Sources of Psychological Stress on Student Pilots during Flight Training

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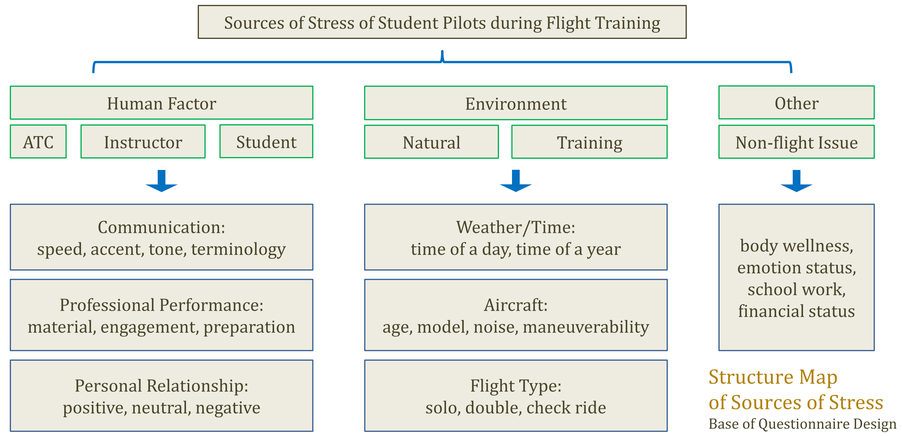
Abstract

Pilots play a vital role in air transportation that they are responsible for the operation and safety during the flight. However, psychological stress may have negative impacts on pilots' performance which may manifest in decision errors, skill-based errors, perceptual errors, routine violations or exceptional violations.

Due to the lack of psychological maturity, student pilots, especially, are more likely to be influenced by psychological stress which may be caused by various sources that differ from experienced professional pilots. Managing stress before it affects student pilots' performance may help improve pilot training design and efficiency, which may contribute to better preparation for careers.

Identifying the sources of psychological stress of student pilots during flight training is the first step of managing stress. In this study, a survey questionnaire will be sent to students who are taking flight training at Purdue University Airport. Then the survey results will be analyzed statistically and compared with identified sources of commercial working pilots in previous studies.

With the knowledge of sources of psychological stress of student pilots during flight training, suggestions on how to avoid certain sources of stress can be made. These suggestions may include adjustments of training curriculum, training schedule, training method and training equipment. Recommendations for future research will be presented as well.



Structure Map of Sources of Stress
Base of Questionnaire Design

Research Progress

Completed Steps:

• February 10th, 2017	Research Topic Identified
• February 14th, 2017	Abstract Generated
• February 24th, 2017	Abstract Revised and Submitted
• April 11th, 2017	Abstract Accepted
• April 16th, 2017	Survey Designed and Revised
• April 20th, 2017	IRB Application Submitted
• May 4th, 2017	IRB Protocol Approved as Exemption
• May 6th, 2017	Online Survey sent
• May 10th, 2017	Poster Generated

Future Steps:

• May 15th, 2017	Start Off-line Survey
• July 1st, 2017	Survey Ends
• July 10th, 2017	Finish Data Analysis and Final Paper

Introduction

Definition of Stress:

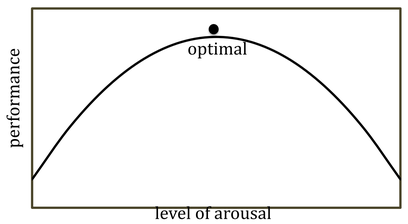
The term "stress", as it is currently used was created by Selye (1976), who defined it as "the nonspecific response of the body to any demand for change". In the Oxford Dictionaries (2010), stress is defined as "a state of mental or emotional strain or tension resulting from adverse or demanding circumstances". The UK Health and Safety Executive (HSE) (n.d.) defines stress as "the adverse reaction people have to excessive pressure or other types of demand placed on them". According to Federal Aviation Administration (FAA) (2012) definition, stress is "the sum of biological reactions to any adverse stimulus physical, mental emotional, internal or external that tends to disturb the body's natural balance".

Types of Stress:

Generally, there are three kinds of methods to classify the stress. In the first way, the stress is classified into three basic forms: acute stress, episodic acute stress and chronic stress (Miller, Smith & Rothstein, 1994). However, American Psychological Association (APA) (2012) state that stress can be classified into acute stress and chronic stress. Contrary to popular belief that all stress is negative, the third classification (Mills, Reiss & Dombeck, 2008), separates the stress into either good (eustress) stress or bad (distress) stress.

Stress and Performance:

The empirical Yerkes–Dodson law (Cohen, 2011) is a relationship between arousal and performance, originally developed by psychologists Yerkes and Dodson (1908). The law dictates that performance increases with arousal of physiology or mentality, but stops at a point. When levels of arousal become too high, the performance decreases.



Yerkes–Dodson Law
Adapted from "Yerkes–Dodson Law. Figure 1" by R. A. Cohen, 2011, Encyclopedia of Clinical Neuropsychology, p. 2737. Copyright 2011 by Springer Science + Business Media, LLC

Stress in College Students:

Many studies have been conducted to find out what individuals perceive as stress and what mediums they use to mitigate it. One group of individuals who often experience stress are college students. Several studies have been done with college students to understand their stress causes and the method they use to mitigate stress. According to the investigation done by Wu (2000), it was found that the main causes of stress were worrying about careers and activities, as well as facing the fast pace of life due to modern technology.

Stress in Aviation

In aviation, the occurrences of most accidents are in the sequence of mistakes made, like a domino effect. Stress is the finger that pushes the first domino into the rest. To ensure safety in the aviation industry, at least one of these dominoes must be removed in order to avoid an accident. For pilots, they are subjected to different amounts of stress at all phases of flight and how they react when subjected to stress will ultimately make or break a safe and successful flight(Aviation Knowledge, 2012).

Stress and Pilot Performance

Researchers have studied the effects on pilot performance of both job-related stress and life-related stress. A study (Fiedler, Rocco, Schroeder, & Nguyen, 2000) based on a questionnaire administered to 19 U.S. Coast Guard helicopter pilots in 2000 found that the effects of domestic stress carried over to the pilots' work world, directly influencing work stress and indirectly affecting pilots' perceptions of their flying performance. The study says that as stress at home increased, the stress on the job also increased. When both stress increased, self-perceptions of flying performance decreased, especially the sense of 'not feeling ahead of the game'. Therefore, stress management is necessary and important to pilots.

Methodology

The final goal of this study is to find out the potential sources of psychological stress of student pilots during training, so that adjustments can be made to ensure a smoother training progress. In this case, the questionnaire was designed to mainly focus on human factors. More detailed questions about the communication and the performance of students or instructors are asked. In terms of format design, two kinds of questions including multiple choice questions and ranking questions are applied. Multiple choice questions are used to identify the sources of stress and the ranking question at last can help determine which source of stress if more severe than another.

Survey Questionnaire

Exemption Granted on 03-MAY-2017

Survey of Potential Sources of Psychological Stress on Student Pilots

We are conducting this survey to learn more about the sources of your psychological stress during current flight training phases. This survey may provide more information to help improve your experience of flight training.

All questions should be answered in regards to your personal experience and practices, and all your answers are kept anonymous. Your participation is voluntary and you can discontinue the survey or skip question(s) at any time. Please ignore this survey if you are under 18 years old or not a student pilot being trained at Purdue University Airport.

If you have any question, please contact Shuyao Wu at wu452@purdue.edu.

Flight Hours _____ **Age** _____ **Gender** _____

Type of FAA Certificate Currently Held _____

Year in School: ☐Freshman ☐Sophomore ☐Junior ☐Senior ☐Graduate

FAA Certificates currently working toward

☐Private ☐Instrument ☐Multi-engine ☐Commercial

☐CFI ☐CFII ☐ATP Other_____

Please circle **ALL** answer(s) that apply on each question.

1. What kind of communication issues with ATC may cause you stress during a flight?

   A. Rapid Speech. B. Regional Accent. C. Tone of Voice.

   D. Use of Terminology. E. Poor Radio Quality. F. None. G. Other: _____

2. What kind of communication issues with your flight instructor or students (if you're a CFI) may cause you stress during a flight?

   A. Rapid Speech. B. Regional Accent. C. Tone of Voice. D. Use of Terminology.

   E. Poor Personal Relationship F. None. G. Other: _____

3. What kind of instructing issues with your flight instructor or learning issues with students (if you're a CFI) may cause you stress during a flight?

   A. Unfamiliarity with Class Material. B. Lack of Preflight Preparation. C. Over Workload

   D. Lack of Involvement or Engagement. E. None. F. Other: _____

4. What kind of aircraft issues may cause you stress during a flight?

   A. Unpreferred Aircraft Model. B. Age of Aircraft. C. Maneuverability.

   D. Cockpit Noise. E. None. F. Other: _____

Exemption Granted on 03-MAY-2017

5. When do you feel stressed during a flight?

   A. Dawn. B. Morning C. Noon. D. Afternoon. E. Sunset. F. Night.

   G. Spring. H. Summer. I. Fall. J. Winter. K. Other: _____

6. What may other non-flight issues give you stress?

   A. Body Wellness. B. Emotion Status. C. Overwhelmed School Work

   D. Finance Status. E. None. F. Other: _____

Please put the following sources of stress in order from 1 to 8. "1" means this kind of issue may have a deep impact on feeling stressed, and "8" means this kind of stress may not give you stress very much.

_____Issues with ATC

_____Issues with Flight Instructor/ Students

_____Time and Schedule of Flight

_____Aircraft Conditions

_____Types of Flight

_____Weather Conditions

_____Non-flight Issues

_____Others: _____

Thank you for completing the survey!

Reference List

American Psychological Association. (2012, January 11). Stress in America: Our health at risk. Retrieved from https://www.apa.org/news/press/releases/stress/2011/final-2011.pdf

Aviation Knowledge (2012). Stress in aviation. Message posted to http://aviationknowledge.wikidot.com/aviation:stress-in-aviation#toc3

Cohen, R. A. (2011). Yerkes–Dodson Law. In J. Kreutzer, J. DeLuca, & B. Caplan (Eds.), Encyclopedia of Clinical Neuropsychology (pp. 2737-2738). New York, NY: Springer.

Dictionaries, O. (2010). Oxford dictionaries. Oxford University Press. Retrieved from http://oxforddictionaries.com/definition/english/VAR. Accessed Oct, 15, 2012.

FAA (2012) FAA TV: Stress in aviation. Airmen Education. Retrieved from http://www.faa.gov/tv/?mediaid=450

Fiedler, E. R., Rocco, P. D., Schroeder, D. J., & Nguyen, K. T. (2000). The relationship between aviators' home-based stress to work stress and self-perceived performance. Retrieved from https://www.faa.gov/data_research/research/med_humanfacs/oamtechreports/2000s/media/00_32.pdfc

Health and Safety Executive (HSE) (n.d.). What is stress? Retrieved from http://www.hse.gov.uk/stress/furtheradvice/whatisstress.htm

Miller, L. H., Smith, A. D., & Rothstein, L. (1994). The stress solution: An action plan to manage the stress in your life. New York, NY: Pocket Books.

Mills, H., Reiss, N., & Dombeck, M. (2008, June 30). Types of stressors [Website]. Retrieved from https://www.mentalhelp.net/articles/types-of-stressors-eustress-vs-distress/

Selye, H. (1976). The stress of life (revised ed.). New York, NY: Mc-GrawHill.

Wu J (2000). College students. The American Institute of Stress, 1-2. Retrieved from http://www.stress.org/college-students/

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habitformation. Journal of comparative neurology and psychology, 18(5), 459-482.

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