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Flying Under the Radar: A Survey of Collegiate Pilots' Mental Health to Identify Aeromedical Nondisclosure and Healthcare-Seeking Behaviors

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The disclosure of a new or existing mental health condition in a pilot complicates their medical certification status. It has been proposed that the threat of losing medical certification often discourages pilots from seeking treatment for mental health issues or disclosing such information to aeromedical professionals, contributing to a barrier to seeking healthcare that affects pilots of all certification levels. The current study focused on the nondisclosure and healthcare-seeking behaviors of the collegiate pilot population ($N = 2,452$) at a large, accredited, private institution that offers flight training in accordance with Pilot Schools (2022). Data collected from our anonymous online survey over the course of 30 days found that 56.6% of a sub-sample ($n = 232$) of collegiate pilots met the criteria for some degree of depression, and 13.8% reported the prevalence of self-injurious or suicidal ideation within the past two weeks. Additionally, 67.7% of the sample ($N = 256$) expressed concern about seeking care for mental health issues because of potential effects on their medical certification, while 29.3% admitted to withholding mental health information from aeromedical professionals out of concern for their medical certification. The current study found that the same barrier to healthcare present in the airline pilot and military populations is also present in the collegiate pilot population. While previous research has focused on healthcare aversion and nondisclosure in airline, commercial, and military pilot populations, these findings focus on collegiate pilots, a population not accounted for in existing studies. Further studies are necessary to explore additional factors contributing to the pilot healthcare barrier and nondisclosure in aeromedical settings.

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Introduction

Medical nondisclosure and the pilot healthcare barrier are serious, yet largely unresearched, issues for aviation safety. In the past ten years, few articles have been published on pilots' healthcare-seeking behaviors, including their aversion to seeking care and the anxiety that surrounds their healthcare-seeking decisions. In a survey of 154 female pilots of varying certification levels, Hoffman et al. (2021) found that nearly 67% withheld information from their healthcare providers. In another survey of 3,765 civilian pilots in the United States, nearly 46% admitted to withholding information from healthcare providers out of fear of aeromedical certificate loss (Hoffman et al., 2022a). The same study also found that more than 56% of pilots reported at least one healthcare avoidance behavior, such as flying despite experiencing new symptoms that the pilot felt warranted medical evaluation, failure to disclose prescription medication use, or misrepresenting or withholding information on a written health questionnaire. Hoffman et al. (2022a) linked motivations for these behaviors to the fear of losing the Federal Aviation Administration (FAA) medical certification.

While the Hoffman et al. (2021, 2022a) studies have been valuable for quantifying the existence of a barrier to healthcare in various pilot populations, they do not specifically concentrate on mental health issues. Wu et al. (2016) examined the prevalence of depression and suicidal ideation in 1,848 commercial airline pilots. Findings revealed that over 12% of pilots met the threshold for a clinical depression diagnosis, while 4% of respondents that reported working as an airline pilot within the previous seven days ($n = 1,430$) also reported suicidal thoughts within the past two weeks (Wu et al., 2016). Disclosing depression and suicidal ideation on aeromedical examinations may jeopardize the career and livelihood of an airline pilot. However, untreated mental health conditions can also be detrimental. When left untreated, psychiatric disorders can increase in frequency, severity, and spontaneity; additionally, treatments that may have been effective in earlier stages of illness might not have the same effectiveness in a more progressed condition (Post & Weiss, 1998)

Previous studies have quantified healthcare aversion and nondisclosure patterns in female pilots, civilian pilots of various certification levels, and commercial airline pilots, but no study has explored the prevalence of such issues and their connection to the mental health of the collegiate pilot population. Recent events have brought attention to the mental health needs of collegiate pilots. On October 18, 2021, University of North Dakota sophomore flight student John Hauser committed suicide by intentionally crashing his aircraft into a field on a solo flight (Henson, 2021). While Hauser's family was unaware of his struggles with mental health, he left a letter detailing his depression and desire to seek mental healthcare; Hauser wrote that "life was not worth living if he could not fly," alluding to the potential loss of flight privileges that accompanies disclosure of mental health conditions (Henson, 2021). Based on the findings of previous studies of other pilot populations and the recent death of a collegiate pilot directly

related to healthcare aversion, there is a clear need for further research on the aeromedical nondisclosure and healthcare-seeking behaviors of the collegiate pilot population. The current study hypothesizes that collegiate pilots will demonstrate aeromedical nondisclosure behaviors as well as an aversion to seeking healthcare for mental health.

Literature Review

Data on pilots' disclosure of specific health concerns mirror the larger trend of general healthcare disclosure. Hoffman et al. (2019) utilized an anonymous, 20-question online survey to quantify trends in the healthcare-seeking behavior of pilots of various certification levels; nearly 39% of respondents (n = 613) reported that they intentionally withheld information about chest pain from their aeromedical examiner (AME) for fear of losing their medical certification. Hoffman et al. also revealed that a significant number of pilots surveyed (nearly 79%) experienced worry related to the implications of seeking health care on their ability to fly. Medical certification systems rely on pilots to be honest in disclosing medical conditions; even with serious health concerns such as cardiovascular disease symptoms, pilots are reluctant to disclose health information (Hoffman et al., 2019).

Hoffman et al. (2022b) sought to understand the factors that influence aeromedical nondisclosure by applying the Andersen Behavioral Model of Health Services Use to the pilot population. They concluded that several psychosocial factors contribute to a pilot's decision to access healthcare, including the pilot's attitude (such as the perceived likelihood of re-obtaining medical certification if theirs is deferred or denied), social norms (such as changes in identity that may accompany the loss of medical certification), and perceived control (such as lack of autonomy while the pilot completes the processes for re-certification, anxiety, or lack of education on the processes to regain medical certification). Additionally, the study proposed formally defining "pilot healthcare barriers" as "factors that impede healthcare-seeking behavior by individuals who hold a pilot certificate. These barriers include perceptions about potentially negative consequences of new health information on future ability to perform piloting duties" (Hoffman et al., 2022b). A formal definition of "pilot healthcare barriers" prompts further research into the validity of that definition among different pilot populations.

The FAA publishes literature to aid Aviation Medical Examiners (AMEs) in their decision to issue medical certificates. The FAA (2022) *Guide for Aviation Medical Examiners* summarizes the most recent information available to AMEs regarding FAA airmen medical certification, including guidelines for issuance regarding potentially disqualifying conditions. The *Guide for Aviation Medical Examiners* explains that applicants are asked to disclose "mental disorders of any sort" and that a report of "an established history of a personality disorder that is severe enough to have repeatedly manifested itself by overt acts, a psychosis disorder, or a bipolar disorder must be denied or deferred by the AME" (Federal Aviation Administration, 2022). In cases where defer/denial protocols are not explicitly stated, such as with diagnoses of depression or anxiety, AMEs are encouraged to defer the certification decision to the FAA. AMEs must also defer applicants that report a history of suicidal attempts or gestures to the FAA, which will request additional testing and records from the applicant to determine certification eligibility. In addition to the *Guide for Aviation Medical Examiners*, standards for medical certification are also outlined in the federal standards, where Medical Standards and

Certification (2022) details the standards that pilots must adhere to in order to qualify for medical certification.

Because of varied healthcare quality, access, and cost globally, it is challenging to compare healthcare-seeking behavior in different regions. However, the nondisclosure issue is not limited to the United States. Carmon et al. (2016) explore the healthcare-seeking patterns of pilots in the Israeli Air Force, reporting that nearly 63% of pilots surveyed reported clinical symptoms (the nature of which was not explicitly defined), of which nearly 71% admitted to not seeking medical treatment from a physician; nearly 18% of symptomatic respondents elected instead to visit non-MD practitioners such as chiropractors and dietitians for treatment. The study stopped short of investigating the aviators' motivations for seeking treatment from non-MD practitioners rather than physicians but noted that cost of care was not a factor in an aviator's decision (Carmon et al., 2016).

The safety implications of nondisclosure and delayed treatment cannot be ignored. The 2007 FAA Oversight Report from the Department of Transportation found that 8% of the roughly 40,000 airmen studied were receiving Social Security benefits for conditions that would disqualify them from holding FAA medical certification (The Federal Aviation Administration's Oversight of Falsified Airman Medical Certificate Applications, 2007). This data has been used by experts as a call for further research because, while this statistic is sufficiently concerning, it only represents disabilities for which individuals actually sought treatment and disability compensation (Amster et al., 2012). Experts also point to the FAA Civil Aerospace Medical Institute's (CAMI) review of the postmortem toxicology results of pilots involved in fatal aviation accidents between 1993 and 2003 (Amster et al., 2012). The FAA CAMI study found that nearly 10% of the pilots examined used psychotropic, cardiovascular, or neurological medications, while only 8% had accurately disclosed the detected medications that they were taking (Canfield et al., 2006). The study also fails to address the magnitude of nondisclosure since it did not consider pilots who might have been taking medication that could affect their performance but was not revealed in the toxicology tests (Amster et al., 2012).

While it is clear that there are safety issues with medical disclosure of physical health concerns, there are also risks related to the nondisclosure of mental health issues. For example, nondisclosure of depression was the root cause of the 2015 Germanwings crash (Clark, 2016). The Germanwings Airbus A320 crashed in the Swiss Alps in 2015, with investigators determining that First Officer Andreas Lubitz intentionally crashed the aircraft in a culminating mental health episode. Lubitz had a history of mental health issues and a diagnosis of depression that had not been disclosed to Germanwings and thus maintained an active flying status (Clark, 2016). The FAA initially denied Lubitz's application for a first-class medical certificate and then issued one at a later date (The Bureau d'Enquêtes et d'Analyses, 2015, as cited in Clark, 2016). After this incident, the FAA policies regarding pilot mental health issues have come under scrutiny. The European Union Aviation Safety Agency's (EASA) regulations governing aeromedical certification are more subjective than the FAA's and rely more heavily on an individual's willingness to self-disclose disqualifying conditions (Clark, 2016). This accident revealed how the threat of losing medical certification could negatively impact a pilot.

While the research on mental health disclosure and healthcare-seeking behavior is extremely limited, there is some data to suggest that, as with physical health concerns, mental health issues may not be adequately disclosed or treated among pilots to protect their flight privileges. Over 12% of pilots surveyed ($n = 1,848$) met the threshold for diagnosis with clinical depression (Wu et al., 2016). Surprisingly, 4% of respondents that reported working as an airline pilot within the previous seven days ($n = 1,430$) also reported suicidal thoughts within the last two weeks (Wu et al., 2016). The respondents were commercial airline pilots from multiple countries recruited from unions, airline companies, and airports (Wu et al., 2016). From the study, it can be assumed that a significant number of commercial airline pilots are flying with depressive symptoms, and a percentage of those have active suicidal thoughts. Disclosure and treatment for these issues may jeopardize their careers.

A challenge for researchers has been the lack of available data; research concerning healthcare aversion, the relationship between disclosure and confidentiality, and reports analyzing the implications of the Special Issuances processes and FAA policies are plentiful. However, minimal research data exists on the explicit relationship between suicidality and nondisclosure among pilots. The most recent articles from Hoffman et al. (2019), Hoffman et al. (2021), and Hoffman et al. (2022a) are the three main studies of nondisclosure and its relationship with medical certification, while Wu et al. (2016) established clear concerns for certain mental health issues. Presently, no studies exist that explore the link between suicidality and nondisclosure among collegiate pilots in the United States.

Purpose of the Research

Safety culture in aviation begins with a pilot's first flight lesson and remains paramount throughout their training and professional career. Flight training should not only produce a certificated pilot but also instill safety habits that are foundational for career development and contribute to aviation safety on a larger, professional scale. (Federal Aviation Administration, 2020). The current study aims to investigate the nondisclosure and healthcare-seeking behaviors of flight training students at a large, accredited, private institution that offers flight training in accordance with Pilot Schools (2022) regarding mental health issues such as the symptoms of suicidality.

Research Questions

The current study seeks to answer the questions: What is the current likelihood that collegiate pilots will seek care for mental health issues? What is the role that fear of loss of medical certification plays in a collegiate pilot's decision to seek care?

Hypothesis

We hypothesize that collegiate pilots will demonstrate aeromedical nondisclosure behaviors as well as an aversion to seeking healthcare for mental health.

Methodology

Research Site & Participants

The research site was a U.S.-based, large-sized, accredited, private university (not for profit). The university includes physical campuses in the U.S. Southeast and U.S. Southwest, offering collegiate flight training programs in accordance with Pilot Schools (2022). A single case study approach was used due to time and accessibility constraints and as a preliminary exploration into the previously unreported nondisclosure and healthcare-seeking behaviors of this population.

From the total population of students enrolled in the flight training program at the institution studied during the study time frame, the sample for survey data was determined through non-probability self-selection. Survey participants were recruited through emailed recruitment messages and bulletin board posters. Participation in the survey was not incentivized. The survey response rate was 10.4% (N = 2,452). Survey responses were collected over a period of 30 consecutive days, from September 1, 2022, to September 30, 2022.

All survey data were collected anonymously, with no individually identifying information. The study was reviewed by the Institutional Review Board and deemed “exempt” (#23-013). Informed consent was presented during recruitment, and the survey required acknowledgment of informed consent prior to starting the research questionnaire. Criteria for participation included a minimum age of 18, the possession of a valid FAA medical certificate, and an active flight training status at the institution being surveyed.

Instrumentation

Surveys were administered through Qualtrics; data collection was ongoing for a period of 30 days, and responses were gathered from September 1, 2022, to September 30, 2022. The survey contained a section for demographic questions and primary survey questions (Appendix A). Demographic questions included age, gender, flight training tenure, and any history of diagnosed depression. The primary survey section included three questions about nondisclosure, ten questions from the Patient-Health Questionnaire Depression Module (PHQ-9), and a final question that asked about participants’ intention to seek care for any symptoms reported on the PHQ-9; the three questions regarding nondisclosure and final question regarding intent compose the four “primary survey” questions. Well-validated in Kroenke et al. (2001) and Gilbody et al. (2007), the PHQ-9 evaluated participants’ depressive symptoms and suicidality. In a clinical setting, the PHQ-9 is often used as a diagnostic tool; in the current study, the PHQ-9 was utilized to measure the prevalence of symptoms in the collegiate pilot population.

Survey questions were closed-ended, with both multiple-choice and Likert scale questions. The primary survey questions were adapted from the Hoffman (2022a) study to focus on behavior specific to mental health and gauge participants’ nondisclosure habits; these questions featured binary responses and one Likert response to evaluate the degree to which pilots correlate their fear of loss of medical certification with their decision to seek medical care.

Data Analysis

The data collected from the survey was both binary and ordinal in nature. For certain survey questions, such as whether a respondent has ever worried about seeking care for mental health due to fear of loss of medical certification, the responses were either “yes” or “no,” with an additional option not to provide an answer. For other questions, such as those from the PHQ-9, the answers followed a scale that assessed the prevalence of mental health symptoms. The responses corresponded to categories that allowed the participant to choose the severity of their symptoms. Each participant’s PHQ-9 responses were scored according to the questionnaire’s instruction manual (Spitzer et al., n.d.). These scores cannot be considered an official clinical diagnosis of depression in any individual.

The data were analyzed with Spearman’s rank-order correlation, which is used for ordinal and binary data and measures the strength and direction of the relationship between two variables; in the current study, the two variables correspond with the PHQ-9 score and participants’ responses to questions 5, 6, 7, 17, and 18. The purpose of Spearman’s correlation is to determine the relationship between the severity of mental health symptoms (as measured by the PHQ-9 score) and healthcare-seeking and nondisclosure behaviors. Separate correlations were determined using Microsoft Excel.

Surveys were excluded from analysis if the respondent abandoned the survey after answering demographic information, if the respondent left any primary survey question unanswered, or if the respondent left any PHQ-9 question unanswered. Surveys were pooled into two categories for analysis: respondents that answered all four primary survey questions and respondents that answered all four primary survey questions plus all nine PHQ-9 questions. It was necessary for respondents to answer all PHQ-9 questions in order to receive a depression severity score, as per the questionnaire manual. Categorical data were summarized using percentages and analyzed using the Spearman Rank Correlation test. Significance for results was established when p-values were less than 0.05, 0.025, and 0.001.

Limitations

Since the current study relies on survey participation, several limitations exist. Participation bias may affect the data since students may be more inclined to complete a voluntary survey about mental health if they have a particular interest in the topic or some other connection to the topic, such as personal mental health concerns. The bias could occur in either an upward or downward fashion: those with more severe mental health symptoms might be more likely to participate in a survey about mental health than those with less severe or no symptoms because they are more familiar with the study’s topic. On the other hand, those with more severe symptoms might be more suspicious of mental health questionnaires and be more reluctant to participate due to fear of repercussions on their medical certification; the current study’s efforts to ensure anonymity and confidentiality may have mitigated this bias. Most survey questions, aside from the PHQ-9 questions, included “choose not to answer” options, which may have lowered the positive answers to especially sensitive questions.

The use of the PHQ-9 to measure depressive symptoms is also subject to limitations. The current study was not designed to rule out “normal bereavement, a history of a Manic Episode (Bipolar Disorder), and a physical disorder, medication, or another drug as the biological cause of the depressive symptoms” (Spitzer et al., n.d.). Therefore, the PHQ-9 responses and categories cannot be considered a formal diagnosis of Major Depressive Disorder or Other Depressive Disorder. There may be other factors not measured by the PHQ-9 that might have influenced the prevalence of depressive symptoms in respondents.

Results

Demographics of Collegiate Pilots

A total of 256 collegiate pilots answered all four primary survey questions but did not answer all nine PHQ-9 questions; these respondents are our total valid sample, N = 256. The demographics for the total valid sample are presented in **Table 1**. The majority of collegiate pilots were between the ages of 19 and 21 (148 respondents or 57.8%). Most respondents identified as male (183 respondents or 71.5%), while 69 (27%) respondents identified as female, and two (0.8%) respondents identified as non-binary or other gender identities. Most collegiate pilots (199 respondents or 77.7%) have been active in flight training for less than four years; 73 (28.5%) reported a flight training tenure of 1-2 years, 66 (25.8%) reported training of fewer than six months, and 60 (23.4%) reported tenure of 3-4 years.

Prevalence of Depression in Collegiate Pilots

Of the collegiate pilots recruited to participate in the current study, 232 completed the entire survey, including all four primary survey questions and nine PHQ-9 questions. The results show that 132 (56.6%) collegiate pilots met the PHQ-9 threshold for some degree of depression, ranging from mild to severe, within the past two weeks (**Figure 1**). Of the 132 respondents that met the threshold for depression, 23 (17.4%) expressed intent to seek, or have already sought, treatment for mental health symptoms. The results also show that 32 (13.8%) respondents reported some degree of self-injurious or suicidal ideation within the past two weeks (**Figure 2**). Of the 32 respondents that reported self-injurious or suicidal ideation, 8 (25%) expressed intent to seek, or have already sought, treatment for mental health symptoms.

Table 1
Demographics (N = 256)

Factor	Total
Age	
< 18	70 (27.3%)
19-21	148 (57.8%)
22-24	23 (9.0%)
25-27	8 (3.1%)
28-30	0 (0%)
31-33	1 (0.4%)
Prefer not to answer	4 (1.6%)
Unanswered	2 (0.8%)
Gender	
Male	183 (71.5%)
Female	69 (27.0%)
Non-binary/other	2 (0.8%)
Prefer not to answer	1 (0.4%)
Unanswered	1 (0.4%)
Flight training tenure	
< 6 months	66 (25.8%)
6 months- 1 year	38 (14.8%)
1-2 years	73 (28.5%)
3-4 years	60 (23.4%)
> 5 years	14 (5.5%)
Prefer not to answer	5 (2.0%)

Note. Percentages may not total to 100 due to rounding.

Figure 1
Depression Severity (according to PHQ-9 score) (n = 232)

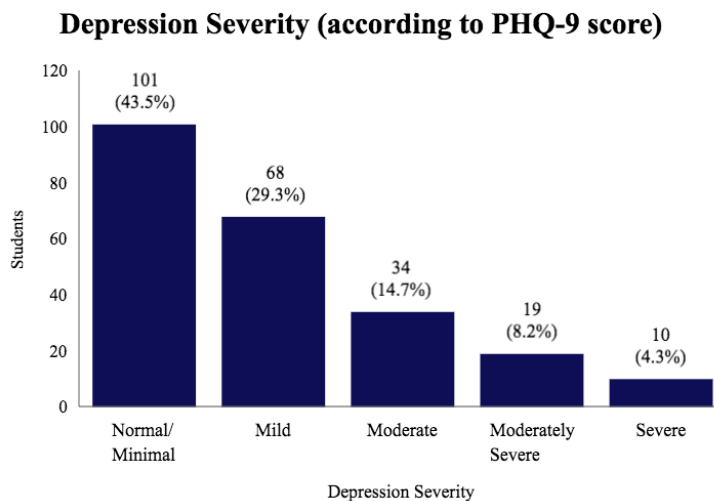
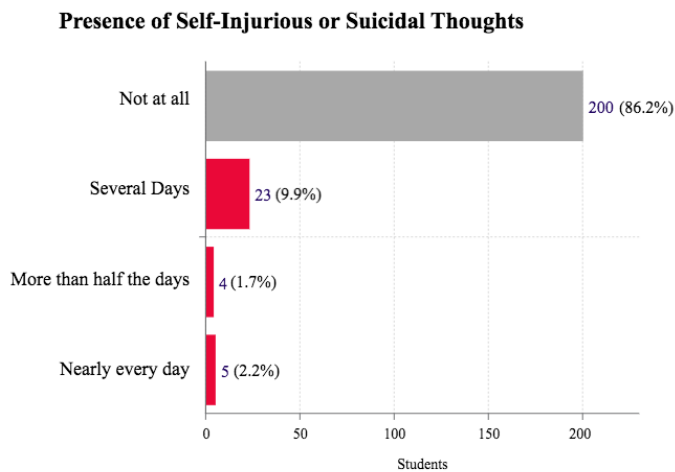


Figure 2*Presence of Self-Injurious or Suicidal Thoughts (n = 232)*

Mental Healthcare-Seeking Behaviors of Collegiate Pilots

Of the 256 respondents that answered all four primary survey questions, 16 (6.3%) reported a prior depression diagnosis, 173 (67.6%) reported that they worry about seeking care for mental health concerns because of potential effects on their medical certification, and 75 (29.3%) reported withholding information about mental health from aeromedical examiners and screenings out of concern for their medical certification. The results show that 222 (86.7%) respondents agreed to some degree in the final primary study Likert question that they would choose not to seek medical treatment if their decision to do so might threaten their medical certification. The responses to the three binary primary survey questions are summarized in **Table 2**.

Table 2*Responses to Primary Survey Questions 4-6 (n=256)*

Question	No	Yes	Prefer Not to Answer
History of diagnosed depression	231 (90.2%)	16 (6.3%)	9 (3.5%)
Worry about seeking care for mental health concerns	80 (31.3%)	173 (67.6%)	3 (1.2%)
Withheld information about mental health from AME or purposefully omitted mental health information on aeromedical screening	152 (59.4%)	75 (29.3%)	29 (11.3%)

Note. Percentages may not total to 100 due to rounding.

A total of 232 collegiate pilots answered all four primary survey questions and all nine PHQ-9 questions, allowing for a look at the correlation between self-reported depression and healthcare-seeking behaviors. Spearman's rank-order correlation was computed to assess the relationship between depression severity (PHQ-9) and intensity of worry surrounding healthcare-seeking decisions; there was a weak linear correlation between the two variables, $r(227) = 0.38$, $p = 0.000$. This means that as the severity of depression increases, the intensity of worry also increases, but in a weak manner. Spearman's rank-order correlation was also computed to assess the relationship between depression severity (PHQ-9) and nondisclosure behaviors; there was a weak linear correlation between the two variables, $r(206) = 0.45$, $p = 0.000$. Therefore, as the severity of depression increases, the likelihood of respondents omitting mental health information from aeromedical screenings also increases, but in a weak manner. This model did not yield any other statistically significant values in the remaining correlations, summarized in **Table 3**.

Discussion

The current study seeks to explore the prevalence of mental health nondisclosure among collegiate pilots, specifically exploring how the fear of the loss of medical certification might influence this nondisclosure. At this time, the authors are unaware of any other studies exploring this issue in a collegiate pilot population. However, it is essential that we should explore the prevalence of self-reported depression and the self-disclosure of medically diagnosed depression in the collegiate pilot population.

Before we can fully understand the implications of depressive symptoms in collegiate pilots, it is necessary to establish a context in terms of national averages and comparable populations. Of the sample, 56.6% of collegiate pilots ($n = 232$) met the PHQ-9 threshold for some degree of depression (mild or greater) within the past two weeks. While the PHQ-9 cannot be used as the sole basis for a clinical depression diagnosis, participants' responses to the nine questions provide insight into the specific issues that the collegiate pilot population faces. Recent data is scarcely available on the depression and suicide rates of college students specifically. However, the 18-24 age range accounts for 94% ($n = 241$) of the current study's 256 respondents; data from the Centers for Disease Control and Prevention show that 52.3% of persons aged 18-24 were symptomatic of depressive disorder (Czeisler et al., 2020). The results indicate that the prevalence of depressive symptoms among collegiate pilots is consistent with national data for individuals of the same age. Digging deeper into this, we can consider published data for other high-stress college programs. Medical students and residents have reported depression symptoms in just 17.2% of participants (Goebert et al., 2009). More recently, Mirza et al. (2021) estimated that the mean prevalence of depressive disorders in university medical students in North America was 30.3%. Therefore, more collegiate pilots report depressive symptoms than students in other competitive, high-stress college programs.

Table 3
Spearman Rank Correlations

Variables	N	Correlation Coefficient (rs)	Correlation Interpretation	P value
Depression severity and worry about seeking care	229	0.38	Weak linear	1.98E-09**
Depression severity and “Yes/No” responses to history of nondisclosure	208	0.45	Weak linear	1.02E-11***
Depression severity and “Prefer not to answer” responses to history of nondisclosure	232	0.09	No linear correlation	1.70E-1*
Depression severity and intent to seek treatment	214	0.21	No linear correlation	1.99E-3**
History of diagnosed depression and history of nondisclosure	221	0.16	No linear correlation	1.88E-2**
Self-injurious or suicidal ideation and intent to seek treatment	214	0.15	No linear correlation	2.49E-2**
Intent to seek treatment and impact of symptoms on everyday life	213	0.17	No linear correlation	1.52E-2**

*Significance at the 0.05 level, **Significance at the 0.025 level, ***Significance at the 0.001 level

Self-harm and suicide are associated with, and symptoms of, depressive disorders. In the current study, 13.8% ($n = 232$) of collegiate pilots reported some degree of self-injurious or suicidal ideation within the past two weeks. The PHQ-9 instrument used in the current study was also used by Wu et al. (2016) to explore suicidal thoughts among airline pilots but reported a much lower prevalence, with just 4.1% of airline pilots reporting suicidal thoughts. Therefore, more collegiate pilots report suicidal ideation than airline pilots. Looking at national data for individuals ages 18-25 in the United States, 11.3% reported suicidal thoughts; therefore, the prevalence of suicidal thoughts in collegiate pilots is consistent with the national average (Centers for Disease Control and Prevention, 2022). The rate of suicidal ideation in collegiate pilots is comparable to students in other high-stress programs. In 2009, only approximately 6% of medical students and residents reported suicidal ideation (Goebert et al., 2009). More recently, a 2016 study found that the overall prevalence of suicidal ideation in medical students was 11.1% ($n = 21,002$) (Rotenstein et al., 2016). Therefore, compared to other competitive, high-stress college programs such as medicine, collegiate pilots reported similar rates of suicidal ideation.

The discrepancy between airline pilots and collegiate pilots may be attributed to the additional stressors that college students face and environmental factors that have driven increasing rates of depression and suicide in young adults in recent years, such as the Coronavirus pandemic (Czeisler et al., 2020). Age may also be a factor in this discrepancy. According to the 2021 FAA Active Airmen Statistics, the average age of airline transport pilots is 51 (U.S. Department of Transportation, 2022). The data from the Centers for Disease Control and Prevention show that 14.4% of respondents aged 45-54 were symptomatic of depressive disorders (Czeisler et al., 2020). The CDC data for the older and younger age groups affirm the discrepancy in depressive symptoms also reflected in the Wu et al. (2016) study and the current study.

While understanding the prevalence of depressive symptoms in collegiate pilots is important, it is even more essential to understand how this may influence student healthcare-seeking behaviors and medical nondisclosure. In the current study, 29.3% ($N = 256$) reported withholding mental health information from their aeromedical examiners or choosing not to disclose mental health struggles on aeromedical screenings. This statistic is in line with a prior study in which 27% of pilots of various certification levels admitted to withholding such information (Hoffman et al., 2022a). Therefore, the fear of loss of medical certification as a result of disclosing the information is also present in and affects the healthcare-seeking decisions of collegiate pilots. Additionally, 67.6% of collegiate pilots ($N = 256$) reported that they worry about seeking care for mental health concerns because of the effects on medical certification, while 86.7% agreed to some degree that they would choose not to seek treatment if it might threaten their medical certification. This data reaffirms the presence of a barrier to healthcare that collegiate pilots face as a result of their chosen career path. The consequences of such a barrier could include increased morbidity and mortality as mental health conditions are left untreated (McLaughlin, 2004). On the professional level, a more severe or progressed condition may render a pilot ineligible to hold medical certification altogether, resulting in permanent certificate denial or subsequent unemployment (Hoffman et al., 2022a).

The findings of the current study highlight the need for additional mental health resources for collegiate pilots. Our findings show that collegiate pilots are reluctant to seek healthcare for mental health concerns; perhaps an informal, peer-led support program tailored to the needs of collegiate pilots would be a valuable resource for those in need. In the fall of 2022, the John D. Odegard School of Aerospace Sciences at the University of North Dakota introduced UpLift, the first collegiate aerospace peer support program (Miller & Dulski, 2022). The program's peer supporters are not mental health experts. Instead, the program recruits aerospace students and trains them to offer support and identify useful resources for fellow aerospace students that reach out with "questions about their personal struggles, uncertainties about their aviation medical, and other mental health concerns" (Miller & Dulski, 2022). The program and its peer supporters are overseen by an aerospace psychologist who ensures that the supporters receive appropriate training (Miller & Dulski, 2022). Collegiate aviation programs should consider adopting similar peer support programs where students are able to receive support for mental health concerns and access resources without the fear of compromising their medical certification.

Conclusion

To the authors' knowledge, the current project is the only study to exist on the nondisclosure and mental healthcare-seeking behaviors of collegiate pilots, thus filling an important knowledge gap in the research of pilot mental health and healthcare-seeking behaviors. The current study found that 56.6% of respondents ($n = 232$) met the PHQ-9 criteria for some degree of depression. Additionally, 13.8% of respondents ($n = 232$) reported the prevalence of self-injurious or suicidal ideation. The data shows that 67.7% of collegiate pilots ($N = 256$) worry about seeking care for mental health concerns because of the effects on medical certification, while 29.3% of collegiate pilots ($N = 256$) have withheld information about mental health issues from their AME or purposefully omitted mental health information from aeromedical screenings out of concern for preserving their medical certification. The current study also found that 86.7% of collegiate pilots agree to some degree that they choose not to seek medical treatment if their decision to do so might threaten their medical certification. Weak linear correlations were established between depression severity and intensity of worry surrounding healthcare-seeking decisions ($r(227) = 0.38, p = 0.000$), as well as between depression severity and nondisclosure behaviors ($r(206) = 0.45, p = 0.000$).

The findings of the current study support the conclusion that healthcare-seeking anxiety and nondisclosure issues established in previous studies are not limited to airline and military pilots and are indeed present in the collegiate pilot population as well, with substantial effects. Future studies should investigate the increased level of suicidal ideation among collegiate pilots in comparison to the airline pilot population, which reports a lower rate of suicidal ideation (Wu et al., 2016). Additionally, future research should further examine the barrier to pilot healthcare and explore other possible factors contributing to aeromedical nondisclosure across all levels of pilot certification. Further research is needed to understand how demographic factors (age, gender, flight training tenure) affect a pilot's decision to seek care or disclose medical conditions.

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Appendix A Survey Questions

1. What is your age?
 - a. <18
 - b. 19-21
 - c. 22-24
 - d. 25-27
 - e. 28-30
 - f. 31-33
 - g. Prefer not to answer
2. What is your gender?
 - a. Male
 - b. Female
 - c. Non-binary/ other
 - d. Prefer not to say
3. How long have you been active in flight training?
 - a. <6 months
 - b. 6 months- 1 year
 - c. 1-2 years
 - d. 3-4 years
 - e. >5 years
 - f. Prefer not to answer
4. Have you ever been diagnosed with depression by a medical professional?
 - a. Yes
 - b. No
 - c. Prefer not to say
5. Have you ever worried about seeking care for mental health concerns because it may affect your medical certification?
 - a. Yes
 - b. No
 - c. Prefer not to say
6. Have you ever withheld information about mental health concerns from an aeromedical examiner or purposefully omitted information about mental health concerns from an aeromedical screening out of concern for your medical certification?
 - a. Yes
 - b. No
 - c. Prefer not to say
7. Rate the degree to which you agree with the following statement: Before I seek medical care, I think about how my decision would affect my medical certificate and if my medical certificate might be threatened by my decision, I do not seek care.
 - a. Strongly agree
 - b. Somewhat agree
 - c. Somewhat disagree
 - d. Strongly disagree
8. Over the last 2 weeks, how often have you been bothered by the following problem: little interest or pleasure in doing things?
 - a. Not at all
 - b. Several days
 - c. More than half the days
 - d. Nearly every day
9. Over the last 2 weeks, how often have you been bothered by the following problem: Feeling down, depressed, or hopeless?
 - a. Not at all
 - b. Several days
 - c. More than half the days
 - d. Nearly every day
10. Over the last 2 weeks, how often have you been bothered by the following problem: Trouble falling or staying asleep or sleeping too much?
 - a. Not at all
 - b. Several days
 - c. More than half the days
 - d. Nearly every day
11. Over the last 2 weeks, how often have you been bothered by the following problem: Feeling tired or having little energy?
 - a. Not at all
 - b. Several days
 - c. More than half the days
 - d. Nearly every day
12. Over the last 2 weeks, how often have you been bothered by the following problem: Poor appetite or over-eating?

- a. Not at all
 - b. Several days
 - c. More than half the days
 - d. Nearly every day
13. Over the last 2 weeks, how often have you been bothered by the following problem: Feeling bad about yourself, or that you are a failure, or have let yourself or your family down?
- a. Not at all
 - b. Several days
 - c. More than half the days
 - d. Nearly every day
14. Over the last 2 weeks, how often have you been bothered by the following problem: Trouble concentrating on things, such as reading the newspaper or watching TV?
- a. Not at all
 - b. Several days
 - c. More than half the days
 - d. Nearly every day
15. Over the last 2 weeks, how often have you been bothered by the following problem: Moving or speaking so slowly that other people could have noticed? Or the opposite- being so fidgety or restless that you have been moving around a lot more than usual?
- a. Not at all
 - b. Several days
 - c. More than half the days
 - d. Nearly every day
16. Over the last 2 weeks, how often have you been bothered by the following problem: Thoughts that you would be better off dead or of hurting yourself in some way?
- a. Not at all
 - b. Several days
 - c. More than half the days
 - d. Nearly every day
17. Have you sought care, or do you have the intention of seeking care for any mental health symptoms in the previous questions?
- a. Yes
 - b. No
 - c. Prefer not to answer
18. How difficult have these problems made it for you to do your work, take care of things at home, or get along with people?
- a. Not at all
 - b. Somewhat
 - c. Very
 - d. Extremely