Facilitating Alternate Career Paths for Mothers in the Aerospace Field

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

The sociotechnical topic I am exploring is the return of women to the aerospace field after taking years off to raise children, because long term maternity leave affects career progression and the fast-moving nature of the space field provides a barrier to entry to people who wish to return after multiple years away from the field. The increasing proportion of women in tech fields makes this a more prominent issue than ever before.

Today, most discussion about careers in engineering is predicated on the assumption that all engineers will have careers that are continuous and last about forty to forty-five years. Current discourse surrounds working mothers, and advocacy for generous maternity and generalized parental leave policies in order to allow parents to recover and stay home until the child is around three months old (Department of Labor, 1993). These policies enable women to stay home without losing their jobs until the child is old enough to reasonably be put in daycare, and thus continue to advance their careers. However, this assumes that working parents will want to put their children in daycare for essentially the rest of their childhood, and this isn't necessarily the case.

There is little discourse surrounding mothers who take longer career breaks, and because few policies are in place to support them, it is difficult to return to the aerospace field after a career break. This combines to send the message that women in the aerospace field should either not have children or should automatically be working parents, as otherwise they have to give up their career. However, this really shouldn't be the case; if a woman takes off ten years to raise children, she still has a combined thirty to thirty-five years remaining in her career, which is

more than enough to make meaningful contributions to a field. So why do we decide that a break from the field is unrecoverable?

The fast-growing nature of the space industry is a double-edged sword; on the one hand, it means that breaks of even a few years from the field mean coming back to a significantly changed landscape with unfamiliar technologies, but the fact that the field is in flux means that policies are already changing, which might make it easier to implement new policies that would benefit women exploring career breaks. A study by Collins and Autino argues that the growth of space tourism will attract many new jobs and will create a lot of new opportunities for engineers (2010). Furthermore, the space industry has begun to outsource more and more of the research and development to various contractors in recent years, which means the institutions aren't as established at a lot of companies (Johannsson et. al, 2015). Therefore, it will likely become easier to re-enter the industry over time, and now is also the time to push for policy change, before the dust has settled.

While a positive long-term outlook is nice, more immediate change should be enacted as well. Universities should encourage female engineers to consider these eventualities and plan their careers accordingly, as significant policy change may not arrive until after it would benefit the current generation. At the industry level, companies should implement policies that provide training for women re-entering the aerospace field.

Background and Motivation

The main barriers to entry for engineers who have taken lengthy career breaks are a lack of connections in the industry, and the degree to which women on career breaks retain the skills that are pertinent to the needs of the industry. Because the aerospace industry is a fast-paced field, recent experience is one of the most valuable qualifications for a new job, which is

something that those returning to the field will lack. A recent study showed that two of the top ten keywords for job descriptions are “simulation software” and “security clearance” (ZipRecruiter, 2018). After a break from the field, many people will have had their security clearances expire, and the fast-evolving nature of simulation software will render experience that is even a few years out of date significantly less valuable. On the other hand, the skill that is central to aerospace engineering isn’t particular technical fields, but problem solving skills. And once that mentality is ingrained, through years in university and in the field, it doesn’t go away. Therefore women in these fields retain the most important skill even after years out of the field.

Over the last couple decades, there has been a huge push to get more women into science and engineering fields, which has increased the proportion of female engineers in the workforce. However, the field is still highly male-dominated; in 2020, female engineers made up just 10% of the engineering workforce (Mitchell & Walthall, 2021). The increasing proportion of women in science and engineering fields has not gone unnoticed by the industry; maternity leave policies have improved significantly over the course of the last few decades. Currently, the baseline is 12 weeks of unpaid parental leave for (effectively) every company with more than 50 employees, due to the Family and Medical Leave Act (Department of Labor, 1993). This allows children to reach the age at which daycare is a reasonable option.

This topic is important because the growing number of women in the aerospace field means that it affects more and more women. It is also important to me on a personal level - as a woman in the aerospace engineering field who intends to have children, I must consider how that decision will affect my career. I realized that engineering education and the career advice we receive in university is predicated on the idea that we will begin work when graduating school and then work until retirement. However, if I decide not to put my children in daycare, then I

may have to take a career break, and none of the career advice we receive in school, or indeed the state of the aerospace industry in general, is geared towards people who would take a career break. Therefore, it is necessary for me to plan for a career that will hopefully facilitate my path back into the aerospace field after I have children, and also to raise awareness about the importance of this issue in order to hopefully make differences in industrial policy and help other women in my position.

Methodology

The best framework with which to approach the question of options for mothers in the workforce is ethics of care. This framework allows for nuance in situations such as this, as it posits that the most affected groups deserve consideration in policy proportional to their vulnerability. It seems that in many socio-technical problems, the root cause is that two separate problems are in direct conflict: profit and treatment of workers, or profit and environmental problems, and so on. However, in this case the root cause is that two different methods of attempting to integrate women into the science and engineering workforce are in conflict. One, the method which is currently prevalent, is to just treat the women exactly the same as the men - providing them equal opportunities to jobs, attempting to eliminate discrimination based on motherhood status, and providing some amount of maternity leave (and, more recently, changing "maternity leave" to "parental leave" to allow both parents equal amounts of time off). This methodology assumes a forty to forty-five year career, which removes the assumption that the mother is likely to leave the industry and stay home with her children when they are born. The stay at home mother assumption is seen as sexist, as it supports more traditional familial roles.

However, the care ethics framework shows the importance of catering not towards some theoretical version of equality but towards the needs and wants of actual mothers or

mothers-to-be in the field. Some of those mothers want to take a few months off and return to work right away, but some would rather take the time to raise their children more directly in their early years, and they should be supported in that as well. The goal of modern equality should be to support both traditional and more modern approaches to work and family balance, instead of just traditional or just modern. The pendulum has swung from just supporting women in traditional roles to mostly supporting women in modern roles, as working mothers. This is harmful for the mothers (and fathers) who choose to stay home, because currently, companies fail to account for those options in the industry, and thus fail to adequately support those who choose that path. Because more women currently stay home for longer periods of time than men, they need the additional support from the industry in ways that men don't as much. And, although perhaps men in lower-paying fields have wives who are higher earners and choose to take time off, aerospace is a pretty well-paid industry. This means that the spouse in this profession is often the breadwinner (or one of two equal earners), and thus, if the person is male, less likely to take time off. Therefore catering specifically to the women in this field is important because it will result in better outcomes for the women and also the men who take time off, whereas trying to cater to both equally, or the average person in the field, would end up still excluding the men who take time off because it excludes women who take time off.

Literature Review and Discussion/Results

There are, essentially, three options for women in the workforce: Outsourcing childcare to other family members or daycare services, increasing flexibility for women who want to work and parent at home simultaneously through hybrid options, and taking a career break. Hereafter I will discuss the scope and implications of each option.

Many mothers wish to return to the workforce soon after their children are born, and there is significant support for this within the industry, as shown above. It is also important that this option is available to women; it has been a decades-long effort to allow women options for work outside of the home, and those who wish to further their careers the most may need a lifetime to do so. These families can put their children in daycare until they are old enough to start school. However, daycare can be very expensive depending on location and quality. In the United States of America, the average family spends 10% of their combined household income on childcare (Child Care Aware 2018: 25). This is, naturally, considerably weighted towards families with two working parents. In 2021, 26% of mothers and 7% of fathers were stay at home parents, so a combined 33% of families had a stay at home parent. An additional 20% of families with two working parents use grandparents as their primary source of childcare. Therefore, it can be reasonably assumed that these families spent little to no income on childcare. The remaining 47% of families, therefore, likely spend around 21% of their income on childcare, which is triple the affordable amount of seven percent (Department of Health and Human Services, 2015). This is a significant challenge for many families, and a sound reason for mothers to choose to stay home; even if the income is split equally between husband and wife, almost half of the wife's income would go into childcare, so staying at home to raise children would be a blow to her income, but not a particularly substantial one. Additionally, sometimes even parents who intended to go back to work can run into unexpected roadblocks; if the child is born with special needs, they may need more time at home with the parent, or daycare may simply not be possible given their needs. So even if it were the case that every woman wanted to go the route of immediate return to work, some of them would need to explore alternatives. On the other hand, some women who intended to stay at home for the rest of their career might need

to return to the industry in order to pay for the increased expenses that come with sending children to college. Therefore it is important to allow for flexibility for various options in women's career paths.

There is, to some extent, an intermediate option for mothers, which came into widespread use during the Covid-19 pandemic: hybrid work. Arora and Kumari found that the move to a hybrid workforce would create opportunities for women with children to stay in the workforce, as they could have more flexibility in scheduling their work hours to enable things like taking children to and from school and activities (2022). An article by Hilbrecht et. al. claims that women who worked from home and on flexible time schedules while caring for children had greater perceived work-life balances than women working in person (2008).

However, there are a few aspects of this arrangement that seem unsavory - particularly for mothers of young children, flexibility in this context seems like it might just mean a higher ability to multitask. This would mean splitting their attention between their work and their children all the time, which probably means they're less successful at both. Additionally, it seems that women who work a flexible/hybrid schedule while their husbands work in person likely receive less support with childcare from their spouse than otherwise; when men work on flexible schedules, they are less happy and fulfilled than when they work a nonflexible schedule, whereas the opposite is true for women. This indicates that men likely contribute less to the running of the household when they work a nonflexible schedule, as a larger role makes them less happy when they are on a flexible schedule (Minnotte et. al., 2016). The combination of less spousal support and a higher need to multitask indicates that flexible work schedules isn't a substitute for career breaks or full time work.

The third option is for women to stay at home and return to the workforce when their children are older. Many parents wish to spend time with their children while they are young, as well as raise them in accordance with their beliefs, which is easier to do when the parents are the primary influences in the early years. The youngest child starting kindergarten provides a logical transition back to full time work, as the children will be out of the house for the same hours of the day as the working parents. So a woman would be out of the workforce for about five years for one child, or about ten years for three children, using the median sibling age gap of two to two and a half years (Thoma et al., 2016). The aerospace industry doesn't provide a good mechanism for women to return to the workforce after a career break, especially one of ten years instead of just one or two years. Because the aerospace industry is a fast-paced field, recent experience is one of the most valuable qualifications for a new job, which is something that those returning to the field will lack. A recent study showed that two of the top ten keywords for job descriptions are "simulation software" and "security clearance" (Crane & Le). After a break from the field, many people will have had their security clearances expire, and the fast-evolving nature of simulation software will render experience that is even a few years out of date significantly less valuable. In a recent study, 72% of those who are trying to return to the STEM workforce from a career break are experiencing difficulty returning to work (Webber, 2022).

While there are some things that women can do before they re-enter the workforce to make themselves more appealing to recruiters, these mechanisms are often expensive - for example, taking certification classes / getting a higher degree to have more contemporary experience, the latter of which might take years of work to earn back. However, if women return directly to work, it might take them a month or two to learn how to apply their experience to the more modern technology, but this should not provide a significant hindrance to the company.

Men who experience a career break experience some of the same troubles returning to the workforce, so the fact that companies don't have mechanisms in place to enable returning employees is harmful to everyone, regardless of gender.

Stepping away from the care ethics framework for the moment, enabling women to transition back into the workforce after several years off is beneficial strictly from the perspective of the aerospace industry as well. Assuming a woman takes ten years off for three children as seen above, and that she has her first child at 26 (which is the median age in the US), she would re-enter the workforce around the age of 36. Since the retirement age in the US is 67, she has another 31 years of working life. That is a significant amount of time she could spend back in the industry as an already fully-trained engineer. Therefore the engineering field can retain a greater portion of the already-trained entry level talent for more years, reducing the need to hire and train lower-skilled workers. The associated solution, companies providing training for a few months for new employees to adapt to changes in technology and industry standards, does cost the industry some amount of money but if women choose between having three months of paid parental leave, as is standard, and three months of training when they rejoin the workforce, the company likely comes out around even for women who choose either path.

This research shows that there isn't a one-size-fits-all solution to how families should manage parenting and work. While some families will prefer to have both parents work and pay for external childcare or receive child care from other family members, others will have one of the parents stay at home, and workplaces should facilitate both pathways in order to support the American family. This is beneficial for both employees, since they have more freedom to choose and support in their journey, and employers, as they are able to retain more. The main ways for employers to do this are to provide concrete pathways back into the workforce, including any

necessary certification classes that will give women the training they need to resume their careers.

Conclusion

The purported benefit of having diverse workplaces is that people who have different backgrounds and perspectives will be able to bring their experience to bear on their work, resulting in different ways to solve problems that allow more efficiency and efficacy in work.

However, it's seen as taboo to acknowledge that people of different genders or backgrounds may be more skilled at different things; our culture wants to bring different people together in order to be perceived as diverse, but does not wish to actually have the full range of perspectives that we are fortunate to be able to bring together in modern society. They wish to hire women, but only women who can fit into the traditional male role in the workplace; forty hours a week for the middle forty years of their lives, with little to no interruption from familial duties. Women who have taken time away from their career to raise children have a different perspective, which allows them to bring new voices to the workplace. This is crucial, not only having gender equality but gender equality across a range of different life experiences, and a large component of this is parenthood.

The initial work towards solving this problem is twofold: one, to bring awareness to this question for those whom it will affect; namely, female university students in aerospace engineering. Acknowledging that women often face different burdens in family life than men and thus may have very different career plans is vital, and if students have a thorough understanding of this before they begin their careers then they can plan for their future accordingly, with the foreknowledge that they may not have the stability provided by forty unbroken years of work. This can allow female students to opt for career choices that will give them the best chance of a

smooth return to the field - choosing jobs in the government, where their government employee status will give them an advantage in applying for government jobs even after a career break, and in large, stable companies, where they can make connections in the industry, rather than smaller companies with higher potential profit but which are more likely to go out of business and render experience less useful after a career break. Another good option might be to delay getting a higher degree until after a career break - this allows for more years in the workforce before a career break, and obtaining a higher degree can be a good transition back into the field, as it provides contemporary experience that will be valuable to companies.

The second component is to determine the specific policy change that will be helpful in the industry. It will be necessary to determine the cost of retraining after career breaks, the length such a program would need to be, and how to implement this, as well as raising awareness to this issue within the industry. The specific economic and political nuances are beyond the scope of this paper, but the next steps will be crucial in facilitating the integration of women into the aerospace field and accommodating for the diversity in their circumstances.

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