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# Factors Influencing Low Female Representation in Pilot Training Recruitment

Kristina Marintseva<sup>a</sup>, Artjoms Mahanecs<sup>a</sup>, Mukesh Pandey<sup>a</sup>, Neil Wilson<sup>a</sup>

<sup>a</sup> School of Mechanical, Aerospace and Automotive Engineering, Faculty of Engineering, Environmental and Computing, Coventry University, Coventry CV1 5FB, United Kingdom

## Highlights

- **Despite numerous studies and initiatives to attract female pilots to commercial aviation, statistics have consistently shown a negligible increase in their number.**
- **Discrimination in hiring and performing duties continues to be mentioned by interviewed female pilots. However, this does not seem to be the main issue in recruiting female pilots. Role models, mentors, the ability to plan a personal life, support, both financial and psychological, are key factors that women will look to when they plan to become pilots.**
- **Support in career planning is especially important for female pilots given the high cost of training, high health and occupational risks, and the sensitivity of the airline industry to various endogenous and exogenous factors.**

## Abstract

In 2011 ICAO published a report about projected pilot and training capacity shortage (ICAO, 2011). To solve this problem, several studies have been carried out, and forecasts of the required number of pilots for the next 10-20 years are constantly being updated. Universities have begun introducing pilot training into their aviation courses, although only US airlines require a degree from the candidates to work as a pilot. The leading providers of pilot training facilities and industry observers argue that even with severe flight restrictions due to COVID-19, the shortage of pilots and quality pilot training remains a major concern. There is a trend of under-representation of females in the pilot roles. Some researchers and aviation industry experts assume that more women should be recruited into the profession to address the pilot shortage.

This paper explores the current key reasons for the low female representation in pilot training recruitment. In many studies, the problem of gender discrimination and societal stereotype that believes that the pilot is a purely male type of job are dominant among the negative ones. The authors investigated whether these factors are seen as predominant in women's career decisions in aviation. A qualitative study was conducted utilising the semi-structured in-depth interview of nine female pilots from Europe, Australia and UK. A transcript based content analysis was done using Nvivo. Further, the triangulation method was utilised to verify the results of the study.

The main findings from this research show that, in addition to the high cost of training and the tendency of airlines to shift financial obligations for training to students, the hiring of pilots continues to suffer

from gender inequality. Reasons such as “Lack of role models for young girls and women in aviation”, “Cultural sexism” and “Lack of acceptance from male peers and passengers” continue to hinder the promotion of the pilot profession among women. Multiple organisations and airlines have initiatives in place to mitigate the problems connected with pilot training and hiring. However, the effectiveness of these initiatives is controversial, as the number of female pilots has seen hardly any growth in the past ten years. Furthermore, they may be responsible in future for creating an even more “gender-unequal” culture inside the industry, as women will be seen in their roles only due to gender recruitment requirement. All stakeholders, including universities that choose to participate in the pilot training process, could help rethink the principles of gender balance, increasing the visibility of their initiatives and raising public awareness of the availability of pilot training and career prospects for women.

The article presents the theoretical and practical implications of the reasons for low female representation in pilot training recruitment.

## Keywords

Pilot shortage; Gender Imbalance; Role models; Discrimination; Pilot Training; Female pilot

# 1. Introduction

Personnel costs, including training and certification, are often a key item in airline financial reports (Stalnaker et al., 2018; Valenta, 2018). It is also known that pilots are the most expensive human resource of any airline. Therefore, the topics of retention, training, retraining have been widely discussed in academic and business circles and numerous papers (Krikunov, 2013, Higgins et al., 2013, Judy D. Aaron, 2018, CAPA, 2018, AIS, 2019). Prior to the crisis caused by the COVID-19 pandemic, the shortage of pilots was considered as ‘one of the biggest challenges’ (Merdith, 2019). For instance, in 2011 ICAO assumed that by 2030 the air transportation market would need 980,799 pilots. ICAO also raised the issue of capacity shortage in flight schools, equivalent to 160,000 pilots (ICAO, 2011). In 2017 CAE, a supplier of flight training services, projected a need for 255,000 new pilots by 2027, which implied an average of 25,000 new pilots per year (CAPA, 2018). The Boeing and Airbus outlooks predicted even larger numbers. Thus, in 2018 Boeing pilot outlook forecasted a 20-year demand for 790,000 new pilots (or an average of 39,500 per year) (Boeing, 2018).

In response to solving the problem of flight crew shortages, many initiatives and programs at different levels have appeared, there was an increase in investment in flight schools, and universities have begun introducing pilot training into their aviation courses (some examples from the UK practice can be found in Table 1), although only some major airlines require a degree from the candidates to work as a pilot (Philips, 2019).

However, the pandemic changed the world in a matter of days. The media was flooded with articles about broken dreams, layoffs and huge training debts for both novice and experienced pilots (BBC News, 2020; ECA, 2021; Schlappig, 2020; Grimstead, 2021). Creedy (2021) in their analysis has noted that demand for flight training at L3Harris was cut in half, and Lufthansa Aviation Training "suspended its ab initio training offering its 850 students full refunds".

Despite unprecedented effects of the pandemic, which caused the deepest crisis in the aviation and tourism industry, experts continue the discussion on a potential *shortage* of new generation pilots. The Oliver Wyman study states that the 34,000 global pilot gaps are expected by 2025 (Wolfsteller, 2021). Boeing's updated forecast predicts the need for 763,000 new pilots by 2039 (Boeing, 2020), while CAE predicts demand for 27,000 new pilots by the end of 2021 and 260,000 new pilots over the next decade (CAE, 2020). Ryanair has announced that 2,000 new pilots would be needed to crew its planned aircraft deliveries by 2024 (CAPA, 2021). Currently, airlines are already forced to cancel flights due to a shortage of pilots, as it takes time for their retraining due to long downtime (Parker, 2021). Another argument for the demand for flight training can be found in Mordor Intelligence report, which states: “the civil aviation flight training and simulation market was valued at USD 1.15 billion in 2020, and it is projected to reach USD 3.10 billion in 2026 with a CAGR<sup>1</sup> of 17.85% during the forecast period (2021-2026)” (Mordor Intelligence , 2021).

Even though the figures regarding new pilot demand vary in a wide range, it is obvious that they are based on the predicted number of aircraft in service and the demand for air travel. The forecasts above show that a stable demand for training and retraining of pilots is expected in the next 10-15 years.

To address the broader problem of the pilot shortage, a few studies have promoted the idea of recruiting female students in pilot training enhancing their participation in pilot roles which will also help in attaining gender equality, one of the UNSDG’s goals (Wolfsteller, 2021; Josephs, 2019; Opengart & Ison, 2016; UN, n/d). In line with this approach, the paper aims to explore the factors which act as enablers or challenges in the recruitment of women to pilot training beyond the current crisis. It was hypothesized that the ongoing employment problem and public stereotype that the pilot is a purely masculine job are the main obstacles to increasing the proportion of female students in flight schools and further in airlines pilot positions.

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<sup>1</sup> CAGR: Compound annual growth rate

Table 1. Embedding of a pilot training module at UK universities.

University (School, Academy)	Course Title / notes	Estimated tuition fee, 000 GBP
L3HARRIS Flight Academy (Crawley, Bournemouth, Cranfield)	'Frozen' ATPL / Does not guarantee job at the end of the training	86
Kingston University London (with Bournemouth Commercial Flight Training partner)	Aviation Operations with Commercial Pilot Training BSc (Hons) / Does not covered by Student Finance and additional funding	70
University of Weston London	Air Transport Management with Air Transport Pilot Licence (frozen) BSc (Hons)	123
University of Hertfordshire (flying lessons are offered by a flight centre partner)	BSc (Hons) Aerospace Technology with Pilot Studies / The additional cost of flying lessons is set by the flying school who will collect fees directly from the students.	No data provided
Buckinghamshire New University	Air Transport with Commercial Pilot Training BSc (Hons)	
Bristol, University of the West of England	Aerospace Engineering with Pilot Studies (with Foundation Year) BEng (Hons)	
University of Leeds (with Leeds Bradford Airport)	Aviation Technology with Pilot Studies and Management BEng (Hons)	
University of Salford	Aircraft Engineering with Pilot Studies BEng (Hons) and MEng (Hons)	
University of Central Lancashire	Aerospace Engineering with Pilot Studies BEng (Hons); MEng (Hons)	
Craven College (the Aviation Academy is based at Leeds Bradford Airport)	Aviation Management & Operations (with Pilot Studies) FD Foundation Degree	

Source of data: Universities websites

## 2. Literature review

### 2.1. Low female representation trends in aviation

The gender imbalance in the aviation industry is evident and recognized (Gagliardo, 2020; Gagliardo, 2020; ICAO, 2019; European Commission, 2019; Uniting Aviation, 2020). However, despite numerous studies and initiatives to attract female pilots to commercial aviation, statistics have consistently shown a negligible increase in their number. Based on data from the U.S. Bureau of Labor Statistics, processed and presented by Lutte (2019), women make up only 5% of airline captains and 5.1% of all pilots, and at the same time more than 70% of “low income” and “low profile” positions such as flight attendants and travel agents. The data in Table 2 shows that, for example, in the UK the growth of the number of female pilots was only 0.9% over the period 2008-2018, and the share of ATPL (A) holders did not exceed 5%.

Table 2. UK CAA Flight Crew Licence.

Year	JAR/EASA ATPL(A)			JAR/EASA ATPL(H)			UK ATPL(A)			UK ATPL(H)		
	Male	Female	% Female	Male	Female	% Female	Male	Female	% Female	Male	Female	% Female
1994	-	-	-	-	-	-	7066	84	1.17%			
2000	-	-	-	-	-	-	10261	214	2.04%			
2008	7219	303	4.03%	505	13	2.51%	4738	148	3.03%			
2012	10579	451	4.09%	771	19	2.41%	2951	101	3.31%	294	1	0.34%
2013	12142	537	4.24%	799	17	2.08%	2189	81	3.57%	197	1	0.51%
2014	12773	594	4.44%	893	26	2.83%	1624	65	3.85%	130	1	0.76%
2015	12725	593	4.45%	931	26	2.72%	1073	44	3.94%	56	0	0.00%
2016	12746	608	4.55%	928	22	2.32%	608	21	3.34%	36	0	0.00%
2017	13199	648	4.68%	925	25	2.63%	331	13	3.78%	21	0	0.00%
2018	11818	613	4.93%	866	24	2.70%	334	13	3.75%	21	0	0.00%

Source of data: Licence holders by age and sex website <https://www.caa.co.uk/>

## 2.2. Approaches to studying the problem and main findings

A considerable amount of literature has been explored the issue of pilot training and career in general, and gender imbalance in aviation in particular. These are mainly descriptive qualitative studies (see Table 3) that synthesize the experience of pilots to make assumptions and recommendations.

Table 3. Research method in studies on pilot training and career.

Study	Research Method	Main findings
Lutte (2019)	Data collection and representation according research structure.	Low female representation in aviation has been proven through statistics.
McCarthy et al. (2015)	Semi-structured face-to-face interviews with commercial flight crew based in the UK.	Shows the problem of additional stress for female pilots due to the belief in the need to prove their suitability for the profession.
Yanikoğlu et.al (2020)	Semi-structured face-to-face interviews with female flight crew from commercial airlines in Turkey.	Female pilots in Turkey are discriminated against mainly due to the gender stereotypes in society.
Ferla & Graham (2019)	An interpretivist approach.  Semi-structured interviews with female selected according to their aviation background (from European countries but mostly working in the UK).  A review of airline CSR webpages and reports.	Elements of discrimination and prejudice towards women working in commercial aviation are still present. Limits to women's entry to pilot positions are also based on assumptions concerning physiological differences between female and male. Most discriminatory and sexist comments towards them come from passengers. Lack of family, industry and educational establishments support and role models. Proactive industry efforts are still needed.
Opengart & Ison(2016).	Pilot surveys and interviews. Tropes and NVivo analysis.	US and Canadian female pilots face significant barriers to their career paths, confirming previous studies in the UK and Australia.
Klapper & Ruff-Stahl (2019).	Scenarios and regression analysis.	A pilot shortage will be a major driving factor for US regional airlines.
Efthymiou (2021)	Case study of pilots at Europe's largest LCC and semi-structured interview. A questionnaire based on the interviews results was developed.	The most important retention-influencing factors for pilots were identified.

	A statistical assessment of the Krustal-Wallis and Mann-Whitney tests of the six factor categories according to rank	
Miani et.al (2021)	Survey based on literature review. Data analysis using non-parametric tests (the Mann-Whitney test; a one-sample Wilcoxon signed rank test).	Students are concerned with the oversupply of aviation professionals in the industry as a result of the COVID-19 pandemic. Critical thinking and analytical skills were found to be the most important non-technical skills from the students' point of view.

The study of McCarthy et al. (2015) investigates the pilots experiences of entering the profession and experiences of initial training. The respondents, six men and four women, were recruited through a snowball sample. Semi-structured face-to-face interviews were conducted with commercial flight crew based in the UK during the winter of 2013/14. This was followed by questions regarding the barriers they faced since qualifying a commercial pilot. The male pilots were also asked about their experiences of flying with female colleagues and the female colleagues for their experiences of flying with men pilots. According to the findings of the paper, “women pilots still believe they have to over-come certain barriers and preconceptions in order to be accepted in what remains an overwhelmingly male profession” (McCarthy et al., 2015, p.36). The authors further conclude that finance is a problem for pilots of both genders. In addition, aspiring female pilots face the additional challenge of trying to be accepted by their male peers. Furthermore, women can potentially be under pressure due to the possibly mistaken belief that they must constantly prove their worth and "right" to be pilots and can become obsessed with the criticism they receive from their instructors. The researchers also hope that the younger generation of pilots will be more open and gender responsive.

Yanikoğlu et.al (2020) presents the results of semi-structured face-to-face interviews with ten female pilots from five commercial airlines in Turkey. The purpose of the questions was to find out if female pilots face gender issues such as inequality in working conditions, standards, performance appraisals, and sexual or gender-based harassment. Based on the analysis of the statements of the respondents, the following conclusions were made: firstly, female pilots in Turkey are facing several gender-based challenges in the workplace; secondly, they experience gender discrimination in the workplace and are being treated un-equally compared to their male colleagues; thirdly, women feel that they have to suppress their feminine traits in order to be accepted by their male colleagues, and this causes them stress; finally, female pilots face difficulties in balancing work and family life, especially after marriage and, most importantly, after childbirth. The authors suggest that the main reasons for these phenomena are the gender stereotypes in society, cultural sexism and perceptions in Turkey, when a woman has more responsibility for housekeeping than a man.

The topic of the causes underlying female underrepresentation in aviation is also discussed in Ferla & Graham (2019). Qualitative research methods are used, namely a semi-structured interview and a literature review on a question in hand. An analysis of interviews with five women working in the aviation industry showed that “Despite their positive experiences, all participants mentioned different challenges and gender issues as part of their daily jobs and reported the presence of sexism, discrimination, prejudices and stereotypes.” (Ferla & Graham, 2019, p.4). The authors also note that the analysis of the Corporate Social Responsibility (CSR) reports has shown that “out of the sixty largest airlines in the world by traffic, only seventeen ... are taking into account gender equality and diversity as a fundamental part of their CSR programmes”. The authors suggest that the problem is compounded by the fact that even if the airline has some elements of gender equality policy, it is difficult to determine what significant efforts are envisaged, since the targets are rather vague and without specific numerical indicators.

Opengart & Ison (2016) raised the issue of reducing aviation shortages by recruiting women. To answer the question of how to recruit and retain more female pilots, a survey and semi-structured interview method were applied, followed by thematic analysis using NVivo and Tropes software. The results of Opengart & Ison (2016) study show that female pilots from the US and Canada face significant career barriers, which, according to the authors' assertion, is consistent with findings from the UK and Australia on the issue in question. The key recommendations in the above article regarding women's

involvement in the aviation industry are that there are several important steps that society needs to take, namely: to remove both real and perceived barriers to success, ensure lower entry costs and higher starting salaries, increase awareness and outreach of young girls, discuss role models, promote and maintain a culture of career development, support women while they study, trainees and pilots.

More general pilot training and career issues are covered in the articles of Klapper & Ruff-Stahl (2019), Efthymiou (2021), Miani et.al (2021). The scenario method was used in Klapper & Ruff-Stahl (2019) to predict potential losses from pilot shortages in regional air travel. A one-factor regression model has also been developed to forecast the number of passengers of regional airlines. Klapper & Ruff-Stahl assert that by 2023 a pilot shortage will be a major driving factor for US regional airlines, therefore “new pilot pathway programs will be an important topic in the next few years, and one that deserves more research” (Klapper & Ruff-Stahl, 2019, p.8).

The aim of Efthymiou (2021) research was to identify the factors influencing pilot retention, using Europe's largest LCC as a case-study, and investigate if these factors differ on the basis of the seniority and commercial flying experience of the pilot. The author used semi-structured interview and based on the results a questionnaire was designed. The questionnaire was conducted using a survey of Ryanair pilots, in which 375 (95.18%) were male and 19 (4.82%) were female. The majority respondents were from European Union Member States or bordering countries such as Andorra, Russia, and Serbia. For statistical assessment of the hypothesis the Krustal-Wallis and Mann-Whitney tests of the six factor categories according to rank were applied. Based on the survey and interview results, the most important retention-influencing factors for pilots were identified as: being based at home, a competitive salary, job security, working a fixed roster pattern, a financially stable employer, recognition as a professional by their employer and a good work environment through well maintained aircraft and skilled colleagues. Statistical tests indicated that younger pilots placed a greater importance on job security and financial benefits. Pilots over 55 indicated a preference for a competitive salary, recognition of length of service and reduction of pilot workload (Efthymiou , 2021).

In terms of student recruitment, noteworthy are the results of Miani et.al (2021), in which the authors investigated the skills that students in current Australian undergraduate tertiary aviation programs consider to be beneficial in meeting future career needs because of the impact of COVID-19 on the aviation industry. The survey was developed following a review of the literature regarding future skills required in the aviation industry and current aviation data following the COVID-19 pandemic. Additionally, an airline senior management focus group contributed industry insights regarding essential skills for new graduates. A total of 67 participants who were enrolled in an Australian undergraduate aviation program completed the online survey. The majority (53 students) was undertaking a pilot major while the remaining participants were undertaking an aviation management major. Approximately two third of the participants (42 students) commenced their aviation program prior to 2020. Data analysis using non-parametric tests (the Mann-Whitney test; a one-sample Wilcoxon signed rank test) were applied for the study. The research findings showed that, most participants overwhelmingly agreed with the statements that external factors such as oversupply of experienced aviation professionals and reduced availability of aviation jobs over the next 2–3 years would likely create an impediment to their career in the 12 months after graduation. 53.7% (or 36 participants) showed their disagreement that their inability to complete flight training was due to financial situation and 59.7% (or 40 participants) showed their agreement that there was a need to consider an alternative career pathway while the industry recovers. *Critical thinking* and *analytical skills* were found to be the most important non-technical skills by all survey participants.

A literature review shows that interviews and surveys are the most applied methods for studying gender imbalance in aviation, although there is no generally accepted technique for processing the received data. The problem in question is an ill-structured one and therefore a qualitative approach is quite acceptable to generate data and then analyse them depending on the type of data (Creswell & Poth, 2018, p.45, pp. 181-220). It is probably worth noting that formulating and testing the hypotheses using quantitative methods is quite problematic due to the specifics of the issue and the difficulty of finding enough respondents who are ready to share their own experiences on sensitive topics.

Regarding the main findings, most studies define the prejudice about the division of professions into male and female, gender-based pay differences, the lack of a clear model for the professional development of female pilots, as well as balance between personal life and work as a root of the gender



imbalance in aviation. A common issue for pilots of both genders is the high cost of training and employment concerns, which obviously leads to risks of return on investment in education.

Below, it is proposed to briefly dwell on a review of the factors most frequently mentioned in the literature as negatively affecting overcoming gender imbalance in the pilot's profession. The purpose of the review is a preliminary discussion about whether the above negative factors remain relevant.

### 2.3. Reasons for low female representation in aviation

#### *Are pilot training costs a deterrent for females?*

The average cost of initial pilot training in the UK increased by approximately 53.8% between 2007 and 2017 (Valenta, 2018). While the average tuition fee for UK students is £ 10,000 per year, pilot training costs around £ 100,000. Beckett (2016) noted that of the thousands of potential pilots who start flight training every year, about 80% leave it. Martin (2016) argues that failure to fully fund tuition is a major reason for dropout. In the UK most airlines require their pilots to contribute to their training costs. It may seem more lenient practice when airlines only require a contribution if the pilot leaves the employment within a specified period (usually three years) (Gov.UK, n/d). Risks of return on investment in pilot training include high health requirements, as well as the time and cost required to take parental leave and recover piloting skills after a long break. Accordingly, high training costs can be a serious obstacle for women dreaming of a career as a pilot. However, this problem is relevant for the pilot-students of both genders.

#### *Is gender discrimination and cultural sexism still relevant?*

Discrimination is a broad and sensitive topic. Discussions can be made both by the definition of the concept of *discrimination* itself, and by the effectiveness of a specific legal framework and its practical implementation. With regard to discrimination in aviation, this problem mainly boils down to identifying the causes of overt or covert male dominance in the industry. In the literature, it is easy to find many private examples of both psychological pressure and specific actions, for example, on the part of society, employers or individual workers, aimed at limiting women's access to technical professions in aviation.

Hoppe (2011) found that aviation has long been considered a “white man’s industry”, and most forms of gender discrimination within commercial aviation include the gender wage gap, sexism involving stereotypical and patronising jokes and comments, sexual harassment, lack of role models for young girls and women in an aviation context, lack of acceptance from male peers and passengers. In 2007, Ryanair launched its “The girls of Ryanair” calendar, which featured semi-naked female cabin crew posing on aircraft and the tarmac. This advertisement campaign was closed in 2014 after several lawsuits being launched against Ryanair (Irishtimes 2014). Even though the ad campaign was withdrawn, it reflects the perception of the role of women in the aviation industry, namely, reducing the role of women to simply attracting customers.

The research of Davey and Davidson (2000) confirmed that jokes, teasing, and pranks are common among the flight crew community. The flight crew sees humour as a sign of good relations and a willingness to laugh at themselves. The presence of female pilots does not necessarily deter flight crew from making jokes and pranks, even when their behaviour could be perceived as sexist. This can be explained by the belief of the male community that jokes and friendly pranks cannot be categorised as actions of sexism. Nevertheless, Davey and Davidson (2000) found that a few women objected to sexist jokes and had found specific sexist comments deeply offensive. For example, one senior female pilot made an official complaint to management about a male colleague who played a sexist joke on her. Consequently, the male community within the organisation perceived this action as a “betrayal of the masculine code” and this result in an enormous scandal within the company (Davey and Davidson 2000).

When women move into what is considered a traditionally male occupation, they face many challenges, moreover their presence is perceived as a “threat” (Neal-Smith and Cockburn 2009). Women employed

within so-called masculine professions are often seen as unusual phenomena. Neal-Smith and Cockburn (2009) also note that for women moving into male-dominated industries, certain issues are invisible within the masculine discourse, which add extra pressure on women. These include joining in with the existing (sexist and racist) humour, performing to a high standard, adopting the conservative dress, dealing with sexualised or masculine language. All these extra pressure results in enormous occupational stress that women would have to go through while completing their job.

Research over the past few years has continued to raise the issue of discrimination against female pilots in different ways. For instance, Yanikoğlu et.al (2020) quotes interviews with female pilots who view men's perceptions of women's role in society as discriminatory: "...he told me that I should get married, have children like every woman, quit flying and that the investment I made in this profession is a waste"; "He yelled at me 'Push it like a man, like a pilot!'", etc. Excessive demands on them during training were also perceived by the respondents as discrimination: "During the trainings, I felt distrust from captains. A male FO sitting next to me had to make just one successful landing, whereas I was required to make five."

Ferla & Graham (2019) in the discrimination theme discuss issue of *physiological differences* between female and male and *psychological factors*, that mainly associated with the perception of certain occupations as prohibited for women due to female role models and patriarchal culture.

The fact that discrimination and cultural sexism in aviation have found their way into research in recent years is progress. However, much remains to be clarified, from the formulation of the problem to concrete steps to overcome the stereotypical behaviour and perception of female pilots in society.

*Is a lack of acceptance from male peers and passengers important?*

Throughout history, women have been the victims of various social stigmas (Winter et al. 2014). The most common one was prejudice on the skills and qualifications women held. Therefore, often women found the need to earn the respect of their male colleagues to be recognised as skilful professional, especially in the aviation industry (Winter et al. 2014).

Another obstacle is the relatively low passenger confidence in female pilots. According to the poll launched in 2013 by the UK-based online travel site *sunshine.co.uk*, 51% of British passengers admitted that they were less likely to trust a female pilot. The main reason for not trusting female pilots is a belief that "male pilots are more skilled" (Sunshine 2013). However, research shows that pilot errors are not gender specific (Bazargan & Guzhva, 2011). That is, passenger distrust is again based on entrenched prejudices about the abilities and skills of women in professions that require technical knowledge. All study participants in Ferla & Graham (2019) mentioned several times that most of the discriminatory and sexist comments about them came from passengers, as they still had some misconceptions and difficulties in trusting female pilots.

This social stigma correlates with conditions such as depression or post-traumatic stress disorder for the females already operating as a pilot and can discourage the new generation from starting the pilot career (Winter et al. 2014).

*Has the gender wage gap been eliminated?*

To mitigate the issue of gender wage gap the UK government obliged employer who has a headcount of 250 or more to comply with the regulations on gender pay gap reporting from 2017 (Gov 2020). Tracking such statistics gives an idea of the real progress of employers towards the goals of gender equality in the workplace. Evidence of the continuing problem is that wage differentials between women and men are still being recorded. For example, British airlines were cited as having significant gender pay gaps (BBC, 2018).

Ryanair reported the largest gender pay gap for an airline - more than 60 % (Table 4). EasyJet had a 21.2% pay gap but argued that men and women in the same roles are paid equally (easyJet plc, 2020, p.4).

Table 4. Comparison average hourly pay gap, 2018-2019

Employer	Women's mean hourly pay is lower than men's by	
	Hourly pay gap, %	Bonuses pay gap, %
Ryanair	62.2	33.4
Virgin Atlantic	58.8	73.6
Jet2	50.7	47.6
Eastern Airways	49.8	No bonuses were paid
British Airways	39.7	33
Easyjet	21.2	8.9

Data source: <https://gender-pay-gap.service.gov.uk/>

The reason why such a considerable wage gap exists is that there is a dramatic imbalance in the gender ratio of pilots (Smith, 2018). While the gender pay gap in the aviation industry can be explained, official statistics give the impression that women are underpaid. Generalized reports of wage differentials in aviation are not an incentive for women and may prompt them to consider alternatives.

#### *Factor of fear of sexual harassment*

Citizensadvice (2020) states that sexual harassment is unwanted behaviour of a sexual nature which: violates your dignity, makes you feel intimidated, degraded, or humiliated, creates a hostile or offensive environment. Sexual harassment is a form of unlawful discrimination under the Equality Act 2010.

Davey & Davidson (2000) stated that sexual harassment could still be seen on the flight deck. However, according to their research women claimed to be well treated by their male colleagues. This may have been a result of that the government started to protect women in their workplace by law. Therefore, women are no longer afraid to stand against sexual harassment, and airlines are not willing to cover any offender as this may result in huge fines and loud lawsuits, which will damage the image and the popularity of the airline.

#### *Are there enough role models for young girls and women in aviation?*

Role models are important from a social learning perspective. It is assumed that the new generation pays attention to models because they can be useful in learning new tasks, skills, norms, and help to understand motivational and self-definitional aspects (Fayyaz 2018). Hoppe (2011), Strömberg (2019) and Ferla & Graham (2019) highlight the lack of leading role models and mentors for women in aviation as a major contributor to gender imbalance in aviation. Young females fail to clearly develop a career plan for themselves as pilots, and subsequently consider the aviation industry as “female-unfriendly” and unattractive.

#### 2.4. Examples of problem resolution

Many airlines are implementing a gender equality strategy to ensure the sustainable development of society. To do this, they are trying to attract more female pilots by launching various initiatives. Thus, in 2015 EasyJet launched its Amy Johnson Flying Initiative to increase the proportion of women entering easyJet's training scheme to 12 % over two years (Careers.easyjet 2018). This initiative included raising awareness in schools through visits and presentations by pilots and airline managers, working with training providers to attract more female entrants to their cadet program, and enhancing mentoring for female pilots (Paddock, 2018). In addition, EasyJet underwrote the training costs of approximately £100,000 for six female entrants (Paddock, 2018).

The CityJet, Europe's leading regional airline, has set a target for 10 % of its pilots to be women by the end of 2022 (Flightglobal 2020). To achieve this aim, CityJet has launched an ambassador program

through which female pilots have been recruited locally as internal brand ambassadors. The key role of the ambassadors will be visiting schools to promote their profession to the younger generation.

The British Women Pilots Association (BWPA) and Women in Aviation International (WAI) initiatives are other examples of inspiring and attracting women in all areas of aviation (BWPA, 2020; WAI, 2020). The BWPA aims to promote the training and employment of women in aviation, the practical schemes to assist women in gaining air licenses and tries to encourage collaboration between members of the association. The association achieves its aims through attending events for young people to raise awareness of careers in aviation, awarding scholarships to support flight training, presenting awards to recognize the achievements of women in aviation (BWPA 2020).

WAI offers educational outreach programs. The recent initiative called “Girls in Aviation Day” gathered 15,000 young people for whom the aviation industry was shown (WAI 2020). WAI also helps to administer scholarship funds that are open to both men and women. In 2020, WAI awarded 151 scholarships valued at \$831,365, bringing the total scholarships awarded since the launch of the organisation to over \$13.2 million (WAI 2020).

There are other examples of initiatives and programs, however, as shown above, the proportion of women pilots remains low, and their growth is negligible. The reason for this might be that the initiatives launched are aimed to mitigate the problems inside the company, or the programs launched can cover only a limited number of women. Therefore, the programs are unable to change the industry-wide trends in the short term and are considered as long-term projects to raise the awareness of the public and make women aware that the aviation industry is open for them.

It is worth noting that many of the initiatives were launched recently, and the stereotypes inside the industry cannot be demolished in the short term. Thus, the results of these programs will be visible in the next ten years, when the next generation of pilots is trained.

## 2.5. What is worth exploring in more detail?

A brief review of the literature indicates that the problem of low female employment rates in pilot and other technical positions requires further study. On the one hand, it seems that the reasons for this phenomenon are clear. To mitigate the situation, several initiatives have been taken to recruit women for pilot training, although it is rather difficult to assess the effectiveness of these strategies since they are at the initial stage of development and are rather local in nature. On the other hand, a set of factors that contribute to the gender imbalance require further study, as the steps taken in recent years have not shown significant results in alleviating gender imbalances among students, instructors and pilots, according to recent research. Perhaps, it is time to reconsider the causes of the problem and change the strategy and tactics of its solution. Therefore, the question in this study is to explore the challenges and enablers in recruiting female students in the pilot training. It explores whether the low representation of females in pilot roles is because of the ongoing gender discrimination problem and the societal stereotype that the pilot is a purely masculine job. The answer to this question should help determine the key focus in the recruiting strategy of female students for the pilot training.

## 3. Methodologies and data

The research was carried out using both primary and secondary data sources. The data collection technique includes a semi-structured interview and a subsequent thematic analysis to investigate the qualitative data gathered (Saunders et al. 2019). The current worldwide situation (COVID-19) does not allow to conduct a face-to-face interview. Therefore, synchronous internet-mediated interviews were conducted.

The interview consists of both open and probing questions to gather evidence and reveal the causes of gender imbalance in pilot positions (Table 5). To collect data aviation associations and trade unions across Europe and Australia were contacted to provide the female pilots' respondents. The purposive sampling method was utilized for the selection of the respondents as it helps to choose the particular characteristics of a population that are of interest (Etikan, Musa and Alkassim, 2016). It was planned that the responses received should help to identify the relevance of the factors of gender imbalance

identified in the literature review. Additionally, to obtain estimates, interview participants were asked to rank the significance of these factors from 1 (no negative impact) to 5 (maximum negative impact). As the qualitative research approach was adopted hence the number of respondents interviewed depended on the saturation level of interview response (Baker, Edwards & Doidge, 2012). It was observed that the responses reached saturation at the sample size of 9. One of the key limitations of the qualitative approach based semi-structured interview is that this method is prone to the biases of the interviewer (Chenail, 2011). By pilot testing, the possibility of ‘interviewer bias’ in the interview scheme gets reduced and it improves the quality of data collection (Barriball & While 1994, Chenail 2011). Hence in this research, we have internally pilot tested the interview scheme and have improved on the interview questions.

Further, the results of the interview have been validated using the triangulation method. The triangulation methods help to validate the research findings by comparing and cross-checking the results of different observers of the same phenomenon, which enhances the credibility of the research (Nightingale, A., 2020).

Table 5. A layout of Semi-Structured Interview Questions

#	Question	Research context
Q1.	In which educational institution and when did you receive a pilot's license?	Determine the region of pilot training
Q2.	In which country / countries (airlines) did you work (do you work) as a pilot? How long have you been working as a pilot?	Determine the region and work experience
Q3.	What factors do you think may influence positively on a pilot's profession choice for a woman, and what, on the contrary, prevent this choice?	Identifying motivating and suppressing factors based on the personal experience of the interviewees
Q4.	In your opinion, should pilot training programmes differ depending on gender? If so, what should be the specifics of training female pilots?	Identifying gender-related training problems
Q5.	Do you think that there is gender discrimination in hiring pilots? Can you share your experience (give examples) of discrimination (non-discrimination)?	Identification of negative factors perceived as discrimination in employment
Q6.	Do you think there is gender discrimination in the performance of pilot duties? Can you share your experience (give examples) of discrimination (non-discrimination)?	Identification of negative factors perceived as discrimination in the performance of official duties
Q7.	Are you aware of the existence of special programmes for attracting women to the pilot profession? If so, do you think they are effective? Why? What factors can make special programmes for involving women in the pilot profession effective in terms of stimulating women's interest in the pilot profession?	Probing the perception of special programmes for female pilots by specialists with experience. This can be useful when designing recruitment programs for educational institutions or flight school.
Q8.	Can you indicate three-four factors that have positively affected your career as a pilot, and three- four factors that have negatively affected (or are influencing) your career development?	Formation of set of stimulating and suppressing factors of recruitment based on the experience of professionals.
Q9.	Please rate on a 5-point scale the degree of negative influence of the following factors: <ul style="list-style-type: none"> <li>• Gender discrimination (hiring and duty performance)</li> <li>• Gender wage gap</li> <li>• Cultural sexism</li> <li>• Sexual Harassment</li> <li>• Lack of role models for young girls and women in an aviation</li> </ul>	Revealing the relevance of the most discussed negative factors for the regions of Europe and Australia, as well as determining the most significant at the present time.

	<ul style="list-style-type: none"> <li>Lack of acceptance from male peers and passengers</li> </ul> <p>5 - fully agree (maximum negative impact)  4 - rather agree  3 - yes and no  2 - rather disagree  1 - disagree (no negative impact)</p>	
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## 4. Findings

As a result of the search for respondents, nine female pilots (one Captain and eight First Officers) were interviewed. The respondents have experience with airlines in Western, Eastern Europe and Australia. All the female pilots interviewed are or had been flying commercially, with a vast range of experience varying from one to thirty years.

### *Gender discrimination in hiring and in the performance of pilot duties*

Six out of nine respondents said they had not personally experienced employment discrimination. However, it is worth noting that there are still examples in the respondents' answers that can be viewed as elements of explicit discrimination.

Below are quotes from interviews with examples of discriminatory behaviour of employer representatives during job interviews:

- a) "I was asked to attend an additional verbal test with the Chief Pilot on the company operating procedures. None of my other colleagues were required to complete such a test".
- b) "When I first tried to get a job as a co-pilot with a ... airline, I was invited for an interview during which they did not ask for any information about my skills and achievements, ignored my presence, ... and spoke dismissively of me in the third person. Instead of saying goodbye, they wished me a good marriage..."

One interviewee noted that she faced discrimination against both women and men: "I have met all kinds of discrimination. Some airlines preferred men when recruiting for the pilot's position, some - on the contrary, women to mitigate the problem of gender imbalance."

Regarding discrimination in the workplace, overall, female pilots were very positive about their experience as a pilot, although some discriminatory elements were mentioned in response, such as: "When a male pilot has an incident or accident it is reported as being a "pilot". When a female pilot is involved in the same it is always made know that it was a "female pilot". This is frustratingly not fair".

One pilot noted the constant pressure, defining it as "sexism": "...almost every time I hear from male colleagues the belief in female physiological capabilities and limitations..."

This observation goes in line with the findings of Kohn-Stuart (2000) and Mc Carthy (2015) in which it was observed that instructors perceived women to have less technical skills and man colleagues may use derogatory language in form of jokes towards female colleagues.

Another respondent said that she faced discrimination in general aviation, while the situation in commercial aviation is significantly different and there is a supportive atmosphere.

Denying cases of discrimination in one's own practice when answering a direct question may be related to the sensitivity of the topic. Each respondent had examples from the practice of their colleagues or acquaintances that can be attributed to examples of discrimination or sexism. Obviously, the study of discrimination and sexism in aviation requires a more systematic approach with the involvement of specialists in various fields, including psychology.

*Factors that can positively or negatively influence a woman's choice of a pilot's profession*

The identification of the key factors influencing the decision of women to be a pilot was based on questions 3, 7 and 8. Aggregating the data from interviews conducted (Table 6), it can be assumed that the factor of *support* plays an important role in the choice of a pilot's profession: the support of family, friends, partners, an employer, and a mentor (Figure 1). Moreover, the importance of having a *role model* and *mentor* was mentioned by almost all interview participants, directly or indirectly, when answering other questions. This finding is in line with the study of Mitchell et al. (2006), which has identified that having a role model and mentor acts as an enabling factor in choosing and progressing in the pilot career. An interesting observation was that four out of nine female pilots named *overcoming of stereotypes* as a motivating factor. Other factors of the respondents' choice of profession can be viewed as very pragmatic: good pay, the ability to travel and develop professionally.



Figure 1. Motivating factors (Enablers) influencing recruiting females into aviation.  
Source: The results obtained in NVIVO based on interview questions 3, 7 and 8.

The main suppressing factor, based on the analysis of interview data, is, perhaps, concerns about personal life and the issue of motherhood (Figure 2). This finding is in line with study of Lepore (2011) in which it was observed that piloting is not a female-friendly job.



Figure 2. Suppressing factors (Challenges) influencing recruiting females into aviation.  
Source: The results obtained in NVIVO based on interview questions 3, 7 and 8.

Table 6. Interview data aggregation results.

# Question	Cases	Data
Q1.	Respondent	Nine female pilots
	Region of study	Australia = 3 USA & Germany = 2 Ukraine = 2 n/d = 2
Q2.	Region of work	Australia = 3 Western Europe = 3 Eastern Europe = 3
	Work experience, years	1-30
	Codes	Findings
Q3.	Motivating factors (Enablers)	Challenging job (because of a male dominated industry) = 4 Awareness and education = 4 Role models = 4 Travel=3 Good pay = 3 Support = 3 Aviation technologies = 1
	Supressing factors (Challenges)	Stereotypes, ignorance, prejudice = 9 Issues with personal (family life) and motherhood = 5 Lack of role models = 2 Time-consuming = 2 Employment issue = 1 Gender imbalance of staff in universities and flight schools = 1
Q8.	Respondents 'pilot career:	
	Positive factors (Enablers)	Good mentors and role models = 5 Challenging job (flying, solve problems and plan, incentive to constantly learn, etc.) = 4 Family support = 3 Supportive employer = 1 Experience as a flight attendant =1
	Negative factors (Challenges)	COVID-19, the general economic downturn in the industry = 2 Stressful if no support, fear of changing the employer, physical anxiety, health condition = 4 Financial issue = 2 Issues with motherhood = 1 No role models = 1 Stereotypes, ignorance, discrimination = 2
Q7.	Special programmes	Know and / or have been involved = 7 Not interested = 2
	Positive effect	Good for awareness, recruiting for flight schools and financial support = 5
	Negative effect	Have the opposite effect of increasing discrimination = 2
Q4.	Training programme adjustment	Definitely not =4 Not in curriculum and requirements, but yes in training approaches and some additional topics = 5
Q5.	Discrimination in employment	Yes = 3 No = 5 To some extent = 1
Q6.	Discrimination in the performance of pilot duties	Yes = 1 No = 7 To some extent = 1



According to the interviewees, the problem of reconciling personal life and work is caused by the fact that the position of a pilot requires incredible concentration, constant training, resources, and all this is accompanied by stereotypes of society. Below are a few quotes that reflect the complexities of balancing personal and professional life that a female pilot may face in her career:

- a) "...you can get tired of flights, especially at night...";
- b) "... long-term flights can have a bad effect on health, while every year the pilot undergoes a medical commission, so you must monitor this...";
- c) "I did not see any opportunity to return to work as a pilot once I had children.";
- d) "Because you have to stay current with flying experience, it is not easy to leave the profession of a pilot for a year or more and then get back into.."
- e) "Never once has my husband (a pilot too) been asked how he, having children, cope with his flying as a career. Yet this was asked of me constantly."

Summing up, we can conclude that the phenomenon of explicit discrimination in hiring and performing official duties is gradually being overcome by society. However, there is still a large gap in the awareness of the younger generation of women and society in general about

- the opportunities and requirements of the pilot position,
- the possible balance between personal life and work, and
- career path and growth.

Role models, mentors and support opportunities, from financial to psychological, are key factors that women will look out for when they want to become a pilot.

*Should pilot training programs differ depending on gender?*

Answering this question, all respondents were unanimous that the structure of the training programme and the requirements for the assessment of knowledge and skills should not differ depending on gender. However, five pilots expressed the opinion that it would still be useful to consider the possibility of introducing more diverse teaching techniques, depending on the characteristics of the student. For example, the pilot with the longest work experience expressed the following thought: "This is the issue that we are dealing with currently. We are working with the ALPA (The Air Line Pilots Association, International) to improve the training programme for female and male pilots. The problem is that the programmes have been developed for many years by men for men. And there are some issues that can be considered when training women."

A recently trained pilot suggested that introducing new topics, for example, in the Human Factors module, could possibly help pilots to better adapt and make decisions under stressful conditions, and become aware of the threat of stereotypes: "There is the false dichotomy in society, which in practice can create conditions for the psychological stress in flight operation. In my opinion, the Human Factors discipline should be expanded to include research on the dangers of gender bias in crew interactions". Another young pilot cautiously expressed the opinion that "women need a slightly different approach to training because of the way of thinking...".

Obviously, the problem of pilot training requires further open and frank discussion of various specialists, in-depth study and transformation of training programs that would help the younger generation of pilots cope with the real problems caused by gender stereotypes.

*Awareness of the existence of special programs for attracting women to the pilot profession*

The study of Mc Carthy (2015) & Hamilton (2014) identified that due to lack of public awareness a female is unable to become a pilot. However, in our study, seven out of nine interviewees said they were aware of various programmes that aim to recruit women for aviation. Several of them have participated as role models in recruiting programmes. Many recognize that the availability of special scholarships and promotion of the profession is a positive aspect of such activities. However, given the lack of public awareness that a woman can be a pilot, and, as a result, an initially small audience, it is rather difficult to assess the effectiveness of such initiatives in addressing the issue of gender imbalance. Moreover, two respondents suggested that such programmes can backfire and promote discrimination:

a) “I am concerned that such initiatives enforce a culture that females are only in these roles because of recruitment gender requirements.”;

b) “I have a concern though that such special programs to attract women run the risk of creating the culture where the women are seen to only be there because they are women. The idea of hiring quotas is another idea that fills me with dread. I fear that such schemes LEAD to gender discrimination as the women who are hired are seen to have ONLY been hired because of their gender, not their ability.”

These assertions deserve attention in terms of the correct formulation of the goals and focus of special programmes to attract women to aviation, in order to avoid the connotation of discrimination and employment on the basis of gender.

#### *Relevance of the discussed in literature review negative factors for the regions of Europe and Australia*

The analysis of the ranking of factors that negatively affect gender equality in the pilot profession, presented in Figure 3 and in Tables 7, 8, confirms the results of the semi-structured interview, namely:

- 78% of respondents identified a lack of role models as the main factor of low female representation in pilot position;

- 56% of respondents identified also cultural sexism as dominant, while 44% consider that there is still a problem of recognition of female pilots by colleagues and passengers;

- discrimination issues in employment, performance of duties and wages still exist, however, they seem to tend to overcome;

- the participants' experience and perception in all aspects in question do not depend on the regions (Europe, Australia) (table 8, the R<sup>2</sup> is low for all factors).

The key reasons of low female representation in pilot profession is attributed to lack of role model, cultural sexism and perception of woman pilot by men peers and passengers which in line with findings of Mc Carthy (2015) and Gottfredson (2002).

Table 7. Results of ranking the main factors influencing gender imbalance, based on interview data.

Rank	Theme	% (rather agree and fully agree)
1	Lack of role models	78%
2	Cultural sexism	56%
3	Lack of acceptance from male peers and passengers	44%
4	Sexual Harassment	33%
5	Gender discrimination (hiring and duty performance)	22%
6	Gender wage gap	11%

Table 8. Revealing the degree of correlation between the ranking results and the respondent's region

Respondent #/ Region	R1: Australia	R2: Australia	R3: Australia	R4: Germany, Australia	R5: EU (Spain)	R6: Eastern Europe	R7: Eastern Europe, Scandinavia and UK	R8: Eastern Europe, Ukraine	R9: Eastern Europe, Ukraine	R <sup>2</sup> (region and factors)
Region code	1	1	1	2	2	2	3	3	3	
Gender discrimination	3	2	5	2	3	2	3	5	1	0.01
Gender wage gap	3	2	4	1	3	1	1	2	1	0.41
Cultural sexism	4	5	5	2	5	2	3	5	1	0.21
Sexual Harassment	3	4	4	3	3	2	2	5	1	0.13
Lack of role models	4	4	3	4	5	5	5	5	3	0.12
Lack of acceptance from male peers and passengers	4	3	5	3	4	3	3	4	1	0.27



Figure 3. Analysis of the ranking of factors contributing to gender imbalance

## 5. Conclusion and Recommendations

The study aimed to explore whether the low representation of females in pilot roles is because of gender discrimination and the societal stereotype that the pilot is a purely masculine job. Based on the findings, we can conclude that the problem is more complex. Undoubtedly, ignorance about a woman's opportunities as a pilot, stereotypes about the role of women in society and cultural aspects play an important role. However, the current employment problems, that are common to pilots of both genders,

are rather temporary in nature and are a consequence of the COVID-19 pandemic crisis. Commercial aviation executives seem to have become even more aware of the importance of sustainable development of the industry and the role of gender balance.

Recurring programs, scholarships and media publications are important marketing tools for both airlines and flight schools. However, the research conducted showed that the time has probably come to develop a more holistic approach to the issue of providing commercial aviation with high-quality pilots. All stakeholders, including universities that choose to participate in the pilot training process, could help rethink the principles of gender balance, increasing the visibility of their initiatives and raising public awareness of the availability of pilot training and career prospects for women.

A clear understanding of financial sources for pilot training, knowledge of the labour market situation, understanding of parental leave and return to careers stages, mentoring and role models can gradually break the prejudice that the pilot profession is not suitable for women careers.

In summary, the most important factor hindering the involvement of women in the pilot's profession today is the lack of a clear model of a woman's career path in this direction. We emphasize that a conception of a career plan is especially important in this profession, given the high cost of training, the high risks associated with the health requirements and, in general, the air transport industry's sensitivity to various endogenous and exogenous factors. The career model for male and female pilots should include scenarios for the stages of training, employment, and performance of the duties, with examples of combining personal life and professional growth.

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