

The Effects of Stress and Fatigue on Levels of Anxiety in Pilots: An Aviation Industry Sample

**Georgia K. Tsismalidou
Hellenic American University**

Barbara K. Kondilis

This study aims to provide a comprehensive understanding of the impact of stress and fatigue on pilots' well-being, with a focus on anxiety. A quantitative research design utilizing structured questionnaires was employed to gather subjective reports from a sample of sixty airline pilots in the commercial aviation industry. Stressors such as demanding flight schedules and operational pressure significantly contributed to increased anxiety levels among pilots. Secondly, fatigue resulting from irregular work hours and long flights emerged as a prominent factor influencing anxiety. Lastly, organizational factors such as lack of support systems and limited access to mental health resources were identified as additional contributors to heightened anxiety levels among pilots.

Keywords: stress, fatigue, anxiety, human factors, organizational psychology, mental health, well-being

INTRODUCTION

Background and Rationale

The aviation industry presents a large spectrum of tools that can be dissected to comprehend the structure, the management, and the outcomes of any possible mistake. Over the years, several studies have increased awareness about the aviation field at all levels. Significant studies include the “Human Factors in Aviation” study by Wiener and Nagel conducted in 1988. Wiener and Nagel have provided significant insight to how the crew’s mental state, personal relationships, and human errors, contribute to more accidents than any other factor. However, most of the studies are concentrated on the flight crew as a whole, with limited studies examining the impact of fatigue and stress on a pilot’s flight performance.

It is undoubtedly of high importance how various airlines handle their employees’ health and well-being. When an airline provides good working conditions to their employees, the risks of them being stressed about their work are minimized. In a study conducted by Little, et. al. (1990), two groups of pilots were examined. The first group of 212 pilots, was the group of a company which would not treat the employees respectfully. The second group belonged to a stable airline and consisted of 220 pilots. The researchers administered all pilots a questionnaire to complete and concluded that in the first group, there were significant levels of stress and depression in nearly all the pilots.

Significance of Study

The study will bring major awareness to students in the aviation industry, individuals working as airline crew, as well as researchers and individuals who are concerned with aviation safety. By providing new information on this subject, we contribute to existing data concerning airline pilots being affected by stress and fatigue, as well as the impact their mental and physical health has on their profession and by default, the aviation industry.

Stress in the Aviation Industry

The amount of stress in flight crew members can be vast among pilots and affects all crew members. Therefore, necessary measures should be taken for this stress to be eliminated. According to Gillan, et. al. (2013), some ways of eliminating stress include incorporating physical exercise into one's daily life, developing healthy eating habits. A study that measured the degree to which work-related stress influences a pilot's well-being is one conducted by Cahill, et.al. (2021). Its objective was to investigate the correlation between work-related stress and a pilot's well-being. The descriptive study examined coping mechanisms using a web-based survey completed by 1,059 pilots working for a private airline. The results showed that airline pilots reported getting a lot less sleep while being on duty, as well as eating less healthy meals. Some reported feeling very stressed and even reported showing symptoms of depression when flying for a lot of hours (more than 20 hours per week). Regarding coping strategies, physical exercise was the highest, as almost half reported exercising several times a week (46.2%). The second most prominent coping mechanism was sleep and relaxation, as nearly 40% of the pilots reported this as the coping strategy that they use several times a week. The researchers concluded that pilots aimed for what they were missing the most because of their work in the aviation industry: improved sleep, exercise, and healthier meals. This study allowed for gaining more insight into how exhausting a pilot's job can be.

The second most prevalent coping strategy identified is sleep, as examined in a study conducted by Levin (2010), underscoring the significance of maintaining a regular sleep schedule. The case study delves into the life of an airline pilot. The pilot in question starts his duty at 2 a.m. on a nightly basis and is tasked with a demanding 16-hour workday. When the pilot was interviewed, he displayed discontent and frustration against his work schedule, as he expressed that the airline he works for does not respect federal aviation regulations. Another source highlighting the importance of the elimination of fatigue in pilots is a study conducted by Reis, et. al. (2013), which had the purpose of explaining how fatigue interferes with a pilot's performance capability, as well as how this elevates the risk factors for an accident to be caused. The researchers confirmed the above hypothesis when they collected a sample of 456 commercial airline pilots working in Portugal, aged between 20 and 65 years old. The results showed that the prevalence values for total mental and physical fatigue were up to 89.3% for medium/short-haul pilots and 94.1% for long-haul pilots. This was a study that not only compared the fatigue levels between the two groups but also gave insight into how fatigue is actually the main factor for an accident waiting to happen (Reis, et. al., 2013).

Pilot Errors in Flight

Throughout their careers, pilots encounter various situations which elevate their stress levels, as the probability of experiencing an unfamiliar and negative event while on duty is very high. Therefore, it is crucial for the crew members to have good communication, as well as an appropriate way of dealing with any errors, so as to avoid accidents. A study conducted by Dismukes, et.al. (2015) examined the errors made by experienced airline pilots. By performing a detailed analysis of 12 airline accidents, the researchers concluded that all errors that happened had something in common -- stress, which caused high levels of threat-induced anxiety. While discussing those errors, the researchers noted that anxiety was one of the most significant factors that disrupted control and communication among the crew members. The authors noted that when the pilots encountered danger, they got stressed and developed symptoms of anxiety and their cognitive functions were limited. As a result, their performance was impaired, and an accident occurred. This reaction is similar to the fight, flight or freeze response, and according to Schmidt, et. al. (2007), most situations which cause stress might trigger it.

Considering the concept of fatigue, it is significant to mention its effect on the airline industry, as well as how it can be a contributing factor towards making errors during flight. Specifically, Sexton, et.al. (2000), examined how individuals working as health care staff or airline pilots operate regarding errors; pilots (26%) were a lot more hesitant to agree that their fatigue prevents them from job exertion, while surgeons and other medical professionals (70%) admitted to their fatigue causing more job-related errors. In the same study, pilots were also less likely to admit that their personal problems interfered with their thought-making process and made them prone to making errors (53%); whereas surgeons were not hesitant to claim that their personal difficulties often affected their performance (80%). Through these findings, the researchers concluded that pilots tend to overestimate their abilities while being fatigued or having a troubled mindset due to interpersonal difficulties, as they do not seek the appropriate measures to acquire help, a matter which would inevitably lead them to make a serious error sometime in the future (Sexton, et. al., 2000).

Can Every Pilot Withstand Flying Long-Haul?

While working for an airline as a pilot, the latter needs to consider whether or not they are competent for withstanding long-haul flights, as they require a great amount of patience and dedication to their job. If a pilot is not competent or cannot physically withstand flying long-haul, the entire airline is placed at risk, as aviation safety should be priority (Venus et. al., 2021). If such a factor is overlooked, the pilot can develop symptoms of severe fatigue, which can cause multiple errors in the aviation industry. Venus et. al. (2021), compared sleep schedule abnormalities, the risk for fatigue, and stress in long-haul or short-haul flights. The researchers concluded that most long-haul pilots reported symptoms of depression, anxiety, and severe fatigue.

Working Long Hours and Symptoms of Anxiety and Depression

Working long hours can be detrimental to an individual's well-being, especially while working as an airline pilot. Job-related sleep and relaxation disturbances can lead to developing anxiety symptoms or even symptoms of depression. Similar findings were made in a meta-analysis conducted by Pasha and Stokes in 2018, which reflected on the 2015 Germanwings Disaster, a flight where 150 people were killed, as one of the two pilots crashed the plane while attempting to commit suicide. By identifying 20 studies, the researchers concluded that the most prevalent factors negatively influencing a pilot's well-being are sleep disturbances, fatigue, and substance abuse. Conclusive factors were working long hours (between 30-40 hours), where the pilots reported increased anxiety and depression. In these self-reports, the same pilots indicated feeling fatigued and connected this to their development of anxiety symptomatology.

Hagan (2016), used the Likert-Type Self-Rated Depression or Anxiety questionnaire to determine if working long hours as a pilot can be considered a factor for developing depression or anxiety. Through a sample of 701 European-registered commercial airline pilots, the statistics were as follows: with increased hours of duty, pilots were likely to report higher levels of depression and anxiety; specifically, those who worked 30-40 hours were more likely to suffer from said symptoms than the pilots who worked 25 hours. The researcher concluded that such symptoms can indeed be blamed on sleep disturbances due to changing circadian rhythms of a long flight schedule.

The Hidden Dangers of Short-Haul Flights

Although long-haul flights can be detrimental to a pilot's well-being, short-haul flights and their negative effects on a pilot's health should not be underestimated. In a study conducted by Craig, & Laurie (2006), the concepts of fatigue, sleep loss and circadian disruption created by flight operation were thoroughly examined. A comparison between low-cost and scheduled airline pilots flying short-haul was conducted, as the researchers wanted to determine whether or not this factor would be sufficient enough to induce such symptoms. The data showed that 75% of them reported severe fatigue, and 81% claimed that their fatigue is even worse than it was two years ago. The levels of stress and fatigue were also more present in low-cost, short-haul airline pilots, as the company would demand they fly into discretion, which caused them uncertainty and a disturbance in their overall schedule. The researchers concluded that while fatigue

is a pervasive vulnerability among all short-haul pilots, it is the extend of flying hours within low-cost airlines that truly exacerbates its harmful effects.

According to Roach, et. al. (2012), flying short-haul can be detrimental to a pilot's well-being as it interrupts normal physical functioning, a matter which can lead to the development of fatigue and as a result, cause psychological strain. Pilots flying short-haul have very short layovers after each flight, which is often not enough for them to reach a healthy and rested state and go back to their duties without having to face physical or mental difficulties. Roach, et. al. (2012) highlight the concept of circadian misalignment in the human body, when one is exposed to long hours of flying with no rest. The researchers used a sample of 19 airline pilots working for an international airline, flying both short-haul and long-haul. Over an 11-day period, data was collected. It was mentioned that the pilots flying long-haul had a three-day layover after every flight, while the pilots flying short-haul had a much shorter layover. Their sleep and body activity were being recorded every night during the research study, and their fatigue levels were monitored through an electronic checklist. When comparing the results, the researchers realized that the pilots flying short-haul were very fatigued in comparison to the pilots who were flying long-haul and had more days to recover after each flight. Another source supporting that patterns of short layovers are not helpful to a pilot's rest and overall well-being is a study conducted by Lamond, et. al. (2006). The researchers examined the response speed between airline crew flying long-haul and was given more days to rest after each flight and airline crew flying short-haul, given less time to rest. It was stated that the crew flying short-haul appeared to be significantly more fatigued, as their response time was much slower than that of the crew flying long-haul (Lamond, et. al., 2006).

Does Fatigue Influence Happiness?

Considering the fact that a pilot's job can be demanding and wearying, their well-being and contentment can be put at risk (Demetouri, et. al., 2018). When a pilot suffers from fatigue, it is testing for them to see life in a positive manner, as they feel exceptionally exhausted to enjoy their free time or their life as a whole. Demetouri, et. al. (2018), specifically examined the correlation between burnout and happiness by collecting a large sample of pilots (over 1,100), via an online survey. The authors later concluded that almost 40% of the pilots experience high burnout, noting that this limited the pilots' job performance, as they were feeling unhappy with their jobs and their life overall.

In the world of aviation, there is a direct link between duty performance and personal sense of accomplishment: the more responsible an airline crew member appears to be, and the safer the passengers are, the higher the motivation of the pilots is (Oster, Strong, & Zorn, 2013). Consequently, errors due to fatigue can be detrimental to a pilot's happiness and healthy mental state, as it directly influences their stress and depression levels (Wilson, et. al., 2022).

The Effects of Low Oxygen Levels on Well-Being

The biological factors of low oxygen levels and job interference are noteworthy to mention, as this may interfere with a pilot's well-being, specifically hypoxia. Low oxygen levels can cause Hypoxia, which can negatively influence one's cognitive function, elevate stress levels and reduce muscle strength (Sridharan, et. al., 2016). Sanchez, et. al. (2019) collected a sample of people working in the aviation industry (10 pilots were among them) and exposed them to low oxygen levels. The researchers noticed an increase in heart rate, an increase in stress levels and job effort, a decrease in the function of breathing muscles, negative impairment on working memory, as well as limited cognitive performance. This is proof that although pilots are by no means going through hypoxia every time they fly, low oxygen levels can impair their physical and mental well-being in the long run.

RESEARCH QUESTION/HYPOTHESIS

The research question is whether stress and fatigue in turn develop symptoms of anxiety in pilots. We hypothesized that there will be a correlation between stress and anxiety, as well as between fatigue and

anxiety. The study indicated that there was a positive and moderate correlation between Stress and Anxiety, as well as between Fatigue and Anxiety.

METHOD

Research Design

This is a correlational research design, examining the relationship among stress, fatigue, and developing symptoms of anxiety, utilizing a convenience sample.

Participants

A total of 60 participants were used for this study. All pilots were of Greek and African descent, with the youngest participant being 25 years old and the oldest participant being 63 years old. All participants were airline pilots working for an airline in sub-Saharan Africa, with the majority of them being males. Most of them were married and had children. All participants were collected through snowball sampling.

Measures

A four-part questionnaire was used in this study. The measures were presented as follows: A demographics questionnaire, the Perceived Stress Scale (Cohen, et.al., 1983), the Fatigue Severity Scale (Krupp, et.al., 1989), and Beck's Anxiety Inventory (Beck, et.al., 1990).

- **Stress:** The participants were administered the Perceived Stress Scale (Cohen et.al., 1983) with the purpose of measuring the perception of stress. The perceived Stress Scale is made up of a total of ten measurable items, rated on a Likert-type scale of 1-5 (1 being "Never" and 5 being "Very Often"). The scores in the Perceived Stress Scale are obtained by reversing responses (0=4, 1=3, 2=2, 3=1 & 4=0) to the four positively stated items (items 4,5,7, & 8) and then summing across all scale items" (Cohen, et.al., 1983). The stress score is calculated by finding the sum of the 10 items and creating a new variable named "Total Stress". The higher the Total Stress score, an increase in participants' stress levels is implied.
- **Fatigue:** Fatigue was measured using the Fatigue Severity Scale (Krupp, et.al., 1989). This scale is comprised of nine items on a 10-point rating scale, ranging from 1 (Strongly Disagree) to 10 (Strongly Agree). The fatigue score is calculated by finding the sum of the nine items and creating a new variable named "Total Fatigue". The higher Total Fatigue score, an increase in participants' fatigue levels is implied.
- **Anxiety:** All participants completed Beck's Anxiety Inventory (Beck, et.al., 1990) to measure their levels of anxiety. Beck's Anxiety inventory consists of a total of 21 self-reported items rated on a 4-point Likert scale from 0 (not at all) to 3 (severely). The scores range from 0-63: minimal anxiety (0-7), mild anxiety (8-15), moderate anxiety (16-25), and severe anxiety (26-63). The total score is calculated by finding the sum of the 21 items and creating a new variable named "Total BAI".

Four alternations have been made to these scales. The first alteration is present in the Fatigue Severity Scale (FSS), where the seventh item of "Fatigue interferes with carrying out certain duties and responsibilities", has been altered to the phrase, "Fatigue interferes with carrying out certain duties and responsibilities while flying", so as to make the question more specific. The second change was made in Beck's Anxiety Inventory Scale (BAI), as the "Fear of Dying" point was excluded from the questionnaire, as we deemed that this does not relate to this current study's focus. The third change was in the Fatigue Severity Scale (FSS), as the description has been changed. While the original description measured symptoms being present within "the last week", the time of measuring the symptoms has been altered to "the last month" instead. This allowed the alignment with the other two scales, which measured symptoms of stress and anxiety during the last month. The final change concerns the Perceived Stress Scale (PSS), as the term "Wobbliness in legs" has been replaced with "Unsteadiness in legs", for the purpose of making the term more specific and easier to comprehend.

Procedure

The study was conducted as part of an undergraduate student capstone thesis. Ethical approval was given through the University's Internal Review Board in Winter 2022, and written approval was given from the Aviation manager, to grant permission for contacting their employees in order to participate in the study. The web-based four-part questionnaire, including demographics, was sent electronically to all participants via Google Forms. Upon the activation of the link, the participants were presented with the Informed Consent Form, assuring confidentiality and anonymity, and explaining that their participation is voluntary. All the participants gave their approval by signing the Informed Consent Form and subsequently were sent the electronic link to the questionnaire, beginning with general instructions, as well as basic demographic questions. Participants were thanked for their time and willingness to participate. The researchers' contact information in the case of further elaborations regarding the study was provided. The results were analyzed by using IBM SPSS Version 25.

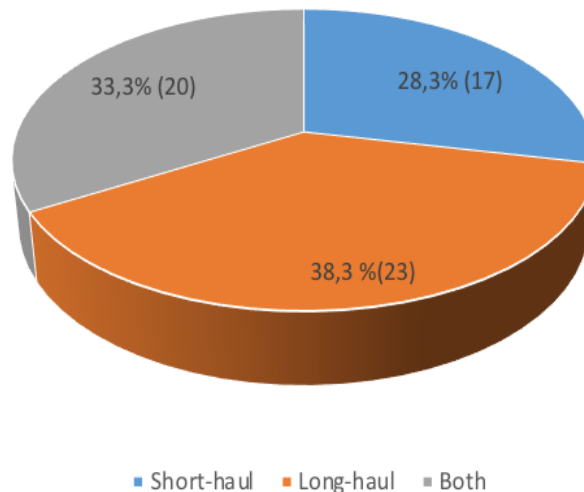
RESULTS

Descriptive Statistics

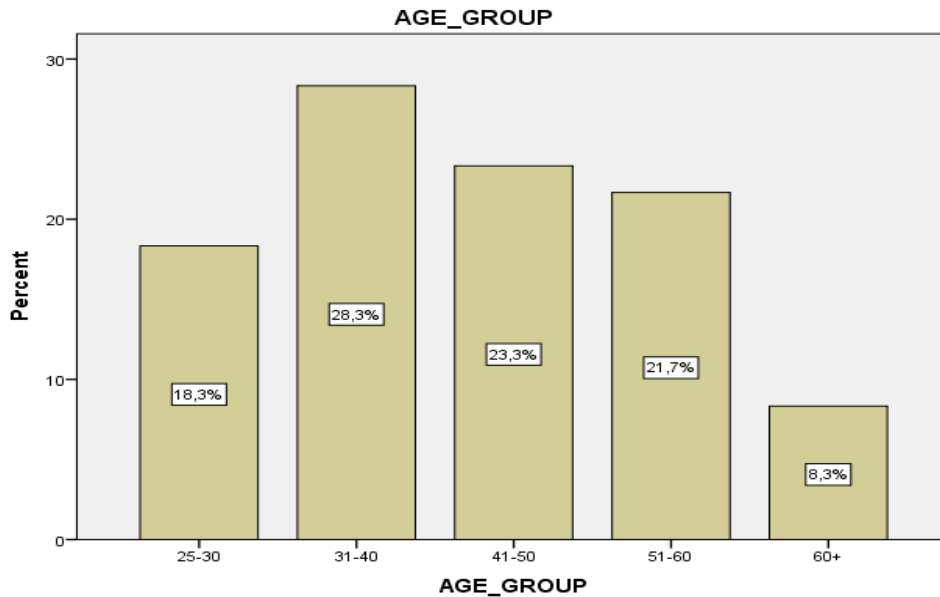
A total of 60 participants completed the questionnaire. Regarding their work schedules, the average of flying hours per week was approximately 17 hours with a standard deviation of 4.5 hours. The minimum flying hours per week is ten hours and the maximum is 26 hours. Out of the total number of participants, 33.3% ($n = 17$) were flying long-haul flights, 38.3% ($n = 23$) were flying long-haul flights and the rest 28.3% ($n = 20$) were flying both short-haul and long-haul flights (see Figure 1).

The ages of the participants ranged from 25 to 63 years old, with the average age being 44 years old (see Figure 2). The majority 83.3% ($n = 50$) were males and 16.7% were females ($n = 10$). Regarding race and ethnicity, 33.3% ($n = 20$) of them were of Greek origin and 66.7% ($n = 40$) of them were of South African origin. Relationship status: 16.7% ($n = 10$) of the participants were single, 38.3% ($n = 23$) were married, 25% ($n = 15$) were in a relationship and 8.3% ($n = 5$) were cohabiting. More than half, 56.7% ($n = 34$) have children, whereas the rest 43.3% ($n = 26$) do not have children.

FIGURE 1
EXAMPLE OF THE TYPES OF FLIGHTS

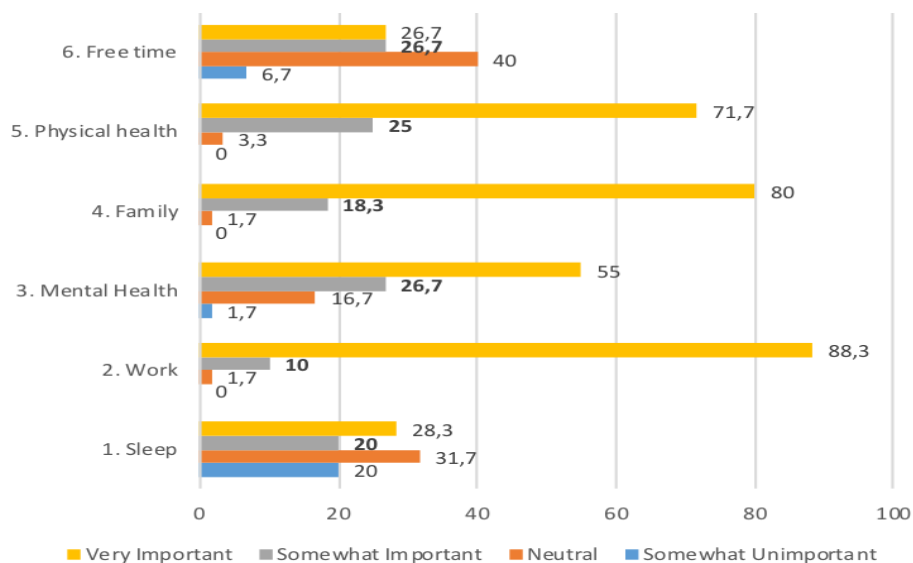


**FIGURE 2
PARTICIPANT AGE GROUPS**



When asked to report the significance of sleep, work, mental health, family, physical health, and free time, 88.3% of the participants considered work very important. 80% reported that family is extremely significant to them, and another 71.7% reported that physical health was very important as well. Forty percent considered free time neither important nor unimportant and almost 32% considered sleep neither important nor unimportant as well (see Figure 3). The rationale for the selection of the participants was that all of them should have a good knowledge of the English language, so as to comprehend the questions in the questionnaire.

**FIGURE 3
PARTICIPANT RATINGS OF IMPORTANCE IN PERSONAL FACTORS**



Regarding the total scores for *Stress* on the Perceived Stress Scale (PSS), the range was from 8 (min) to 33 (max). The mean of the Total Stress score was 20.9 and the Standard Deviation was 5.2 (see Table 1 below). Regarding the total scores for *Fatigue* on the Fatigue Severity Scale (FSS) the range was from 33 (min) to 77 (max). The mean of the Total Fatigue score was 56.4 and the Standard Deviation was 11.4 (see Table 2 below).

TABLE 1
MEAN AND STANDARD DEVIATION OF PSS QUESTIONNAIRE

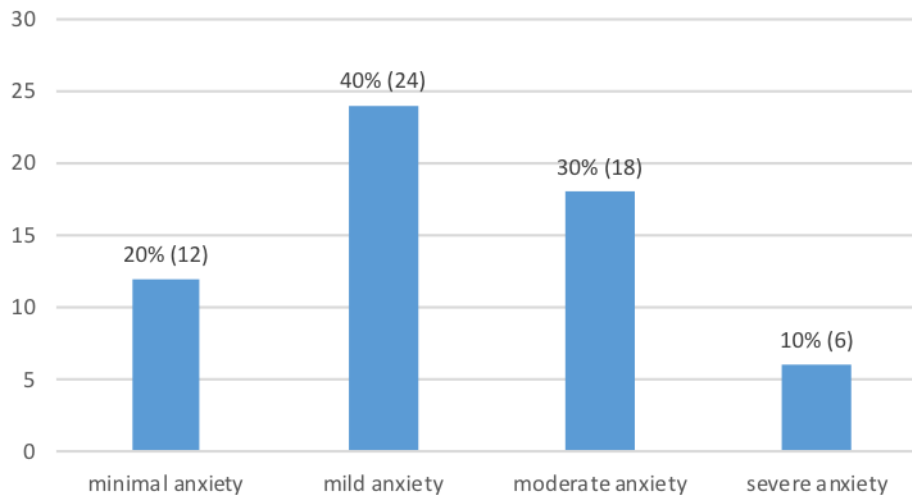
	N	Mean	Std. Deviation
1. In the last month, how often have you been upset because of something that happened unexpectedly?	60	2.02	1.00
2. In the last month, how often have you felt that you were unable to control the important things in your life?	60	2.23	0.81
3. In the last month, how often have you felt nervous and “stressed”?	60	2.53	0.85
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	58	2.47	0.92
5. In the last month, how often have you felt that things were going your way?	60	2.35	0.90
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	60	2.45	0.93
7. In the last month, how often have you been able to control irritations in your life?	60	2.22	0.83
8. In the last month, how often have you felt that you were on top of things?	59	2.31	0.73
9. In the last month, how often have you been angered because of things that were outside of your control?	60	2.37	0.86
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	60	2.67	0.80

TABLE 2
MEAN AND STANDARD DEVIATION OF FSS QUESTIONNAIRE

	N	Min	Max	Mean	Std. Deviation
1. My motivation is lower when I am fatigued.	60	3	10	7.12	1.81
2. Exercise brings on my fatigue.	60	1	9	4.92	1.91
3. I am easily fatigued.	60	2	9	4.88	1.88
4. Fatigue interferes with my physical functioning.	60	3	10	6.52	1.87
5. Fatigue causes frequent problems for me.	60	3	10	6.23	1.68
6. My fatigue prevents sustained physical functioning.	60	3	10	6.48	1.83
7. Fatigue interferes with carrying out certain duties and responsibilities while flying.	60	4	10	7.37	1.23
8. Fatigue is among my most disabling symptoms.	60	3	10	6.53	1.73
9. Fatigue interferes with my work, family, or social life.	60	3	10	6.38	1.74

Regarding the *Anxiety* on Beck's Anxiety Inventory (BAI), the total scores ranged from 1 to 32. Specifically, the mean of the Total Anxiety score was 14.62 and the Standard Deviation was 8.12. The score of the questionnaire was divided into four categories: The participants who scored from 0-7, have minimal anxiety; the participants who scored from 8-15, had mild anxiety; the participants who scored from 16-25, had moderate anxiety; and the participants who scored from 26-32, have severe anxiety. According to the scores, 40% of the participants had mild anxiety, the 30% had moderate anxiety, 20% had mild anxiety and 10% had severe anxiety (see Figure 4).

FIGURE 4
SELF-REPORTED LEVELS OF ANXIETY



In order to test the hypothesis that stress and fatigue have a high and positive correlation with anxiety among airline pilots, a Pearson correlation r was performed. The purpose was to determine whether the pairs of the variables of the questionnaires would show statistical significance, concerning their strength and direction of linear relationships. In conducting the Pearson correlation analysis, it is crucial to consider and address certain assumptions, such as normality and the presence of outliers, as they can impact the validity of the results. Firstly, we acknowledge the assumption of normality in the distribution of variables. To combat this, we conducted a thorough examination of the data distribution using appropriate statistical tests and visual inspections. Our results indicated that the data did not violate the assumptions necessary for the Pearson correlation test. Furthermore, potential outliers were identified and scrutinized to assess their impact on the correlation analysis and confirm the robustness of our findings. Through the analysis of the correlations, it was determined that Stress and Anxiety were positively but moderately correlated as $r = .583, n = 60, p < .001$. Fatigue and Anxiety were also positively correlated, as $r = .486, n = 60, p < .001$.

TABLE 3
CORRELATION USING PEARSON r FOR THE FACTORS OF STRESS, FATIGUE, AND ANXIETY (N=60)

TOTAL STRESS	TOTAL FATIGUE	TOTAL ANXIETY
TOTAL STRESS	1	,485**
		,583**
		,000
TOTAL FATIGUE		1
		,486**
		,000
TOTAL ANXIETY		
		1

** . Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

The study findings were consistent with the researchers' hypothesis, that Stress and Fatigue can elevate an airline pilot's Anxiety levels. There was a positive and moderate correlation between Stress and Anxiety, as well as between Fatigue and Anxiety. More specifically, when pilots are stressed, their anxiety levels increase as well. Moreover, the more fatigued the pilots are, the more their anxiety levels increase. The matter of Anxiety being present in the aviation industry should be taken more into consideration and be measured on a deeper level, as it seems to be very prevalent among airline pilots. A noteworthy aspect of this study is the inclusion of airline pilots who have a family, as more than half of the sample used in this study (56.7%) have children. This aspect adds an extra layer to the work-family conflict dynamic, as it suggests that these pilots are not only handling the demands of their profession but are also likely contending with family responsibilities. This dynamic is examined in a pivotal study conducted by Allen, et. al. (2000). The researchers provided a comprehensive review of the outcomes related to work-family conflict, and provided insight on how the pressure of performing well in both domains can lead to the disruption of work-family balance and, as a consequence, to the development of anxiety symptoms.

In addition to the factors of stress and fatigue influencing a pilot's anxiety levels, it is noteworthy to examine the impact of personal relationships, particularly within the context of marriage, as it can have a profound effect on a pilot's job performance and well-being. As mentioned before, 38.3% of the pilots in the current study's sample are married. In their research study, Avis, Bor, & Eriksen (2019) delved into how pilots perceive the impact of their job duties and shift patterns on personal relationships. Based on a sample of mostly male airline pilots with over two years of experience, the study emphasized the magnitude of a partner's support in managing the demands of their work and helping them alleviate their symptoms of stress. While having a supportive partner arose as a key factor towards maintaining balance between family and work duties, another study by Alghamdi, & Alghamdi (2023) addresses the concept of work-related burnout among airline pilots and significantly correlates it with various factors, most notable one being nationality and marital status. More specifically, the researchers initially investigated the prevalence of burnout and the impact of coping strategies among commercial pilots in Saudi Arabia. It was discovered that burnout is a prevalent issue within the aviation industry, as 70% of the pilots revealed in their self-reports (Alghamdi & Alghamdi, 2023). As mentioned before, married pilots reported higher levels of burnout compared to their single counterparts. The discrepancy may be attributed to the additional pressures outside of work, as well as the work-family conflicts that airline pilots often face difficulties with (Alghamdi & Alghamdi, 2023). Considering the concept of marriage and support within partners, as well as the vulnerability pilots face towards developing symptoms of burnout, it becomes evident that understanding and addressing the interplay between personal factors and work-related stressors is essential (Alghamdi & Alghamdi, 2023).

Mental and physical well-being is an integral concept of life that should not be neglected. Nevertheless, most airline pilots do not realize such matters. As mentioned previously, most pilots (88.3%) considered work more important than sleep, mental health or free time, a matter that calls for a form of intervention. As written by Harnois, & Gabriel (2000), "Job stress can cause poor health and can increase rates of work-

related injuries and accidents” (p.6). Therefore, it is crucial for one to detect and resolve this issue. A form of intervention could be counseling, as communicating and asking for help could help one eliminate their symptoms of anxiety. Although mental health assistance in the aviation industry was stigmatized in the past, individuals who encounter emotional disturbances are now emboldened to seek help for all types of stress and emotional well-being. Counseling can reduce prolonged emotional disturbances, encourage one to manage daily risks in their pilot career, provide them with insight into how their work-related stress negatively affects their life and propose alternative ways of coping with future crises (Hubbard, & Bor, 2016). In the aviation industry, counseling can be reached through human resources specialists or aviation psychologists, as they are highly trained to evaluate the cognitive processes within the aviation environment (Hubbard, & Bor, 2016).

Emphasizing on the concept of the acknowledgment of emotional well-being within the aviation industry, Winter, & Rice (2015) delved into public perceptions of pilot behaviors. In their study, a notable pattern was illuminated; pilots who were perceived as less sociable were more prone to be associated with perceived mental illness, compared to those who seemed more outgoing. The perception of sociability occurred as a critical factor in shaping these judgments. The insight that the researchers provided does not only shed light into the concept of public perception, as well as the intricacies it involves, but it also serves as a reflection of the involving approaches concerning mental health within the aviation industry. What this suggests is that the aviation industry, once reluctant about addressing mental health, now calls for a nurturing environment where pilots are not only permitted, but also encouraged to seek aid and support for a spectrum of emotional and psychological well-being matters (Winter & Rice, 2015).

Individuals working in the aviation industry, especially airline pilots, have a high teamwork spirit as they reject steep hierarchies and are willing to discuss errors with the rest of the airline crew. Researchers discuss that this stems from the fact that airline crews undergo similar training, which makes them feel a lot closer to each other (Sexton, et. al., 2000). The fact that airline crew members value teamwork so much can be a step towards developing group therapy sessions for whoever faces troubles in their personal life, in an attempt for each individual to resolve them. The above-mentioned statement could also be connected to one of the factors of attraction, the “Proximity Effect”, which states that individuals that spend a lot of time with each other develop a certain kind of connection and attraction (Aronson, et. al., 2022). In a research study conducted by Hamilton (2016), the concept of spreading awareness towards airline pilots recovering from alcoholism is presented, as well as proposing various treatment methods for rehabilitation. According to Hamilton (2016), over 5.000 airline pilots have been able to overcome alcohol abuse and return to flying, as the Federal Aviation Administration offers treatment programs and has eliminated the rule of having no clinical diagnosis of any mental disease or substance abuse difficulty to be eligible to work as an airline pilot. Aftercare group therapy sessions have been discussed in the research paper and are being proposed as the next step after seeking psychiatric help and having individual meetings. Through group therapy, airline pilots have the chance to monitor their progress while having returned to their duties, as well as to find a peer support system in order to handle their stress, as well as their duties that their job demands (Hamilton, 2016).

While scrutinizing the importance of mental health in individuals working in the aviation industry, it is significant to mention the troubles maintenance crew face. The terms “pilot error”, or “human error” are ascribed to aircraft accidents over 75% of the time. However, a study in the United States reported that 18% of aircraft accidents were attributed to maintenance factors, which was noted as a supporting cause (Philips, 1994). In their research study, Virovac, et. al. (2017) analyzed twenty-eight investigations of individual cases and provided significant insight relating to the importance of human factors in aircraft maintenance. Throughout the analysis, the researchers concluded that human factors is an integral part of aircraft maintenance procedures, as continuously monitoring and analyzing the aircraft’s progress plays a necessary role in eliminating errors (Virovac, et. al., 2017).

Further Recommendations for Employee Assistance

Given the diversification of employees in the context of the globalized workplace, new ways of assisting employees needs to be considered ranging from self-help groups, on-line counselling, and

Employee Assistance Programs (EAPs). EAPs are employer-funded program designed to support employees to find and deal with personal issues which may affect their work performance, and overall health and well-being (Attridge, 2019; Coombs, 2019). Accessing EAPs can help employees address varying issues that may affect employee performance and job commitment which include: stress, personal health matters, relationships, financial, legal, other personal issues (Coombs, 2019; Fister Gale, 2019). EAPs are available in several countries, providing support in the form of counselling and referrals; any organisational interventions work in context of confidentiality and ethical standards, that can counsel and train managers and supervisors or assist with conflict resolution, stress management, developing online interactive content and information (APA, 2006; Coombs, 2019).

CONCLUDING REMARKS

This study contributes to others in examining how stress and fatigue may affect airline pilots' performance. Although airline pilots seem responsible and are seen as figures of authority, they are still susceptible to various setbacks, such as the development of anxiety symptoms. Findings in the existing literature suggest diverse concerns relating to fatigue, stress and anxiety that call for more research. The end means is to continue to build a stronger foundation around improving the policies and procedures that relate to the aviation industry.

KEY POINTS

1. The study identified a significant correlation between stress, fatigue, and high levels of anxiety in pilots within the private aviation industry. Pilots experiencing increased stress and fatigue were more likely to exhibit elevated anxiety symptoms.
2. Fatigue emerged as a crucial contributing factor to anxiety levels in pilots. The demanding nature of their profession, including irregular schedules and long flights, can lead to fatigue accumulation over time, which can subsequently increase anxiety.
3. Stress was identified as a significant factor associated with heightened anxiety levels in pilots. The numerous stressors faced by pilots, such as intense workload and time pressure, can contribute to increased stress levels, emphasizing the importance of effective stress management techniques.
4. The study's findings underscore the need for addressing stress and fatigue to promote pilot well-being and mental health. Implementing fatigue management strategies and stress reduction interventions can mitigate the negative effects on pilot performance and safety, ensuring a safer aviation environment.

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