The Effects of a Flight Educational
Intervention on Flying Anxiety,
Self-efficacy and Locus of Control.

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I am truly indebted to Dr. Hyland for his constant support, guidance and direction throughout my thesis writing.
The purpose of this quasi-experimental survey study was to explore the effects of a multi-component fear of flying program on individuals who fear flying. The purposive sample of seventeen participants comprised of five men (29.4%) and twelve women (70.6%). This within-groups study measured participants’ flying anxiety, self-efficacy and locus of control. Each participant completed a questionnaire prior to the intervention and immediately after. The questionnaire consisted of three measures, *Flight Anxiety Situations, Generalized self-efficacy Scale and Locus of Control Scale*. The analysis showed a significant reduction in flying anxiety, a significant increase in self-efficacy but no increase in locus of control. Thus proving that a multi-component fear of flying program has a positive effect on one’s flying anxiety and self-efficacy.
INTRODUCTION

In recent times, air travel has become increasingly important for personal, business, humanitarian and political purposes, but for fearful fliers this can be a major handicap (Crangle, 2001, p. 9). In 2012, the Federal Aviation Authority (FAA, 2012) predicted that air travel would double in the next 20 years. According to the International Civil Aviation Organization (ICAO, 2014), 2013 was the safest year ever recorded in terms of fatalities for scheduled international air transport operations. So if air travel has become so commonplace and safe, why do so many people still fear flying? This thesis explores the effectiveness of a Dublin based fear of flying program, which has attracted many candidates over the past five years.

Pteromerhanophobia is the term used to refer to the fear of flying or being on an aircraft while in flight. The Diagnostic and Statistical Manual of Mental Disorders (DSM) is a manual commonly by mental health practitioners to assist in making diagnosis. Fear of flying was described as a specific phobia for the first time in the DSM-IV-TR edition, in the year 2000. It is defined as “a marked and persistent fear that is excessive or unreasonable, cued by the presence or anticipation of a specific object or situation” (Sperry, 2003). This fear can affect many aspects in a person’s life, career development, personal relationships, cultural or educational interests and even holidays. Ekeberg, Seeberg and Ellertsen (1989) believed that the population affected by pteromerhanophobia could be divided into three groups. The first group of individuals is those who because of the severity of their fears, do not fly at all. The second group restricts their flying to an absolute minimum, and when doing so they experience considerable discomfort. The third group of individuals have a moderate apprehension about flying, but do not avoid it; it is estimated that this group constitutes 20% of the total flying population.
Aetiology

Research considers there to be many diverse causes of pteromerhanophobia such as maternal instinct and family, personal stress or major life events, the media and one’s lack of knowledge. Crangle (2001) found that many women quite enjoyed flying until they had children. However, this newly acquired maternal instinct made them feel generally more responsible and protective and thus more risk averse. This caused them to refrain from participating in activities that they perceived to be potentially life threatening. Parents, particularly mothers, can often transmit their own fears and anxieties upon their children, which instils a notion in them that there is something worthy of being anxious about. In this case, it would leave the child with a vicarious fear of flying (Albon, Dubi, Rapee, & Schniering, 2007). Excessive or persistent stress can cause anxiety disorders, panic attacks and phobias (Passer, Smith, Holt, Bremner, Sutherland, & Vliek, 2009). Flying at a time of high personal stress or after a major life event, can increase the association between anxiety and flying. The result is that individual’s risk reliving this anxiety the next time they fly, even though the original anxiety was unrelated to flying in the first place (Passer et al., 2009). Unfortunately, the media too can portray flying in a negative way, for example a news report of a simple ‘go around’ manoeuvre can easily be exaggerated. Pilots choose to conduct such manoeuvres when they feel it is better to not land on a particular occasion. They simply pull up and then try to land again (Crangle, 2001, p. 21). Without an educated knowledge of the aviation industry, manoeuvres such as these can be understood incorrectly. Similarly, a lack of knowledge with regards to ‘normal’ aircraft noises, movements and sensations can enormously contribute towards the fear of flying (Crangle, 2001, p. 20-21). Misinformation about flying leads to a catastrophic interpretation of normal flight events (Van Gerwen, Van
Cognition

The purpose of this study is to examine the effect of a one-day multi-component educational program in aviation aimed at those who fear or have anxiety towards flying. It was essential that the intervention particularly addressed the issues relating to an individual’s lack of knowledge of the aviation industry because of its huge contribution towards fear of flying (Crangle, 2001). The program used for the purpose of this study included a series of educational seminars on aviation. The content covered in the program includes the psychology of fear, in particular explaining how the amygdale (groups of nuclei located within the temporal lobes of the brain) plays a crucial role in the development and expression of conditioned fear. The physiological effects of flying such as lowered oxygen levels and dehydration were also explored. The physics of an aircraft such as thrust, lift, drag and weight were explained as well as the safety procedures of the pilots, the cabin crew, air traffic control and all other maintenance crew. The impact of weather on flying was also discussed in great detail. By providing a broad and in-depth explanation of the aviation industry, it allowed participants to understand ‘normal’ everyday flying procedures. Thus allowing them to distinguish between ‘normal’ and what they or the media may perceive as threatening. Education was used as an aid in these cognitive restructuring techniques that address increased danger expectancies. Self-management techniques are also taught in order to prepare the participants for future flight. These can be used in the run-up to a flight and also during the course of the flight. Such techniques use a cognitive behavioural approach.
The mind processes life events so that they can become memories. Most life events are of a size and nature that the mind can cope with. However, sometimes an event can be perceived to be traumatic, and as a result, it is too difficult for the mind to process. An event that can’t be processed is prevented from becoming a memory; however, it is remains present in the mind. A situation that reminds a person of an original trauma can act as a trigger resulting in a ‘flashback’ (Passer et al., 2009). The traumatic event is constantly re-lived, including the emotional and physical sensations of the original event. For many fearful fliers, they perceive many flying situations to be traumatic; such fears can include lack of control, claustrophobia, fear of heights, fear of having a panic attack or simply being out one’s comfort zone (Crangle, 2001, p. 27-33). There are also specific flight related fears that are perceived to be traumatic, such as the dangers of take-off, after take-off, motion sickness, unfamiliar noises, turbulence, weather, descent, landing, and the safety of an aircraft and it’s crew (Crangle, 2001, p. 34-48). In order to cope, some individuals may avoid any activity or event that relates to the original trauma, in this flying.

There have been many studies surrounding the topic of flying anxiety and particularly those that use cognitive behavioural therapy (CBT). CBT assists individuals in identifying and changing their thoughts emotions and habits that contribute to their problem. Van Gerwen, Spinhoven, and Van Dyck (2006) compared Cognitive-behavioural group therapy (CBGT), a two-day course with a one day more behaviourally oriented group treatment (BGT); all participants feared flying. They also tested whether the longer CBGT program differs in effectiveness from the shorter BGT program. Participants were randomly assigned to either the CBGT or the BGT. A post-treatment flight measured participants’ ability to cope with a flight aboard a plane. Different self-report questionnaires were completed before, during and after the
treatment. Results indicated that both treatments were equally effective on their ability to cope on board a flight, but the CBGT was significantly more effective than the BGT when measuring fear and self-efficacy, this could be due to the longer duration of the program.

A study by Moller, Nortjie, & Helderes (1998) examined whether fear of flying is associated with irrational cognitions. It compared fearful flyers with non-fearful flyers using experimental scenes involving basic fears associated with pteromerhanophobia and non-anxiety provoking flight-related scenes as the control. The results indicated that the fearful flyers displayed significantly more irrational thoughts and ratings of anxiety within the control scenes. This demonstrates that negative cognitions are characterized by a preoccupation with danger, an overestimation of the seriousness of the perceived threat and an underestimation of coping abilities.

**Exposure**

An effective treatment for trauma requires gradual exposure to the traumatic event (Passer et al., 2009). Gradual exposure is a cognitive behavioural approach that is proven to be a frequent and very important tool in the treatment of pteromerhanophobia (Rothbaum, Anderson, Zimand, Hoges, Lang, & Wilson, 2006). Exposure involves repeatedly presenting the individual with the feared stimulus, in a controlled manner (Foa & Kozak, 1986), this is known as systematic desensitisation. The stimulus can be presented in a variety of forms. When the stimulus is presented in many forms, including the actual stimulus, it is known as vivo exposure (Linden, 1981). This is a standard form of gradual exposure. Vivo exposure is an emotionally difficult process for the patient due to the sensitivity and anxiety that one feels in relation to the fear. Vivo exposure is most effective when used over a prolonged
period of time. While effective, due to the increased security and the financial aspects of flying vivo exposure is not always the most practical or economical treatment. As a response to this problem Choy, Fyer, & Lipsitz (2007) proposed another form of exposure, Virtual Reality Exposure (VRE). VRE has since emerged as a very important tool in the treatment of pteromerhanophobia and uses a three-dimensional computer generated representation of the feared stimulus. To treat those suffering from pteromerhanophobia a flight simulator is used. During simulation users are required to wear a helmet with a head-mounted display (HMD) that tracks the body’s movements. This allows the therapist to have a detailed account of the patient’s anxieties. The therapist is able to control the experience, which ensures maximum therapeutic gain (Rothbaum, Hodges, Kooper, & Opdyke, 1995). Research suggests best results are obtained when exposure is used in conjunction with cognitive interventions (Price, Anderson, & Rothbaum, 2008).

A recent study compared VRE and vivo exposure using participants with pteromerhanophobia (Rothbaum et al., 2006). Treatment consisted of four sessions of anxiety measurement followed by exposure to either a virtual aeroplane (VRE) or to an actual aeroplane (vivo exposure), which they were randomly assigned to. This study was conducted over six weeks. Post treatment, there were two follow-up sessions with the patients, six and twelve months later. Results found both exposures resulted in the same increased willingness to fly, anxiety ratings during a flight, self-ratings of improvement and patient satisfaction with the treatment.

This present study uses a multi-component program that gradually exposed the participant, using sensory visual and audio exposure. Initially, model airplanes are displayed at the front of the classroom and are used to demonstrate parts of an airplane and the way in which it flies. Images of airplanes including parts of the
aircraft are shown using an overhead projector. Videos of aircraft taking off and landing are played. Audio recordings of common noises experienced during flight are also played. Through the use of a reconstructed aircraft, participants are exposed to the inside an aircraft. The participants were asked to pick a seat and safety equipment is then demonstrated and explained. The final part of exposure is the flight simulator; a commercial airline pilot takes participants on a virtual flight. Gradual exposure is an essential part of the program.

*Conditioning*

If someone is conditioned to fear flying then surely one can be conditioned to be tolerant of it? Classical conditioning is a form of learning that occurs when a conditioned stimulus (CS) is paired with an unconditioned stimulus (US). When they are paired together, an unconditioned response (UR) occurs. For a fearful flier this can occur when they are sitting on the airplane (CS), turbulence happens (US), or when they get become scared and anxious. They can associate the plane and its turbulence with fear and anxiety (UR). This can occur if pairing is repeated or after only one pairing. According to Wilhelm & Roth (1997) there are three ways that conditioning can occur with respect to flying anxiety. Certain stimuli can lead to distress and an associated fear of flying. Watson (1924) found that these stimuli include such events as an aircraft ‘dropping’ during turbulence, loud noises such as those experienced during take-off and landing and ear discomfort due to the pressurization of the cabin. Flying creates intense accelerating forces in three dimensions and tilting of the body’s natural position, this has been shown as a link to a fear response (Ohman, 1986). People who suffer from a panic disorder avoid specific situations such as flying as they know that they have no control after the aircraft takes-off, causing distress leading to the possibility of having a panic attack, which is traumatic in itself.
Self-efficacy

This current study measures the effect of a one-day multi-component fear of flying program on one’s self-efficacy. People tend to engage in behaviours they believe will produce a desired effect and that they believe they can perform. Bandura’s self-efficacy concept is "the belief in one’s capabilities to organize and execute the courses of action required to manage prospective situations” (Bandura, 1995, p. 2). Much of Bandura’s work focused on understanding the role of self-efficacy in the development and treatment of fears and phobias (Bandura, 1986). Those with low self-efficacy cannot manage threatening events, and this inability to cope leads to high levels of anxiety arousal and possibly panic (as cited by Cervone and Pervin, 2008). People with anxiety problems have unrealistic expectations and feel incapable of performing actions that control events. People can increase self-efficacy expectancies by observing others cope successfully, through social persuasion and through encouragement from others (Passer et al., 2009). This program provides knowledge of the aviation sector, within an encouraging environment.

A recent study by Van Gerwen, Van de Wal, Spinhoven, Diekstra and Van Dyck (2003) measured the effects on self-efficacy expectancies of various treatment components. All participants suffered from a fear of flying and participated in a multi-component fear of flying treatment program. The program included technical information and sensory experiences, exercises in controlling and modifying negative thoughts, relaxation training and breathing exercises, a visit to a Boeing 747, a flight simulator and in-flight therapy. Their fear of flying was assessed using the five measures in the form of self-report questions. The first was a Flight Anxiety
Situations (FAS) questionnaire, which measured the level of anxiety produced at these different times throughout a flight. The second was a Flight Anxiety Modality (FAM) questionnaire, which measured two modalities, somatic modality, which related to physical conditions and cognitive modality that related to distressing conditions. Thirdly was a Visual Analogue Flight Anxiety Scale (VAFAS) questionnaire, which enabled participants to indicate how anxious they were about flying at a specific moment in time. The forth questionnaire was a Flight Self-Confidence Scale (FSCS) which measured one’s belief in self-efficacy. The final measure was the Fear of Flying Coping Scale (FFCS), which also measured one’s belief in self-efficacy but from a different angle, a person’s ability to cope and deal with feelings. A three-hour follow-up session was given three months after initial treatment where post treatment data was collected. The follow-up data included the FAS, FAM and VAFAS questionnaires. Results showed a significant improvement three months after treatment. The FSCS and FFCS were given eight times during the initial treatment. Belief in self-efficacy significantly increased over the course of treatment. The FSCS and FFCS showed that the most effective treatment component of the multi-component treatment program was the exposure component, which consisted of a visit to a Boeing 747, a flight simulator and in-flight therapy. The relaxation training and breathing exercises component showed the second highest results for improvement. Technical information and sensory experiences about flying was the third most effective component. Controlling and modifying negative thoughts was the forth most effective intervention.

Locus of control

This study looks to measure the effect of a one-day multi-component fear of flying program on one’s locus of control (LOC). LOC is a concept developed by
Julian Rotter in 1966. It refers to how people’s behaviour and attitudes affect the outcome in their life in different situations. An internal LOC refers to the belief that individuals control his or her own life. People with a higher internal LOC would tend to praise or blame themselves and their abilities or failures. An external LOC refers to the belief that environmental factors influence a person’s life. People with a lower external LOC would tend to praise or blame an external factor instead of them. LOC is important for fearful flyers as some people claim they would feel less anxious if they were to fly the plane themselves. It is important for fearful flyers to distinguish what they can and cannot control. This program teaches techniques for self-management of anxiousness and fear, enabling people to control their own anxiety. Through the educational seminars, fearful flyers learn that there are different teams that manage different aspects of the aviation industry, each team double-check each other’s work, eliminating error. For example, many fearful flyers worry if the plane was in working order, once they realize that not only is the plane serviced on a regular basis, but an engineer carries out safety checks followed by the pilot who then conducts his own safety checks, and then lastly the computer systems on board the aircraft identifies if anything is incorrect.

LOC was first used in aviation in a series of studies of aviation pilots (Wichman and Ball, 1983). A recent study by Joseph, Reddy and Kashore (2013) measured LOC, safety attitudes and involvement in hazardous situations in Indian Army Aviators. Results demonstrated a positive correlation between external LOC and involvement in hazardous events. External LOC was associated with higher impulsivity, anxiety, and weather anxiety and with lower self-confidence, safety orientation, and denial. Internal LOC was associated with increased self-confidence, safety orientation, and denial. This study relates to fearful fliers, as they perceive
flying to be ‘hazardous’ (Crangle, 2001). There has not yet been research conducted on passengers themselves, or fearful fliers. As proven by Mühlberger, Alpers and Pauli (2008), one’s personal beliefs can hugely impact the development of a fear. Individuals with pteromerhanophobia have a need for control (Crangle, 2001). Through the techniques that are taught in fear of flying programs, participants are able to compose themselves and put the situation into perspective by distinguishing between a ‘normal’ situation and a ‘hazardous’ one.

Current Study

This study aims to produce findings in an Irish population to advance existent international findings regarding the effectiveness of a one-day multi-component educational program on flying anxiety, self-efficacy and LOC. It is accepted that fear of flying treatments have a positive effect on flying anxiety and self-efficacy (Van Gerwen et al., 2003), but no research has looked at the effect of LOC. The current research measures one’s flying anxiety, self-efficacy and LOC, pre and post the intervention. The following hypotheses were formulated for direct testing:

Hypothesis One: That individuals with pteromerhanophobia would experience reduced flying anxiety on completion of the one-day multi-component educational program on aviation.

Hypothesis Two: That individuals with pteromerhanophobia would experience an increase in self-efficacy on completion of the one-day multi-component educational program on aviation.

Hypothesis Three: That individuals with pteromerhanophobia would experience an increase in LOC on completion of the one-day multi-component educational program on aviation.
Hypothesis Four: There will be a significant difference between males and females in flying anxiety, self-efficacy and LOC.
METHODOLOGY

Participants

This study was conducted using purposive sampling. All participants attended a one-day fear of flying program. Participants are allowed to bring along a companion for support, but it was essential that only those who feared flying were allowed to take part in study. Due to time constraints this study was conducted over 3 separate days in the months of December 2013, January 2014 and February 2014, as the program only runs once a month. The first program consisted of 5 participants, the second consisted of 7 participants and the third consisted of 5 participants. The total number of participants was 17, 5 men (29.4%) and 12 women (70.6%). The average age of the participants was 38.59 years (SD = 8.91), with a distribution ranging from 28 to 56 years. There appeared to be no significant difference with the age of participants, which demonstrates that pteromerhanophobia, can affect anyone at any time. All 17 participants had flown before, but for the purpose of calculating the mean number of flights flown, one participant was not included. This was due to the fact that the individual in question had flown on a notably higher number of occasions than the rest of the participants. The average number of flights taken by the participants had taken prior to this study was 36.81 (SD = 29.07) with a distribution range from 5 to 100 times. No participants had ever participated in any fear of flying program prior to this study.

Table 1 Descriptive statistics for the age of participants and the number of times they had flown prior to the educational intervention.

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<tr>
<td>Number of Flights</td>
<td>36.81</td>
<td>29.07</td>
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In order to qualify for this study, all participants had to be over the age of 18, all had agreed to participate and fully understood the study’s instructions. There was no inducement necessary as these participants had chosen of their own accord to participate in the program. All findings were anonymous and confidential. This study was given approval by DBS School of Psychology Research Ethics Committee.

Design

This was a quasi-experimental survey study, quantifying the effect of an interventional program. This systematic empirical investigation used a multi component fear of flying program as a possible treatment intervention on one’s flying anxiety, self-efficacy and LOC. This within-groups study measured the participants flying anxiety, self-efficacy and LOC before the intervention and immediately after. The results were then compared to distinguish whether the intervention had a statistically significant influence on the participants’ anxiety, self-efficacy and LOC.

Measures

After each individual confirmed their booking on the program, they were emailed a link to an online questionnaire could be filled out and submitted online (see Appendix B). The email was sent five days prior to each course. A contact email address was provided should the participant have any queries in completing the questionnaire, also a contact number for a helpline was provided should the participant get anxious or distressed whilst filling out the questionnaire. Each participant was asked for their gender, the number of times they had flown, whether they had ever participated in a fear of flying course and if so, how many times. Due to the anonymity of this study, each participant was asked for his or her date of birth. This facilitated the matching of the pre and post-program results. Additionally three specific questionnaires were included, “The Flight Anxiety Situations Questionnaire”
The Flight Anxiety Situations Questionnaire (see Appendix C)

The FAS questionnaire was developed by Van Gerwen, Spinhoven, Van Dyck, & Diekstra, (1999) as a measurement that was fast and easy to administer and makes a diagnostic self-report. The initial selection of the items for the FAS started in 1986, where patients with pteromerhanophobia were interviewed (Van Gerwen, 1988). A description of chronological events includes situations relevant to a journey by plane, and excludes situations that do not occur on a normal flight. The questions range from when one sees an airplane to when the landing is announced. Pilots, cabin crew, and therapists that work with individuals suffering from pteromerhanophobia, were then asked questions relating to the times during a flight where they felt were typical in provoking anxiety amongst individuals. The items were then put together and tested in clinical work with individuals with pteromerhanophobia. The final questionnaire consisted of 32 scale items. Participants of the questionnaire are asked to select one of five options that best relates to the situation in question. The five options are ‘No Anxiety’, ‘Light Anxiety’, ‘Moderate Anxiety’, ‘Strong Anxiety’ and ‘Vehement Anxiety’. The lowest possible score one could receive for this test is 32; the highest possible score is 160. The higher the score the greater the anxiety.

Generalized self-efficacy Scale (see Appendix D)

The “Generalized self-efficacy Scale”, assesses the strength of an individual's belief in their own ability to respond to a difficult situation and deal with associated obstacles or setbacks. This questionnaire consists of ten scale questions. Participants were instructed to select one option that best describes how they feel in that particular
situation. They may choose from four options ‘Not at all true’, ‘Hardly True’, Moderately True’ and ‘Exactly true’. The lowest possible score is ten, the highest possible score is 40, the higher the total the greater the persons’ generalized sense of self-efficacy.

*Locus of Control Scale* (see Appendix E)

The “Locus of Control Scale” questionnaire consisted of 29 questions and is intended to measure the individuals LOC. For each question, there are two possible choices and participants were advised to select the statement that they most agreed with. Only certain choices were awarded a point and the points were totalled. A higher number of total points is indicative of an individual with an internal LOC reflecting a sense of personal empowerment. Lower scores are indicative of individuals with an external LOC, meaning decisions and life are controlled by environmental factors, which they cannot influence. The questionnaire consists of 6 filler items and 23 scoring items, questions numbered 1, 8, 14, 19, 24 and 27 were not included in the totalling of points. If a participant scored between 0 and 4 they were considered to have a very strong external LOC. If they scored between 5 and 9 they were considered to have an external LOC. If they scored between 10 and 14 they were considered to have both external and internal LOC. Scores between 15 and 19 indicated an internal LOC and scores between 19 and 23 suggested that the individual has a very strong internal LOC.

*Apparatus*

The classroom used was equipped with a computer, projector and enlarged notepad, which were used to visually demonstrate explanations. All participants were provided with bottles of water and sweets throughout the day. Tea and coffee were served along with pastries for the break, and again with lunch, along with a selection
of sandwiches. Each participant received a pack that includes a pen, a notepad, a card with the program’s contact details (should they require any assistance in the future), and a card with cues as a reminder of the taught techniques. There were information sheets that are handed out throughout the day which participants were able to add to their packs. This provided all the necessities for their future flights in one single location.

Procedure

The program is run on a monthly basis by a certified Aircrew Resource Management Instructor with a psychology background. It took place in a building that is used for recurrent training by many Irish pilots. Participants were advised to arrive approximately 30 minutes before the program commences at 10am, in order to settle any outstanding fees and receive their introduction pack and nametag. Participants were then introduced to the instructor, the pilots and cabin crew that assist in delivering the programme throughout the day. Three participants did not answer the questionnaire online prior to their course, so they were given a paper copy to fill out before the program started. This took approximately ten minutes to complete. All participants were then brought into the classroom, where they were seated at desks and asked to write their name on a placard provided.

The initial task of the day was for each participant to introduce themselves to the others sitting around them and discuss their hopes for the day. There were some participants that brought a companion for support. The areas of aviation that were of concern to the participants were then discussed and written up on a flipchart board, as to ensure that they would be covered throughout the day. The course was broken into three parts. The first part discusses the psychology of fear, i.e. the amygdala and the need for control. Then a 20-minute break was then taken. The second part of the
course informed the participants of the history of avionics, the physics of an airplane, weather and specific related events such as turbulence and lightening. The safety procedures of flight were then described, from the aircraft itself to the pilots, crew air traffic controllers, mechanics and dispatchers. A lunch break was then taken at approximately 13:00pm. Participants were then divided into two groups, one group was taken into the aircraft simulator with a trained pilot, where they experienced normal take-offs and landings as well as irregular take-offs and landings. The second group was taken in to an old airplane where they were shown and could familiarise themselves with all the safety equipment on board. The third part of the course focused on preparing the participant for their next flight (which they are recommended to take within three months of having completed the course). Anxiety management techniques using cognitive behavioural therapy (CBT) were demonstrated to help participants notice their own levels of anxiety. On completion of the program, those participants who filled out the initial questionnaire were asked to fill out an identical paper copy. The results were then compared.
RESULTS

The purpose of this research was to investigate if education had an effect on ones flying anxiety, self-efficacy and LOC. This research project used a paired samples t-test to compare the pre and post-test scores. A simple bar chart was used to display the effect on the criterion variables of flying anxiety, self-efficacy and LOC. An independent samples t-test was used to compare males and females flying anxiety, self-efficacy and LOC. A pearson’s correlation was used to identify whether age had any significance the results of any of the tests.

Hypothesis One stated that individuals with pteromerhanophobia would experience reduced anxiety on completion of the one-day multi-component educational program on aviation. A paired samples t-test was employed to check the mean score for the pre and post-test FAS questionnaire. The pre-test mean score was 111.24 (SD = 19.37), while the post-test mean score was much lower at 88.82 (SD = 29.44). The 95% confidence limits showed that the population mean difference of the variables lay between 10.41 and 34.41. A significant difference was found between the pre and post FAS questionnaire (t(16) = 3.96, p < .001). Therefore the null hypothesis was rejected. Indicating that the intervention reduced the participants flying anxiety.

Figure 1
Hypothesis Two stated that individuals with pteromerhanophobia would experience an increase in self-efficacy on completion of the one-day multi-component educational program on aviation. A paired samples t-test was employed to check the mean score for the pre and post-test SE questionnaire. The pre-test mean score was 28.47 (SD = 5.42), while the post-test mean score was slightly higher at 30.82 (SD = 3.97). The 95% confidence limits showed that the population mean difference of the variables lay between -4.37 and -.34. These mean scores differed slightly however, it showed that there was a significant difference between the pre and post SE questionnaire (t(16) = -2.47, p = .025). Therefore the null hypothesis was rejected. Illustrating that the invention had a positive effect on the participants’ self-efficacy.

Figure 2

Hypothesis Three stated that individuals with pteromerhanophobia would experience an increase in LOC on completion of the one-day multi-component educational program on aviation. A paired samples t-test was employed to check the mean score for the pre and post-test LOC questionnaire. The pre-test mean score was 11.82 (SD = 4.05), while the post-test mean score was slightly lower at 10.47 (SD = 4.14). The 95% confidence limits showed that the population mean difference of the
variables lay somewhere between -.42 and 3.12. These mean scores differed slightly however, it showed that there was no significant difference between the pre and post LOC questionnaire (t(16) = 1.61, p = .125). Therefore we failed to reject the null hypothesis. Demonstrating that the invention did not increase the participants LOC.

**Figure 3**

![Locus of control: Pre and post-treatment scores](image)

**Table 2** *Group statistics: Flying Anxiety, Self-efficacy and Locus of Control*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pre-test</th>
<th></th>
<th></th>
<th>95% CI for Mean Difference</th>
<th>r</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flying Anxiety</td>
<td>111.24</td>
<td>19.37</td>
<td>88.82</td>
<td>29.44</td>
<td>17</td>
<td>10.41</td>
<td>34.41</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>28.47</td>
<td>5.42</td>
<td>30.82</td>
<td>3.97</td>
<td>17</td>
<td>-4.37</td>
<td>-3.4</td>
</tr>
<tr>
<td>Locus of Control</td>
<td>11.82</td>
<td>4.05</td>
<td>10.47</td>
<td>4.14</td>
<td>17</td>
<td>-.42</td>
<td>3.12</td>
</tr>
</tbody>
</table>

* p < .05

Hypothesis Four stated that there would be a significant difference between males and females in one’s flying anxiety, self-efficacy and LOC. Using independent samples t-tests, no significant difference was found between males and females, in either the pre or post-tests in flying anxiety, self-efficacy and LOC.
Table 3 Gender differences in flying Anxiety, self-efficacy and locus of control in the pre-test.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pre-test</th>
<th>95% CI for Mean Difference</th>
<th>r</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flying Anxiety</td>
<td>Male 114.4 (SD = 19.34)</td>
<td>-18.08, 27.04</td>
<td>0.834</td>
<td>0.42</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Female 109.01 (SD = 20.08)</td>
<td></td>
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<tr>
<td>Self-efficacy</td>
<td>Male 29.80 (SD = 3.56)</td>
<td>-4.38, 8.15</td>
<td>0.597</td>
<td>0.22</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Female 27.91 (SD = 3.78)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Locus of Control</td>
<td>Male 9.80 (SD = 4.14)</td>
<td>-7.34, 1.60</td>
<td>0.825</td>
<td>0.64</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Female 12.67 (SD = 4.92)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*p < .05

Table 4 Gender differences in Flying Anxiety, Self-efficacy and Locus of Control in the Post-test.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Post-test</th>
<th>95% CI for Mean Difference</th>
<th>r</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flying Anxiety</td>
<td>Male 102.40 (SD = 35.62)</td>
<td>-13.60, 52.07</td>
<td>0.644</td>
<td>0.50</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Female 83.17 (SD = 26.09)</td>
<td></td>
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</tr>
<tr>
<td>Self-efficacy</td>
<td>Male 31.60 (SD = 3.78)</td>
<td>-3.52, 5.72</td>
<td>0.825</td>
<td>-1.36</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Female 30.50 (SD = 4.17)</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Locus of Control</td>
<td>Male 9.20 (SD = 4.92)</td>
<td>-6.55, 2.95</td>
<td>0.720</td>
<td>-0.80</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Female 11.00 (SD = 3.88)</td>
<td></td>
<td></td>
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</tbody>
</table>

*p < .05

Three participants did not complete the questionnaire in advance of their intervention and they were given the opportunity to complete it on the morning of (but advance of) their intervention. An independent samples t-test found a significant difference with only one of the variables; flying anxiety. Those who completed the questionnaire online in the days before had a mean score of 111.71 (SD = 21.42), compared to the three who filled it out on the morning of the intervention, who had a lower flying anxiety mean score of 109.00 (SD = 3.00). The 95% confidence limits showed that the population mean difference of the variables lay somewhere between -15.49 and 10.06.
Table 5 *Differences between filling out the questionnaire in the days before the intervention and the morning of the intervention.*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>When the pre-test was conducted</th>
<th>95% CI for Mean Difference</th>
<th>( r )</th>
<th>( t )</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One the day Online</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FA1</td>
<td>109.00 3.00 3</td>
<td>-15.49, 10.06 *0.008 -0.45 14.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE1</td>
<td>29.33 2.89 3</td>
<td>-6.52, 8.62 0.449 0.29 15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOC1</td>
<td>6.67 3.06 3</td>
<td>-10.77, -1.76 0.722 -2.96 15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FA2</td>
<td>96.33 19.86 3</td>
<td>-31.81, 50.04 0.479 0.47 15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE2</td>
<td>33.33 3.51 3</td>
<td>-2.26, 8.35 0.668 1.23 15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOC2</td>
<td>6.00 5.00 3</td>
<td>-10.40, -.46 0.620 -2.33 15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*\( p < .05 \).*
DISCUSSION

This present study had several primary aims. In the broad form, the first aim was to investigate pteromerhanophobia. There are many diverse causes of pteromerhanophobia, but many diverse treatments too. Similar research by Van Gerwen et al, (2003) found the exposure component to be the most successful component for treating pteromerhanophobia, relaxation techniques was found to be the second and education was ranked to be the third most successful component. However, this study used education as the main component of the intervention, with an aspect of exposure and cognitive behavioural approach. The effects of the program were tested using pre-collected data, compared with data that was collected immediately after the course.

The second aim of the study related to the first hypothesis, which examined the positive effect of the educational program on flying anxiety in individuals suffering with pteromerhanophobia. The findings support the hypothesis that a multi-component education program significantly reduces one’s flying anxiety. The results shown in Table 2 supports previous findings that flying anxiety can be treated through the use of a multi-component program (Van Gerwen et al., 2003). Both males and females flying anxiety levels dropped, as indicated in Table 3 and Table 4, but males appeared to have a much higher anxiety level. Only 29.4% of participants were males, which is on par with the majority of other fear of flying studies. Normally the distribution of gender is 30% males to 70% percent females (Van Gerwen et al., 2002). This illustrates that males have a greater level of flying anxiety, but are less likely to seek treatment.

The third aim of the study related to the second hypothesis, which examined the positive effect of the educational program on self-efficacy in individuals suffering
with pteromerhanophobia. The findings illustrated in Table 2 demonstrate that the multi-component education program had a significantly positive effect on participants’ self-efficacy. This positive effect relates to their belief in their ability to engage in behaviours’ that they believe will produce a desired effect, and they believe they can perform. These results support this hypothesis and previous research (Van Gerwen et al., 2003). Both males and females self-efficacy increased, as indicated in Tables 3 and 4. Males demonstrated a higher self-efficacy than females, indicating that males have a stronger belief that they can cope in a flying situation.

The fourth aim of the study related to the third hypothesis, which examined the effect of the educational program on the LOC of individuals suffering with pteromerhanophobia. It was predicted that individuals with pteromerhanophobia would experience an increase in LOC on completion of the program - that one would develop a more internal LOC. However, this was not demonstrated in the results. The pre and post-mean scores differed slightly, but the results were not statistically significant. The level of LOC dropped in both males and females but females appeared to have a higher LOC than males. A possible explanation for the findings indicated in table 2 could be that the educational program allowed the participants to relinquish some of that ‘need for control’. For example, many individuals who suffer with pteromerhanophobia fear that the aeroplane might not be safe and therefore feel that they have to watch for any issues that may not be safe. Through education, they learn that aeroplanes are constantly safety checked which allows the individual feel as thought they can allow others to control that aspect of their fear, almost a development of trust. Distinguishing between what the fearful flyers can control and what they cannot control is a very important aspect in the treatment of pteromerhanophobia. Lowering LOC, to a more external LOC, could possibly have
affected the attitudes and behaviour of fearful fliers in a positive way.

Interestingly all participants in this study had flown before. The average number of times that participants had flown was 36.81. One particular participant claims she had flown 550 times prior to the fear of flying program. Prior to the program the individual in question had a flying anxiety mean score of 110, which reduced to 58 upon completion, these results were scored on a scale from 32 to 160. The participant’s self-efficacy did not change at all and their LOC increased by one point. The results from this participant demonstrate the levels that people have to go to for personal, business, humanitarian and political purposes.

How far in advance participants complete the questionnaire is important from a flying anxiety aspect. Demonstrated in Table 5, a significant difference was found from those who filled out the questionnaire the morning of the intervention and those who filled it in a few days prior to the intervention online. Further research could perhaps ensure that all data is collected in advance.

Limitations

It would be incomplete to ignore some of the limitations of this study, which presents the opportunity for further future research. This study was conducted in the months of December, January and February. The fear of flying program only runs once a month, therefore due to time constraints, only 17 participants participated in the program during this time and were thus included in this study. A larger sample size would increase the reliability and validity of the sample and would make the study more powerful in terms of detecting any effects that might exist. However, as the average number of participants per course was 5.7 and as the course takes place once per month even over the course of 12 months one may only be able to achieve a total number of 68 participants. This of course assumes that no participant participates
in more than one course. Time constraints didn’t allow for additional retesting, therefore retesting was conducted on completion of the program. Retesting after two weeks is ideal. The findings of this study could therefore be skewed by post-course euphoria, a concept that one feels this feeling of euphoria on completion of a course. This feeling of euphoria could have influenced the results. Further research could perhaps retest a while after the course is completed, instead of immediately afterwards. Perhaps further research could test participants after each component of the program education, exposure and CBT techniques. This would determine which part of the course was most effective. Perhaps a more even gender response would reflect greater information on gender differences. Further research could also develop a control, which would further increase the validity of the study.

Conclusion

This study demonstrates how air travel has become increasingly important and necessary in modern times, and has also demonstrated how increasingly safe it is becoming. This study further contributes to similar research in this field and proves that through treatment, a person’s flying anxiety can be reduced and a person’s belief in their own ability to cope in a flying situation can be increased. However, there remains individuals with pteromerhanophobia that refuse to fly, and others that keep their flying to a minimum. Of course there are also those who fly, but do so with apprehension. These individuals account for 20% of the total flying population. Greater awareness of the successful treatments available for those with pteromerhanophobia, may entice more people to seek the services of experts in this field and thus further reduce the number individuals suffering with debilitating pteromerhanophobia.
REFERENCES


APPENDICES

Appendix A: Consent form

Dublin Business School
Psychology Department
13-14 Aungier Street
Dublin 2.

Appendix B: Email / Participant Consent

Hi,

My name is Claire Openshaw, I am a psychology student at Dublin Business School. For my final project, I am studying the fear of flying - its effect on people and its treatment. I currently work as a cabin crew member for Aer Lingus and as such this topic particularly appeals to me. As you are due to participate in the Fly Fearless course on Saturday I am inviting you to participate in this research study by completing a short survey (link below). Only those who feel anxious when flying should fill this out, not the companions/coaches.

Only if you fully understand and consent to this study please fill in the following questionnaire; https://docs.google.com/forms/d/1lyoXC9Kh0uev8LrFaY_sKOPXyA6X4uCFvKfNfpgRhG/form?edit_requested=true. It will require approximately 10 minutes to complete. All responses are entirely confidential, and at no point will you be asked to disclose your name. If answering any of the questions on the questionnaire lead you to feel distressed and you would like to talk to someone please contact one of the Samaritans on 1850 60 90 90. If you have any questions in relation to this survey or my research in general please do not hesitate me via my email at:

I will be present at the Fly Fearless course on Saturday and look forward to meeting with you. Thank you for taking the time to assist me in my educational endeavours.

Sincerely,
Claire Openshaw
Psychology Student
Dublin Business School

Appendix C: Permission for use of Flight Anxiety Situations Questionnaire

granted by Lucas Van Gerwen via email.
**Appendix D: Generalized Self-Efficacy Scale**

1 = Not at all true   2 = Hardly true   3 = Moderately true   4 = Exactly true

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I can always manage to solve difficult problems if I try hard enough.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>If someone opposes me, I can find the means and ways to get what I want.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>It is easy for me to stick to my aims and accomplish my goals.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I am confident that I could deal efficiently with unexpected events.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Thanks to my resourcefulness, I know how to handle unforeseen situations.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I can solve most problems if I invest the necessary effort.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I can remain calm when facing difficulties because I can rely on my coping abilities.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>When I am confronted with a problem, I can usually find several solutions.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>If I am in trouble, I can usually think of a solution.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I can usually handle whatever comes my way.</td>
<td></td>
</tr>
</tbody>
</table>

**Scoring:** Add the scores together from all 10 items. The higher the total the greater the person’s generalized sense of self-efficacy.
Appendix E: Locus of Control Scale

For each question select the statement that you agree with the most:

1. a. Children get into trouble because their patents punish them too much.
   b. The trouble with most children nowadays is that their parents are too easy
      with them.

2. a. Many of the unhappy things in people's lives are partly due to bad luck.
   b. People's misfortunes result from the mistakes they make.

3. a. One of the major reasons why we have wars is because people don't take
    enough interest in politics.
   b. There will always be wars, no matter how hard people try to prevent them.

4. a. In the long run people get the respect they deserve in this world
   b. Unfortunately, an individual's worth often passes unrecognized no matter
      how hard he tries

5. a. The idea that teachers are unfair to students is nonsense.
   b. Most students don't realize the extent to which their grades are influenced
      by accidental happenings.

6. a. Without the right breaks one cannot be an effective leader.
   b. Capable people who fail to become leaders hive not taken advantage of their
      opportunities.

7. a. No matter how hard you try some people just don't like you.
   b. People who can't get others to like them don't understand how to get along
      with others.

8. a. Heredity plays the major role in determining one's personality
   b. It is one’s experiences in life which determine what they’re like.

9. a. I have often found that what is going to happen will happen.
   b. Trusting to fate has never turned out as well for me as making a decision to
      take a definite course of action.

10. a. In the case of the well-prepared student there is rarely if ever such a thing
      as an unfair test.
    b. Many times exam questions tend to be so unrelated to course work that
       studying in really useless.

11. a. Becoming a success is a matter of hard work, luck has little or nothing to do
      with it.
b. Getting a good job depends mainly on being in the right place at the right time.

12. a. The average citizen can have an influence in government decisions.
   b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. a. When I make plans, I am almost certain that I can make them work.
   b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. a. There are certain people who are just no good.
   b. There is some good in everybody.

15. a. In my case getting what I want has little or nothing to do with luck.
   b. Many times we might just as well decide what to do by flipping a coin.

16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
   b. Getting people to do the right thing depends upon ability. Luck has little or nothing to do with it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we cannot understand, nor control.
   b. By taking an active part in political and social affairs the people can control world events.

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
   b. There really is no such thing as "luck."

19. a. One should always be willing to admit mistakes.
   b. It is usually best to cover up one's mistakes.

20. a. It is hard to know whether or not a person really likes you.
   b. How many friends you have depends upon how nice a person you are.

21. a. In the long run the bad things that happen to us are balanced by the good ones.
   b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. a. With enough effort we can wipe out political corruption.
   b. It is difficult for people to have much control over the things politicians do in office.

23. a. Sometimes I can't understand how teachers arrive at the grades they give.
   b. There is a direct connection between how hard I study and the grades I get.
24. a. A good leader expects people to decide for themselves what they should do.
    b. A good leader makes it clear to everybody what their jobs are.

25. a. Many times I feel that I have little influence over the things that happen to me.
    b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. a. People are lonely because they don’t try to be friendly.
    b. There’s not much use in trying too hard to please people, if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.
    b. Team sports are an excellent way to build character.

28. a. What happens to me is my own doing.
    b. Sometimes I feel that I don’t have enough control over the direction my life is taking.

29. a. Most of the time I can’t understand why politicians behave the way they do.
    b. In the long run the people are responsible for bad government on a national as well as on a local level.