

Understanding Collegiate Aviation Pilot Mental Performance Studies and Future Research Opportunities

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FATIGUE AND MENTAL HEALTH PERFORMANCE STUDIES AND FUTURE RESEARCH OPPORTUNITIES



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OVERVIEW

There is limited extant research on fatigue and psychological distress levels in the Part 141 collegiate aviation pilot population. These aviators are susceptible to both poor sleep quantity and quality, which is related to their mental and physical well-being. When left unchecked, this is a threat to aviation safety. Pilots are required to perform a self-assessment prior to every flight. Contemporary technology may allow objective measures to confirm fitness for duty.

Risk Level Outcomes

Status	Score	Risk
Complete	21	No Action Needed – Ready for Dispatch
Complete	41	Warning (Yellow) Chief or Assistant Chief Approval Needed before Dispatching
Dispatch	50	NOT ALLOWED Dispatch not allowed – discuss or cancel

FLIGHT DISPATCH PROCESS

The Professional Flight Program at Purdue University incorporates mental health initiatives as part of their safety process. Throughout the semester and prior to final exams, special events are held that are designed for mitigating stress and anxiety via The Whole You program. Activities educate participants on how to manage stress and are created to build community within the program. In addition to these events, students must complete a Flight Risk Assessment Tool (FRAT) within one hour prior to every training flight.

When students have a yellow score on their FRAT, they are required to meet with a full-time safety representative to establish mitigation measures. If the potential hazard cannot be mitigated, the flight is canceled and a ground-based training event is substituted. The canceled flight will be done at no financial cost to the student and without disciplinary action.

When students have a red score on their FRAT, they are required to meet individually with the Director of Aviation Safety to address the circumstances that generated a red score. All FRAT and safety reports are maintained as part of tracking and assessing safety measures.

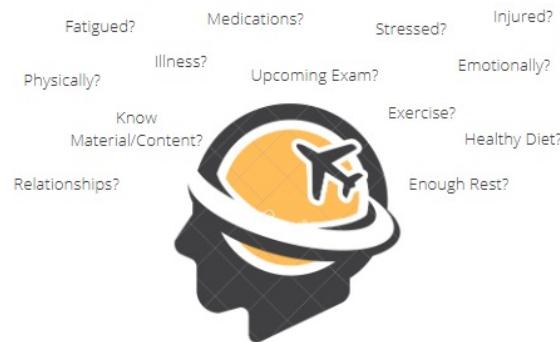
SLEEP QUALITY AND STRESS IN COLLEGIATE PILOTS

Mendonca et al. (2023) conducted an investigation of collegiate aviation pilots examining the prevalence and relationship between self-reported sleep quality and levels of psychological distress using the Pittsburgh Sleepiness Quality Index (PSQI) and the Kessler Psychological Stress Scale (K10). A sample size of 192 aviation students completed the questionnaires. Of those participants, 69% ($n = 133$) reported poor sleep quality, with 56% ($n = 108$) reporting extremely poor sleep quality on the PSQI scale. On the K10 scale, 42% of participants ($n = 81$) reported some amount of psychological distress, with 25% ($n = 48$) reporting moderate stress and 7% ($n = 13$) reporting severe stress.

A Spearman's rank-order correlation was performed and found a strong positive relationship between poor sleep quality and psychological distress

levels $r_s(192) = .716, p < .05$. A multivariate regression analysis for K10 and PSQI component scores found a statistically significant association between perceived stress and sleep quality. These findings are consistent with previous studies that suggest college students experience poor sleep quality. In addition to the many stressors affecting college students, Part 141 pilots must also incorporate and balance a rigorous flight training schedule, achievement of certificates, and time-building activities.

Mendonca, F. A. C., Keller, J., & Albelo, J. D. (2023). Sleep quality and stress: An investigation of collegiate aviation pilots. *Journal of American College Health*, 1-10.
<https://doi.org/10.1080/07448481.2023.2237598>



the whole YOU!

Are you prepared...

FUTURE RESEARCH

Contemporary research on FAA Part 141 collegiate aviation is lacking compared to studies performed on military, commercial, and transport aviators. Extant research utilizes subjective measures. Recent advancement and accessibility of technology allows the feasibility of including objective measures in the study of fatigue and mental health. These measures range from eye tracking to facial recognition and other biometrics. The authors of this poster will be conducting interdisciplinary research that incorporates objective measures and artificial intelligence (AI). The purpose of upcoming studies is to better inform the FRAT, safety management systems (SMS), and mental health initiatives. Research questions will include the following:

- Can objective measures be used to supplement the FRAT and improve self-awareness of fatigue and psychological distress?
- Under what conditions can various objective biometric data be linked to subjective measures, allowing for better insight into fitness for duty?
- Under what conditions can various objective biometric data be linked to other objective data allowing for better insight into fitness for duty?
- Under what conditions can objective and subjective measures be used to allow for better insight into fitness for duty?

Expected outcomes include increased bi-mathematical modeling, improved fatigue and stress self-awareness, and an enhanced safety promotion campaign. Machine-learning algorithms may be incorporated for integration of objective biometric data and additional outcomes.