Development and Evaluation of an Online Fatigue Training Course for Collegiate Aviation Pilots

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Outline

- Introduction
- Recent Studies
- Methodology
- Key Points
- Discussion

Lesson 1 of 19

Aviation Fatigue Training Introduction

Welcome

Introduction

- A query using the National Transportation Safety Board (NTSB) database yielded 36 accidents involving Code of Federal Regulation Part 91, general aviation operators, from January 2000 through December of 2017, in which pilot fatigue was a contributing factor.
- Most research studies have focused on fatigue identification and management within the commercial and/or military aviation environments (Caldwell et al., 2009; Gawron, 2016; Sieberichs & Kluge, 2016).
- However, collegiate aviation may be the most challenging in terms of fatigue mitigation.
    - Flight instructors and students often have schedules which may increase the risks for fatigue.

Recent Studies

Top Causes for Fatigue for Collegiate Aviation Pilots

- McDale & Ma (2008)
  - Intensive workload and/or long workday
  - Reduced rest
  - Boredom
  - Scheduling
  - Poor quality of sleep
- Mendonca, KELLER, &LU (2019)
  - Intensive workload and/or long workday
  - Not enough sleep
  - Poor quality of sleep
  - Academic activities
  - Poor scheduling of flight lessons

Recent Studies

Summary of Key Findings

- Inconsistent go no-go **decision-making** when responding to scenarios (Keller, Mendonca, Cutter, 2019).
- Students struggle to get enough sleep, reported **high workloads**, even though they knew the benefits (Romero, Robertson, & Goetz, 2020).
- Majority of students reported **not living healthy lifestyles** (Levin & Teo, 2019)
- Results from a study of eight collegiate programs indicated approximately 50% of respondents indicated **not having fatigue training** (Keller, Mendonca, & Adjekum, 2022).

Recent Studies

Additional Key Points

- Only duty regulation for Part 141/91 is
  - CFR 14 Part 61.195 Hours of training.
    - In any 24-consecutive-hour period, a flight instructor may not conduct more than 8 hours of flight training.
- The Risk Management Handbook discusses the causes and symptoms of fatigue with a broad overview of self-assessment but does not include how to get quality sleep and live a healthy lifestyle.
- Many curriculum plans of study do not have courses directed toward time management, mental performance, and developing resilience techniques.

Course Development

- Expertise from collegiate aviation SMEs
- Direction from Curriculum Design Experts
- Utilized the following principles:
    - The three dimensions that dictate a good flow in online courses are **clear goals, immediate feedback, and a balance between challenge and skill** (Panigrahi, 2018).
    - Frameworks that have been found to be effective are the **cognitive theory of multimedia and cognitive load theory** (Ou et al., 2019).
    - Additionally, in online learning, the introduction of **tools, multimedia, and other hands-on/visual formats** is essential for increasing student engagement (Ou et al., 2019).
    - Participants who learn by experience have been shown to exhibit higher learning outcomes in terms of cognitive knowledge and self-efficacy (Panigrahi, 2018).

Research Design

- Non control group pretest-posttest
- Two universities (three courses), multiple semesters starting in 2021
- Course given as a homework assignment and discussed in class
- 40 questions before and after training
- Course evaluation provided qualitative feedback
- Utilized the nonparametric Wilcoxon Signed Ranked Test due to outliers.
- Fatigue Training Course

Quantitative Results

- n = 212 (Fall 2021 to Fall 2022)
- Of the 212 collegiate aviation pilots, the fatigue training elicited an increase in test scores in 198 participants. Seven participants' test scores went down.
- A Wilcoxon signed-rank test determined that there was a statistically significant median increase in scores (4 questions), $z = 12.20$, $p < .0005$.

Report

Median

Score before online fatigue training	Score after online fatigue training	Difference
35.0000	39.0000	4.0000

Selected Quotes from Students

Positive Feedback

- “This module was put together very effectively. It made me question if I have ever flown fatigued and if I could recognize my own symptoms.”
- “I felt this course was very interactive and improved my knowledge of fatigue, its causes and effects, sleep habits, healthy lifestyle, and time management.”
- “I really enjoyed the course, especially the interactive nature of it.”

Negative Feedback

- “It was a bit long, and so it was easy to get distracted from the course.”
- “As a college student, it's impossible for me to eat well, get enough sleep, exercise, and not be overloaded with work. No matter how much planning ahead I do, it's just not feasible.”
- “The course was a little dry”

Key Take Aways

- Research indicates the need for solutions toward student well-being and increased fatigue training.
- Preliminary results of this ongoing study provide evidence students were engaged and improved their fatigue knowledge improved their knowledge test scores.
- Future research can investigate the retention of fatigue-related knowledge i.e., different semesters.
- Future iterations of the course can include resilience training, stress management, and effective mental performance practices.

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Questions?