our programs that I worked on had successes.

This knowledge kept Samantha in the know about the company and field, which helped her return to a similar position in systems engineering.

Other sources of industry knowledge for interviewees included reading scientific journals and magazines, attending lectures and society meetings, or taking community college courses. Even while women were on their career break, connecting with technical content and other engineers helped them stay updated on technical developments and opportunities.

5.2 Moving In

The *moving in* phase of transition encompasses returners' steps to prepare for and seek employment after deciding to return to work. This phase was often challenging for returners as they figured out how to navigate the job market. Looking for a job is regarded as a difficult and stressful process for anyone, but getting back in the habit of applying to jobs was especially challenging for women engineers returning to the workforce. Job postings are typically geared toward those starting or continuing careers, which makes it difficult for returners to get past the resume screening. This strategy was rarely fruitful, typically taking about six months for returners to receive an interview. The lack of success through this method led many interviewees to find alternate pathways to a job.

5.2.1 Networks—Old and New

Returners persevered in the job search process by creating and utilizing social networks. Some returners were fortunate enough to have connections with their former employers or colleagues. Interviewees realized that even though they had been out of the field for many years, their reputation was 'frozen in time' for their colleagues. Sirisha discussed how she found a job due to a former colleague whom she had not known well,

It came from an old colleague that I worked with, but I didn't really think I got to know them really well because you're in a team and there are a lot of members in that

team...But that's what I find interesting. You never know who your advocates are and who remembers you...That is a reflection that people will come back and remember. Many interviewees experienced a similar phenomenon—they were remembered for their past work life—which helped them find references, new opportunities, or return to their previous company.

Returners who did not have networks from previous jobs sourced new networks from LinkedIn and professional societies. One interviewee described this process as “finding their tribe again,” a sentiment echoed by many other participants who used networking to return to their careers. For example, Krystal, a military spouse, used LinkedIn to create a virtual network when frequent moves made it difficult to put down physical roots. She discussed interacting with posts and articles to engage with her industry.

Similarly, interviewee Pam utilized her memberships in the Society of Women Engineers (SWE) and Society of Manufacturing Engineers (SME) to build a network in the field she wanted to return to:

So while I say SWE helped me stay connected with the women engineers, SME let me expand my network technically, especially as I got into 3D printing...And then when I was ready to shift into high gear...I emailed dozens of my contacts within SME and just started asking them for advice.

Since most of the interviewees were actively involved in the iRelaunch community, they also discussed their gratitude for the iRelaunch resources and community that helped them return.

5.2.2 Obtaining New Credentials

To address skill gaps and demonstrate to employers that their engineering knowledge was up to date, some interviewees pursued additional credentials such as completing a master's degree, pursuing courses at a community college, taking the fundamentals of engineering (FE) exam, or sitting for their professional engineer (PE) license. Krystal shared how sitting for her PE was an important step in returning to engineering,

The best thing I think I was able to do was reapply to sit for the professional engineer exam. And I think after speaking with other people in the industry...they all told me getting your PE would be a great way to show your future employer that you still have the skills necessary, and that you are still able to comprehend and use complicated principles.

Similarly, Tcheula took the FE exam to boost her resume and found that it helped her meet the required qualifications for more jobs, but did not automatically translate to more interviews.

5.3 Moving Through

The intermediate phase of transition was a dynamic combination of interviewing, negotiating, and starting jobs for women engineer returners. While returners were successful in getting a job at this stage, this accomplishment was not the conclusion of their transition back to work. As women returners *moved through* the transition, they leveraged their life experiences and sometimes sought help from returnship programs.

5.3.1 Reviving Engineering Careers

The principles of engineering don't change, but the technology and programs used in the workplace evolve. After multiple years away from the field, it can be challenging to jump back into a technical role. Many interviewees discussed their experiences getting back into a technical field after multiple years away. Shweta mentioned how her skills were outdated when attempting to return to work,

The difficulty for me was nobody was looking for my skills there. I had to regain the new skills. I was an experienced person. I knew how to do my job;...the tech stack changed, so I identified that [and] I started working on that part.

The need for upskilling extends beyond technical skills. Samantha was concerned with the everyday practices of working when she exclaimed, “I don’t even know what Outlook looks like anymore!”

Nearly all participants described the imposter syndrome and a lack of confidence they felt throughout the transition. The multiple rejections that Krystal received made her feel like she should try to do something else instead of working in engineering again. Lack of confidence and imposter syndrome pervaded throughout the moving through stage, from the draining job search to the first months on the job. For example, Tcheula described how she felt like she was going to fail at any minute at her new job: “I remember overthinking was a problem at the beginning, just overthinking and knowing I’m just one minute away from falling on my face here.”

5.3.2 Leveraging Break Experiences

One source of pride and confidence for women engineer returners was that the activities during their breaks had endowed them with valuable skills, even if the work was nontechnical. Cynthia worked as a children’s ministry director, which taught her how to deal with people, a skill she had not developed while she was an engineer.

I would say, well, you know, being a children’s minister, you really learn how to deal with people. My communication skills,...how to handle conflict, how to have difficult conversations, how to relate to people has expounded. My people skills...have really, really improved. I am not a nerdy engineer anymore with tunnel vision, right?

Sirisha agreed that her career break changed her mindset: “When I look back, [my break]...let me take more risks...if I had continued and stayed in the course, I don’t know if I would be doing the same things as I’m doing.” Interviewees realized upon returning to work that their life experience and professional skills were just as valuable as technical knowledge. This highlights a career break as a valuable source of skills for women engineers rather than just a resume gap.

5.3.3 Reentry Programs

Individual networking proved to be a successful strategy for many interviewees during the transition, but was less effective for those seeking to return to a large company or a different industry. In these cases, a corporate returnship program provided a dedicated point of entry for relaunchers. Five interviewees returned to work through a corporate returnship program that enabled them to intern at companies like Lockheed Martin or Trane Technologies and transition into full-time roles. Gabriella expresses her gratitude for the reentry program she completed:

It was an incredible privilege to be part of this program. I had actually had trouble finding a job, trying to go back into the workforce and they actually took a chance on me and the rest of us, valuing our previous experience. They provided a lot of support for all of us to ensure that we succeeded. Everybody in the program had a technical mentor and then a second mentor...where we could ask questions that maybe we wouldn’t be comfortable asking our immediate manager.

Returnship programs were designed to recruit, train, support, and retain returners, so the experience for interviewees in these programs was distinct from others. Returners who completed a ‘returnship’ through a program were compensated for their upskilling efforts and provided with more resources than other returners. Jennifer described the benefits of participating in a reentry program when she said, “I think that’s the beauty of these returnships is

that it gives you the chance to not have to start hitting the ground running. That they are ready there to help you get up to speed.”

5.4 Moving Out

Finally, after successfully securing a job in engineering, returners *move out* of the transitional stage and into a new phase of their career. Returners discussed their adjustment returning to work and the importance of mentors to help them in this new phase of their career.

For many interviewees, returning to work was like riding a bike. Letitia described this experience, “No, a lot of it came back. It's kinda like riding a bicycle. You're wobbly at first, but then it's no big deal.” This was echoed by Jane and her experience returning to her field, “You might get a little rusty, but you don't forget it. You don't unlearn what you already know.” This theme is particularly poignant for the engineering field because of the parallel importance of technical and professional skills. As long as returners maintained a foundation of engineering knowledge, they could communicate and use company resources to acquire new technical skills.

Although many interviewees discussed how many skills came back quickly, there was still a learning curve in their return to work, as Krystal described, “There was a time where it felt like, “Okay, I remember this.” And then there were times, where I thought, “I have no idea,” so it was a journey for sure.” It typically took a few months for interviewees to feel comfortable in their roles, but this did not significantly differ from the transition time of other new employees.

Successful returners were often supported in their transitions by mentors. Gabriella relied on the mentor from her returnship program to adjust to a technical role:

The fact that I had a technical mentor probably made it easier for me than someone new off the streets. I had someone who was readily available to answer any questions that I had, and I spent a good amount of time shadowing them before I was really expected to do work on my own.

Similarly, Tcheula’s mentor helped her “own my relaunch” and overcome overthinking by clearly communicating with her supervisors. Like former colleagues and family during the job search, mentors at work served as a source of confidence and encouragement as interviewees transitioned back to work.

6. Discussion

As women engineers moved in, through, and out of their return-to-work transitions, they utilized numerous skills, strategies, and supports to overcome challenges. The circumstances of each returner’s transition depended on their field, break experiences, and available opportunities. To discuss the factors that impacted women engineer returners’ journeys, this section is organized into the ‘Four Ss’ framework from Schlossberg [38], [39]. These four elements of transition—self, situation, support, and strategies—were developed to help adults in transition ‘take stock’ of the resources around them. We utilize this framework to understand how women engineers used these resources to navigate their transition back to work.

6.1 Self

The self element of Schlossberg’s ‘taking stock’ refers to a person’s inner strengths that help them cope with transition. This can include both personal characteristics, such as one’s education, life experiences, and skills, and psychological resources that help someone overcome the cognitive and affective challenges of transition [38]. The women engineers returning to work in our study represent a diversity of personal characteristics, including parental, marital,

disability, and citizenship status. These elements of a woman engineer's background influenced her decision to return to work and her *transition back into* the workforce. Participants with specific needs, such as disability accommodations or a work visa, were limited in the jobs that they could apply for, so they tended to be more skeptical about their ability to find a job that fulfilled their needs. On the other hand, women who were married to other engineers or were not motivated to return to work by financial need faced a more relaxed transition, allowing them to wait for opportunities to arise.

Motivation to return to engineering was an interesting psychological resource that emerged in our findings. Several participants had a strong desire to return to technical engineering work because of the challenge and intrigue it provided. Pam worked as a technical writer during her break, but she sought to return to something even more technical and hands-on. She started work as an additive manufacturing engineer after a 31-year career break. This runs contrary to some career theories that suggest that older professionals tend to value balance and social impact over challenging work [33]. While the desire to shift careers to something more focused on people was certainly present in our data, it was a minority. Lucy's background was in Civil Engineering, but she pivoted her career to local civil service after her career break. Winifred's experience as a woman in Petroleum Engineering inspired her to start a nonprofit that encourages girls to pursue STEM careers. The paths of Winifred and Lucy highlight that some returners motivated by social impact did not return to engineering. This aligns with research that women are deterred by the technical-social dualism present in engineering culture [45].

Self-confidence was an essential psychological resource that supported women engineers as they returned to work. Returners were the driving force behind their return transitions, so self-confidence and the belief that they could return to work were catalysts for the process. Interestingly, participants bolstered their confidence by finding sources of encouragement from their previous careers. Returners were consistently surprised by how willing their former mentors, supervisors, and colleagues were to recommend them for jobs or connect a prospective returner with current opportunities, even if they had not been in contact for several years. These connections remembered the returners as they were before their career break, as if their reputation was 'frozen in time.' This perspective helped returners recall the accomplishments they had achieved before their career breaks, which bolstered their self-confidence. A similar phenomenon occurred for returners during the first few months in a new job: they realized that they had retained their previous experience and training. The reconstruction of returners' engineering identity was buttressed by this example of their performance and competence, a key construct of engineering identity [46], [47], [48].

6.2 Situation

The situation factor of transitions accounts for the environment surrounding an individual's transition. The circumstances that trigger and influence the transition can greatly shape how it unfolds and how the individual copes. Our participants experienced several different situations in their career reentry, from their break to the job search to their new work environment. Each situation contributed differently to the transition.

The average career break length in this study was 12.6 years, ranging from 2.5 to 31 years. The breaks were generally longer than participants expected, as new familial circumstances (e.g., eldercare, relocation) often arose, and the partner already on a career break was best equipped to take on new responsibilities. Other research on women who take career breaks suggests that they tend to assume traditional gender roles and prioritize their spouses'

careers after stopping work [49]. A consequence of this shift, according to Stone and Lovejoy, is the delay of the woman's return to work. So, what factors prompt women engineers to return to work? The transitions for our returners were largely expected, meaning they could be anticipated and planned for [38], [39]. Having children leave the house or enter school was the most common anticipated trigger. A couple of participants had an unexpected transition, like Lucy, who got divorced and unexpectedly needed to provide for her family, or Samantha, who recovered from a chronic illness and was able to return to work. The difference between anticipated and unexpected transitions was the level to which returners had used the end of their break to prepare for the job search. Interviewees with both types of transition engaged in a variety of break activities, but those who anticipated their return to work tended to focus their activities on upskilling or networking.

The job search was a transition situation that changed dramatically depending on the field to which returners were applying. Returnship programs existed at large, private companies. Many of the interviewees in our study who participated in returnships worked for private defense contractors. Returners in smaller fields or those who did not want to work at large corporations did not have the option to participate in returnship programs. Arlene and Letitia worked in the specialized fields of public transportation and hazardous substances engineering, and jobs in their field were in municipal or state governments, so they had to learn how to navigate the hiring process in the public sector. Many interviewees discussed the difficulty of the impersonal online application process. For returners who had been on career breaks for more than a decade, the job application process on websites like Glassdoor, Indeed, and LinkedIn was new and foreign. It was very disconcerting for interviewees when they submitted applications to dozens of jobs and heard nothing from recruiters. This experience follows that of many professionals in the 'hidden workforce,' or qualified applicants who are filtered out by automated Applicant Tracking Systems (ATS) used to manage online job postings [50]. ATS systems often use a gap in full-time employment as an exclusionary criterion to filter out applicants. This phenomenon explains why it was so difficult for returners to get past the initial job recruitment stages.

The final situation that returners encountered in the *moving out* phase of transition was their new workplace. Before starting new jobs, returners were very apprehensive about adjusting to the work environment after their career break. Some worried about building relationships with coworkers and supervisors who were much younger than they were. Others worried about completing work at a pace and quality that met the standards of their supervisors. These apprehensions, however, dissipated quickly for returners once they became familiar with their new situation. Those who participated in returnships felt validated by interacting with other returners and mentors, which follows other studies that have examined the benefits of reentry programs [27]. As of the recording of their respective 3, 2, 1...iRelaunch episodes, several women returners had been promoted, indicating that they performed well in their new positions.

6.3 Support

Help from those around us is essential to a successful transition. This is the crux of the support factor in Taking Stock. Support can come in many forms and from individuals and groups. For women engineers returning to work, sources of support included spouses, parents, friends, former coworkers, fellow returners, iRelaunch, returnship programs, and employers.

An important characteristic of the transition back to engineering work was how women engineers stayed connected to their fields. Support from friends and family was a common resource that helped women engineers maintain their familiarity with technical work. Returners

mentioned that informal gatherings, such as Christmas parties, helped them stay connected with former colleagues or mentors. The infrequent nature of many returners' interactions with their networks suggests that a little effort goes a long way. For returners who used former colleagues as job references, they were consistently surprised that the lack of regular interaction did not impact the quality of the reference.

Returners who lacked a large community or family nearby had a harder time finding opportunities. Returners in these situations instead worked to build digital networks not tied to a specific geographic area. LinkedIn was the most popular networking tool returners used to make connections, but the iRelaunch community was also helpful to many. iRelaunch maintains a Facebook Group open only to returners (and iRelaunch career coaches) to foster community and share resources for career transition. Both LinkedIn and iRelaunch networking required significant time and effort investment, but after the initial learning curve, returners enjoyed connecting with their field and other returners.

Levels of employer support in our sample were bimodal: reentry programs provided incredible support, and other employers treated returners like any other new employee. The formal systems implemented through returnship programs demystified the transition process for returners. Most programs allowed women engineers to explore a few positions before being placed in a permanent role. Returners who did not participate in a returnship program had to figure out what area and position were appropriate for them before applying to the position. Mentorship was also formalized in returnship programs, whereas other returners received little to no internal mentorship. While the impact of returnship programs may be overstated in our data set, they provided significant institutional support to the few returners who participated.

6.4 Strategies

Strategies are actions an individual takes to change, reframe, or manage stress during the phases of transition [38], [39]. Women engineers returning to work used a wide variety of strategies, likely specific to engineering, as they transitioned back to work. While the success of each strategy depended on the unique situation of that returner, there were commonalities.

Many returners sought additional education as they transitioned into new roles. For some, this was an online course or community college classes, while others sought formal degrees (master's or PhD) or licenses (FE or PE). The knowledge gained through these upskilling practices proved valuable to returners in interviews, at their new jobs, and also helped them feel more prepared to return to technical work. The returners who pursued additional credentials hoped that this would help them stand out in applicant pools, but we did not see this effect in our sample. Returners with FE or PE licenses reported the same difficulty getting job interviews as those without those credentials, which is interesting, since traditional job wisdom assumes that degrees and certifications often translate into hiring potential. Women who focused on upskilling in the specific skills required for their desired jobs found those experiences very useful and confidence-building.

Activities that returners engaged in throughout their career breaks translated into valuable return-to-work strategies, regardless of whether they were technically focused. The women returners honed valuable professional and leadership skills during their career breaks. Proudly displaying these skills on their resumes or in job interviews was a very successful strategy. Experiences with nonprofits, freelance work, or entrepreneurship were all attractive to potential employers. By showcasing break activities, returners challenged the assumption that they had not been working or growing while on their career breaks. The communication skills of many

returners were also instrumental in moving out of the transition. Returners reported being more willing to ask questions, seek help, and take initiative than they were earlier in their careers.

Across the many strategies used by returners, they were largely independent and self-motivated. Returners worked to find knowledge, networks, opportunities, and the drive to return to work. The resource-seeking practices of returners in our study highlight the lack of established paths for returners. Despite numerous challenges along the way, the greatest strategy exemplified by women engineer returners was resilience.

6.5 Limitations

This study's findings and implications are accompanied by limitations. Utilizing podcast interviews as a data source has advantages and drawbacks (see [40] for more details on methodological limitations). The series of interviews we sourced episodes from is titled “Relaunch Success Stories.” Thus, our dataset omits unsuccessful stories. Additionally, all interviewees were part of the iRelaunch community, meaning the proportion of interviewees who participated in returnship programs (33%) is not representative of the number of returners who engage with returnship programs in the population. Because the impact of these data limitations on the findings is unknown, we do not believe our findings are generalizable to all women engineers returning to work.

7. Conclusions, Implications, and Future Work

Women engineers who take a career break represent a skilled, often untapped source of talent that could support the engineering workforce. However, significant barriers can make returning to technical roles challenging. Guided by Schlossberg’s transition theory, our findings show that women who have successfully returned to the field used a variety of strategies to navigate this transition, including networking through prior colleagues, professional societies and social media like LinkedIn, recognizing transferable skills they gained from activities they participated in during their break, upskilling (or taking the PE or FE exams), and taking advantage of returnship opportunities. For those considering a career break or supporting someone planning one, maintaining connections or building networks in the field is key. Interviewees were surprised that their reputation was “frozen in time” from their prior work and the utility of prior connections in the workplace. For engineering hiring managers, consider that ATS systems may be unnecessarily screening out engineering talent.

Our work offers insights into the experiences of women engineers returning to work after a career break, and we have identified several opportunities for future research. First, because this study analyzed only success stories, we suggest interviewing engineers who attempted to return to work but were unsuccessful, or whose plans didn’t turn out as they had hoped. We recognize that the perspectives of those who were unable to return to technical fields are critical to understanding the full range of challenges and barriers in this process. Next, understanding perspectives from employers and hiring managers would provide a more holistic view of the return process and its impacts, especially over time, to understand how returning affects career development and promotions. Finally, we were unable to find a conceptual model or theory for returning to work after a career break tailored to engineering or other technical fields. Future work can build on empirical data to develop a conceptual model that illustrates the unique challenges and dynamics of returning to work in a highly technical, gendered field like engineering. Such a model could inform targeted interventions, policy recommendations, and organizational practices that better support individuals returning to technical careers.

9. References

- [1] National Academies of Sciences and Medicine and Division of Behavioral and Social Sciences and Policy and Global Affairs and Board on Science Education and Board on Higher Education and Board on Science and Economic Policy and others, *Building America's skilled technical workforce*. National Academies Press, 2017.
- [2] National Research Council and Global Affairs and Board on Higher Education and Division on Engineering and Physical Sciences and Committee on Science and Mathematics Workforce Needs for the US Department of Defense and the US Defense Industrial Base, *Assuring the US Department of Defense a strong science, technology, engineering, and mathematics (STEM) workforce*. National Academies Press, 2012.
- [3] "U.S. Degree Attainment - Society of Women Engineers." Accessed: Jan. 20, 2026. [Online]. Available: <https://swe.org/research/2025/us-degree-attainment/>
- [4] "U.S. Employment - Society of Women Engineers." Accessed: Jan. 20, 2026. [Online]. Available: <https://swe.org/research/2025/us-employment/>
- [5] N. A. Fouad, W.-H. Chang, M. Wan, and R. Singh, "Women's Reasons for Leaving the Engineering Field," *Front. Psychol.*, vol. 8, Jun. 2017, doi: 10.3389/fpsyg.2017.00875.
- [6] T. Kim and D. Kim, "Chilly climate perceived by female engineering undergraduates: an exploratory study using concept mapping," *Front. Psychol.*, vol. 14, p. 1145795, 2023.
- [7] W. Bastalich, S. Franzway, J. Gill, J. Mills, and R. Sharp, "Disrupting Masculinities: Women Engineers and Engineering Workplace Culture," *Aust. Fem. Stud.*, vol. 22, no. 54, pp. 385–400, Nov. 2007, doi: 10.1080/08164640701578765.
- [8] S. S. Silbey, "Why do so many women who study engineering leave the field," *Harv. Bus. Rev.*, vol. 23, pp. 1–8, 2016.
- [9] N. Fouad, M. Fitzpatrick, and J. P. Liu, "PERSISTENCE OF WOMEN IN ENGINEERING CAREERS: A QUALITATIVE STUDY OF CURRENT AND FORMER FEMALE ENGINEERS," *J. Women Minor. Sci. Eng.*, vol. 17, no. 1, 2011, doi: 10.1615/JWomenMinorScienEng.v17.i1.60.
- [10] C. Herman, "Rebooting and Rerouting: Women's Articulations of Frayed Careers in Science, Engineering and Technology Professions," *Gend. Work Organ.*, vol. 22, no. 4, pp. 324–338, 2015, doi: 10.1111/gwao.12088.
- [11] H. E. George, "STEM Reentry Task Force." Accessed: Jan. 18, 2026. [Online]. Available: <https://reentry.swe.org/return-to-work-opportunities/>
- [12] P. C. Miles, "Why Do Educated, Successful Women Leave The Workforce?," vol. 2, no. 2, 2013.
- [13] P. Roberts and M. Ayre, "Did she Jump or was she Pushed? A Study of Women's Retention in the Engineering Workforce," *Int. J. Eng. Educ.*, vol. 18, no. 4, 2002.
- [14] N. A. Fouad, W.-H. Chang, M. Wan, and R. Singh, "Women's Reasons for Leaving the Engineering Field," *Front. Psychol.*, vol. 8, Jun. 2017, doi: 10.3389/fpsyg.2017.00875.
- [15] A. B. Diekmann, E. R. Brown, A. M. Johnston, and E. K. Clark, "Seeking Congruity Between Goals and Roles: A New Look at Why Women Opt Out of Science, Technology, Engineering, and Mathematics Careers," *Psychol. Sci.*, vol. 21, no. 8, pp. 1051–1057, Aug. 2010, doi: 10.1177/0956797610377342.
- [16] J. Hunt, "Why do Women Leave Science and Engineering?," *ILR Rev.*, vol. 69, no. 1, pp. 199–226, Jan. 2016, doi: 10.1177/0019793915594597.

- [17] “Retention in the Engineering Workforce - Society of Women Engineers.” Accessed: Jan. 18, 2026. [Online]. Available: <https://swe.org/research/2025/retention/>
- [18] E. A. Cech and M. Blair-Loy, “The changing career trajectories of new parents in STEM,” *Proc. Natl. Acad. Sci.*, vol. 116, no. 10, pp. 4182–4187, Mar. 2019, doi: 10.1073/pnas.1810862116.
- [19] J. L. Glass, S. Sassler, Y. Levitte, and K. M. Michelmore, “What’s So Special about STEM? A Comparison of Women’s Retention in STEM and Professional Occupations,” *Soc. Forces*, vol. 92, no. 2, pp. 723–756, Dec. 2013, doi: 10.1093/sf/sot092.
- [20] K. S. Ericksen, J. C. Jurgens, M. T. Garrett, and R. B. Swedburg, “should i stay at home or should i go back to work? workforce reentry influences on a mother’s decision-making process,” *J. Employ. Couns.*, vol. 45, no. 4, pp. 156–167, 2008, doi: 10.1002/j.2161-1920.2008.tb00055.x.
- [21] E. F. Cabrera, “Opting out and opting in: understanding the complexities of women’s career transitions,” *Career Dev. Int.*, vol. 12, no. 3, pp. 218–237, Jan. 2007, doi: 10.1108/13620430710745872.
- [22] G. Albertini-Bennett, “Exploring the Lived Experiences of Educated Women Who Opted Back into the Workforce after Working as a Stay at Home Mother: A Phenomenological Study,” Ed.D., Brandman University, United States -- California, 2018. Accessed: Jul. 23, 2024. [Online]. Available: <https://www.proquest.com/docview/2026696543/abstract/F415E8BFB68240CEPQ/1>
- [23] C. Herman, “Returning to STEM: gendered factors affecting employability for mature women students,” *J. Educ. Work*, vol. 28, no. 6, pp. 571–591, Nov. 2015, doi: 10.1080/13639080.2014.887198.
- [24] G. Ranson, “No Longer ‘One of the Boys’: Negotiations with Motherhood, as Prospect or Reality, among Women in Engineering*,” *Can. Rev. Sociol. Can. Sociol.*, vol. 42, no. 2, pp. 145–166, 2005, doi: 10.1111/j.1755-618X.2005.tb02459.x.
- [25] C. Herman and G. Kirkup, “Learners in transition: the use of ePortfolios for women returners to science, engineering and technology,” *Innov. Educ. Teach. Int.*, vol. 45, no. 1, pp. 67–76, Feb. 2008, doi: 10.1080/14703290701757468.
- [26] N. Panteli, “A community of practice view of intervention programmes: the case of women returning to IT,” *Inf. Syst. J.*, vol. 22, no. 5, pp. 391–405, 2012, doi: 10.1111/j.1365-2575.2012.00415.x.
- [27] N. Panteli and S. Pen, “Empowering women returners in the UK high-tech industry,” *Pers. Rev.*, vol. 39, no. 1, pp. 44–61, Jan. 2010, doi: 10.1108/00483481011007850.
- [28] “Normalizing career breaks® ...for everyone, everywhere.” iRelaunch. Accessed: Jan. 09, 2025. [Online]. Available: <https://www.irelaunch.com/>
- [29] H. E. George, “An Intervention Strategy to Re-engage Women Engineers in the Workforce,” Society of Women Engineers, White Paper, 2017. [Online]. Available: <https://reentry.swe.org/wp-content/uploads/2019/10/STEM-Re-entry-White-Paper-Exec-Summary-and-Needs-Statement.pdf>
- [30] “STEM Reentry Task Force,” iRelaunch. Accessed: Jan. 18, 2026. [Online]. Available: <https://www.irelaunch.com/employers/services/stem-reentry-task-force>
- [31] M. B. Arthur and D. M. Rousseau, *The Boundaryless Career: A New Employment Principle for a New Organizational Era*. Oxford University Press, 2001.
- [32] D. T. Hall, “The protean career: A quarter-century journey,” *J. Vocat. Behav.*, vol. 65, no. 1, pp. 1–13, Aug. 2004, doi: 10.1016/j.jvb.2003.10.006.

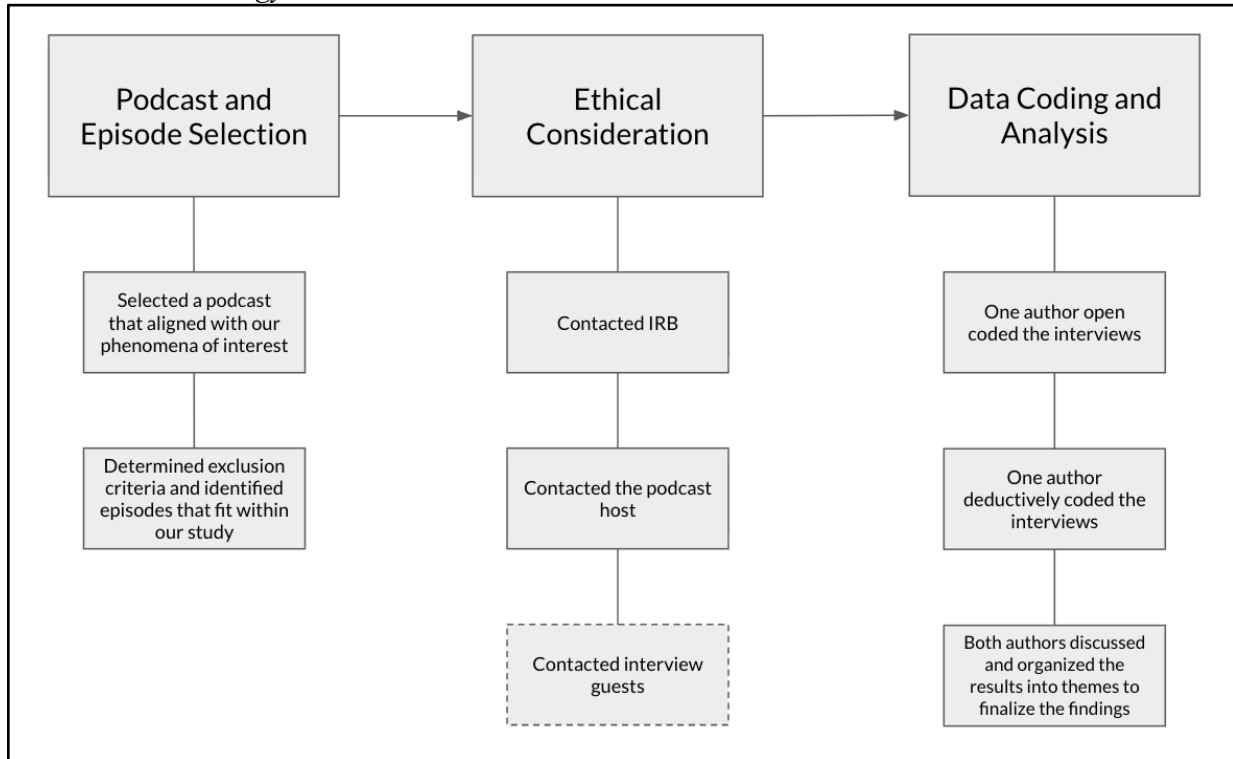
- [33] L. A. Mainiero and S. E. Sullivan, "Kaleidoscope careers: An alternate explanation for the "opt-out" revolution," *Acad. Manag. Perspect.*, vol. 19, no. 1, pp. 106–123, Feb. 2005, doi: 10.5465/ame.2005.15841962.
- [34] L. M. Zimmerman and M. A. Clark, "Opting-out and opting-in: a review and agenda for future research," *Career Dev. Int.*, vol. 21, no. 6, pp. 603–633, Oct. 2016, doi: 10.1108/CDI-10-2015-0137.
- [35] J. Simone, "Career Break Perceptions and Experiences: Women in STEM," other, Victoria University, 2024. Accessed: Jul. 16, 2025. [Online]. Available: <http://vuir.vu.edu.au/>
- [36] N. K. Schlossberg, "A Model for Analyzing Human Adaptation to Transition," *Couns. Psychol.*, vol. 9, no. 2, pp. 2–18, Jun. 1981, doi: 10.1177/001100008100900202.
- [37] J. Goodman, N. K. Schlossberg, and M. L. Anderson, *Counseling Adults in Transition: Linking Practices with Theory*. New York, UNITED STATES: Springer Publishing Company, 2006. Accessed: Jul. 14, 2025. [Online]. Available: <http://ebookcentral.proquest.com/lib/vt/detail.action?docID=291321>
- [38] N. K. Schlossberg, *Counseling Adults in Transition*. Springer Publishing Company, 2005.
- [39] N. K. Schlossberg, "The challenge of change: the transition model and its applications," *J. Employ. Couns.*, vol. 48, no. 4, pp. 159–162, Dec. 2011, doi: 10.1002/j.2161-1920.2011.tb01102.x.
- [40] O. Ryan, K. Drinkwater, and S. Sajadi, "Utilizing Podcast Interviews as a Data Source in Engineering Education Research to Analyze Experiences of Women Engineers After a Career Break," presented at the 2025 ASEE Annual Conference & Exposition, Jun. 2025. Accessed: Apr. 27, 2026. [Online]. Available: <https://peer.asee.org/utilizing-podcast-interviews-as-a-data-source-in-engineering-education-research-to-analyze-experiences-of-women-engineers-after-a-career-break>
- [41] I. Kulkov, J. Kulkova, R. Rohrbeck, and L. Menvielle, "Leveraging Podcasts as Academic Resources: A Seven-step Methodological Guide," *Int. J. Qual. Methods*, vol. 23, p. 16094069241266197, Jan. 2024, doi: 10.1177/16094069241266197.
- [42] "3, 2, 1 iRelaunch Podcast," iRelaunch. Accessed: Jan. 09, 2025. [Online]. Available: <https://www.irelaunch.com/podcast>
- [43] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qual. Res. Psychol.*, vol. 3, no. 2, pp. 77–101, Jan. 2006, doi: 10.1191/1478088706qp063oa.
- [44] J. Saldaña, *The coding manual for qualitative researchers*, 2nd ed. Los Angeles: SAGE, 2013.
- [45] W. Faulkner, "Doing gender in engineering workplace cultures. II. Gender in/authenticity and the in/visibility paradox," *Eng. Stud.*, vol. 1, no. 3, pp. 169–189, Nov. 2009, doi: 10.1080/19378620903225059.
- [46] Z. Hazari, G. Sonnert, P. M. Sadler, and M.-C. Shanahan, "Connecting high school physics experiences, outcome expectations, physics identity, and physics career choice: A gender study," *J. Res. Sci. Teach.*, vol. 47, no. 8, pp. 978–1003, 2010, doi: 10.1002/tea.20363.
- [47] A. Godwin, "The Development of a Measure of Engineering Identity," in *2016 ASEE Annual Conference & Exposition Proceedings*, New Orleans, Louisiana: ASEE Conferences, Jun. 2016, p. 26122. doi: 10.18260/p.26122.

- [48] K. L. Tonso, "Student Engineers and Engineer Identity: Campus Engineer Identities as Figured World," *Cult. Stud. Sci. Educ.*, vol. 1, no. 2, pp. 273–307, Sep. 2006, doi: 10.1007/s11422-005-9009-2.
- [49] M. Lovejoy and P. Stone, "Opting Back In: The Influence of Time at Home on Professional Women's Career Redirection after Opting Out," *Gend. Work Organ.*, vol. 19, no. 6, pp. 631–653, 2012, doi: 10.1111/j.1468-0432.2010.00550.x.
- [50] J. B. Fuller, M. Raman, E. Sage-Gavin, K. Hines, and others, "Hidden workers: Untapped talent," *Harv. Bus. Sch. Proj. Manag. Future Work Accent.*, vol. 1, 2021.

10. Appendix

Appendix A

Figure 1
Podcast Methodology



Appendix B

Table 1
Career Break Information for iRelaunch Participants

Participant	Field Before Break	Reason for break	Length of break (years)	Activities during break	Reason for Return	Field after reentry	Reentry Program?
Arlene	Public Transportation Engineering	Childcare	13	Nonprofit management	Children grown	Public Transportation Engineering	No
Cynthia	Aerospace engineering	Childcare	17	Children's Ministry Director	Financial	Aerospace Systems Engineering	No
Gabriella	Manufacturing Management	Childcare	22	-	Children grown	Engineering Operations	Yes
Jane	Aerospace programming	Childcare	11, 4.5	-	Children grown	Aerospace Systems Engineering	No
Jennifer	Systems Engineering	Childcare, Health	20	-	Children grown	Systems Engineering	Yes
Krystal	-	Childcare	3	Master's Degree, PE	Financial	Structural Engineering	No
Letitia	Hazardous Substance Engineering	Childcare	20+	Volunteering, Tutoring	Children grown	Hazardous Substance Engineering	No
Lucy	Civil Engineering	Childcare	13	-	Financial	Public Service	No
Pam	Microwave Engineering	Childcare, Eldercare	31	Technical Writing	Desire for technical work	3D Printing Engineering	No
Samantha	Systems Engineering	Health	8	Volunteering	Improved Health	Systems Engineering	Yes
Shweta	Software Engineer	Relocation, Childcare	3	-	Settled in US, Able to get work visa	Software Engineering	No
Sirisha	-	Childcare, Education	2.5	PhD	Finished PhD	Software Technology	No
Sue	Mechanical Design	Childcare	19	Teaching, Master's Degree	Children grown	Manufacturing Engineering	Yes
Tcheula	Energy Electrical Engineering	Childcare	10	Small food business	Children grown	Electrical Product Design	Yes
Winifred	Petroleum Engineering	Childcare, Interest Shift	~5	Philanthropy, Volunteering	Interest in social impact	Women in STEM Education	No

