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Against the Wind: Exploring Gender Disparities & Barriers Women Face in Aviation

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by

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Dedication:

I would like to dedicate this thesis to my parents, Wajiha and Hussain. Thank you so much, Mom and Dad. I am forever grateful to God for having both of you! You both have been my source of inspiration, support, and guidance.

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Abstract

The aviation sector, essential to global economics and international trade, has traditionally been dominated by men, with fundamental barriers preventing women from entry and career progression. This study examines the persistent underrepresentation of women in the aviation workforce, especially in pilot positions, and aims to identify the root causes of this gender disparity. The research investigates the institutional barriers, personal experiences, and problems women face in the aviation industry (commercial and Air Force) through qualitative interviews with women and men working or studying in the field. The main obstacles are listed as follows: persistent gender stereotypes, pregnancy discrimination, a lack of female role models and mentors, work-life balance barriers for individuals, financial barriers, and the unsuitability of military equipment for women. The results emphasize the necessity of the aviation sector making strategic reforms to create a more welcoming environment that encourages and supports women's careers in the field, eventually increasing efficiency and innovation.

Chapter I

Introduction

"Ladies and Gentlemen, welcome aboard, this is your Captain speaking" is an announcement in which everyone hears different voices while flying from one place to another to connect with families, friends, and colleagues. However, on a flight, the chance of hearing that announcement from a female voice is less than 1 percent (Lancia, 2017). In addition, you might also read in the news occasionally about flight cases, such as topics like "the passenger refused to fly with a female pilot." Unfortunately, this is one case that has happened to many of the few female pilots who exist and work in the airline industry around the globe today. Not only is the number of women in the pilot role very low, but it's also low in other roles such as airline engineers, air controllers, aviation leadership roles, aerospace engineers, and aircraft structures, which make up most of the roles in the industry. In short, although there are high skies to fly planes, women have fallen short of contributing to and working in the aviation industry, along with their male colleagues, over the history of the aviation industry and its careers.

The aviation industry is critical to both the domestic and international economies. Even though aviation is a global and large industry, there is a lack of diversity in training, airline operations, and military aviation, among other areas. Sobieralski and Hubbard (2019), argue that less than 5% of pilots worldwide are women, and enrollment statistics in aviation schools do not indicate that there will be any substantial increases in diversity in the future until a deliberate effort to change is pursued (Hubbard & Sobieralski, 2019). Boeing (2019) states that a greater awareness of these diversity challenges is required due to the existing and projected aviation workforce shortage and the anticipated rise in travel demand over the next 20 years worldwide.

While women make up about half of the workforce in the U.S. and are more likely than males to obtain a bachelor's degree, according to the Bureau of Labor Statistics (2018a), it is critical to fully understand why women are underrepresented in aviation, especially considering the expected rise in aviation professions that will accompany global aviation growth. This underrepresentation is significant because of diversity, labor scarcity, available transportation, international trade, and the intermediary function that aviation performs in all of these areas. Consequently, this chapter offers a glance at the trends and numbers of females involved within the aviation industry, as well as a historical overview of aviation and the involvement of women within the aviation sector, which Nilson (2022) refers to as the "old boys club" or a job area dominated by men.

Aviation and Women: Background and History

Women and the Aviation Industry's Beginnings

The field of aviation has grown significantly since its invention by the Wright brothers in December 1903. On December 17, 1903, their powered flying machine under the pilot's command successfully flew off, traveled 120 feet in the air, and landed in the early hours of the morning. Many men were drawn to the aviation industry after the invention of flight, devoting their time and energy to building numerous aircraft types and creating new flying activities. Following the Wright brothers' 1903 invention of the Wright Flyer, women also discovered that they were prepared to give up their conventional responsibilities to pursue careers as pilots and investigate new prospects in the field of aviation (Mutisya, 2010). During those periods, airplanes were not yet thought of as reliable modes of transportation between the mid-1900s and early 1920s. It was seen as an interesting machine, a "but somehow useless toy", that could be

utilized for sports and leisure activities; however, in the late 1920s and 1930s, the airplane emerged as a practical and reliable means of transportation (Corn, 1979, p. 558). Therefore, women who wanted to be pilots and have successful aviation career spent their time concentrating on developing their flying skills, competing in air races, and operating exhibitions of flights (Corn, 1979).

The female students were inspired to try flying planes by the challenge of achieving women's speed and attitude milestones. Among the first few women aviators were Amelia Earhart, Harriet Quimby, and Blache Scott. These women constantly pushed themselves to take on more challenging missions and inspired more young women to pursue careers in aviation (Mutisya, 2010). Early pilots needed to possess a lot of energy, a sharp eye, sound judgment, and massive physical strength. Demanding these qualities put women in danger and contributed to the public's assumption that women lack these "heroic traits." As a result, a stereotype encouraging the public to judge the abilities of women emerged. It led early women aviators to write books and stories about their experience, challenging the widespread view that female flying was unwomanly through their writings and describing how the sky offered freedom and equality to both genders.

Amelia Earhart established the all-female pilots' organization, The Ninety-Nines, on November 2, 1929, which contributed to the protests against the numerous types of discrimination women faced at work. For example, women pilots were grounded by the Air Commerce Department during their monthly periods since it was believed that they were weaker and less competent during this time. A typical gender stereotype at that time was that "man-made machines must truly be fail-safe and all-forgiving" if "incompetent" women could use them (Corn, 1979, p. 560). In the early 1930s, when women had platforms such as the Ninety-Nines,

more clubs for women were built for women to get together, suggest changes to these roles, and urge one another to stick with their passion for flying (Corn, 1979).

A commercial perspective on aviation's impact did not emerge until the late 1920s. Charles Lindbergh's historic solo transatlantic nonstop flight in 1927 made the necessary shift toward the development of air commerce and travel (Mutsiya, 2010). The development of airports, airlines, and aircraft capable of transporting people and commodities across great distances in a timely and safe manner came next. But when it came to flight safety, the public remained very skeptical, which made support for aviation development and engineering essential. However, women aviators found opportunities in promoting and selling airplanes to the market, which allows them to obtain a greater flying experience despite the existing stereotypes in society.

The rise in the number of female pilots was first encouraged by aircraft sales and air show events, but it was eventually interrupted by an evolving aviation industry in the late 1930s. Businesses stopped lending women airplanes for races and long-distance flights, and the public's interest in private aviation decreased (Davies, 1964). Despite being essential to the development of female pilots, these attempts lost significance as passengers flying by air increased. Female pilots were also unable to obtain a transport license for employment with airlines in the late 1930s. As a result, many women aviators' expectations were shattered when they had to retire from a growing sector due to a lack of opportunities for advancement. (Davies, 1964). Some prospective female pilots were discouraged by the deaths of notable female aviators like Phoebe Omelie (July 17, 1975), Harriet Quimby (July 1, 1912), and Amelia Earhart (January 5, 1939) during flying missions (Corn, 1979).

World War II and the Rise of Female Air Force Service Pilots

Women pilots had new chances after the United States entered World War II on December 8, 1941. Women were able to pursue military aviation through gateways established since the country's military lacked combat pilots to transport aircraft from factories to military bases and fly military personnel. The new environment of military aeronautical activity prompted swift responses from groups like the Women Flyers of America (established in July 1940), the Civil Aeronautics Association (established on June 23, 1938), and the Ninety-Nines International Women Pilots Association (established on November 2, 1929). They looked for young female pilots who wanted to work for their nation in whatever capacity and provided financial support to those who couldn't afford to get trained. Women might also complete their private pilot training for a total of $275 through a pay-as-you-go approach (Douglas, 1990). As a result, the prospect of pursuing an aviation profession successfully became more possible with the availability of cheap ground and flight training for women during World War II (Douglas, 1990).

In addition, the primary source of competent and trained ferry pilots for the US military during the war was the Women Air Force Service Pilots (WASP), which was founded on August 5, 1943, as a civilian organization that cooperated with the army. Ferry pilots are commercially rated pilots and aviation professionals who specialize in repositioning aircraft for owners, buyers, sellers, maintenance facilities, and businesses. More than sixty million miles and 77 different varieties of military aircraft were flown by the WASPs. some of which had dangerous reputations as heavy bombers with design and safety problems (Merryman, 1998) They flew military troops, towed targets, test-piloted new and reconditioned aircraft, transported aircraft from manufacturers to bases, and flew bombers, guided and taught navigators and other military

personnel. Furthermore, they were also interested in performing the administrative duties associated with general aviation, including developing regulations and procedures regarding certifications, evaluation, training, and commercial operations, as well as flying instructors, among other things (Merryman, 1998).

Even after women cracked gender stereotypes and flew intimidating aircraft with success, prejudice, and instances of discrimination persisted. At some stations, there were suspicions of sabotage events, and the WASPs were frequently assigned to aircraft that were not properly taken care of. On top of that, women only earned two-thirds of the income that men received for doing similar ferrying jobs. The idea that women are emotionally and physically vulnerable persisted, and complaints about these occurrences and equitable wage gaps were disregarded (Frisbee, 1995).

When Congress turned down the WASPs' application to enter the military during World War II, they faced even more oppression. The perception that women's participation in military aviation programs was experimental posed a significant obstacle to the permanent integration of women into American society. According to Douglas (1990), it was believed that the WASP program could not be militarized until sufficient experience had been acquired to assess its importance for female pilots. After the war, 90% of women were willing to stay in the military and requested to be retained. But male pilots protested against the military and veteran status of women, arguing that would prevent men from flying missions. As a result, the WASP was shut down shortly after the end of World War II in December 1944, forcing women pilots to look for alternative employment options.

Nevertheless, groups like the Ninety-Nines, the National Intercollegiate Flying Association, and the Civil Air Patrol assisted women in pursuing piloting careers in general

aviation[1]. These groups put a lot of effort into removing barriers (such as financial barriers, gender stereotypes, lack of mentors, etc.) that prevented women from becoming pilots and expanding the opportunities for women to fly. However, progress was very slow due to the lack of supportive regulations and a lack of adequate responses to women's career potential in the commercial aviation industry (Douglas, 1990).

History of International Women Pilots

In the 1930s, there were 500 American women among the 1,000–2,000 women who were aviators worldwide. Internationally, the number of women pilots grew more slowly, and they faced comparable obstacles that women encountered in the United States. In addition, the majority of the first female aviators in France were from wealthy backgrounds, as they had to pay for flying lessons with the instructor (usually given by ex-army pilots), and then pay for every hour they spent in the sky. Raymonde de Laroche was the first female pilot who got her pilot license in March 1910. Through French women's involvement in aircraft promotional campaigns and sports flights, French female pilots rose in popularity as role models and heroes for younger females. (Reynolds, 1989).

Early female pilots in Nazi Germany were restricted to flying a small selection of aircraft and could only earn sporting permits. Women were appointed by the Luftwaffe, a division of the German Army Air Force, to transport aircraft and serve as gliders, instructors, and motor non-combat pilots during World War II. They were only granted permission to fly under optimal weather conditions. Strict Nazi gender role laws reduced the contribution of female pilots to

[1] General Aviation Pilot: recreational flying, flight training, aerial photography, agricultural spraying, and business aviation, among others. General aviation pilots may fly small single-engine airplanes, helicopters, gliders, or other types of aircraft for various purposes.

aviation, disregarding their dedication and sense of nationalism. Women were not hired by the Luftwaffe as combat pilots until the end of the 20th century (Zegenhagen, 2009).

For most of the 20th century, women pilots in Africa were rare. The industrialization of many African countries was influenced by colonization, which resulted in a markedly delayed expansion of both commercial and military aircraft. However, their independence made it possible for the national military and aviation industries to be established and grow. Males controlled air forces and large air travel corporations, while women continued to play more conventional roles like household responsibilities and raising children, which are bulks of unpaid work. For example, women were not admitted into the Kenya Air Force or airlines until the late 1990s. Therefore, the modest rates of economic development in Africa may have contributed to a slower rise in the number of international women pilots.

In summary, women's history in aviation is characterized by tenacity and overcoming barriers. Women have contributed to the profession and challenged biases, from the early pioneers such as Amelia Earhart to the establishment of groups like The Ninety-Nines. Women served as crucial Women Air Force Service Pilots (WASP) members during World War II despite prejudice and restricted opportunities. Women had comparable difficulties worldwide, with differing degrees of discrimination. Even in the face of progress, persistent barriers, including gender stereotypes and limited opportunities, have shaped women's history in aviation.

Low female representation in aviation careers: numbers and trends

The number and percentage of women in aviation are almost a single digit. Based on a report issued by the International Air Transport Association (IATA, 2018), only 3% of chief executive officers and chief operating officers in the top 100 airline corporations worldwide are female, while 8% of airline chief financial officers are female. The figure below shows the share of women in senior executive roles in aviation and other industries.

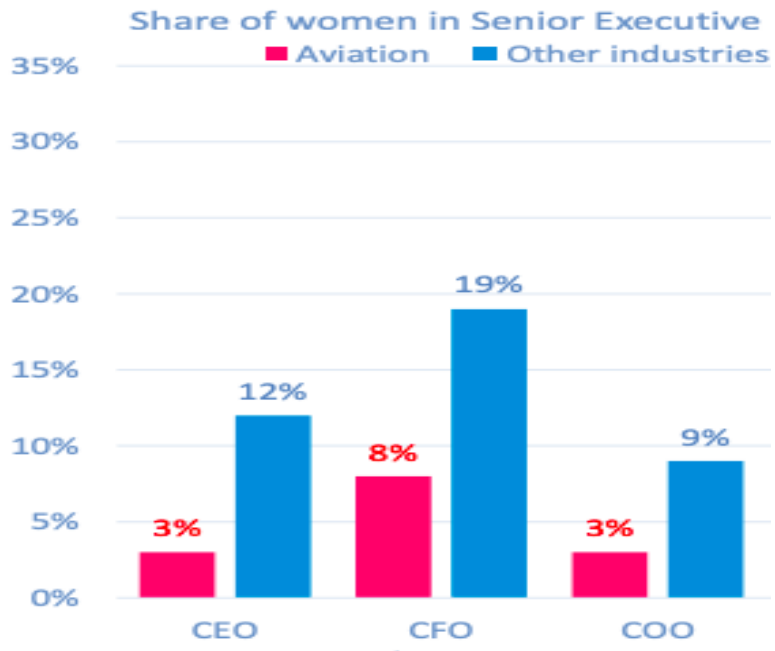

Figure 1: Women in Aviation Executive Roles at World's Top 100 Airline Groups (IATA, 2018)

In addition, with a fast-growing industry in the US and around the globe, women still fall short in numbers within the field. The table below shows the percentage of women pilot certificate holders at different levels within the United States aviation industry. For example, with 633,317 pilots, women only make (46,463) or 7.3% of all the pilots.

Total Pilots	633,317
Total Pilots (women)	46,463
% Women Total	7.3%
Student	167,804
Student (women)	22,266
% Women Students	13.3%
Private	163,695
Private (women)	10,255
% Women Private	6.3%
Commercial	99,880
Commercial (women)	6,556
% Women Commercial	6.6%
Airline Transport	162,145
Airline Transport (women)	7,136
% Women ATP	4.4%
Flight Instructor	108,564
Flight Instructor (women)	7,335
% Women CFI	6.8%

Table 1: 2018 Percentage of Women Pilot Certificate Holders (FAA[2], 2019b)[34]

The International Society of Women Airline Pilots additionally presents a graphical representation (Figure 2) of the top airlines that employ the greatest number of female pilots as an insight involving women pilots (McCarthy, 2019). Based on the below figure, United Airlines has the highest percentage of female pilots (7.4 percent), and Norwegian Airlines has the lowest number of female pilots (1 percent).

[2] FAA: Federal Aviation Adminstration
[3] Women ATP: Women Airline Transport Pilot
[4] Women CFI:Women Certified Flight Instructor

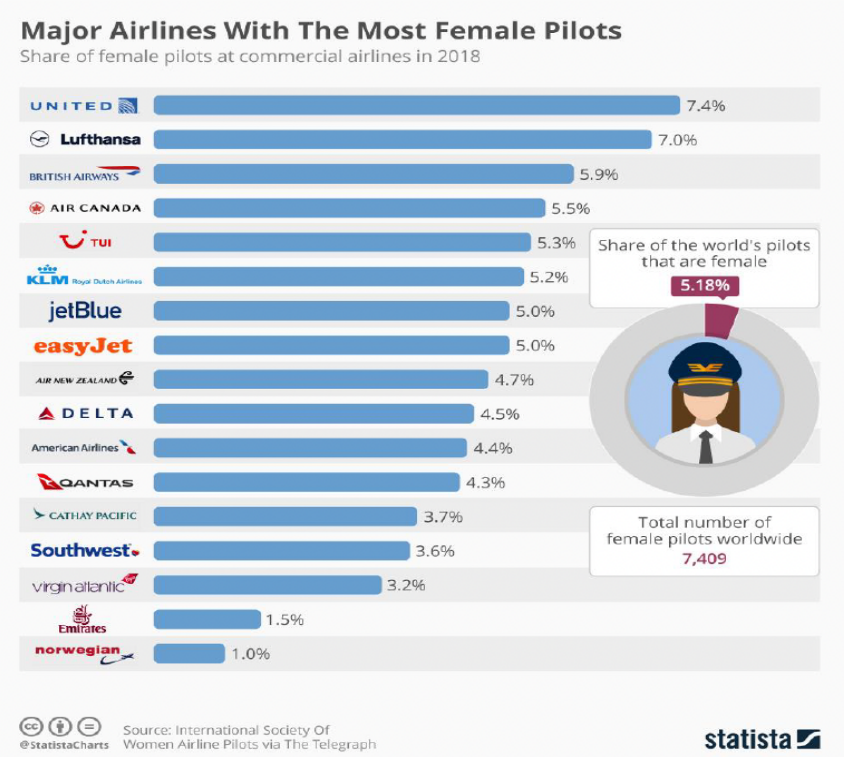

Figure 2: Major Airlines with the Most Female Pilots (McCarthy, 2019)

Despite its significant impact on worldwide economies, the aviation sector encounters obstacles to achieving gender diversity, specifically in critical positions such as pilots, engineers, and leadership roles. Globally, women comprise less than 5% of pilots, and aviation school enrollment trends do not suggest substantial increases in diversity. From early aviators such as Amelia Earhart to the Women Airforce Service Pilots (WASP) during World War II, a historical overview of women in aviation reveals a legacy of obstacles and accomplishments. Despite their pioneering achievements, these women faced prejudice and discrimination, which limited their chances in both military and commercial aviation. Women had obstacles in pursuing professions in aviation following the closure of the WASP program following World War II. Similar

challenges confronted female international pilots, whose advancements varied according to the sociopolitical environment of their home nation.

Women still comprise a tiny portion of senior positions and pilot certifications in the aviation industry today, indicating their continued underrepresentation. Stats from industry studies show the imbalance: women make up just around 7% of pilots in the US and fewer than 10% of senior leadership roles. In general, the aviation sector remains affected by challenges related to gender diversity, which underscores the need for coordinated initiatives to overcome systemic obstacles and foster an environment that welcomes women across all aspects of the industry.

Chapter II: Review of Literature

What Does the Gender Gap Mean?

Shang (2022) defines the gender gap as the observed differences in a wide range of social and economic dimensions between boys and girls or between men and women in relevant measures like school/college enrollment and the labor force participation rate, among other factors (Shang, 2022). Social and economic stratification, and therefore exclusion, are significantly influenced by gender (Seguino, 2016). Policymakers continue to struggle with the topic of why there is still such a staring gender disparity, even though there is widespread agreement worldwide (UN, 1995) that gender equality matters (England et al., 1988; Magnusson, 2010; Bohnet, 2016).

It is critical to recognize that women can play a pivotal role in fostering innovation and ensuring the sustained expansion of the economy at large. An additional 6% may be added to the net margins of an organization if 30% of its leadership is made up of women (Noland et al., 2016; Brooke-Marciniak, 2018). However, women continue to encounter significant barriers when attaining leadership roles. Furthermore, as Katrine Marcal says, *Who Cooked Adam Smith's Dinner? A Story About Women and Economics* emphasizes that one of the contributing factors to the gender disparity is that women worldwide perform the majority of unpaid labor, including domestic chores and caring for children and the elderly.

According to Katrine Marcel's book, the notion of an economic person fails to encompass half of the population engaged in unpaid labor. Marcal recalls an ancient expression between economists: "[I]f a man marries his housekeeper, the country's GDP declines. Conversely, should he place his mother in an elderly care facility, the amount once again expands. In addition to

revealing much about gender roles among economists, the joke illustrates how the same types of work can be included or excluded from the GDP. “If you want the full picture of the economy, you cannot ignore what half of the population is doing half of the time" (Marçal 2016, 60).

Even though women's unpaid labor is not factored into the GDP, they continue to be employed when the economy is led by men. In addition to the conventional societal expectation that women should manage the household, deliver children, take care of them, and shoulder a larger portion of the workload while juggling a family, work-life balance is predominantly perceived as a concern that affects women. The existing body of research on work-life balance primarily examines women's experiences, with comparatively less attention given to the viewpoints of men (Rahel & Emily, 2015).

Gender gaps, which are the result of gender inequality (characterized by unequal rights, responsibilities, and opportunities for women and girls), are not a new occurrence. Conversely, it has been a societal trait for millennia, although to different extents across nations and throughout history. The development of the human rights agenda in the mid-20th century and women's movements around the world since the 1960s have both contributed to an increased international focus on this form of inequality (Seguino, 2016; Bunch, 2012). In the 1960s, increased female labor force participation in industrialized nations also contributed to recognizing unequal gender relations in the economy.

The discipline of economics in its current form was established by Adam Smith, who was obsessed with the production of goods and services, and the behavior of individuals in the marketplace. However, he failed to account for a crucial element in “the fundamental question of economics.”

> Adam Smith only succeeded in answering half of the fundamental questions of economics. He didn't get his dinner only because the tradesmen served their self-interests through trade. Adam Smith got his dinner every evening because his mother made sure it was on the table. (Marçal, 2016)

The economically widespread phrase "the invisible hand" was originally coined by Smith. However, it appears that the true invisible hand—his mother—was responsible for setting the dinner table every night of his life—a task that went unrecognized and not compensated for in his equations and calculations (Marçal, 2016). We will not begin to address some of the real fundamental structural issues in our workplaces, economy, and overall society until we remove the economic man from his throne and incorporate the feminist perspective into economics.

Career, Gender Stereotypes, and Female Underrepresentation in STEM Careers:

Career choice is a complex task that challenges straightforward explanations. However, knowing the career decision-making processes of both men and women would help us provide insight into the underlying causes of gender disparity in the labor force. Considerable attention is devoted by scholars, policymakers, activists, and researchers to the gender segregation of the workforce (Erica et al., 2011). Understanding the decision-making process and the determinants that impact individuals' career trajectories is of great significance, given that each individual makes a unique selection. There remains a persistent disparity in the representation of women in leadership positions. Female CEOs comprise less than 5% of the executive team and less than a quarter of the board members in the European Union and the United States, respectively (European Commission, 2016). The high percentage of male CEOs (approximately 95 percent)

over female CEOs (5 percent) indicates that men will make the majority of crucial decisions; it is also intriguing to figure out how these decisions will affect women in entry-level positions.

Furthermore, it is critical to note that gender disparities in work-family choices frequently emerge after males and females become parents. As an illustration, mothers frequently reduce their compensated work hours and allocate more time to domestic caregiving responsibilities following childbirth, whereas fathers generally enhance their working hours (Aarntzen et al., 2022). The existing body of literature concerning gender inequality in the home and the workplace offers valuable insights into the underlying factors that contribute to the persistence of gendered work-family decisions (Aarntzen et al., 2022). For instance, it has been observed that mothers who resume work following childbirth frequently encounter discriminatory employment conditions, including being assigned less engaging tasks (Yerkes et al., 2017). Furthermore, within the professional sphere, colleagues tend to hold career-oriented mothers in lower regard than family-oriented mothers (Morgenroth & Heilman, 2017). However, when males handle a significant portion of domestic duties, they are stigmatized as "unmanly" (Chaney et al., 2019). Such presumptions regarding the expected conduct and decision-making of mothers and fathers could potentially influence mothers to decrease their paid work hours to take on greater household and childcare duties as "caregivers," while fathers might increase their work hours and perceive themselves as "breadwinners." As a result, when internalized gender stereotypes predict that working fathers will experience low guilt while working mothers will experience high guilt, work-family guilt becomes an issue for women (Aarntzen et al., 2022). This ultimately results in a gender gap in the workforce, as women are expected to contribute and pick up the family responsibilities besides work.

Furthermore, it has been emphasized in the literature that society frequently places emphasis on "adventure" for males and "femininity" for girls (Mitchell, Kristovics, & Vermeulen, 2006). Scholars such as Kessels (2015) and Cardi et al. (2016) investigated how this societal phenomenon affected teenage girls and women pursuing STEM careers. They concluded that girls usually think STEM fields are "masculine" and inappropriate for females. This observation aligns with the findings of a study conducted by Manns et al. (2016), which found that girls who identify as "girly" (very feminine) are less likely to pursue careers in STEM fields, and that girls who do desire to work in these fields are more likely to characterize themselves as "not girly" and highly intelligent. Labeling specific occupations exclusively for particular genders would ultimately undermine gender diversity in the labor force and discourage many young women from pursuing STEM-related disciplines.

According to the U.S. Department of Commerce, the science, technology, engineering, and mathematics (STEM) workforce is vital to America's innovative capacity and global competitiveness. However, despite comprising nearly half of the U.S. workforce and half of the college-educated workforce, women remain significantly underrepresented in STEM occupations and among STEM graduates (U.S. Department of Commerce, 2009). The figure below also illustrates that women occupied 48% of all occupations in 2009, whereas they filled only 24% of STEM positions. As a result, STEM fields have systematically excluded women, labeling them as "masculine" or "not girly" occupations. In contrast, men and women hold closer proportions of employment in other fields where such labels have not been applied.

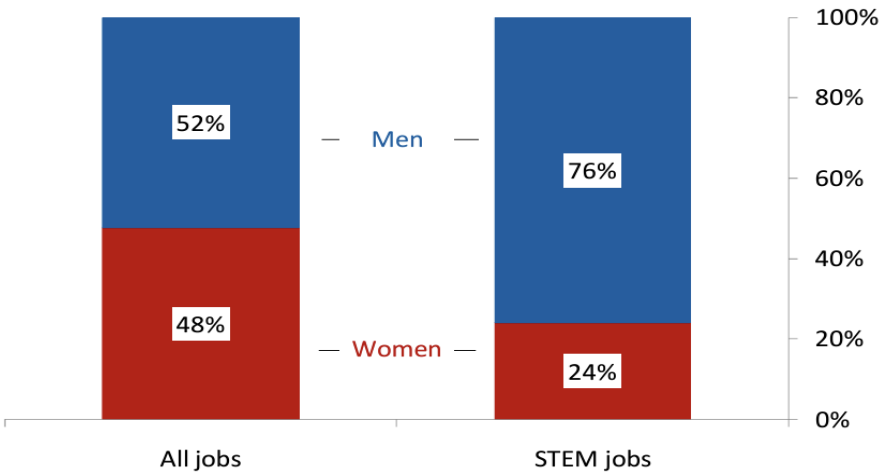

Figure 3: ESA Calculations from American Community Survey Public-use Microdata[5]
Note: estimates are for an employed person aged 16 or Over

Considering the substantial gender disparity in STEM disciplines (see Figure 3), it is crucial to investigate the correlation between earnings, STEM, and gender. Women are paid considerably less than men, while STEM professionals earn substantially more than non-STEM workers (U.S. Department of Commerce, 2009). In addition, while women in STEM are making more than those working in non-STEM jobs, women in STEM again earn less than men in STEM careers. Therefore, the potential causes for the inadequate representation of women in STEM professions are varied, such as the scarcity of female STEM role models or the inaccessibility of STEM career paths to individuals juggling work and family responsibilities. In the absence of intervention, robust gender stereotypes might deter women from pursuing careers and academic programs in the STEM fields, thereby contributing to the eventual expansion of the gender gap.

[5] ESA stands for Employment Standards Administration (ESA), and it is a committee within the U.S. Department of Labor.What will occur if we do not have sufficient personnel to operate in all of these sectors, with a particular emphasis on pilot jobs?

Aviation Careers & Shortage of Pilots?

Aerospace and aviation are highly technical, international industries with comprehensive employment opportunities. Aviation involves the engineering, creation, manufacturing, execution, and sale of aircraft. “These operations encompass a wide range of sectors, including but not limited to government suppliers, commercial aviation (which includes cargo and passenger airlines), military aviation (which includes flight training and business transportation), aerial firefighting, crop dusting, pipeline patrol, air ambulance services, search and rescue, and recreational flying” (Aviation Women Advisory Board Report, 2022). Aviation also encompasses unmanned aerial systems (UAS), commonly referred to as "drones," spacecraft, and emerging technologies like electric vertical take-off and landing aircraft (eVTOLs), which are frequently referenced in the context of "air taxis." It is important to ask the following question: What will occur if we do not have sufficient personnel to operate in these sectors, with a particular emphasis on pilot jobs?

We may not have enough people in pilot jobs in the future, as some of the current pilot population is aging and might have retirement plans. The Federal Aviation Administration's Part 121 regulations prohibit any individual aged 60 or older from operating an airplane as a pilot. The "Age-60" principle contends that as pilots age, their safety performance diminishes as a result of the detrimental impacts of aging on both cognitive abilities and health (Federal Register, 2024). Between 1990 and 2010, the average age of U.S. pilots climbed from 40.5 to 44.2, according to AOPA Air Safety. Keeping these changes in mind, Boeing also projected that by 2037, there would be a need for 790,000 pilots (Coast Flight Training, 2018). The projected figure represents a 267 percent growth compared to the 305,000 active commercial pilots worldwide in 2018, as reported by Mazareanu (2018). Over the next two decades, North America

alone will require more than two hundred thousand additional pilots, according to the FAA (2019). In addition, the precise figure approaches 360,000 newly licensed pilots, as reported by the Federal Aviation Administration (FAA) in its 2019 monitoring of student trends. To satisfy the projected demand for pilots, the aviation industry will need to double the number of trainee pilots from 2018 levels and maintain that level for the next eighteen years. Based on data from the FAA (2019), the quantity of student pilots increased by 18,863 from 2017 levels to 167,804 in 2018. From 2018 to 2037, the aviation industry must annually hire 36,683 new pilots the shortfall. An anticipated pilot shortage necessitates a more comprehensive and unconventional approach to resolving this matter.

Over the last 106 years, aviation has evolved substantially from a luxury amenity for leisure for the wealthy population in communities to a critical requirement for business and personal travel. It has been an essential enabler of globalization and the foundation of international commerce. Our economic culture has changed, and aviation has impacted every industry's current business model. Because of the aviation sector's pilot shortage, failure to resolve the issue will also affect other economic sectors. The global economy as a whole will be adversely affected.

Gender Gap in Aviation & Benefits of Diverse Workforce:

As stated in the preceding chapter, women continue to be notably underrepresented in the majority of aviation-related areas. The representation of women in the majority of aviation occupations is below 20%, with the most pronounced gender disparities remaining in senior leadership positions, maintenance technicians, and pilots (Lutte, 2021). In 2019, Rebbeca Lutte released a workforce report titled "Women in Aviation." This report utilized data on the

proportion of women working in diverse aviation occupations to underscore the substantial presence of women in the aviation sector. Lutte (2019) disclosed that women are underrepresented in nearly every aviation sector. Subsequently, two years later, she produced a workforce report relating to women in aviation in order to provide an update and monitor developments and progress made over the course of the two-year period. In her findings, she concluded that "considerable steps are not being taken to substantially increase the proportion of women in aviation." (Lutte, 2019, p.5) In the Air Force, the gender disparity persists, as evidenced by the fact that women comprised a mere 3.1% of fighter pilots in 2021 (Engel, 2021). This figure stands in opposition to the overall USAF female pilot representation rate of 7.7%.

To recruit a competitive workforce in the aviation industry, gender diversity is essential. Furthermore, Florida Tech's article "Increasing Diversity in Aviation: Why and How" discusses the advantages of gender diversity within the aviation sector, including the introduction of new ideas and viewpoints, an expansion of market presence, and enhanced financial performance. The article describes how innovative concepts and unique viewpoints are essential elements of commercially successful airlines. Furthermore, according to the article, diverse leadership teams enhance the resistance of commercial airlines to outdated approaches and boost creative thinking, market share, and performance as a whole.

The Shadows of Flight: Barriers Women Face in the Aviation Workforce

The challenges I am about to outline may not provide a comprehensive overview of the obstacles women encounter in aviation professions, whether in the commercial or air force sectors. Nevertheless, according to the extant body of literature, the following obstacles are

among the most formidable challenges women encounter when they make the decision to embark on their professional careers while already employed alongside their male counterparts.

a. Gender Stereotypes, Sexual Harassment & Lack of Acceptance:

Society exhibits gender prejudice against women because of gender stereotyping and the societal expectations and roles assigned to women in various cultures and countries; piloting is particularly challenging for women in Turkey (Yankoğ glu et al., 2020). The author's study also incorporates the results obtained from semi-structured in-person interviews that were carried out with ten female pilots who were employed by five major airline companies in Turkey. The inquiries were designed to determine whether or not female pilots encounter gender-related challenges, including disparities in working conditions and standards, as well as sexual or gender-based harassment. Following an examination of the responses to the statements, the following conclusions were reached: Initially, it is important to note that female pilots in Turkey encounter a multitude of gender-related obstacles in the professional sphere. Secondly, they are subjected to gender discrimination and unequal treatment in comparison to their male counterparts. Thirdly, women are burdened with the pressure to conceal feminine characteristics to gain acceptance from their male counterparts, which induces stress. Lastly, balancing work and family life becomes particularly difficult for female pilots, particularly after marriage. According to the authors, gender stereotypes in society, cultural misogyny, and the perception in Turkey that women have greater domestic responsibilities than men are the primary causes of these phenomena.

Furthermore, Anderson (2013) discusses the lowered trust of passengers in female pilots. 51% of British passengers, according to a 2013 survey by the online travel agency

Sunshine.co.uk, based in the United Kingdom, acknowledged having a lower likelihood of placing their trust in a female pilot. Prejudice against female pilots is primarily due to the misconception that "male pilots are more skilled," as stated by Anderson (2013). Ferla and Graham (2019) asserted that the majority of discriminatory remarks directed at female pilots originated from passengers, who maintained their skepticism and doubts regarding their competence.

Even before they become licensed pilots, women experience discrimination during their training phase. McCarthy et al. (2015) conducted a study that examines the experiences of aspiring pilots as well as their initial training. Six men and four women constituted the respondents, who were enlisted using a snowball sample technique. In the winter of 2013/14, semi-structured in-person interviews were carried out with commercial flight crew members who were stationed in the United Kingdom. Then, inquiries arose concerning the obstacles they had encountered subsequent to obtaining commercial pilot certification. Additionally, the female counterparts were questioned regarding their experiences flying with male pilots, while Male pilots were questioned concerning their experiences while flying alongside female co-pilots. The paper's findings indicate that female pilots continue to perceive certain obstacles and prejudices as necessary to gain acceptance in an industry that is still predominantly male-dominated (McCarthy et al., 2015, p.36). Furthermore, prospective female pilots have to deal with the additional difficulty of gaining the approval of their masculine colleagues. Moreover, women may experience pressure as a result of the erroneous thought that they must perpetually demonstrate their competency and "rights" to be pilots; they may also develop an unhealthy obsession with the criticism they receive from their instructors.

Additionally, it is hoped that the newer cohort of pilots will exhibit greater receptiveness and consideration towards gender.

Additionally, Hoppe (2011) discovered that aviation has historically been perceived as an industry dominated by men and that the majority of gender-based discrimination in commercial aviation consists of male peers and passengers making gender-stereotypical jokes and statements to female aviators. Gender harassment is frequently concealed by "pranks and humor" and the capacity to "take a joke" (Davey, 1996), according to the literature. Furthermore, according to a study cited by Mc Cartly et al. (2015), half of the male respondents reported witnessing a colleague use sexist language towards a female pilot, but justified it as being understood in humor by all.

b. Financial Barriers or the Cost/Access to Opportunities:

Culture was cited as the primary obstacle for women aspiring to enter the aviation industry, surpassing the cost of entry (Women in Aviation Advisory Board, 2022). However, speaking about the cost of entry as a second major challenge, in contrast to the substantial flight time hour demands observed in the commercial sector, which can span from 1000 to 7000 hours (Zheng, 2016), the minimum required number of flying hours in the United States Air Force is not fixed. In contrast, according to an analysis of training outcomes conducted by the USAF, pilots with the most flight hours are typically the most effective (Couse & Meek, 2021). Prior to commissioning, obtaining flight hours necessitates access to and the financial capacity to finance such opportunities; thus, Flying hours can function as a more reliable indicator of social and economic standing while also covering the piloting skills of those who are unable to pursue further flight training. At times, the financial assistance available fails to adequately address the

supplementary expenses associated with obtaining a flight degree for four years and flight training, which may cost from $50,000 to $80,000 (Women in Aviation Advisory Board, 2022).

Moreover, the costs associated with pilot training continue to rise daily. To illustrate, between 2007 and 2017, the mean expense of preliminary pilot training in the United Kingdom rose by an estimated 53.8% (Valenta, 2018). Annual tuition for undergraduate university students in the United Kingdom is an average of 10,000 pounds, whereas pilot training costs approximately 100,000 pounds. Approximately 80% of the thousands of prospective pilots who begin flight training annually abandon their studies, according to Beckett (2016). According to Martin (2016), the primary factor contributing to the withdrawal is the inability to adequately finance tuition. While excessive training expenses may pose a significant barrier for female aspiring pilots, this issue affects all pilot students, irrespective of gender.

Pilot training is an exceptionally expensive effort from the standpoint of the military, especially for fighter and bomber pilots that their education costs between $7.3 million and $9.9 million per each individual (Mattock et al., 2019). According to ongoing efforts by the USAF Studies and Analysis Squadron and the Rated Diversity Improvement Data Collection and Analysis Dashboard, women have, on average, fewer flying hours than men. The discrepancy can be linked to the high cost of flight instruction, as opposed to a lack of proficiency in aviation or a lack of interest or dedication. The focus of the research conducted by John and Buck (2021) is the prospective removal of hours spent flying (or longer intervals of flying hours) from the Pilot Candidate Selection Method (PCSM) score. This measure is employed during the

pilot candidate selection procedure. These initiatives may help mitigate any possible prejudice in pilot selection towards women who have lower PCSM scores and, on average, fewer flying hours than their male counterparts.

c. Pregnancy, Motherhood & Work/Life Balance:

Aviation women who are thinking about parenthood may encounter additional stress due to the competing responsibilities of maternity and their careers (Taber, 2013). For example, female fighter pilots have expressed a sense of being prevented from having children due to the fact that pregnancy would render them ineligible for flight (Keller et al., 2018). Furthermore, it is possible for "unwritten" career culture norms to deter women from conceiving due to the perception that it will be a burden on the organization (e.g., "picking up the slack"; Engel, 2021; Taber, 2013; Keller et al., 2018).

Despite the absence of discouragement engendered by these prospective constraints, the matter of coordinating pregnancies within rigid career timelines persists. Some women have expressed worries regarding the possibility of sacrificing career advancements and opportunities as a result of their pregnancy (Keller et al., 2018; Zheng, 2016). There have been concerns expressed by some regarding the disclosure of family planning information to leadership, citing the adverse implications associated with using pregnancy as a means to avoid carrying one's own weight or to skip deployments (Keller et al., 2018). Certain women stated that in order to reconcile work and family obligations, which can leave them with no option to take career breaks (Engel, 2021).

d. Training/Performance Barriers:

"Tokenism" was identified as a source of stress for women working in commercial and military aviation. Female pilots who were the only women in their unit

reported feeling greater pressure to demonstrate their competence and suitability for the profession in numerous studies (Engel, 2021; Gagliardo, 2020; Women in Aviation Advisory Board, 2022). The previously mentioned pressure is possibly got worse by research indicating that both male coworkers and passengers hold the belief that female pilots are not competent and reliable (Ferla & Graham, 2019).

Tokenism is frequently perceived in unbalanced environments where the dominant group exercises considerable influence over the formation of a culture that mirrors its own values, beliefs, and behaviors; as a result, individuals who do not belong to that group may feel as though they are subjected to intense scrutiny. Within the realm of aviation, there may be an elevated expectation for women to demonstrate their abilities and affiliation with the profession to their male counterparts in order to prevent the perception that they are being selected based on their gender and to mitigate instances of harassment (Mounton & Morrison, 2022). Additionally, females may experience feelings of isolation and loneliness during their training periods or while actively working their jobs if they feel compelled to adopt more "masculine" behaviors to protect themselves from psychological safety-threatening stereotype threats (Mounton & Morrison, 2022). The obstacles and pressures encountered during training may deter women from achieving satisfactory results or from continuing their professions, as they will be less optimistic about the future after completing the program.

e. Lack of Role Models & Mentorship:

Freud (1933) emphasized the significance of role models earlier than any other psychologist. His conviction was that "the superego is formed via profound assimilation of aspects of the personalities of others and strong identification with them." Gibson

(2004) proposed a comparable definition, defining a role model as "a cognitive construction predicated on the qualities of individuals occupying social roles, which an individual perceives to possess a certain degree of similarity with themselves and aspires to improve that perceived similarity through the imitation of said traits." (Freud et al., 1933, p. 136).

Wright (2016) identifies mentoring, networking, and role-modeling as notably advantageous approaches to conquering the isolation experienced by women in masculine societies that employ social exclusionary strategies as a means of opposing their integration into society. According to Simon and Clarke (2016, p.589), female role models function as "agents of change." In their research, young women were motivated by the experiences of other women, and women in leadership positions contributed to the advancement of gender equality (Galea et al., 2015). In contrast, a woman would feel like an "outsider" in the aviation industry, which is predominantly male, in the absence of a female mentor or role model. Recognizing the essential importance of role models in the domains of education, training, and the professional sector extends beyond female pilots to include female air traffic controllers and engineers. These individuals possess the capacity to demonstrate that females can succeed in the aviation industry and they are not alone in spite of being underrepresented (Martina & Graham, 2019).

In addition, Hope (2011) identifies the absence of mentors and influential role models for women in aviation as a significant factor in the gender gap in the industry. As a result, young women who lack a well-defined career objective as pilots perceive the aviation industry as "unwelcoming" to them and undesirable to enter. Due to the shortage of female role models in specific sectors, such as aviation, women may frequently be

compelled to seek guidance from male mentors. Male mentorship can frequently result in negative experiences for females, according to Maack and Passet (1994), who discovered that women may feel compelled to "dress, talk, and walk like men." "A snake eating its own tail" (Sarkisyan, 2018) has been utilized to relate the lack of female role models to this circumstance. The cycle of invisibility is thus maintained, as the shortage of women in an industry such as aviation contributes to the overall lack of women in the field (Sarkisyan, 2018).

Summary

An examination of the relevant scholarly works reveals the complex correlation between social and educational determinants that shape the identities and interests of young women and girls. The causes of the aviation personnel shortage are readily and unambiguously evident from the literature review. It has been believed, and many still believe, that girls should only consider educational and professional paths and that they are not enough for certain disciplines, meaning that they are not good fits for certain careers, such as STEM careers. It has been suggested that they experience greater anxiety than their partners regarding domestic and parental obligations, and they should intervene in taking on the responsibilities instead of waiting for their partners to do so. Despite the fact that some women and girls choose to go beyond their comfort zones, they frequently encounter more extensive obstacles and a lack of support from their parents, partners, coworkers, and society at large. Regardless of their decision to persist, they may continue to experience feelings of isolation and be prone to quitting when confronted with obstacles and pressure. Moreover, they may feel they will be deprived of numerous opportunities and promotions during their maternity leave, other unpaid domestic obligations, and childcare.

However, the aviation industry requires more workers, including women, and pilots are in short supply to help the economy. The airline industry will require more pilots than it can provide; therefore, the government must reevaluate its policies and regulations and devise solutions to this dilemma, or the economy will face a huge problem at large. Failure to address the pilot shortage could have far-reaching consequences for the economy. Therefore, governments, airlines, educational institutions, and other stakeholders must collaborate and devise effective solutions to this pressing dilemma. By doing so, we can ensure that the aviation industry continues to grow and prosper, while also supporting broader economic development.

Chapter III: Methodology

Overview:

Each female pilot's interest in the aviation industry is underpinned by an individual narrative. Frequently, the beginnings of these narratives can be identified in significant events that transpired later in life or childhood adventures devoted to the observation of aircraft. Intending to understand the elements that sparked these women's initial enthusiasm for aviation, how they began their journey, and the challenges they faced during their journey, this study attempts to examine these narratives in depth. Our intention in investigating female pilots' experiences is twofold: to gain valuable insights into their journeys, and to inspire other women and girls who aspire to pursue careers in the aviation industry. Nevertheless, our investigation surpasses the female point of view. Additionally, we are collecting the viewpoints of a few male professionals who are either employed or pursuing education in the aviation sector regarding the gender dynamics that exist within the industry. Our goal is to gain an understanding of their perspectives on the obstacles that limit greater female participation in aviation, as well as their perspectives on working with female pilots and students. Our goal in conducting this comparative analysis is to provide insight into males’ and females' aviation experiences.

Research Questions:

1. How do people, especially women, start their journey into an aviation career?
2. What are the primary barriers women face in the aviation industry?
3. What policies and programs should be in place to bring more gender diversity in the aviation sector?

Research Design

The objective of this research project is to determine the extent to which the experiences of women have impacted their decisions to pursue a profession in aviation, as well as the obstacles they have encountered along the way. A qualitative technique was used because the researcher wanted to learn in-depth and profound views from the men and women working in the aviation industry. In addition, Creswell (2013) also highlights that “qualitative research begins with assumptions, a worldview, the possible use of a theoretical lens, and the study of research problems inquiring into the meaning individuals or groups ascribe to a social or human problem” (p. 37). Patton (2002), also states that qualitative research methods are “ways of finding out what people do, know, think, feel by observing, interviewing, and analyzing documents” (p. 145). Through the strategic implementation of these three distinct collection methods, the researcher successfully gathered the data, consequently strengthening the study's reliability (Patton, 2015).

This study employed a phenomenological research technique. "What is important to know is what people experience and how they interpret the world," according to Patton (2002), who defines phenomenological study as "the only way for us to really know what another person experiences is to experience the phenomenon as directly as possible for ourselves" (p. 106). According to the literature assessment, women make up a comparatively small percentage of professional pilots. As this study examines the "lived experiences" of a female pilot that may have influenced her decision to pursue aviation, phenomenological qualitative research is ideal for its objective. The researcher intends to discover whether or not there are parallels between the experiences of eight females working or studying in the aviation industry, with a particular emphasis on pilots, and male aviation professionals. The study, by examining these individuals' perspectives on the future of gender diversity in aviation and whether or not there are

similarities, may provide valuable information for future educational and social initiatives that seek to increase the representation of women in the aviation industry.

Population:

In this study, the researcher conducted interviews with a diverse group of participants from various backgrounds within the aviation industry. The cohort comprised 8 females and 3 males, ensuring a good representation of gender perspectives in the research findings. The participants encompassed a broad spectrum of roles and expertise within aviation, contributing to the richness and depth of insights gathered. Among them were current pilots, retired pilots, flight instructors, aviation student pilots, and aviation students focusing on the management and sustainability side of aviation. The diverse mix of participants provided a deep understanding of the challenges, experiences, and perspectives across different stages and facets of aviation careers.

To maintain the confidentiality and anonymity of the interviewees, each participant was assigned a letter from A to K for ease of reference. These letter assignments are intended to protect individuals' identities while allowing for meaningful analysis and discussion of the findings. Below is a breakdown of the interviewees, including their assigned letter names, gender, and original roles and titles within the aviation industry.

No.	Name	Gender	Title/Role within Aviation
1	Participant A	Female	Air Force retired pilot (24 years of experience)
2	Participant B	Female	Air Force retired pilot (21 years of experience)
3	Participant C	Female	Former fighter pilot & current private jet pilot
4	Participant D	Female	Current Commercial Pilot

5	Participant E	Female	Ground Instructors, under an airline pilot training to become commercial pilot
6	Participant F	Male	Flight Instructor, under an airline pilot training to become commercial pilot
7	Participant G	Female	Private Jet Pilot, flight instructors
8	Participant H	Female	Private license Holder
9	Participant I	Female	Flight Attendant, Student Pilot (college aviation program)
10	Participant J	Male	Private license Certificate Holder
11	Participant K	Male	PHD Student (Aviation Sustainability)

Table 2: Research Participants & Their Title/Roles in Aviation

These assigned letters provide anonymity for the participants while allowing for a clear identification of the various roles and perspectives represented within the study. The research upheld ethical standards by ensuring participant confidentiality while facilitating an open and candid exchange of views and experiences within the aviation community. The researcher also considered interviewing participants from different geographic locations. The study participants based on different geographic locations are shown in the figure below:

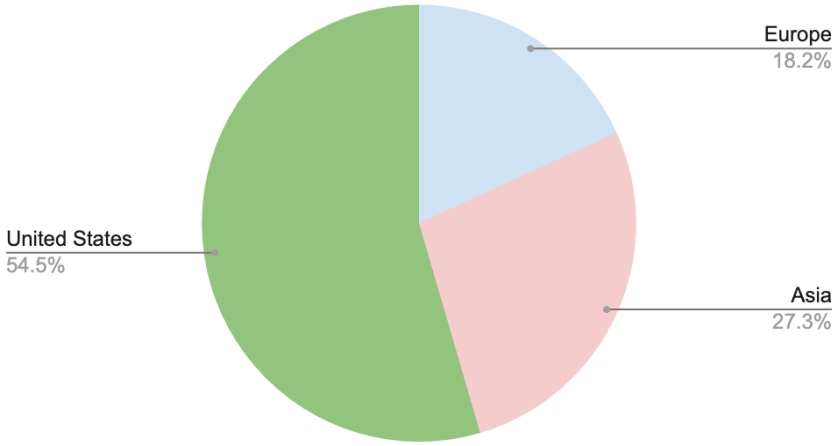

Figure 4: Study Participants by Geographic Location

Data Collection:

Qualitative research encompasses a variety of data collection methods, such as interviews, artifacts, and evaluations (Merriam & Tisdell, 2015). The primary method used to collect data was to conduct interviews with the study participants. Janesick (1998) defines an interview as a "meeting of two persons to exchange information and ideas through questions and responses, resulting in communication and joint construction of meaning about a particular topic" (p. 30). Additionally, it is crucial to note that the interview inquiries were open-ended, permitting the study participants to provide further elaboration in their responses.

The interview questions and study design were submitted to and approved by the Bard College Institutional Review Board (Bard IRB) committee before the start of the research. The researcher subsequently initiated contact with potential study participants. After receiving informed consent from the participants and obtaining their signatures on the Informed Consent Form, the researcher proceeded to schedule interview sessions via Google Meet and Zoom. To facilitate transcription, the meetings were recorded on a separate device from the computer where the meetings were held, which the participants consented to and were aware of. Each participant was informed at the beginning of the interview that their involvement in the research was entirely voluntary and that they maintained the right to withdraw from the study at any point before April 15th, 2024.

The interview questions were not provided in advance to the study participants; rather, they were posed during the interview. The researcher carefully recorded each interview, afterward cross-referencing the notes, which the interviewer took during the interviews, with the transcripts. The researcher thanked the participant once more at the end of each interview, informing him or her that a copy of the research paper would be provided to the participant upon

submission to the college and that all recordings, transcriptions, and notes would be permanently removed upon submission of the thesis. Additionally, participant confidentiality was maintained throughout the study, and no identifying information was utilized in the research.

Interview Questions

The interview questions were meant to uncover commonalities and distinctions between the military and civilian/commercial trajectories of each participant in the aviation industry. The following table contains an entire set of interview questions that were posed to every participant:

No.	Interview Questions
1	Can you please introduce yourself and provide some background on your career in aviation, and what you do right now?
2	What sparked your curiosity and how you became interested in studying and pursuing your aviation career?
3	What educational and training paths did you choose and followed to enter the aviation industry?
4	Were there specific challenges or barriers you faced during your education or training?
5	How do you perceive the current state of gender diversity in the aviation industry?
6	From your perspective, what are the benefits of gender diversity in Aviation?
7	From your perspective, what are the primary barriers that discourage women from entering aviation careers?
8	How can educational institutions and aviation organizations foster a more inclusive environment for women?
9	Have you had mentors or role models who have played a significant role in your aviation journey? From your perspective, how important is the role of mentorship in guiding women into aviation careers?
10	What specific changes or policies would you recommend addressing gender disparities in the aviation sector?

11	If you could give advice to young women aspiring to enter aviation, what would it be?
12	Have you witnessed positive changes or improvements in gender inclusivity during your time in the aviation industry?
13	How optimistic are you regarding the future of gender diversity in aviation? Additionally, what changes do you anticipate seeing surrounding gender equality within the next decade?

Table 3: List of Interview Questions

Data Analysis:

For this study, the researcher compiled all the interviews on one device altogether. Following the conclusion of all interviews, the researcher utilized the Trint application to transcribe the interviews. The researcher then read through each transcript and fixed grammatical errors. Following the transcription process, the transcripts were exported and printed by the researcher, who thoroughly examined each one, highlighted significant details, and identified common themes for the findings section. Once the major themes were identified, the researcher categorized the data based on themes, making it easy to go back and find relevant information on each theme in one place.

Chapter IV: Findings & Results

Based on the research interviews and data analysis, the researcher came up with four major themes, which would have subcategories for detailed information. The majority of the research participants have discussed these four themes. The major themes for this study are as follows:

Theme 1: Childhood Spark & Parents/Society's Influence on Making Career Choices

The launch of the US space shuttle in 1986 planted the seed of a dream to become an astronaut inside a 10-year-old child. Although the mission did not go well, resulting in a tragedy in which all the crew members died, she (Participant A) understood that the crew members had died while doing something they believed in. "It was something bigger than themselves," she says. Later, her father proposed that she join the Air Force Academy to become a pilot, as most astronauts were pilots, watering the seed of her dream. Although her father was aware that women were not allowed to become fighter pilots during that time, he didn't tell his daughter this, not wanting to ruin her dream, hoping that the policy would change by the time his daughter graduated from high school.

Several years later, on the other side of the world, another girl (Participant C), growing up in a non-privileged environment, wanted to become a bird to fly, thinking that the bird was more free than herself as a woman living in a very traditional, non-privileged society. Though she developed a deep desire to fly, she had never been on a plane a single time (not even as a passenger) until she started her pilot training program. Participant D also describes her passion for flying as one of her biggest childhood dreams, as she believed she could travel to many countries and meet new people besides the people of her home country.

Depending on where you are born, your parents and society will play an important role in helping you navigate possible career choices. Among the 11 study participants, five (four females, one male) were exposed to the fact that being a pilot was a career option at an early age. For example, when her parents moved to Pensacola, Florida, participant B attended an airshow, where she got the chance to be exposed to aviation. Later, on a career day in middle school, she met her first female pilot. She does not remember what she flew, her name, or what she said, but as an 11-year-old girl, all she saw was someone who looked like her in a flight suit. Although she grew up in an environment where women were less exposed to STEM career choices, with aviation being one of them, she realized that it was an option for her to become a pilot. In addition, Participant D's mother played a role in navigating her path to becoming a pilot, and Participant F was also exposed to aviation at a young age as his mother was a flight attendant.

However, other participants realized they could become pilots at a later age. Participant G changed her career from being a newscaster to becoming a private jet pilot when she received a phone call from an 85-year-old flight instructor asking her to do a story on aviation. She had never been good at math or science and had already counted herself out, but when the 85-year-old flight instructor took her flying and let her control the plane, she found the spark that she was also capable of doing this. "I just remember that feeling of weightlessness and freedom, and I immediately fell in love," she says. Participant J and Participant K were also exposed to aviation at a later age. Participant K spoke about how his sister inspired him as a role model for his aviation journey. (She earned a bachelor's degree in mechanical engineering and a master's degree in aerospace engineering.) He is now finishing his PhD in aviation sustainability, which focuses on airports and UK airlines' net zeros.

Participant J, on the other hand, was working at a job to find good sites for the development of small hydroelectric plants back in the 1980s and 1990s. He realized that if he could get his private license certificate, fly himself over the sites he needed to visit, and not pay someone else to take him, it would be more efficient and would have greater utility. He describes aviation as a "boys club" back in his time, during his training and flying later as a member of a soaring club. During his time, he only encountered one female student pilot, and he never met a female pilot.

The childhood spark ignited by early exposure to aviation and parental influence played a significant role in shaping most participants' career choices. However, for others, the realization came later in life, catalyzed by unexpected experiences. Ultimately, these narratives underscore the multifaceted impact of childhood experiences and societal influences on career trajectories. However, others discover their passion later in life, highlighting the importance of diverse pathways for fulfilling one's aspirations.

Theme 2: Educational and Training Pathways

Operating an aircraft at an altitude of 30,000 feet entails significant accountability; one is entrusted with the safety of the personnel and, in certain instances, hundreds of passengers. Each flight is unique due to the fact that you operate various aircraft models in varied environments. A substantial financial investment, or hundreds of hours of flight practice, is necessary to prepare for this profession, assuming flight school is financed. For the sake of simplification, I divide pilot careers into two categories: military and civilian. Both fighter and civilian pilots are capable of piloting a diverse array of aircraft and missions, and each has a distinct description of duties.

1. Civilian Pathway:

    Traditional or civilian student pilots training earn certificates and ratings in a specific order in accordance with the regulations and directives of an aviation authority. By combining ground and flight training, these programs allow the pilot to continually acquire new skills and knowledge. The initial and fundamental requirement for earning an income through civilian aviation is the acquisition of a Private Pilot License (PPL). A medical exam, a minimum age of 17, and being able to speak English fluently are prerequisites for aspiring pilots to ensure they are fit and medically competent to fly. After completing the theoretical foundations of ground school, pilots must log a minimum of forty hours of flight experience. This encompasses solo flights, which are essentially aviation's "trust falls." By passing both the written and practical FAA exams, one can advance to the next level. Following this, an individual would be eligible to obtain an Instrument Rating, which is critical for navigating through cloudy days and dark nights. Upon completion of this step, they would be able to obtain their Commercial Pilot license (CPL) and, finally, their Airline Transport Pilot License (ATPL), which is considered the highest level of aviation and grants access to the cockpit of a commercial airline. Furthermore, college and university campuses, regional airports featuring a flight school, and specialized training facilities that serve the "pilot career" can all provide opportunities for pilot training. The estimated cost to become a commercial airline pilot in the United States is greater than $100,000 USD.

2. Military Pathway:

    Prior to being accepted into the pilot training program, individuals who elect to pursue the military program will be subjected to comprehensive screening, background

checks, and assessment evaluations. Additionally, they will participate in a rigorous flight training program that devotes months to academic and flight instruction (similar to the civilian pathway). Upon completion of the program, each individual will specialize in a particular fighter aircraft. Those accepted into fighter pilot training programs are financially compensated and are not required to make any financial contributions to the program. However, they are required to make a ten-year commitment to the armed forces by the time they finish their pilot training.

In this study, Participant A, Participant B, and Participant C, all of whom became fighter pilots, took a different path (military path) than other participants, who mostly chose the civilian path. Both paths have similarities and differences in training time, costs, and commitment.

According to Participant A, Participant B, and Participant C, all three of whom served as fighter pilots, if you choose to join the Air Force for your pilot training, there are a few specific steps to take. They include the completion of Officer Training (Air Force Academy, AFROTC[6], or OTC), followed by the completion of Pilot Training (UPT)[7], and the beginning of flight training, which will take approximately one year. Nearing completion of UPT, you will be assigned to specific aircraft and get your seat assignment based on class ranking, performance reports, and your aircraft preference, among other factors. Upon the completion of UPT and seat assignment, you will continue flight training for more hours until you are given a location and squadron assignment. According to Participant B, the commitment for an Air Force Pilot is 10

[6] ROTC: "Reserve Officers' Training Corps (ROTC) is a leadership training and development program that prepares full-time, college-enrolled students for service opportunities in the Army, Marine Corps, Navy, Air Force and Space Force" (Today's Military)

[7] UPT: Undergraduate Pilot Training

years of active-duty service after the completion of pilot training. Participant A, Participant B, and Participant C chose the military pathway to join the Air Force and become fighter pilots. The three are assigned to different aircraft, and their duty period differs based on the time they joined the Air Force and completed their Pilot training. Participant A has served as a fighter pilot for 24 years, and Participant B has served for 21 years.

However, Participant D, Participant E, Participant F, Participant G, Participant H, Participant I, and Participant J chose the civilian path to become pilots. They are all on different timelines with regard to their licenses and certificates as well as the time they decided to start their aviation journey. These differences in timelines were determined by their ability to finance their training. The financial barrier is the first huge barrier people who take the civilian pathway toward aviation face, and it will be discussed in detail later in this chapter. Participant J earned his private pilot license back in the 1980s, while other participants are more recent in terms of their licenses and rankings. Participant D, who is currently flying as a commercial pilot in Europe, started her initial flight training and hours in Canada, but was being sponsored by an airline to complete her pilot training in the Philippines under 16 accelerated months before moving to Bulgaria for her "type rating."[8] In addition, Participant F and Participant I started their flight lessons while also juggling university and work to be able to support their flight training and ground school classes.

Participants note that knowing someone in the industry was helpful when they started their training. The challenges a person might face might be less than those who do not know anyone. In this study, Participant J, Participant G, and H knew individuals in the industry or met people during their training period. Participant J talks about his flight instructor, who was also

[8] Type Rating in Aviation: A type rating is basically the benchmark required by standardized agencies, such as the Federal Aviation Administration in the United States, in order to operate certain types of aircraft.

his co-worker and very helpful both in his learning process and his work. He got his private license mostly under his tutelage. Participant G also had the same opportunity to learn from her partner and get most of her ratings under her partner's supervision.

Theme 3: What are some of the barriers they have faced?

There are substantial barriers in the way of women aspiring to become pilots. Access is restricted by expensive training costs, which is a significant financial barrier. Complicating matters further are gender stereotypes and a lack of acceptance, as female aviators deal with discrimination. Furthermore, cockpit designs and equipment frequently do not accommodate women's different body types. Issues with work-life balance, discrimination against pregnant women, a shortage of role models, and linguistic difficulties further complicate women's progress in aviation. To promote gender equity and provide equal chances for aspiring female pilots, these structural concerns must be addressed. These barriers are categorized below under four major themes that have been identified based on the participants' interviews:

1. Financial Barrier:

    Becoming a civilian pilot is a complex and remarkably expensive process. According to Participant G, people jokingly refer to aviation expenses as a "Jet Tax" when it comes to the affordability of flight training. It means that anything on a jet aircraft is up to four to five times more expensive than on a cargo plane. The aviation industry is built on a very expensive base, and Participant G doubts if the prices of tranings, and financial barriers will be changing soon. Participant D started her flight lessons in Canada, while working to be able to afford the flight training; However, she

realized she might not be able to support herself during the whole flight training, which led her to move to Kabul, and seek program support from an airline in Afghanistan.

Participant E and Participant F also raise concerns about the affordability of flight training. However, unlike Participant D, their parents were able to partially support their Flight Instructor License. Participant E talks about the ability to take flying lessons regularly and finish the pilot training in one year, if there is the money for it. But she herself did not have the money; it took her five years to finish while she was also working to pay for her license. Now, while they are working as flight instructors, they are also making up their hours to be eligible to apply for a commercial pilot license. Participant I also is working two jobs, one of them being a flight attendant, to support herself and take care of the cost of flying lessons.

Financial barriers also lead to longer-term training as people are not able to regularly take flying lessons and complete their training. They do it only when they have the money to pay for flight school. Participant H, who also confirms the high cost of aviation training, mentions that training might be more accessible in terms of number of flight schools and programs in some countries, such as the U.S. She also points out that if a person does not have the money either from a program or pocket money, they cannot really take long breaks and gaps, as the training is very specific, and a person would then need to refresh their memory again.

According to Participant G, women tend to face financial difficulties more than men when supporting themselves. She talks about how men and women differ in their money-earning mentality. According to her, men, traditionally being the “breadwinners,” seek high-paying jobs. Still, for a woman, it might not be a priority, depending on her

role and responsibility in the household. She also thinks about women in aviation and talks about how organizations working in empowerment missions can support women and empower them to find out to be financial unicorns and how to build their wealth and create generational wealth. However, on the military side of aviation, the Air Force takes responsibility for all expenses during training and service. No significant financial barrier was found among the fighter pilot participants. In sum, the financial barrier is among the most prominent and huge obstacles women face when they decide to go through flight training and become pilots.

2. Gender Stereotypes and Lack of Acceptance:

Gender stereotypes and lack of acceptance from male colleagues and passengers are reported by almost all of the female pilots who participated in the study. This barrier is significant in the first few months of training and on the job site but declines after a woman pilot spends more time working and proving her competency to her colleagues and passengers. Participant D, who comes from a very traditional society, talks about gender stereotypes as one of the main problems that prevent women from entering aviation, mentioning that people perceive having a female pilot as a "funny idea." When she started her job as the first commercial female pilot in her country, she faced a very big mental challenge, as the male crew she was flying with did not trust her at all. They tried to involve themselves as much as possible in the tasks she was supposed to perform, and led her to ask them several times, "Please let me do this, Am I flying, or you are flying?" These behaviors also gave her self-doubt if she was competent enough to fly the plane. However, she didn't give up, and the situation improved when she assured the

crew members that she was as competent as them. She also witnessed cases where the passengers found themselves unsure if it was safe for them to fly with a woman pilot. The airline she was working with usually used male crew members as a "shield" to reassure passengers they were safe, and that the woman pilot was competent enough to handle the plane.

Participant G, who flies private jets, also confirms that she hears comments such as "You should not pull the chocks[9] because I do not want to see you break a nail." In addition, she has also been asked several times if she is a flight attendant. Participant G describes how she feels every time she hears sexist comments:

> 98% of the time, when someone makes a sexist joke with a racist and homophobic tone, I would be still sitting there and be like, is it a joke? But it did not feel right, so I finally was able to have the courage to say respectfully to them, listen, this is not right. I appreciate you are trying to make a fun environment, but I am not your bro, and this is not a locker room. If you can't say this to HR, please don't say this to me, because it then becomes a safety issue.

Participant C also reports extreme gender stereotypes and a lack of acceptance by her crew members as a fighter pilot. She talks about how uncomfortable and stressed she felt during her solo flight training. A few male colleagues told the instructor, "You are going to let this girl fly solo; it's ok. She is going to kill herself, but you are going to destroy a million-dollar plane." When she became the flight instructor, she would have

[9] Chocks: Chocks are wedges placed around an aircraft's wheels to prevent accidental movement on the ground.

designated students' names (males) to train on the whiteboard every morning, but by the time she went to the locker room, changed, and came back, the names were gone, and the student pilots did not want to fly under her supervision and order. She always felt like an outsider from the beginning. She had to work and study alone while male students shared notes and supported each other throughout the journey. Participant A also talks about the pressure of being a female pilot, emphasizing that if she made a mistake or failed, it was tagged to her gender, not because she was just a pilot who had a bad ride.

Participant A talks about the unknowns and questions that come up when a person is the only female fighter pilot in her squadron. Questions such as “Can they (male colleagues) still make jokes?”, “can they still have fun?” Later, she talks about how people assume that her husband is a pilot, while her husband is a veteran, and she emphasized the lack of knowledge that people have, and that she is not getting offended by hearing those comments. Participant K, Participant I, Participant E, and Participant F have also confirmed that gender stereotypes exist and have either experienced or seen cases during their flight training and work. They agree that the generational gap plays a role, as some of the older men tend to be more biased toward women. Participant E recommended that more young males should be hired as they tend to be more supportive to women and gender diversity in aviation.

All the participants agree that the pilot has no gender, and all of them are putting on the education hat to raise awareness and discuss these stereotypes. Participant G describes how she sees herself and other women colleagues as educators besides their actual job as pilots. “We are in the role of educating people that females can be pilots,” she says. “Females can also absolutely love sparkles, get their nails done, their hair done,

their makeup done, and all the traditional very feminine things and still can be incredible pilots."

3. The Unsuitability of Military Equipment for Women:

While women who chose the civilian path did not report any problems they faced in the cockpit regarding their body size, the female fighter pilots reported that the flight suit/gear and the cockpit of the aircraft in the military are designed for a specific body type. Participant A talks about flight gear that is not meant for women:

> Over 20 years of my career flying in the Air Force, we didn't fix it. I think part of it is for us women who were early, and first, we did not want to speak up about it because we didn't want to be like, it is a problem. We were like, hey, we are fine, we can fly this, that the suit will be good enough and it will work, but in reality, it was not fine. We were just trying not to cause trouble, and it was kind of how we wanted to fit in.

She continues talking about the flight gear that was not designed for women's body types. "Is that harness totally digging into my shoulders because it was too big? Yes! Is this survival vest that is ridiculously big getting in the way of the cockpit? Yes, but I just learned to deal with it, but it certainly was a barrier." Participants B and C also talk about how the flying suits were not made for female pilots. Participant B also says that these "female issues" aren't just about politics or diversity; they're also about making sure that outfits and other military gear fit right, which is important for the U.S. National Defense. Participant B says that when women go to war zones, they need body armor that

fits them properly and doesn't have any holes that could cause skeletal damage over time. If this hurdle isn't fixed, it will add to the many paper cuts that tell women over time that they don't belong here.

The flight gear isn’t the only problem. The fighter cockpits make the environment uncomfortable and not welcoming to women by specifying height and weight restrictions that immediately disqualify certain numbers and groups of women from joining the military. The minimum height requirement to qualify for flying a fighter craft is 5 feet 4 inches, which is equivalent to 162.56 cm. Therefore, getting medically qualified in orthopedic metrics is one of the barriers women face to entering the Air Force. Participant A talked about how cockpits were not designed for women, as she had problems reaching out to rudder pedals, and she had to pull all the way to the front so she could reach them. In addition, according to Participant A, the ejection seat also has a weight restriction that she could not meet as she didn’t weigh enough. The cockpit was designed with an average man’s height taken into consideration. According to Participant B, the standing height requirement (5 feet 4 inches) would eliminate 44% of the female population between the ages of 20-29, which is also counted as the target demographic in the US. This design for only one body type (Caucasian male) according to Participant B, would also eliminate minorities and disadvantaged groups, as it would eliminate 74% of black women, 72% of Hispanic women, and 61% of Asian women, as these ethnicities have different heights and body types.

In addition, the standing and sitting height requirements of specific fighter crafts also disqualify a huge percentage of women according to Participant B’s research. Her research shows that only 8.9% of women are qualified to fly the F-15 fighter craft, and an

A-10 fighter craft would only allow 14% of women, meaning that 86% of women would be immediately disqualified based on the engineering and design of the fighter craft because they will not meet the standing and sitting height requirements. Participant B emphasized that all these barriers to entry are a symptom of a larger systemic problem, and we should design the aircraft considering the recruiting population, regardless of gender, and race. Although there are efforts to fix this system and change the policy, Participant B thinks that it will take decades to make changes to fighter aircraft, and until then, many women will be restricted from flying them.

4. Work-Life Balance:

To make it very simple, traditionally, if a husband finds a job in another state or country, the woman has picked up the whole family and moved. Although men also have family responsibilities and schedules to keep, the truth is that women have always been the buffer, to pick up the unpaid care work so that a man can do the kind of job he wants. In aviation, the work-life balance has been reported as one of the main challenges women face in numerous studies. The participants for this study when asked about their work-life balance had different views, but certainly agreed that work-life balance is unique and looks different in each household. Participant G mentions that using the term "balance" is not the best idea, as the word gives the sense that a person should consider working, and taking care of family equally, which is not practical. "Harmony" might be a better term. She speaks about how an individual would allocate their time in different seasons of life. Therefore, everyone's balance and time allocation to specific roles they play is different. Participant G talks about her passion for travel and the desire to introduce it to her

children. She concludes how important it is for a woman to receive support from family members and her colleagues at work before and after her pregnancy, as she cannot possibly do it alone.

Participant A also talks about work-life balance as a fighter pilot, mentioning that she had all her focus on training when she started and that her social life was with the people she was training with. She emphasizes the importance of using the training as a chance to excel, as your performance in the training impacts the rest of your life. Later on, when she got married and became a mother, she talked about how, with time management, it's doable to manage family and work, making specific priorities and ensuring you are always ready and flexible.

Participant D, who has been flying over Europe as a commercial pilot, talked about the bad social life that most females face as a result of their job as pilots. Depending on culture, some families expect women to allocate sufficient time to family matters and children. However, it's easier for men to stay away from home because it's more acceptable for them to be away. After all, the woman of the house will take care of the family. Participant D talked about how this can be a barrier for women, many of whom might drop out of training as a result of family responsibilities and society's pre-defined roles for both genders. Therefore, work-life balance might seem like a huge barrier for some women, depending on the societies and cultures they grew up in, while other women enjoy the freedom of making their own decisions on balancing their work-life and family responsibilities.

5. Pregnancy:

Pregnancy continues to be one of the main challenges women face in the aviation industry, whether an individual is taking the civilian pathway or the military pathway. In the civilian side of aviation, women cannot fly a plane if they are more than three months pregnant. The maternity leave in the US, based on the U.S. The Department of Labor, the Federal Employee Paid Leave Act (FEPLA) makes 12 weeks of paid parental leave available to federal employees. In European countries, maternity leave is paid, which might encourage the women to return back to work after the maternity leave.

There is a major issue besides paid or unpaid maternity leave that affects women aviators. According to Participant D, a woman pilot who takes an extended break from the job to have a child will face significant hardships. The flight requirement mandates physical fitness, and pregnancy can hinder a woman's ability to stay fit. Additionally, being away from flying for a year is too long, and a pilot who takes a break must complete specific training again to catch up and be able to fly. Some women may not return after having a child due to the hassle involved in completing the training and keeping the license up to date. This makes pregnancy a significant barrier for many women aviators, and some of them end up quitting their jobs after having a child. Participant D also discussed how airline companies view the hiring process from a business perspective. They prefer to hire male pilots who can work with them for ten years non-stop rather than female pilots who take several breaks and require additional training, which costs the company more. Furthermore, women aviators miss out on promotion opportunities within their airline company due to taking an extended work break during pregnancy. This sentiment was shared by Participant G, Participant F, and Participant I.

On the military side of aviation, maternity leaves are paid, and the training is also paid when the female pilot returns to work. They do not have the civilian problems of not getting paid. Participant B describes the result of her study about the percentage of women and men fighter pilots trying to get out of the military when their 10-year contract and commitment is over. However, after that 10-year commitment, your chance to get bonuses will increase if you stay longer in service. According to Participant B's research, 35 to 38% stayed in the service after 10 years compared to almost 60% of men, and one of the main reasons behind leaving the service after the contract is over seems to be family planning and having children. In addition, when a woman takes a break from flying, her peers start upgrading faster than her and getting promotions while she is away and recovering from pregnancy. Fighter pilots generally have a very aggressive timeline for when they can upgrade to get higher ranks by mastering their specific fighter craft. Also, based on Participant B's research, this was why most women fighter pilots wanted to delay having children until the age of 29.

Participant B also talks about the recent changes as women started to fly while pregnant, including during her service, and it is important to mention that both Participant A and B flew pregnant while they were in service in the Air Force. Most women can fly pregnant in their first and second trimesters by signing a waiver form (please see the appendix A, attached at the end of this study). However, there is an ongoing fight to allow women to continue operating their aircraft while pregnant. Participant B talks about how the data the U.S. government uses to argue that pregnant women should not fly is based not on science but on benevolent sexism. According to Participant B, instead of doing studies, they use emotional terms, arguing that women are too emotional when they

are flying. They did end up doing a risk study showing that women cannot fly ejection aircraft pregnant because they believed if the woman ejected, she might lose the baby. However, Participant B also talked about scientific studies and safety standards regarding the chances of a woman ejecting from an aircraft compared to the Department of Transportation of getting in a fatal car crash while driving to work. It is around 100 times more likely for a pregnant woman to die while driving to work. Therefore, while the U.S. cannot discriminate on race and sex, according to Participant B they are discriminating based on pregnancy, which would impact women in general.

Participant B also discusses the maternity flight suit's recent design. According to her, although there are around 400 women per year in the military, including navigators and pilots, who are pregnant, most of them continue to be in service during pregnancy, either part of it or some part of it. Still, the Air Force has no special uniform to accommodate their expanding midsection. Women hear comments such as “suck it up, figure it out, or buy a really big size,” which will be loose on the arms and legs. However, another woman designed her maternity suit, which Participant B found on the internet, and took it to the Pentagon, which validated it. It’s now a requirement that women have maternity suits. Participant B says this development sends a message to the younger generation that women are welcome here.

To conclude, pregnancy discrimination is a barrier; women fighter pilots are fighting for two things. The first is the recognition that pregnancy discrimination exists, whether a person is a pilot or not. The second is allowing women to make decisions about their bodies based on science, data, and doctors, rather than policy informed by benevolent sexism and emotion.

6. Lack of Role Models & the Importance of Mentorship

Participants were asked if they had a role model when they started their aviation career. Unsurprisingly, not all female pilots had female role models to follow. Participant B had to be the pathfinder for herself, as she never had a role model or a female supervisor during the 21 years of her service in the military. Participant A wrote “Reach for the stars” on a gold star paper that was on her bedroom ceiling, a reminder for her to keep working towards her dream as she did not have a role model. In other words, when she started, there were not really any women who looked like her. Participant D, coming from a background in which female pilots were very rare and a “funny idea,” also did not have any role models when she began her journey in aviation. What she did instead was imagine her future self in the cockpit (the ideal person she wanted to become) and use that as a role model to help her push past boundaries to become a commercial pilot.

However, mentors, especially for young aspiring girls in aviation, are critical. Participant A talks about the stories she heard of girls who said they wanted to become pilots, but the boys in her classroom would tell her they couldn’t, or her parents said no, that’s not something a woman would do. Participant A is worried about these dreams being crushed and thinks about a career day in school where a woman pilot can go and see the girls and tell them that yes, they can be pilots if they want to, and tell her story of how I did. Participant A talks about the lack of exposure to aviation that young females have. Based on experience, when she visited her son’s school in her uniform, she saw young girls asking her if she was a pilot, with a mix of happy and shocked reactions.

Participant G, a private jet pilot, also never had a role model in her life to inspire her to become a pilot. Still, she did have a supportive family who never told her that she could not achieve anything, and a very supportive group who helped her through her journey to become a pilot for private jets in the U.S. She emphasized the importance of mentorship, as she would not be able to become a pilot without her support group.

All participants in this study stressed the importance of mentorship in bringing more women into aviation, and the lack of female role models and mentors might be a reason to play a role in explaining the vast gender gap that exists now. Participant B says representation matters because it empowers the children to envision possibilities for their own lives that previously seemed impossible.

7. Language Barrier:

While only Participant C talked about the language barrier that prevents women from entering aviation, it's an important topic to focus on. If the person wants to fly internationally, one of the requirements for becoming a pilot is to speak English fluently and understand it very clearly. The accessibility, time, and cost of learning the English language are different in each country, but it definitely is a barrier for women who want to become pilots but don't have access to language courses and learning opportunities. Therefore, learning English as a second language would pose challenges to some females aspiring to become pilots, as it would be an extra expense to learn the language first to qualify to apply to aviation schools.

Theme 4: Current State of Gender Diversity and an Optimistic Look Toward the Future of Aviation?

Participant J, who got his private license certificate in the 1980s, only encountered one female student pilot during training and not a single female pilot. Participant A, who started her career as a fighter pilot in the late 1990s, had 35 female fighter pilots in the Air Force out of 3500 fighter pilots in the U.S., constituting only 1 percent, making it a very lonely environment for women. However, she says the number of female fighter pilots is 120 now, better than 35, but it took 20 years and is a prolonged growth. But she is very optimistic, thinking it's going in the right direction as women pilots are getting out in the community, spreading the word, and focusing more on raising awareness. Most parents nowadays are the generation where they've seen women pilots believing that they can do this. If children are interested in aviation, parents are more likely to encourage them.

Participant B also shows optimism about the future of gender diversity in aviation. She attends a yearly conference about women in aviation, and she has been overwhelmed by the increasing number of female participants attending the event compared to the last few years. She confirms that it may be slow growth, but positive growth. Participant G also showed strong optimism toward the future of gender diversity in the aviation industry, emphasizing the significant amount of work being done in recent years to increase the number of women participating in the industry. She also emphasized the critical role of social media in attracting more women interested in aviation who are inspired by current female pilots who show them that they can do anything they truly want to. It could be something they've never dreamed of. Participant C also shows great optimism toward the future of gender diversity in aviation, as the flight instructor who helped her become a private pilot was a woman whom she has been inspired by. When she was training in the military, there were no female pilots or students. This

also motivated her to get her flight instructor license to teach other girls so they could look at her and get inspired by her. This is also the case for Participant E, who is inspired to become the flight instructor who teaches the new hires.

When the male participants were asked about their perspective on the current state of gender diversity and how optimistic they are toward the future of gender inclusivity in aviation, all three showed tremendous support and optimism. Participant F talked about the recent changes and saw a schedule where most of his students were female student pilots. He emphasizes the importance of having women in aviation, as shown below:

> I think there should be more girls in the aviation industry because when they are prepared, they are actually prepared. I don't know what it is, but they are more meticulous with the details when it comes to the smaller things, and they get it right, which is quite impressive.

He continues to emphasize the importance of having more women in the field, as women have proven their competency and can even do better than men, and everyone should have a fair chance. What he would like to see in the next two decades is more diversity in the workforce, as the more diverse the workforce is, it will bring up new ideas, and the community can grow. On the other side of the world, Participant K talked about how his sister's resilience influenced him to start his aviation journey. His sister has a bachelor's in mechanical engineering and a master's in aerospace engineering, and she has faced similar challenges in STEM in a male-dominated environment. However, she has proved her competency and positively influenced her brother, who is pursuing a PhD in aviation sustainability.

Participant K, when asked about the current state of gender diversity, raised concerns about not having enough females in aviation, even in academic programs such as the one he is currently in (aviation sustainability). Participant K talked about the role of males in this issue of the underrepresentation of women in aviation, and everybody should do their own part by raising awareness, especially men in the aviation industry's leadership positions. He emphasized the importance of shared responsibility for both genders on this matter by saying, "You cannot clap with one hand," and everybody needs to do their own share to make sure the desired inclusion of genders in the aviation industry is seen in the near future. He emphasized the importance of both gender participation and contributions in this effort.

Chapter V: Discussion and Limitation of the Study

Discussion:

The analysis of the interviews conducted during this study reveals deeply ingrained structural barriers that deter women from entering or advancing in the aviation industry. For those who wish to choose the civilian side of aviation, financial barriers stand out prominently, with the high costs of education and training disproportionately affecting women due to existing economic disparities. Gender stereotypes further exacerbate these challenges, where societal and cultural perceptions of aviation as a male-dominated field continue to persist. In addition, the aviation industry's demanding nature, with irregular hours and long periods away from home, poses unique challenges for women, who also bear a more significant burden of familial responsibilities as they have to choose between family or career. It is essential to mention that the lack of role models further complicates these barriers, as the woman alone might be unable to navigate her path without any support and mentorship.

While these barriers exist, the researcher, while interviewing the study participants, observed that the women in the aviation community are very small but strongly supportive of each other. Their approach is very welcoming and warm, and they want to ensure that the new member feels welcomed. In the researcher's opinion, the study results suggest slow incremental change. Still, all the participants showed optimism toward the future of gender diversity, believing that the industry is going in the right direction and that they will also contribute toward making a positive impact and helping to bring more women into the aviation industry to create a balance. Based on the optimistic perspectives of the study participants, the researcher observed that the conventional understanding of who can take on the role of a pilot is undergoing a

transformation, at least among the communities these women live in, which will open more doors for young aspiring women who plan to pursue an aviation career.

Study Limitation:

The study's limitations include its constrained submission time frame, which limited the researchers' ability to recruit more research participants. During the time the researcher had, she interviewed only eleven participants. Despite intentions to encompass a diverse range of backgrounds among the participants, the small sample size may have restricted the thorough exploration of potential barriers. Additional participants could have provided insights into unaddressed challenges and introduced new perspectives, enriching the depth of the study's findings.

Chapter VI: Study Recommendations & Further Research

A gender gap exists within the aviation industry, in which women are not well-represented to the extent that they should. Based on the study's findings, this research makes the following recommendations:

a. **Young Girls' Exposure to Aviation:**

   Young girls need to be exposed to aviation during elementary and high school. This might be the perfect time to plant the seed of aviation inside a young girl so she can work towards it. Parents would also play a crucial role in encouraging their daughters to consider STEM careers, aviation being one of them.

b. **Financial Support and Scholarships**:

   Economic barriers significantly hinder the entry of women into the aviation sector. To address this, increased availability of scholarships, sponsorships, and grants specifically targeted at women can play a pivotal role. For instance, initiatives like Women in Aviation International (WAI) have made strides in providing financial aid to prospective female aviators. However, broader and more accessible funding opportunities are needed. These economic structures should be designed to cover educational expenses and provide stipends that can help mitigate the living costs associated with training periods, making aviation careers more accessible to women from diverse economic backgrounds.

c. **Launching Mentorship Programs**:

   An increased presence of female role models in the aviation industry would benefit women who are already employed in the sector, draw in a greater number of young women, and encourage them to think about pursuing a career in aviation. Furthermore,

women would be more inclined to pursue careers in aviation if formal mentoring programs supporting young female aviators throughout their studies and careers were established and administered by women. While women only make up 1% of the leadership positions in aviation, bringing more women into aviation leadership will give women visibility and a share in decision-making about women at a higher level.

d. **Hiring younger people:**

   Based on the perception of study participants, hiring young professionals would also help to address the gender stereotype challenges, as younger generations tend to be more supportive of women and favor gender inclusivity in almost all sectors, including aviation. The younger generation has already seen their moms and women working outside the house compared to senior people.

e. **Launching communication and awareness campaigns**:

   It is important that we begin aviation industry education initiatives in academic institutions in order to support career choices of all students, irrespective of gender, while avoiding the reinforcement of gender biases and traditional gender roles. Among young female students, initiatives and campaigns as such would seek to advance careers in aviation and STEM. These awareness programs and campaigns can take various forms, such as hosting a "career day at school," organizing an airshow, or taking students to small local airports to meet pilots and student pilots.

f. **Paid maternity leave & Robust Childcare Support:**

   It is essential to provide pregnant women with flexible work arrangements and reliable childcare support to encourage them to return to work after their leave. For the aviation industry to expand, gender diversity was emphasized by the study's participants.

Additionally, by supporting women throughout their aviation careers, we can expedite the industry's development in the coming years.

Call for Further Research:

Further research should be conducted on the economic demands of having pilots in different countries, especially those with huge economies in the future, and airlines should step in to avoid shortages of pilots in the future by investing in training programs and supporting a more inclusive population of people aspiring to become pilots. Further investigation into the economic impacts of increased gender diversity in aviation could provide additional arguments for more substantial investment in diversity initiatives within the aviation industry.

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Appendix A: Aircrew Voluntary Acceptance of Risk (AVAR)

The Aircrew Voluntary Acceptance of Risk (AVAR) form is taken from the Air Force Medicine website and is meant to educate airmen and guardians on these risks so they can make informed decisions about flying while pregnant. For more information, please visit the below link:

https://www.airforcemedicine.af.mil/Reproductive-Health/

AIRCREW VOLUNTARY ACCEPTANCE OF RISK (AVAR)
TAB 1 – RISK ACKNOWLEDGMENT FOR FLYING WHILE PREGNANT
CAO: 25 October 2022

During pregnancy, your body changes in significant wide-ranging ways. Many of the normal physical changes of pregnancy create potential risks in the flight environment. The overall impact of these changes is unpredictable and varies between individuals and even between your own pregnancies. Additionally, there are certain pregnancy-related conditions that can cause sudden incapacitation or life-threatening emergencies. The Aircrew Voluntary Acceptance of Risk (AVAR) document is meant to educate you on these risks, in order for you to make an informed decision when you request to fly during your pregnancy. By signing below, you acknowledge the following:

I have read, and I understand the AVAR discussing risks associated with flying while pregnant.

I have discussed this information, to include specific risks and hazards associated with my airframe, with my obstetrician and my flight surgeon. I have also reviewed the Aviation Platform Specific Occupational Hazard Exposure Guide for the platform I will be flying. My questions have been answered to my satisfaction.

I request permission to continue flying during pregnancy. I understand that flying while pregnant may present known and unknown risks to me and my pregnancy and voluntarily accept all such known and unknown risks.

I understand I am not required to continue to fly while pregnant and I may voluntarily suspend my participation in aerial flights at any time. I understand that I can take myself off the schedule at any time for any reason, including temporary conditions like fatigue, without requiring medical re-examination, the same as any other crew member. I understand that if at any time during the pregnancy, a complication or situation arises making the pregnancy potentially higher risk, I must notify my obstetrician and flight surgeon for determination if continued flight status is appropriate.

I will comply with all requirements, including keeping follow-up appointments as scheduled with my obstetrician and flight surgeon at least every four weeks while I am on flying status. I understand that my flight surgeon is required to review any new diagnosis or change in treatment made by my obstetrician. I understand that inability to review medical treatment provided by other providers, or changes in symptoms can be sufficient reason for my flight surgeon to issue a "DOWN" DD Form 2992, *Medical Recommendation for Flying or Special Operational Duty*.

_____ _____
Aircrew/Operator Signature / Date Printed Name

I have reviewed the above document with this member. I have answered all questions from the above aircrew member to their satisfaction.

_____ _____
Flight Surgeon Signature / Date Printed Name

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