

2-18-2020

# Depression, Anxiety, and Stress in Collegiate Aviators

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The purpose of this mixed-method research was to determine if students who are enrolled in a collegiate flight program exhibit significantly higher rates of depression, stress, and anxiety. This study compared collegiate flight students to non-professional flight students to determine whether collegiate flight students have higher rates of depression, anxiety or stress. In addition, this study sought to determine if there were higher depression, anxiety, and stress levels in upperclassmen (juniors and seniors) than in lowerclassmen (freshman and sophomore). These groups were compared to each other by using results from the DASS-21, a survey that measures depression, anxiety, and stress. There were no statistically significant results indicating no singular group is more or less prone to depression, anxiety, or stress.

## Recommended Citation:

Jacobs, D., Niemczyk, M., Nullmeyer, R., Cooke, N., & Cline, P. (2020). Depression, Anxiety, and Stress in Collegiate Aviators. *Collegiate Aviation Review International*, 38(1), 46-68. Retrieved from <http://ojs.library.okstate.edu/osu/index.php/CARI/article/view/7956/7349>

College can be a turbulent time for students as many of them are confronting new and complex experiences without the immediate and direct support from their parents, family, and friends. Some students may also be embarking on this new phase of life without the maturity or experience to handle many demanding events. Even for those who make the transition well it can be difficult to manage everyday responsibilities, academia, and adulthood (Pedrelli, Nyer, Yueng, Zulauf, & Wilson 2015). In general, this can be a challenging time but can become more so when an individual is dealing with mental illness.

More and more college students are dealing with mental illnesses, specifically depression and anxiety (Center of Collegiate Mental Health [CCMH], 2017 & 2018). Rates for students seeking counseling are increasing dramatically, yet some still attempt to handle things on their own. A recent study reported that rate of college students seeking treatment increased from 19% in 2007 to 34% in 2017 (Lipson, Lattie, & Eisenberg, 2019). The Center of Collegiate Mental Health, noted that anxiety and depression have had a clear growth trend over the past five years (CCMH, 2018).

Generally, while it appears college students are dealing with increasing levels of stress and mental illness, specifically depression, anxiety and stress, there may be some students pursuing academic majors which may cause even higher levels of stress due to the demands of highly-complicated course material and requirements of frequent skill demonstrations. One such major is *professional flight* where students are required to master not only the concepts of many complex courses such as meteorology, and aircraft systems but must also be able to demonstrate various flight maneuvers in varying types of environmental conditions. Studying to become a collegiate pilot may cause students to experience higher levels of stress (Blouin, Deaton, Richard, & Buza, 2014).

Mental health concerns can be a sensitive subject in everyday life and even more so in aviation. Even a suspicion of a mental health disorder can ground a pilot; and, if a diagnosis is made where the FAA deems the pilot is unable to meet requirements the pilot's certificate may be temporarily or permanently revoked (Morse & Bor, 2006). Therefore, it is an important topic to investigate as collegiate aviators will be entering into various flight roles upon their graduation, and a mental health disorder can cause a certified pilot to lose flight privileges.

### **Research Questions & Hypotheses**

The researchers posed the following research questions:

1: Are students who are enrolled in a professional flight degree program more prone to exhibit significantly higher levels of depression, anxiety, and stress?

H<sub>0</sub>: The null hypothesis proposed would be such that there are no specific group of students who are more depressed, stressed, or anxious than the others.

H<sub>A</sub>: Alternative hypothesis proposed that students enrolled in a collegiate flight program would have significantly higher levels of depression, anxiety, and stress than non-professional flight students.

2: Do upperclassmen (juniors and senior) students exhibit more depression, anxiety, and stress than underclassmen (freshman and sophomore) students?

H<sub>0</sub>: The null hypothesis proposed would be such that upperclassmen do not exhibit significantly higher levels of depression, anxiety, and stress than underclassmen.

H<sub>A</sub>: Alternative hypothesis proposed that upperclassmen would exhibit significantly higher levels of depression, anxiety and stress than underclassmen.

3: Is there an interaction between enrollment and academic stage (i.e., underclassmen vs. upperclassmen) such that differences between professional flight and non-professional flight students are greater for upperclassmen than underclassmen?

H<sub>0</sub>: The null hypothesis proposed that there is not an interaction between upper/underclassmen in the collegiate aviation flight program regarding depression, anxiety, and stress.

H<sub>A</sub>: Alternative hypothesis proposed that there is an interaction between upper/underclassmen in the collegiate aviation flight program regarding depression, anxiety, and stress.

## **Literature Review**

### **Background**

In 2016, more than 70% of high school students enrolled in a post-secondary institution (McFarland et al., 2018). In addition to attending classes, many students also need to establish independence, self-sufficiency, and how to manage new tasks, (Meadows, Brown & Elder, 2006). These new factors can lead to stress, anxiety, and depression—especially for students who have poor coping skills or those who are predisposed to mental illness.

For some college students, mental health issues may not be a new concern, as mental illness usually develops during adolescence and presents itself by age 24 (Andrews & Wilding, 2004; Hunt & Eisenberg, 2010; Mahmoud, Staten, Hall & Lennie, 2012). As an example, approximately 75% of young adults who are diagnosed with an anxiety disorder have their first episode by age 22 (Kessler et al., 2007).

Anxiety and depression disorders are the most common mental illnesses among adults (CCMH, 2017 & 2018). Approximately 18% of the United States population suffers from some type of anxiety disorder, with 6.7% suffering from Major Depressive Disorder (MDD) (National Institute of Mental Health [NIMH], 2017). Anxiety and mood disorders often co-occur and

nearly half of those diagnosed with depression are also diagnosed with an anxiety disorder (NIMH, 2017; Sanderson, Di Nardo, Rapee, & Barlow, 1990).

Mental illness can plague college students in their everyday life causing ordinary activities to become difficult. Untreated mental illness in students can impact academic success, productivity, and incite substance abuse (Hunt & Eisenberg, 2010).

## **Mental Health Definitions**

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) published by the American Psychiatric Association (2013) is the authoritative guide used by health care practitioners to provide a diagnosis for individuals dealing with mental disorders. The DSM-5 has been developed over time and is updated regularly to maintain currency with new research and breakthroughs in the mental health community. It is important to note, however, that not all practitioners utilize or rely solely on the DSM-5, but instead use it as part of their practice. Some mental disorders are clearly defined with clear boundaries and symptom clusters, yet many appear on a spectrum and can appear with some or all symptoms. Many disorders are closely-related with shared symptoms with similar genetic and environmental factors (American Psychiatric Association, 2013). Some mental health disorders can be fleeting and solved with time, while others can be more pervasive and take years of care and help to address. Depression and anxiety disorders can be in both of those categories.

**Depressive disorders.** The most common feature of depressive disorders is a sad, empty, and irritable mood. Depressive disorders also include body changes and cognitive impacts that affect the individual's ability to function for more than two weeks. Depression tends to impact the sufferer in everyday life making it difficult to complete daily activities and even get out of bed (NIMH, 2017). Specifically, in academia, depression can impact the student's ability to learn and retain information (NIMH, 2017; Prince, 2015). Difficulty concentrating, social isolation, and feelings of hopelessness are also common and impactful (Johns Hopkins Student Assistance Program, 2019). The individual can experience feelings of guilt, worthlessness, hopelessness, pessimism and have difficulty finding happiness in previously enjoyable activities (NIMH, 2017). Other symptoms include slow talking, moving, and decision making, or in extreme cases thoughts of death, suicidal ideation or even suicide attempts. Depressive disorders differ in duration, timing and like many other health concerns depression and how the symptoms manifest is unique to the individual (American Psychiatric Association, 2013; Johns Hopkins Student Assistance Program, 2019; NIMH, 2017).

Major Depressive Disorder (MDD), a recurrent disorder, is characterized by discrete episodes of at least two weeks of clear cognitive and neurovegetative affects that impact function. These episodes may also have inter-episode remissions through the depressive period disorder (American Psychiatric Association, 2013).

**Anxiety disorders.** Anxiety disorders present in many forms but are mostly characterized by excessive fear and anxiety and related behavioral disturbances (American Psychiatric Association, 2013). Most anxiety disorders are developed in childhood and if not addressed by a medical professional through treatment, can worsen as the individual ages (American Psychiatric

Association, 2013). More females are impacted by anxiety than males by a 2:1 ratio (NIMH, 2017).

General Anxiety Disorder (GAD) is one of the most common anxiety disorders (American Psychiatric Association, 2013). GAD is persistent and excessive anxiety exhibiting worry across domains such as work, education, and social relationships, to name a few. GAD is also accompanied by physical symptoms such as restlessness, becoming easily fatigued, consistently on edge, muscle tension, sleep disturbance, irritability, and difficulty concentrating (American Psychiatric Association, 2013).

### **Explanations to Rising Mental Illness in College-Aged Young Adults**

There are many factors that may explain these increases such as a lack of social support, relationship stressors, or other life challenges (Hunt & Eisenberg, 2010).

**Stigma towards mental health.** It appears there is a decreased stigma towards mental health issues for current college students as attitudes towards receiving help for mental health are much more favorable in younger adults than in older adults (American Psychiatric Association, 2018; Mojtabai, 2007). Thus, the reports of increasing mental health concerns in college students could be due to the increase of those getting help. However, some other studies suggest that less than half of students who are suffering with a mental health disorder are receiving treatment (Zivin, Eisenberg, Gollust, & Golberstein, 2009).

If less stigma is causing more college students to reach out for help, this may be a cause of increased reporting. Yet, this may also indicate more college students are suffering with mental illness than previously thought. If less stigma is not causing college students to reach for help, then there may be a genuine increase of students impacted by mental illness.

Most people develop mental health disorders as children but tend to not be treated until later. More commonly, it takes years for the patient to seek help, if they search for help at all (Pedrelli et. al., 2015; Prince, 2015). More colleges and universities are providing counseling services and other support systems for students. Some universities are reporting a staggering increase of students now utilizing the student mental health centers (Beiter et. al., 2015).

### **Traditional College Students and Collegiate Aviation Students**

**Traditional and non-traditional college students.** Traditional college students tend to be around 18-24 years of age. Most enroll directly into a postsecondary institution after completing high school at 18 or 19 years of age (McFarland et. al., 2018; Pedrelli et. al., 2015). Most commonly, these students enroll in 12 or more credit hours of classes and are considered full-time students. Many of these students rely on their parents or other family members for financial support and may also hold a job to supplement the cost of living or their education (Pedrelli et. al., 2015). Many of these students can feel stressed by trying to balance their academics in addition to the new demands of college (Pedrelli et al., 2015).

Non-traditional students are older (above 24 years of age), are usually employed full-time, and may have spouses or dependents (Pedrelli et al., 2015). While these students need to balance their academics with work, and family, they may find more stress in coming back to school and adjusting to the role and expectations of being a student again (Pedrelli et al., 2015).

**Collegiate aviation flight students.** Collegiate aviation flight students usually maintain the typical college student role while also progressing through the flight portion of their degree program. Aviation flight students are typically full-time students, may maintain full-time or part-time jobs, and are required to spend many hours flying to earn their various flight certificates and ratings. These students may be traditional or non-traditional students.

Flying an aircraft is an inherently stressful activity (Martinussen & Hunter, 2010; Matthews, 2001; Morse & Bor, 2006; Telfer & Biggs, 1988). The pilot's responsibilities include safely operating the plane in a variety of environments, completing periodic check rides, and more. Pilots may experience consistent low-level stress by just being in the airplane. While flying, pilots are constantly monitoring their aircraft and surroundings, which can lead to subtle chronic tension (Suedfeld & Steel, 2000). Additional stress can arise from the requirement to persist in increasing their knowledge and skills as they achieve the designated certificates and ratings for their flight program (Katz, 1997; Matthews, 2001; Salas, Driskell, & Hughes, 1996). A reduction in performance may result in increased number of errors (Martinussen & Hunter, 2010) and accident rates (Loewenthal et al., 2000), as well as the increased financial requirement. Collegiate aviation students are continuously confronted with all these stressors along with those from their academics and everyday life.

### **Possible Triggers of Mental Health Disorders in College Students**

The most common reason found to trigger depression in students are financial issues (Andrews & Wilding, 2004). Financial issues are universal for students, as a post-secondary education has become more expensive possibly leading to a considerable financial burden on the student and their family (Callender & Kemp, 2000). With 70% of high school graduates enrolling in postsecondary education (McFarland et al., 2018), financial burdens on students and families are becoming all the more common (Andrews & Wilding, 2004).

Both anxiety and depression can impact daily life but, depression tends to impact academic performance more than anxiety disorders as the nature of anxiety can motivate students to use compensatory strategies that can increase performance effectiveness (Andrews & Wilding, 2004; Eysenck & Calvo, 1992). Though this sounds like it may be beneficial, often it is not as this can set students up for a lifetime of stress and impact their long-term health and well-being (Stewart-Brown et al., 2000).

### **Mental Health in Aviation**

Mental health in aviation is a sensitive topic and comes with many challenges. Pilots and other flight crew may have a deep aversion to the admittance of a mental health issue as it can put their flight careers in jeopardy. Pilots who are diagnosed with a psychiatric disorder must be grounded until recovered, therefore many may not reach out for help (Bor & Hubbard, 2006;

Morse & Bor, 2006). Additionally, mental health is not a singular topic, as it is diverse, ranges in degree and severity, and can change over time. According to Bor and Hubbard (2006), there are five main sources of mental health problems associated with aviation employees:

- (a) stresses associated with coping, safety, and survival,
- (b) stress that emanates from workload, how work is organized and organizational climate (e.g. rostering, frequency of flights, jet lag, pensions and financial changes),
- (c) personal problems that stem from disruption to personal relationships, which clinical research suggests should act as a buffer to work stress,
- (d) ever-present concerns about loss of license as a consequence of the onset of a disqualifying medical condition, and
- (e) normal psychological problems that occur naturally in the everyday life of the population at large. (p. 2)

Elevated levels of stress can have significant impacts on cognitive processes and decision making. In combination, work and personal stress can impact performance (Blouin et al., 2014). In a survey conducted by Sexton, Thomas, and Helmreich (2000), 74% of pilots reported that stress and fatigue do impact their performance, and 47% reported that personal problems also impact them while flying. If these issues are affecting experienced pilots, there may be similar issues confronting student pilots.

The Federal Aviation Administration (FAA) has specific physical and mental health standards. To receive a First Class Medical, which is required to fly for airlines, pilots must undergo a physical and psychological evaluation (Federal Aviation Administration, 2018a). A First-Class Medical Certificate cannot be issued if the pilot has been diagnosed with a personality disorder, experienced psychosis (hallucinations, delusions, bizarre behavior), bipolar personality disorder, or substance dependence (Federal Aviation Administration, 2018c). Additionally, there are many medications that disqualify or may revoke a pilot's medical due to the potential side effects. Most of the medications used to treat depression and anxiety are included and can cause the pilot to be grounded. Updated in 2010, the FAA has allowed for Special Issuance or Special Consideration to be given to pilots who have been diagnosed with MDD (mild to moderate), Dysthymic Disorder, Adjustment Disorder with depressed mood, and any non-depression related condition where an SSRI (selective serotonin reuptake inhibitor) is used to treat the disorder. There are four medications that can be taken by pilots but are approved on a case by case basis by the FAA (Federal Aviation Administration [FAA], 2018a).

The FAA lists all medications that pilots are and are not able to use while flying. There are two lists: Do Not Issue (DNI) and Do Not Fly (DNF). Any pilot taking any medication on the DNI list will not be issued their flight medical certificate or be able to renew their certificate (FAA, 2018a). Pilots who are taking any medications on the DNF list are highly discouraged to not fly. This list tends to apply more to over-the-counter medications. Pilots are able to return to flying after the medication has been stopped and sufficient time has elapsed allowing the drug to leave the pilot's system.

Pilots are still prone to mental health concerns in spite of extensive medical screening (Morse & Bor, 2006). When the pilot is examined by an Aviation Medical Examiner (AME) the

decision to certify the pilot fit for service is up to the AME. AMEs do not diagnose or perform psychiatric exams but make the final decision based on the information provided by the applicant (FAA, 2018a). If the AME cannot make the decision based on the information provided by the applicant, the application is then sent to a FAA certified psychiatrist and all of the pilot's medical records are then reviewed by the FAA (FAA, 2018a).

The ambiguity of the FAA on mental health make it a pain point for many pilots. After physical disorders, psychological disorders, at 12.5% (Pombal, R., Peixoto, H., Lima, M. & Jorge, A., 2005), are the most common reason for pilots to lose their license (Bor & Hubbard, 2006). The loss of a license or even a temporary hold can cause legal, social, and personal consequences.

These rules, regulations, and stigmas do not only apply to the US airline industry, but also includes international pilots. Collegiate aviators may already be in a turbulent and transitional phase of life and with the added stigma and possible consequences of being diagnosed with a mental disorder, these students may be much less likely to reach out for help if it is needed. Even if the student's mental health issue is transient, the student can still be grounded from flight operations impacting the speed at which he/she completes their education. This interruption in training can incite financial concerns as well as complicating other aspects of daily life.

## **Mental Health and Collegiate Aviation Students**

Changes in domestic life, social life, and work may produce stress and other adverse reactions. Internal biological changes can also result in psychiatric disturbances (Morse & Bor, 2006). Academics and personal stresses can create large amounts of stress for students. One of the biggest challenges faced by collegiate aviation students is the cost of flight time. Depending on the certificates and ratings included in the academic program, collegiate flight costs can climb to well above \$80,000, for flight time, examiner fees, and supplies (ATP Flight School, 2018).

Financial issues are a contributing factor causing student depression; therefore, the intense costs of an aviation program may put students at a higher risk. Results from a previous study found that 70% of college students are stressed about finances (McDaniel, A., Montalto, C., Ashton, B., Duckett, K., & Croft, A. (2014). This stress can precipitate the onset of mood and anxiety disorders in students (Robinson, Bond & Rosier, 2015). Additionally, previous research focusing on the stress levels of collegiate aviators found that FAA practical tests are the most stressful, followed by financial concerns, written exams, flight course workload, checkride scheduling, and time management (Robertson & Ruiz, 2010).

## **Pilot Profile**

When people think of pilots they may think of a confident and level-headed individual. Some studies even support that there are specific personality types that are drawn to being aviators. The pilot personality as studied by Fitzgibbons, Davis, and Schutte (2004) is quite common. The most common pilot profile is someone who is emotionally stable, has low anxiety, low vulnerability (being able to handle difficult situations), difficult to anger, not impulsive, and



low on depression. Pilots are also very contentious, goal-orientated, deliberate, competent and dutiful. Most pilots also are trusting, straightforward, and assertive which helps with crew resource management. Because of this profile and the commonality, a majority of pilots may not have a personality that is prone to mental health problems. This could mean that collegiate aviators could have less anxiety and depression rates.

### **Purpose of the Study**

The purpose of this study was to determine and compare the rates of depression, anxiety, and stress among collegiate flight students and non-professional flight students.

### **Methodology**

This study utilized the DASS-21 (Lovibond & Lovibond, 1995) survey which is comprised of three scales (depression, stress, and anxiety), each with seven Likert-type items utilizing a four-point scale, ranging from Never to Almost Always. The reliability of DASS-21 was confirmed by Antony, Cox, Enns, Bieling and Swinson (1998). Generic, non-identifying demographic questions were also included. The survey used in this study can be found in the Appendix.

The DASS measures features specific to depression, anxiety, and stress. The three sections DASS- D (depression), DASS-S (stress), DASS-A (anxiety) address specific conditions within the DASS. The DASS is a reliable, valid method in both clinical and non-clinical groups (Antony et al., 1998).

This study utilized the DASS-21 for brevity. DASS-21, has fewer items, a cleaner factor structure and a smaller inter-factor correlation. For the purpose of this study the DASS-21 is shorter for students to take, encompasses all of the mental disorders pertinent to the study, and can be compared to previous studies. Additionally, the issue of self-reporting should also be addressed. Respondents were asked to report to the best of their ability. Self-reporting, though beneficial in many cases, can also have issues with over-exaggerated answers, unwillingness of response honestly, and various other biases that may skew reporting reliability. Yet, self-reporting is the main way that clinicians diagnose their patients. The main purpose of this survey is to address whether or not depression, anxiety, or stress, though possibly not diagnosed, is perceived pervasive enough in a respondent's life that could impact the ability to effectively perform duties asked of them.

After receiving Institutional Review Board approval, the survey was disseminated using convenience sampling. Both paper copies and electronic versions were available for the respondent. The survey was distributed to University Aviation Association (UAA) members via email and at the Women in Aviation (WAI) Conference via iPad. Additionally, the survey was also accessible through a URL with solicitation on social media (Facebook), and in-person requests in college courses with enrollments that included both aviation flight students and non-aviation degree seeking students. Prior to the start of the survey, participants completed a consent form. An additional statement was included to note that due to the nature of the study participants experiencing any discomfort or distress could stop the survey at any time. There was no compensation or class credit available for this study.

## Results

### Participants

Convenience sampling was used as the respondents took the survey in their classes and included a mix of majors. Of the collected surveys 88% were usable. Of these 224 surveys, 62% were completed by non-collegiate flight students and 38% were completed by collegiate aviation flight students.

### Data and Analysis

This study utilized a two-way, mixed factor ANOVA to analyze the data comparing the survey results of collegiate flight students and non-collegiate flight students and comparing of lowerclassmen (freshman and sophomores) and upperclassmen(juniors and seniors).

### Summary of Demographics

Table 1  
*Frequency Distributions of Demographic Characteristics of the Sample*

Demographic Characteristic	Category	Frequency	Percent	
Class	Freshman	23	10.3	
	Sophomore	33	14.7	
	Junior	93	41.5	
	Senior	59	26.3	
	Graduate Student	15	6.7	
	Subtotal	223	99.6	
	Missing	1	0.4	
	Total	224	100	
Under/Upper Class	Underclassman	57	25.4	
	Upperclassman	167	74.6	
	Total	224	100	
Gender	Male	144	64.3	
	Female	78	34.8	
	Other	1	0.4	
	Subtotal	223	99.6	
	Missing	1	0.4	
Total	Total	224	100	
	Military Service	Yes	16	7.1
		No	207	92.4
		Subtotal	223	99.6
Missing		1	0.4	
Total	Total	224	100	
	Collegiate Flight Student	Yes	87	38.8
No		137	61.2	

Demographic Characteristic	Category	Frequency	Percent
Marital Status	Never Married	210	93.8
	Separated	2	0.9
	Divorced	3	1.3
	Married	9	4
	Total	224	100

The distributions reveal that the participants mainly consisted of upperclassmen (74.6%) and males at (64.3%). The majority of respondents were non-collegiate flight students (61.2%). A large majority of participants were single and had never been married (93.8%) and with a similar occurrence (92.4%) of participants had no current or prior military service.

### Psychometric Performance of Dependent Variable Scales

Though the DASS-21 is an established scale and may have exhibited adequate psychometric characteristics in development and in other research studies, its performance with new samples and data may vary quite widely. Particularly with respect to a multi-item scale's internal reliability, if a scale's reliability and performance with the new sample falls below acceptable limit the confidence in the results of its use in the testing of hypotheses may be lost. Thus, it was appropriate and important to address the level of internal reliability that such multi-item scales in the data obtained for this particular study.

To address the internal reliability Cronbach's alpha coefficient was calculated for each of the three scales measuring this study's dependent variables (depression, anxiety, and stress). This assessment is reported in Table 2.

Table 2  
*Sample-Specific Internal Consistency Reliability Coefficients for the DASS-21*

Scale	Cronbach's	
	Alpha	N of Items
Depression	.906	7
Anxiety	.820	7
Stress	.844	7

All three scales revealed alpha coefficients above .80 which was regarded as a sufficient level of internal reliability for this study.

### Depression, Anxiety, and Stress

Table 3 depicts descriptive statistics for the dependent variables depression, anxiety, and stress by the categories of the independent variables (upperclassmen, underclassmen).

Table 3  
*Descriptive Statistics for Depression, Anxiety, and Stress by Collegiate Flight Program and Under- vs. Upper-classman*

Dependent Variable		Collegiate Flight Program?						Total
		Yes			No			
		Underclass	Upperclass	Total	Underclass	Upperclass	Total	
Depression	N	35	50	85	19	116	135	220
	Mean	4.78	5.48	5.18	5.05	5.58	5.51	5.38
	SD	3.83	5.12	4.61	4.94	4.95	4.93	4.80
Anxiety	N	37	49	86	19	117	136	222
	Mean	3.86	4.88	4.45	5.26	5.20	5.21	4.91
	SD	3.22	4.62	3.49	4.26	4.18	4.17	3.93
Stress	N	37	47	84	19	113	132	216
	Mean	6.43	7.58	7.09	6.57	6.72	6.71	6.85
	SD	4.11	4.62	4.42	3.83	4.15	4.09	4.22

The three hypotheses were tested using a two-way ANOVA specifying collegiate flight enrollment and under/upperclassman status as the factors for the three dependent variables (depression, anxiety, and stress). To test for compliance with the ANOVA assumption of normality, the residual error terms for each analysis were tested for normality using the Shapiro-Wilk test. Results of this test are shown in Table 4.

Table 4  
*Results of Normality Tests of the Residual Error Terms of the ANOVAs of Each Dependent Variable*

Error Term	Statistic	Shapiro-Wilk	
		df	p
Residual for Depression	.892	212	<.001
Residual for Anxiety	.934	212	<.001
Residual for Stress	.970	212	<.001

The Shapiro-Wilk statistic test is extremely sensitive to sample size. For sample sizes over 60 it is conventional to use the value of the statistic (W) itself as the basis for judging departures from normality. The most common rule used is .90. The residuals for the dependent variables exceeded .90 substantially in two cases and were under .90 by .008 in the one case, it can be concluded that the error terms exhibited have no problematic departure from normality.

Another assumption within ANOVA is homogeneity of variance. This assumption was tested using the Levene test for all three ANOVAs. In all three cases the *p*-values of the Levene test were .09 or higher, indicating that there was no violation of the homogeneity assumption. All hypotheses were tested using the results of the same three ANOVAs (See Tables 5, 6, and 7).

Table 5

*Results of ANOVA of Depression by Collegiate Flight Program and Under-/Upperclass Status*

Source	df	Mean Square	F	p	Partial Eta Squared
Prof. Flight Program	1	1.967	.021	.885	.000
Under/Upper Classman	1	48.366	.515	.474	.002
Prof. Flight Program *					
Under/Upper Classman	1	1.118	.012	.913	.000
Error	216	93.987			

R Squared = .003 (Adjusted R Squared = -.010)

Table 6

*Results of ANOVA of Anxiety by Collegiate Flight Program and Under-/Upperclass Status*

Source	df	Mean Square	F	p	Partial Eta Squared
Prof. Flight Program	1	87.289	1.340	.248	.006
Under/Upper Classman	1	65.048	.998	.319	.005
Prof. Flight Program *					
Under/Upper Classman	1	32.628	.501	.480	.002
Error	218	65.149			

R Squared = .016 (Adjusted R Squared = .003)

Table 7

*Results of ANOVA of Stress by Collegiate Flight Program and Under-/Upperclass Status*

Source	df	Mean Square	F	p	Partial Eta Squared
Prof. Flight Program	1	11.030	.146	.703	.001
Under/Upper Classman	1	50.053	.663	.417	.003
Prof. Flight Program *					
Under/Upper Classman	1	90.966	1.204	.274	.006
Error	212	75.526			

R Squared = .012 (Adjusted R Squared = -.002)

The null hypothesis proposed would be such that there are no specific group of students that are more depressed, stressed, or anxious than the others.

Research question one proposed that students enrolled in a collegiate flight program would have significantly higher levels of depression, anxiety, and stress than non-collegiate flight students. The results for the collegiate flight enrollment factor was not significant in the ANOVAs for all three dependent variables. Thus, it can be concluded that failed to reject the null. This study provides no evidence that supports the existence of higher levels of depression, anxiety, and stress among collegiate flight students compared to non-collegiate flight students.

Research question two proposed that upperclassmen would exhibit significantly higher levels of depression, anxiety and stress than underclassmen. The results for under/upperclassman status factor was nonsignificant in the ANOVAs for all three dependent variables. Thus, it can be concluded that failed to reject the null. This study provides no evidence that supports the existence of higher levels of depression, anxiety, or stress among upperclassmen compared to underclassmen.

Research question three proposed that there is an interaction between upper/underclassmen and the collegiate flight enrollment with depression, anxiety, and stress. The results for the under / upperclassmen status against collegiate flight enrollment interaction was non-significant in the ANOVAs for all three dependent variables. Thus, it is concluded that failed to reject the null. This study provides no evidence that those upperclassmen and underclassmen enrolled in a collegiate flight program have any degrees of difference in depression, anxiety and stress between students enrolled in a collegiate flight program and those not enrolled.

Comparing the averages of the scores to the scoring rubric of the DASS-21 shows that the average of respondents had a normal to mild ranking of depression, anxiety, and stress. Table 8 shows these results. Table 9 shows the scoring rubric for the DASS-21.

Table 8  
*Score Averages for Depression, Anxiety, and Stress by Collegiate Flight*

						Total
Collegiate Flight	Average Score	Rank	Non-Collegiate Flight	Average Score	Rank	
Stress	7.09	Normal	Stress	6.71	Normal	6.85
Anxiety	4.45	Mild	Anxiety	5.21	Mild	4.91
Depression	5.18	Mild	Depression	5.51	Mild	5.38

Table 9  
*DASS-21 Scoring Rubric*

	Depression	Anxiety	Stress
Normal	0-4	0-3	0-7
Mild	5-6	4-5	8-9
Moderate	7-10	6-7	10-12
Severe	11-13	8-9	19-16
Extremely Severe	14+	10+	17+

Overall, the average scores show that both groups, collegiate flight and non-collegiate flight are both in the mild to normal categories for depression, anxiety, and stress.

### Discussion

The purpose of this research was to determine if students who are enrolled in a collegiate aviation flight program are at higher risk for depression, stress, and anxiety than non-flight students, as well as assess whether there are higher depression, anxiety, and stress levels in upperclassmen than in underclassmen. In addition, upperclassmen and underclassmen were compared within collegiate flight programs.

### Significant Results

There were no significant results found in this study. Overall, it seems as if students who are enrolled in a collegiate flight program were just as prone to depression, anxiety, and stress as those students who are not enrolled in a collegiate flight program. Additionally, upperclassmen

were not more prone to depression, anxiety, or stress compared to underclassmen. An identical result was found when comparing upperclassmen and lowerclassmen enrolled in a collegiate flight program.

A possible explanation for these results is that collegiate flight students are just that; students. Though they incur more academic obligations than non-flight students there are equal opportunities for non-flight students to have equal amounts of responsibilities and additional requirements.

Additionally, as addressed previously, those who are drawn to becoming pilots may have a pilot personality. This personality or at least some personality traits may mean those who are attracted to becoming a pilot may be more resilient and less likely to develop depression, anxiety, or high levels of stress.

## **Implications**

Though there were no significant differences among participant groups, there are still some important findings. Based on this study, no specific group, pilot, non-pilot, upperclassmen, or lower classmen, were more prone to depression, anxiety, or stress than another group. Yet, to assure students are aware of the services available to them, all students still need to be provided education about mental health and have mental health services available to them. Student mental health is a national issue as increases in depression, anxiety, and stress among college have been reported by various organizations.

Collegiate aviation flight students still need to be educated about the impacts that mental health can have on them and their careers. Knowing the signs of common mental health disorders may help them in aiding themselves or others. Positive coping methods and stress relief is an important topic to address for all students.

Overall, this study has shown that there are no specific groups within a collegiate flight program that are more likely to exhibit high statistical levels of depression, anxiety, or stress. Conclusively, students enrolled in a professional flight program are not more or less stressed than those not enrolled in a flight program.

Since these results are positive and the results do not show that either of these student groups are more stressed, depressed, or anxious than others (and actually show a fairly low rate of these traits), it is important to not be lulled into a false sense of security. Though these results are something to be comforted about at these universities and member organizations it is still important to educate all students on the importance of mental health and ways to effectively take care of themselves and produce positive coping mechanisms and self-care strategies.

## **Limitations & Future Research**

This survey was disseminated through email to University Aviation Association institutions, Women in Aviation Conference volunteers, administered during classroom visits, and social media. While a large number of prospective participants had access to the survey, data

collection was conducted for three weeks. A longer collection window may have been advantageous to secure more responses from a more diverse sample pool.

Future studies should also take into account other student responsibilities in and outside of the classroom for example, employment status, involvement in student organizations, class credit load, home environment, and other factors. Both collegiate flight and non-flight students have the equal opportunity to incur additional responsibilities in and outside of the classroom. An analysis of pilot personality at the collegiate level may also be a point of interest to future studies. Finally, the same study can be repeated and add a test/re-test aspect. Addressing these limitations may add to a better understanding of collegiate flight students and what is needed to support them.



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## APPENDIX

### SURVEY INSTRUMENT

Q1 **Please be advised:** All responses to this survey are ANONYMOUS. There will be no way to identify you. These results will be used strictly for research purposes. Please fill out the questions below to the best of your ability. If at any time you do not wish to answer a question or wish to discontinue taking the survey you have the right to do so. Thank you for your time.

Q2 Degree Program

Q3 Estimated date of graduation (Semester, Year):

Q4 Class Standing

Freshman (1), Sophomore (2), Junior (3), Senior (4), Graduate Student (5)

Q5 Are you a transfer student?

Yes (1), No (2)

Q6 Gender

Male (1), Female (2), Other (3)

Q7 Age

Q8 Have you or are you currently serving in the US Armed Forces?

Yes (1), No (2)

Q9 Relationship Status

Never Married (1), Separated (2), Divorced (3), Widowed (4), Married (5)

Q10 Do you have any children?

Yes (1), No (2)

Q11 Are you enrolled in a Collegiate Flight degree program?

Yes (1), No (2)

*Skip To: Q13 If Are you enrolled in a Collegiate Flight degree program? = Yes*

*Skip To: Q16 If Are you enrolled in a Collegiate Flight degree program? = No*

Q12 How many flight hours PER WEEK do you have?

Q13 What flight certificates/ratings do you have?

Private Pilot (27), Commercial (28), Instrument (29), Multi-engine (30), CFI (31), CFI-I (32)

Q14 How many total flight hours do you have?

Q15 Are you a pilot (ie: hold any FAA airman certificate or rating)?

Yes (1), No (2)

Q16 If you are not enrolled in a Collegiate Flight major, are you currently taking flight lessons with an FBO or any other type of flight training program?

Yes (1), No (2)

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all

1 Applied to me to some degree, or some of the time

2 Applied to me to a considerable degree or a good part of the time

3 Applied to me very much or most of the time

	Never	Sometimes	Often	Almost Always
1. I found it hard to wind down	0	1	2	3
2. I was aware of dryness of my mouth	0	1	2	3
3. I couldn't seem to experience any positive feeling at all	0	1	2	3
4. I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5. I found it difficult to work up the initiative to do things	0	1	2	3
6. I tended to over-react to situations	0	1	2	3
7. I experienced trembling (e.g. in the hands)	0	1	2	3
8. I felt that I was using a lot of nervous energy	0	1	2	3
9. I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10. I felt that I had nothing to look forward to	0	1	2	3
11. I found myself getting agitated	0	1	2	3
12. I found it difficult to relax	0	1	2	3
13. I felt down-hearted and blue	0	1	2	3
14. I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15. I felt I was close to panic	0	1	2	3
16. I was unable to become enthusiastic about anything	0	1	2	3
17. I felt I wasn't worth much as a person	0	1	2	3
18. I felt that I was rather touchy	0	1	2	3
19. I was aware of the action of my heart in the absences of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20. I felt scared without any good reason	0	1	2	3
21. I felt that life was meaningless	0	1	2	3