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A Quantitative Study of Undergraduate Students' Anxiety

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Abstract

The main purpose of this quantitative study was to explore undergraduates' anxiety level, as well as the correlation and differences among such variables as the sources of anxiety, students' GPAs, grade levels, and majors. The research results indicated that undergraduates at a flagship university in the northwest, United States, were moderately anxious. There was no statistically significant difference in anxiety level and GPAs between domestic and international students. There was no statistically significant correlation between the anxiety and GPA concerning grade levels. Based on sources of anxiety and grade levels, undergraduates suffered exam anxiety most, and presentation anxiety came second. Freshmen' anxiety level related to all sources was highest. Seniors were least anxious. There were statistically significant differences in the anxiety level related to specific sources regarding grade levels, except for presentation source of anxiety. Built on anxiety sources and majors, Human Services students had the highest level of anxiety. The least anxious was Agriculture, Food and Natural Resources students. The study concluded that higher education institutions should implement effective policies, procedures and practices to mitigate students' anxiety level and thus improve their mental health and well-being.

Keywords: anxiety level, sources of anxiety, undergraduate students

1. Introduction

One of the common mental health concerns among college students is anxiety (SAMHSA, 2021). When faced with changes and navigating new challenges, both domestic and international college students may experience anxiety during their college careers. MAYO Clinic Heath System (2021) summarizes the symptoms of anxiety from two perspectives: emotional and physical. Emotionally, anxiety results in excessive worry, fatigue, irritability, panic, poor concentration, restlessness, sleep disturbances, etc. Physically, anxiety may lead to chest pain, diarrhea, headache, increased heart rate, muscle aches, shortness of breath, sweating, and so forth. If anxiety cannot be handled timely and appropriately, it will exert a negative influence on people (MAYO Clinic Heath System, 2021). According to Khoshlessan and Das (2017), the anxiety of college students is a very important factor in their learning process (p. 311). Since learning to deal with anxiety is a factor in the successful student's learning process, researchers have explored areas around this concept to assist in providing solutions and, potentially, turn the anxiety into motivation.

2. Literature Review

2.1 Definitions of Terms

For the purposes of the study, the following definitions are used.

Academic performance or achievement. "Academic achievement refers to a student's success in meeting short- or long-term goals in education. In the big picture, academic achievement means completing high school or earning a college degree. In a given semester, high academic achievement may mean a student is on the honor roll" (Reference.com, n.d., para. 1).

Anxiety. Feelings, thoughts, and experiences that create an apprehension level during the study process and affect

the students' academic performance (Vitasari et al., 2010, p. 190).

GPA. *GPA* stands for Grade Point Average on a 4.0 scale. It is a standard way of measuring academic achievement in the U.S. GPA assumes a grading scale of A, B, C, D, F. Each grade is assigned a number of grade points. An A grade receives 4 points, a B=3, a C=2, a D=1, and an F=0. The GPA is calculated by dividing the total number of points by the number of credits.

2.2 Anxiety of College Students

There are mixed ideas on the role anxiety plays in students' learning and academic performance. Rosen (2008) describes anxiety as "a major source of energy" (p. 33) and states that "just enough anxiety creates the optimal condition for learning" (p. 36). Some researchers hold the opposite point of view—that anxiety can have negative effects on students' academic achievement. Sizoo, Jozkowskia, Malhotra, and Shapero (2008) claim that anxiety affected students' performances and made them fall behind in class. Kessler, Sonnega, Bromet, Hughes and Nelson (1995) report anxiety disorders had significant effects on failure to enter college, and failure to complete college in a sample of over 5,000 participants ages 15 to 54 (p. 1048). Vitasari et al. (2010) state that it is common for students to deal with study anxiety and stated that if students have a problem with anxiety, they cannot perform well. In a retrospective study by Van Ameringen, Mancini, and Farvolden (2003), about 24% of psychological patients who dropped out of school reported leaving school prematurely because of their anxiety disorder (p. 561). Recent data demonstrate anxiety does influence students' academic achievements.

Some researchers focus on the single source of anxiety, such as Hembree (1998), Hancock (2001), Grassi, Gaggioli and Riva (2011), and Trifoni and Shahini (2011) conduct research on test or exam anxiety; Horwitz (2001), Von Worde (2003), along with MacIntyre and Gardner (1994) centered on language anxiety; Elliot and Chong (2005), Hartman and LeMay (2004), as well as Barker and Barker (2007) do a research on presentation anxiety; Leary and Kowalski (1997), together with Heinrichs et al. (2006) focus on social anxiety; Ma and Xu (2004), Dowker, Sarkar, and Looi (2016), together with Ashcraft and Moore (2009) deal with mathematics anxiety; Jiao and Onwuegbuzie (2002) and Mellon (1986) concentrate on library anxiety. Other researchers center on multiple sources of anxiety altogether, such as Vitasari et al. (2010) deal with study anxiety from seven sources: exam anxiety, language anxiety, presentation anxiety, social anxiety, family anxiety, mathematics anxiety, and library anxiety. They conclude that "Students cannot perform well if they are having a problem regarding anxiety" (Vitasari et al., 2010, p. 193). Khoshlessan and Das (2017) conduct research on five sources of anxiety concerning international students and they found "some differences in anxiety levels among different demographic groups" (p. 311)

3. The Empirical Study

Anxiety can play a significant role in student learning and academic performance. In order to explore the influence that anxiety has on college undergraduate students, based on their academic performance, the researchers of this study employed a quantitative research design and data were collected using a cross-sectional online survey. The research questions of this quantitative study are as follows:

(1) What is the anxiety level of undergraduate students at a flagship university in the northwest, United States?

(2) What are the anxiety levels of domestic and international students respectively?

(3) Is there any statistically significant difference in the anxiety level and GPAs between domestic and international students?

(4) Is there any relationship between anxiety and GPAs of undergraduate students based on the grade levels (first year, second year, third year, fourth year and up)?

(5) Are there any statistically significant differences in the anxiety levels related to specific sources (exam anxiety, language anxiety, social anxiety, presentation anxiety and family anxiety) and grade levels (first year, second year, third year, fourth year or more) of undergraduate students?

(6) Are there any statistically significant differences in the anxiety levels of specific sources and majors of undergraduate students?

3.1 Methodology

3.1.1 Population and Sample

The population of this quantitative study is 6,321 (fall, 2020) undergraduate students at a flagship university in the Northwest, United States. With the help of the Data Office of the university, email invitations were sent to 5,940 undergraduate students, including 89 international students. There were 868 students who signed informed

consent forms and responded to the survey on Qualtrics. After deleting the invalid responses, there were 712 valid responses, consisting of 16 international students.

3.1.2 Research Instrument

A self-report questionnaire on Qualtrics was used to collect data. The instrument of this study is a revised Study Anxiety Questionnaire (SAQ), which is composed of three sections. Section one is the Demographic Information, including (a) participant's age; (b) ethnicity (White/Caucasian, African American, Asian, Hispanic, Latino, Pacific Islander, Native American or Alaskan Native, and Other Race or More than One Race); (c) Current status (Domestic or international); (d) grade level (freshman, sophomore, junior and senior or more); (e) major/curriculum by 16 Career Clusters (Torpey, 2015) (Agriculture, Food and Natural Resources; Architecture and Construction; Arts, Audio/Video Technology and Communications; Marketing, Business Management and Administration; Education and Training; Finance, Government and Public Administration; Health Science; Hospitality and Tourism; Human Services; Information Technology; Law, Public Safety, Corrections & Security; Manufacturing; Science, Technology Engineering and Mathematics; Transportation, Distribution & Logistics; and others); and (f) student's GPA.

Section two is the revised Anxiety Sensitivity Index (ASI, Collins, 2009), designed to measure the levels of students' anxiety. The ASI includes 16 items, which are scored on a Likert scale from 1 to 5, with 1 = very little, 2 = a little, 3 = moderate, 4 = much, and 5 = very much. A high score on the SAS indicates a high level of study anxiety. Students' final anxiety scores will be used to assign them into three groups: low level of anxiety group (scores are below 2.50), moderate level of anxiety group (scores between 2.50 and 3.49) and high level of anxiety group (scores above 3.50).

Section three is the Study Anxiety Questionnaire (SAQ), modified by Khoshlessan and Das (2017), based on the Study Anxiety Questionnaire developed by Vitasari, et al. (2010). The revised SAQ consists of 29 items that measure five sources of study Anxiety on a Likert scale with the ranges from 1 = never, 2 = almost never, 3 = rarely, 4 = fairly often, to 5 = very often. Five sources include exam anxiety, language anxiety, social anxiety, presentation anxiety and family anxiety. Put simply, this revised version of the SAQ is designed to measure students' study anxiety at a flagship university in the northwest, United States, based on their feelings, experiences, and thoughts regarding their anxiety about their studies.

Validity and Reliability. Validity of the instrument was established by pilot-testing 10 graduate students, in order to check whether items in the anxiety questionnaire represent all possible items and how well the number of items reflects the situation. Ten graduate students read and understood each item in the questionnaire, which meant the instrument has high readability and understandability. After the pilot study, Cronbach alpha was calculated to determine whether the Study Anxiety Questionnaire was reliable. The Cronbach alpha of Section Two (ASI) was .90, and Section Three (SAQ) was .90 as well (Khoshlessan & Das, 2017, p. 319), which meant that the instrument had an excellent internal consistency or high reliability.

3.1.3 Data Collection and Analysis

With the aim of investigating the relationship and difference among variables concerning undergraduate students (domestic and international) at a flagship university in the Northwest, United States, the researchers of this study collected quantitative data via a survey on Qualtrics. Both IBM SPSS Statistics 25 and Excel were utilized to conduct the statistical analysis. The Pearson Correlation, T-test, and ANOVA were used to analyze data. Descriptive statistics were employed first to explore the anxiety level of all undergraduate students, along with the anxiety level of domestic and international students. The cut-off points were created by the researchers to judge the anxiety level of participants (Table 1). Table 1 shows the scores that are above 3.50 are considered a high level of anxiety. Scores ranging from 2.50 to 3.49 are moderate level, and low level if the scores are below 2.50. Next, a T-test was then used to investigate whether there is any statistically significant difference in the anxiety level and GPAs between domestic and international students. The Pearson Correlation was then utilized to examine whether there was any relationship between anxiety and GPAs of undergraduate students based on their grade levels (first year, second year, third year, fourth year or more). Finally, an ANOVA was employed to explore whether there are any statistically significant differences in the anxiety levels related to specific sources (exam anxiety, language anxiety, social anxiety, presentation anxiety and family anxiety) and grade levels, as well as whether there are any statistically significant differences in the anxiety levels related to specific sources and majors of undergraduate students.

Table 1. Criteria of anxiety level

Anxiety Level	Mean
High	Above 3.50
Moderate	2.50–3.50
Low	Below 2.50

3.2 Results

This quantitative study employed a survey on Qualtrics. The anxiety level of undergraduate students (domestic and international) was examined. The following questions were addressed: Are there any statistically significant differences in the anxiety level and GPAs between domestic and international students? Is there any relationship between anxiety and GPAs of undergraduate students based on their grade levels? Are there any statistically significant differences in the anxiety levels related to specific sources and grade levels? Are there any statistically significant differences in the anxiety levels related to specific sources and majors of undergraduate students? Based on the quantitative data, the descriptive statistics were presented first, followed by inferential statistics.

There were 712 valid responses from the survey. There were 708 participants reported their age. The mean scores of their age are 22.67, (SD = 7.03, minimum age = 17, maximum age = 65). There were 696 domestic students and 16 international students. In terms of ethnicity or race, one student did not report his or her ethnicity. The majority of participants were White/Caucasian (617), accounting for 86.8%, followed by 29 other races or more than one race (4.1%), 23 Native Americans or Alaskan Natives (3.2%), 18 Hispanic (2.5%), 14 Asians (2.0%), 6 Latino (0.8%), 2 African Americans (0.3%), and 2 Pacific Islanders (0.3%). Regarding the participants' grade level, there were 172 freshmen (24.2%), 150 sophomores (21.1%), 140 juniors (19.7%), and 249 seniors or more (35%). For major or curriculum, (one student is missing), there were 133 in Science, Technology Engineering and Mathematics (18.7%), and 105 in Health Science (14.7%). There were 84 students in Arts, Audio/Video Technology and Communications (11.8%), and 59 in Marketing, Business Management and Administration (7.0%). Forty-nine are in Education and Training (6.9%), 34 in Human Services (4.8%), 33 students majoring in Agriculture, Food and Natural Resources (4.6%), 10 in Finance, Government and Public Administration (1.4%), 8 in Law, Public Safety, Corrections & Security (1.1%), and 2 in Hospitality and Tourism (0.3%). There are195 students who chose "others" (27.4%). The possible reason for it was there were 322 freshmen and sophomores (45.3%), and some of them had not selected a major yet. That was why they chose "others". There were 597 students who reported their GPAs. The mean scores were 3.45 (SD = .51). The mean scores of 12 international students' GPA is 3.38 (SD = .55), which was lower than those of 585 domestic students' GPAs (M = 3.45, SD = .50).

As indicated in Table 2, the results showed the anxiety level of overall undergraduate students fell into the range of moderate (N = 712, Mean = 2.86). The anxiety level of domestic students (N = 696, Mean = 2.87) was higher than that of international students (N = 16, Mean = 2.58).

Table 2. Means for all students' anxiety level, anxiety levels of domestic and international students

	Overall Anxiety Level	Anxiety Level of Domestic Students	Anxiety Level of International Students
Mean	2.86	2.87	2.58
N	712	696	16

To examine whether there are any statistically significant differences in anxiety level and GPAs between domestic and international students, T-tests were conducted. Table 3 indicated the results of the T-tests, which showed there were no statistically significant differences in anxiety level and GPAs between domestic students and international students.

Table 3. Results of T-tests

	Anxiety Level		GPAs	
	Domestic	International	Domestic	International
Mean	2.86	2.67	3.46	3.38
P two-tail	.28		.57	

Note. $p < .05$.

To explore whether there is any relationship between the anxiety level and GPAs of undergraduate students based on their grade levels, a Pearson correlation coefficient was calculated. Table 4 demonstrated that there was a very weak correlation between the anxiety level and GPAs of undergraduate students based on grade levels, and there was no statistically significant relationship between the anxiety level and GPAs based on grade levels.

Table 4. Results of pearson correlation

		FreAnx		SopAnx		JunAnx		SenAnx
Pearson Correlation	FreGPA	-.16	SopGPA	.15	JunGPA	.07	SenGPA	.01
Sig. (2-tailed)		.22		.07		.43		.82
N		60		150		140		246

ANOVA and T-test were conducted to investigate whether there are any statistically significant differences in the anxiety levels related to specific sources (exam anxiety, language anxiety, social anxiety, presentation anxiety and family anxiety) and grade levels (freshman, sophomore, junior and senior or more) of undergraduate students. Table 5 ANOVA showed that there was statistically significant difference between the anxiety level related to the exam source and the grade levels ($p = .00$). Then the researchers ran a Post Hoc Test—Tukey HSD and made multiple comparisons to locate the statistically significant differences between grade levels, as shown in Table 6. The exam anxiety of Freshman and Junior ($p = .00$) was significantly different, so was Freshman and Senior ($p = .00$). There was statistically significant difference between Sophomore and Senior ($p = .00$) There was no statistically significant differences between Freshman and Sophomore ($p = .07$), as well as between Junior and Senior ($p = .09$).

Table 5. ANOVA of exam anxiety and grade levels

Exam Anxiety					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	31.06	3	10.35	14.93	.00
Within Groups	410.46	592	.69		
Total	441.52	595			

Note. $p < .05$.

Table 6. Post Hoc Test—Tukey HSD of exam anxiety and grade levels

	Sophomore		Junior		Senior	
	Mean Difference	Sig.	Mean Difference	Sig.	Mean Difference	Sig.
Freshman	.31	.07	.50	.00	.71	.00
Sophomore			.19	.21	.40	.00
Junior					.21	.09

Note. $p < .05$.

Table 7 showed there was statistically significant difference between the anxiety level related to the language and the grade levels ($p = .00$). The researchers then ran Tukey HSD to locate the statistically significant differences between grade levels, as shown in Table 8. The language anxiety of Freshman and Junior ($p = .00$) was significantly different, so was Freshman and Senior ($p = .00$). There were statistically significant differences between Sophomore and Senior ($p = .00$), as well as Junior and Senior ($p = .01$). There was no statistically significant difference between Freshman and Sophomore ($p = .10$).

Table 7. ANOVA of language anxiety and grade levels

Language Anxiety					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	32.33	3	10.78	21.53	.00
Within Groups	296.39	592	.50		
Total	328.72	595			

Note. $p < .05$.

Table 8. Post Hoc Test—Tukey HSD of language anxiety and grade levels

	Sophomore		Junior		Senior	
	Mean Difference	Sig.	Mean Difference	Sig.	Mean Difference	Sig.
Freshman	.25	.10	.46	.00	.69	.00
Sophomore			.21	.06	.44	.00
Junior					.23	.01

Note. p < .05.

As shown in Table 9, there was statistically significant difference between **social anxiety** and the grade levels (p = .00). Post Hoc test—Tukey HSD was then conducted to locate the statistically significant differences between grade levels. Table 10 indicated that the social anxiety of Freshman and Junior (p = .03) was significantly different, so was Freshman and Senior (p = .02). There was statistically significant difference between Sophomore and Junior (p = .03), as well as between Sophomore and Senior (p = .02). There was no statistically significant difference between Freshman and Sophomore (p = .90), as well as Junior and Senior (p = 1.0).

Table 9. ANOVA of social anxiety and grade levels

Social Anxiety					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.96	3	5.65	5.63	.00
Within Groups	594.12	592	1.00		
Total	611.08	595			

Note. p < .05.

Table 10. Post Hoc Test—Tukey HSD of social anxiety and grade levels

	Sophomore		Junior		Senior	
	Mean Difference	Sig.	Mean Difference	Sig.	Mean Difference	Sig.
Freshman	.11	.90	.43	.03	.42	.02
Sophomore			.33	.03	.31	.02
Junior					.02	1.0

Note. p < .05.

Regarding whether there is statistically significant difference between **presentation anxiety** and the grade levels, the researchers found that homogeneity of variance was not established after conducting the ANOVA. Therefore, T-tests were run using pooled variance to compare different groups of participants (from Freshman to Senior) concerning presentation source of anxiety. Table 11 demonstrated that there were statistically significant differences between Freshman and Sophomore (p = .00), Freshman and Junior (p = .00), Freshman and Senior (p = .00), and Sophomore and Junior (p = .00). There were no statistically significant differences between Sophomore and Senior (p = .11), as well as Junior and Senior (p = .06).

Table 11. T-test of presentation anxiety and grade levels

	Sophomore		Junior		Grade4	
	Mean Difference	Sig.	Mean Difference	Sig.	Mean Difference	Sig.
Freshman	.69	.00	.40	.00	.56	.00
Sophomore			.29	.00	.12	.11
Junior					.17	.06

Note. p < .05.

Table 12 indicated that there was statistically significant difference between **family anxiety** and the grade levels (p = .00). Post Hoc test—Tukey HSD was used to locate the statistically significant differences between grade levels. As shown in Table 13, there were statistically significant differences between Freshman and Junior (p = .02), Freshman and Senior (p = .00), as well as Sophomore and Senior (p = .00). There were no statistically significant differences between Freshman and Sophomore (p = .37), Sophomore and Junior (p = .30), as well as Junior and Senior (p = .06).

Table 12. ANOVA of family anxiety and grade levels

Family Anxiety					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	40.52	3	13.51	12.06	.00
Within Groups	662.93	592	1.12		
Total	703.45	595			

Note. p < .05.

Table 13. Post Hoc Test—Tukey HSD of family anxiety and grade levels

	Sophomore		Junior		Senior	
	Mean Difference	Sig.	Mean Difference	Sig.	Mean Difference	Sig.
Freshman	.26	.37	.48	.02	.76	.00
Sophomore			.22	.30	.50	.00
Junior					.28	.06

Note. p < .05.

To investigate whether there are any statistically significant differences in the anxiety levels related to specific sources and majors of undergraduate students, ANOVA and T-test were conducted. The researchers disregard those majors of less than 10 participants, as well as those who chose “others”. Finally, there were seven major groups left: Major 1= Agriculture, Food and Natural Resources (33), Major 2 = Arts, Audio/Video Technology and Communications (84), Major 3 = Marketing, Business Management and Administration (59), Major 4 = Education and Training (49), Major 5 = Health Science (105), Major 6 = Human Services (34), and Major 7 = Science, Technology Engineering and Mathematics.

ANOVA and T-test were employed to examine whether there are any statistically significant differences in the anxiety level related to the **exam** source and seven major groups. Researchers found that homogeneity of variance was not established concerning exam anxiety, language anxiety and presentation anxiety. Therefore, T-tests using pooled variance were run.

Table 14 demonstrated that there were statistically significant differences between Major 1 and Major 4 (p = .01), Major 3 and Major 4 (p = .04), Major 3 and Major 5 (p = .01), as well as Major 3 and Major 6 (p = .00). The rest of the groups of majors were not significantly different at all, concerning exam anxiety.

Table 14. T-test of exam anxiety and majors

	Major2		Major3		Major4		Major5		Major6		Major 7	
	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig	MeanDif	Sig.
Major1	.27	.12	.10	.62	.46	.01	.03	.81	.17	.23	.12	.26
Major2			.18	.25	.20	.19	.17	.15	.34	.04	.05	.67
Major3					.38	.04	.34	.01	.51	.00	.23	.10
Major4							.03	.81	.14	.42	.15	.29
Major5									.17	.23	.12	.26
Major6											.29	.06

Note. p < .05.

To examine whether there are any statistically significant differences in **language** anxiety and seven major groups, researchers ran T-tests using pooled variance. Table 15 showed that there were statistically significant differences between Major 1 and Major 4, Major 1 and Major 6, Major 1 and Major 7, Major 2 and Major 6, Major 3 and Major 4, Major 3 and Major 6, Major 3 and Major 7. The rest of the groups of majors had no statistically significant differences.

Table 15. T-test of language anxiety and majors

	Major2		Major3		Major4		Major5		Major6		Major 7	
	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig	MeanDif	Sig.
Major1	.13	.40	.08	.64	.39	.02	.17	.18	.57	.00	.33	.02
Major2			.05	.68	.26	.06	.04	.69	.44	.00	.20	.06
Major3					.31	.03	.09	.39	.50	.00	.26	.03
Major4							.22	.051	.19	.19	.06	.65
Major5									.40	.00	.16	.08
Major6											.24	.08

Note. p < .05.

Regarding social anxiety, Table 16 indicated that there was statistically significant difference between **language** anxiety and seven major groups (p = .03). T-tests were conducted to find out which groups were statistically significant. The results of T-tests demonstrated that there were statistically significant differences between Major 1 and Major 6 (p = .04), Major 3 and Major 4 (p = .02), Major 3 and Major 6 (p = .01), Major 4 and Major 5 (p = .03), Major 5 and Major 6 (p = .00), as well as Major 6 and Major 7 (p = .04). The rest of the groups of majors had no statistically significant differences (See Table 17).

Table 16. ANOVA of social anxiety and majors

Family Anxiety					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.88	6	2.31	2.44	.03
Within Groups	464.87	490	.95		
Total	478.75	496			

Note. p < .05.

Table 17. T-test of social anxiety and majors

	Major2		Major3		Major4		Major5		Major6		Major 7	
	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig	MeanDif	Sig.
Major1	.20	.32	.13	.57	.33	.14	.04	.84	.49	.04	.11	.59
Major2			.32	.06	.14	.45	.24	.09	.29	.14	.09	.50
Major3					.46	.02	.09	.58	.61	.01	.23	.15
Major4							.37	.03	.15	.48	.23	.17
Major5									.53	.00	.14	.26
Major6											.38	.04

Note. p < .05.

In terms of **family** anxiety, the results of ANOVA indicated that there was statistically significant difference between family anxiety and seven major groups (p = .00) (See Table 18). The results of T-tests showed that there were statistically significant differences between Major 1 and Major 2 (p = .00), Major 1 and Major 6 (p = .00), Major 1 and Major 7 (p = .01), Major 2 and Major 3 (p = .03), Major 2 and Major 5(p = .01), Major 3 and Major 6 (p = .02), as well as Major 5 and Major 6 (p = .01). The rest of the groups of majors had no statistically significant differences (See Table 19).

Table 18. ANOVA of family anxiety and majors

Family Anxiety					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.87	6	3.31	3.01	.00
Within Groups	538.96	490	1.10		
Total	558.84	496			

Note. p < .05.

Table 19. T-test of family anxiety and majors

	Major2		Major3		Major4		Major5		Major6		Major 7	
	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig	MeanDif	Sig.
Major1	.63	.00	.24	.31	.49	.054	.26	.19	.77	.00	.52	.01
Major2			.39	.03	.13	.50	.37	.01	.15	.46	.10	.48
Major3					.26	.25	.02	.88	.54	.02	.29	.09
Major4							.23	.21	.28	.26	.03	.88
Major5									.51	.01	.26	.06
Major6											.25	.21

Note. $p < .05$.

Regarding **presentation** anxiety, the results of T-tests using pooled variance indicated that there were statistically significant differences between Major 1 and Major 6 ($p = .00$), Major 1 and Major 7 ($p = .04$), Major 2 and Major 6 ($p = .00$), Major 2 and Major 7 ($p = .03$), Major 3 and Major 6 ($p = .00$), Major 3 and Major 7 ($p = .00$), Major 4 and Major 6 ($p = .00$), as well as Major 5 and Major 6 ($p = .00$). The rest of the groups of majors had no statistically significant differences (See Table 20).

Table 20. T-test of presentation anxiety and majors

	Major2		Major3		Major4		Major5		Major6		Major 7	
	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig.	MeanDif	Sig	MeanDif	Sig.
Major1	.05	.82	.02	.92	.10	.62	.20	.17	.59	.00	.32	.04
Major2			.06	.69	.05	.76	.16	.20	.54	.00	.27	.03
Major3					.12	.50	.22	.08	.61	.00	.34	.00
Major4							.10	.44	.49	.00	.22	.11
Major5									.38	.00	.12	.24
Major6											.27	.07

Note. $p < .05$.

3.3 Discussion

In this section, the researchers mainly discussed the aforementioned findings based on the six research questions of this quantitative study:

(1) What is the anxiety level of undergraduate students at a flagship university in the northwest, United States?

(2) What are the anxiety levels of domestic and international students respectively?

(3) Is there any statistically significant difference in the anxiety level and GPAs between domestic and international students?

(4) Is there any relationship between anxiety and GPAs of undergraduate students based on the grade levels (first year, second year, third year, fourth year and up)?

(5) Are there any statistically significant differences in the anxiety levels related to specific sources (exam anxiety, language anxiety, social anxiety, presentation anxiety and family anxiety) and grade levels (first year, second year, third year, fourth year or more) of undergraduate students?

(6) Are there any statistically significant differences in the anxiety levels of specific sources and majors of undergraduate students?

3.3.1 The Anxiety Level of Undergraduate Students

The findings of the quantitative study indicated the anxiety level of undergraduate students at a flagship university in the northwest, United States was moderate. The possible reason for it is more than half of the participants (55%) were juniors and seniors or more. After more than two or three years of study at the university, they have adjusted to the life and study on or off campus, making them feel less anxious than those who were freshmen and sophomores. The longer they stay at the university, the more they get used to the college life and study, and the less anxious they feel. Another contributing factor is the quantitative data of this study were collected in the beginning of 2020, before the COVID-19 pandemic widely spread over the world. Therefore, the pandemic did not exerted a strong impact on students.

3.3.2 The Anxiety Levels of Domestic Students and International Students

The findings of this study also showed that the anxiety level of domestic and international students were both moderate. The anxiety of domestic students was higher than that of international students. The likely reason for it is the sample of international students was not normally distributed due to the small size (16 participants).

3.3.3 The Anxiety Level and GPA Difference Between Domestic Students and International Students

Although domestic students suffered more anxiety than international students, there was no statistically significant difference in anxiety level and GPAs between domestic and international students. Again, this is likely due to the small sample size of international students. This result differs from Bell's (2008) findings that international students were more worried about their studies and suffer more stress than domestic students in the US.

3.3.4 Relationship Between Anxiety and GPAs of Undergraduate Students Based on the Grade levels

After conducting the Pearson Product-Moment correlation, the researchers found there was a very weak relationship between the anxiety level and GPAs of undergraduates (domestic and international) based on grade levels, and there was no statistically significant correlation between these two variables based on grade levels. This result is not consistent with McCraty's (2007) and Mazzone et al.'s (2007) research results that high level of anxiety led to low level of academic performance.

3.3.5 Differences in the Anxiety Sources and Grade Levels

Among the five sources of anxiety, all participants (from Freshmen to Senior) suffer exam anxiety at the highest level (M = 3.69), and presentation anxiety (M = 3.61) second. Language anxiety comes third (M = 3.61), followed by family anxiety (M = 3.06) and social anxiety (M = 3.05). The first three rankings are consistent with Vitasari et al.'s (2010) findings. However, regarding the family anxiety and social anxiety, Vitasari et al. (2010) found that social anxiety ranked higher than family anxiety, which is opposite to this research result.

After conducting an ANOVA and T-test, researchers discovered the Freshmen' anxiety level related to all sources ranked highest, and the anxiety level of Sophomores ranked second. Juniors rank third and Seniors are lease anxious (See Figure 1). The likely reason for it is the Freshman stepped into the new environment or culture, they need time to adjust to the life and study at the university. This result supports the findings of Khoshlessan and El-Houbi (2015) that younger students are more anxious or nervous than older students and students' anxiety gradually decreased as they proceed further in their education (p. 58). Juniors' anxiety ranked third concerning exam anxiety, language anxiety and family anxiety, except for social anxiety (Seniors' anxiety ranked third, a little bit higher than that of juniors).

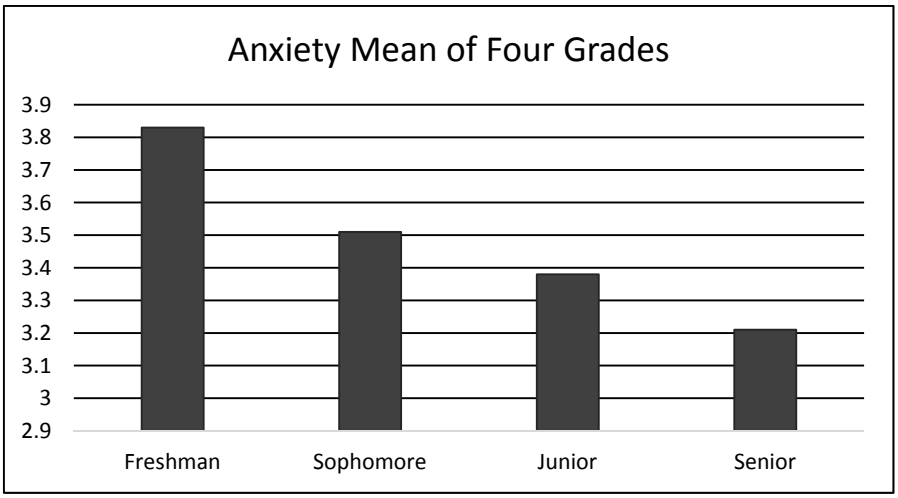

Figure 1. Anxiety mean differences of four grade levels

Researchers also found there were statistically significant differences in the anxiety level related to specific sources based on grade levels. The single exception was the presentation source of anxiety (See Table 21). This occurred because the homogeneity of variance was not able to be established. As for **exam anxiety**, Freshman and Junior, Freshman and Senior, Sophomore and Senior were significantly different, while Freshman and

Sophomore, Sophomore and Junior, as well as Junior and Senior were not.

Regarding **language anxiety**, Freshman and Junior, Freshman and Senior, Sophomore and Senior, and Junior and Senior were significantly different, while Freshman and Sophomore was not. In terms of social anxiety, there were statistically significant difference between Freshman and Junior, Freshman and Senior, Sophomore and Junior, and Sophomore and Senior. Freshman and Sophomore and Junior and Senior were not significant different.

As for **family anxiety**, Freshman and Junior, Freshman and Senior, and Sophomore and Senior were significantly different. There were no statistically significant differences between Freshman and Sophomore, Sophomore and Junior, as well as Junior and Senior. Finally comes the presentation anxiety. By running T-tests, rather than ANOVA (because no homogeneity of variance was established), researchers found there were significant differences between Freshman and Sophomore, Freshman and Junior, Freshman and Senior, and Sophomore and Junior, and no differences between Sophomore and Senior, and Junior and Senior.

The general pattern manifested was there were statistically significant differences between Freshman and Junior, as well as Freshman and Senior based on five sources of anxiety. Meanwhile, Sophomore and Senior was significantly different concerning sources of anxiety, except for presentation anxiety (See Table 21).

Table 21. Summary of statistically significant difference between grade levels based on anxiety sources

ExamAnx	**Sophomore**	**Junior**	**Senior**
Freshman		Difference	Difference
Sophomore			Difference
LanguageAnx	**Sophomore**	**Junior**	**Senior**
Freshman		Difference	Difference
Sophomore			Difference
Junior			Difference
SocialAnx	**Sophomore**	**Junior**	**Senior**
Freshman		Difference	Difference
Sophomore		Difference	Difference
FamilyAnx	**Sophomore**	**Junior**	**Senior**
Freshman		Difference	Difference
Sophomore			Difference
PresentationAnx	**Sophomore**	**Junior**	**Senior**
Freshman	Difference	Difference	Difference
Sophomore		Difference	

3.3.6 Differences in the Anxiety Sources and Majors

After conducting ANOVAs and T-tests, researchers found that different majors have different anxiety levels based on five sources. Regarding **exam anxiety**, Human Services students (M = 4.01, SD = .59) are most anxious, and then followed by Education & Training students, (M = 3.87, SD = .85), Health Science (M = 3.84, SD = .74), Science, Technology Engineering & Mathematics (M = 3.72, SD = .84), Arts, Audio/Video Technology & Communications (M = 3.67, SD = .85), Marketing, Business Management & Administration (M = 3.50, SD = 1.00), and Agriculture, Food & Natural Resources (M = 3.40, SD = .82).

In terms of **language anxiety**, Human Services students (M = 3.90, SD = .54) are also most anxious, and then followed by Education & Training (M = 3.71, SD = .69), Science, Technology Engineering & Mathematics (M = 3.66, SD = .76), Health Science (M = 3.50, SD = .61), Arts, Audio/Video Technology & Communications (M = 3.46, SD = .76), Marketing, Business Management & Administration (M = 3.40, SD = .75), and Agriculture, Food & Natural Resources (M = 3.33, SD = .69).

As for **social anxiety**, again, Human Services (M = 3.51, SD = .90) are most anxious, and then followed by Education & Training (M = 3.36, SD = 1.02), Arts, Audio/Video Technology & Communications (M = 3.22, SD = .97), Science, Technology Engineering & Mathematics (M = 3.13, SD = 1.00), Agriculture, Food & Natural Resources (M = 3.02, SD = .95), Health Science (M = 2.98, SD = .91), and Marketing, Business Management & Administration (M = 2.90, SD = 1.04).

In terms of **family anxiety**, once again Human Services students (M = 3.43, SD = .99) are most anxious, and then followed by Arts, Audio/Video Technology & Communications (M = 3.28, SD = 1.00), Science, Technology Engineering & Mathematics (M = 3.18, SD = 1.07), Education & Training (M = 3.15, SD = 1.19),

Health Science (M = 2.92, SD = 1.00), Marketing, Business Management & Administration (M = 2.89, SD = 1.10), and Agriculture, Food &Natural Resources (M = 2.66, SD = 1.00).

As to **presentation anxiety**, Human Services students (M = 4.16, SD = .59) are most anxious, as well, and then followed by Science, Technology Engineering & Mathematics (M = 3.90, SD = .80), Health Science (M = 3.78, SD = .70), Education & Training (M = 3.68, SD = .91), Arts, Audio/Video Technology & Communications (M = 3.62, SD = .98), Agriculture, Food & Natural Resources (M = 3.58, SD = .83), and Marketing, Business Management & Administration (M = 3.56, SD = .87).

Regardless of the source of the anxiety, Human Services students were the most anxious. Educational and Training students were the second most anxious, followed by Science, Technology Engineering & Mathematics; Arts, Audio/Video Technology & Communications; and Health Science. The least anxious was Agriculture, Food and Natural Resources students. The second least anxious was Marketing, Business Management and Administration (See Figure 2). For Human Services students, presentation anxiety was the highest level, followed by exam, language, social and family anxiety. Education and Training students have the highest level of exam anxiety, followed by language, presentation, social and family anxiety. For the least anxious Agriculture, Food and Natural Resources students, presentation anxiety ranks highest, followed by exam, language, social and family anxiety. For the second least anxious Marketing, Business Management and Administration, presentation anxiety ranked highest, followed by exam, language, social and family anxiety. Based on majors, students suffer most presentation anxiety (M= 3.76), which is consistent with Moore et al.'s (2007) finding that delivering a speech or presentation ranks highest level of fear among people, involving students. Exam anxiety (M= 3.73) comes second, followed by language (M= 3.56), social (M= 3.13) and family anxiety (M= 3.09). This result is different from the ranking of students based on grade levels, which exam anxiety ranks highest, and presentation anxiety comes second, followed by language, family and social anxiety.

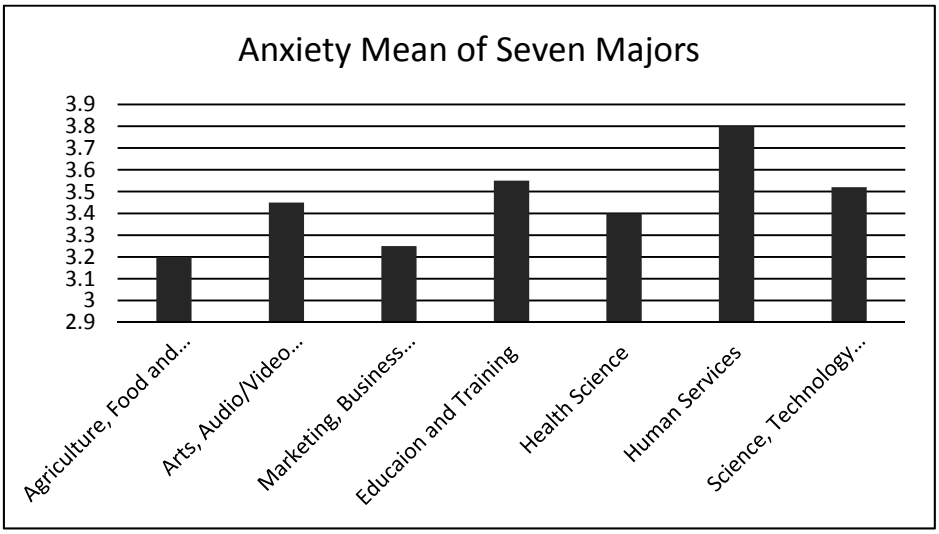

Figure 2. Anxiety mean differences of seven majors

Researchers also found that there were statistically significant differences in two sources of anxiety (social and family) based on seven major groups. For **social anxiety**, Agriculture, Food, & Natural Resources and Human Services; Marketing, Business Management & Administration and Education & Training; Marketing, Business Management & Administration and Human Services; Education & Training and Health Science; Health Science and Human Services; as well as Human Services and Science, Technology Engineering & Mathematics were significantly different. The rest of the groups of majors had no statistically significant differences.

Regarding **family anxiety**, there were significant differences between Agriculture, Food, & Natural Resources and Arts, Audio/Video Technology & Communications; Agriculture, Food & Natural Resources and Human Services; Agriculture, Food, & Natural Resources and Science, Technology Engineering and Mathematics; Arts, Audio/Video Technology & Communications and Marketing, Business Management & Administration; Arts, Audio/Video Technology & Communications and Health Science; Marketing, Business Management & Administration and Human Services; as well as Health Science and Human Services. The rest of the groups of

majors were not significantly different. Since homogeneity of variance was not established concerning exam anxiety, language anxiety and presentation anxiety, T-tests were conducted to examine which groups were significantly different.

In terms of **exam anxiety**, there were statistically significant differences between Agriculture, Food, & Natural Resources and Education and Training; Marketing, Business Management & Administration and Education and Training; Marketing, Business Management & Administration and Health Science; as well as Marketing, Business Management & Administration and Human Services. The rest of the groups of majors were not significantly different.

Regarding **language anxiety,** there were significant differences between Agriculture, Food, & Natural Resources and Education & Training; Agriculture, Food, & Natural Resources and Human Services; Agriculture, Food, & Natural Resources and Science, Technology Engineering & Mathematics; Arts, Audio/Video Technology & Communications and Human Services; Marketing, Business Management & Administration and Education & Training; Marketing, Business Management & Administration and Human Services; Marketing, Business Management & Administration and Science, Technology Engineering & Mathematics. The rest of the groups of majors had no statistically significant differences.

As for **presentation anxiety**, there were statistically significant differences between Agriculture, Food, & Natural Resources and Human Services; Agriculture, Food, & Natural Resources and Science, Technology Engineering & Mathematics; Arts, Audio/Video Technology & Communications and Human Services; Arts, Audio/Video Technology & Communications and Science, Technology Engineering & Mathematics; Marketing, Business Management & Administration and Human Services; Marketing, Business Management & Administration and Science, Technology Engineering and Mathematics, Education and Training and Human Services, as well as Health Science and Human Services. The rest of the groups of majors had no statistically significant differences. The results demonstrated that it was difficult to find a general pattern between anxiety sources and majors.

3.4 Limitations

One of the limitations of this quantitative study is the small sample size of international students (16 participants), which is not normally distributed. Meanwhile, the small sample size cannot represent the features of the international student population. More international students need to be recruited to generalize the research results to the population. One item, “Major or Curriculum”, in the demographic information section of the SAQ, consists of 16 options, and 195 students (27.4%) selected “others”. This item needs to be revised based on the course catalogue of the university, if the similar research will be done in the near future. This quantitative study is cross-sectional, which cannot provide a dynamic and systemic perspective on the changes of the same group of undergraduates’ anxiety level. The longitudinal study on anxiety needs to be conducted in the future in order to have a better understanding of students’ anxiety changing process. The main focus of this study is on undergraduate students, so graduate students need to be covered in the future study in order to have a comprehensive or exhaustive understanding of all student population. The limitations in this study will be viewed as recommendations for the future research on anxiety.

3.5 Implications and Recommendations

College and university students, no matter who they are (domestic or international), which grade level they are at, or what major they belong to, are all experiencing anxiety in varying degrees. The consequences of too much anxiety are very serious and cannot be overlooked. High levels of anxiety may lead to depression and suicidal thoughts and behaviors among students, thus greatly influence their physical, emotional and mental health and well-being (SAMHSA, 2021). Therefore, it is important to help students mitigate their anxiety, and improve their well-being and mental health. Administrators of higher education institutions need to construct a healthy, positive and welcoming environment and culture, especially focusing more on the mental health and well-being of freshmen and sophomores, given that they are the first two most anxious groups of students at the university. Early identification of students’ anxiety level is one of the effective strategies, followed by early intervention, intensive intervention and continuous intervention. According to SAMHSA (Substance Abuse and Mental Health Services Administration, 2021), the campus-based mental health programs should be carried out for effectiveness of mental health interventions in colleges. Such mental health programs consist of two categories: Campus-wide interventions focused on prevention and early intervention, including Gatekeeper trainings, as well as clinical interventions, involving Mindfulness-Based Stress Reduction (MBSR), Acceptance and Commitment Therapy (A & CT), Cognitive Behavioral Therapy (CBT) and Dialectical Behavior Therapy (DBT) (SAMHSA, 2021, p. 18).

Secondly, since presentation anxiety and exam anxiety are the two most frequent sources for students based on either grade levels or majors, professors need to make specific strategies to relieve students' anxiety, such as, run some courses—*Public Speaking* or *Oral Communication* that may improve students' skills of presenting speaking, and communicating. Professors should cite Pecarora's (2006) idea students who are not well prepared are more anxious during the exam than those who are better prepared, which means good and adequate preparation contributes to students' good performance during exams, reduce their anxiety, and improve their confidence. Considering that students who major in Human Services; Educational & Training; and Science, Technology Engineering & Mathematics are the first three most anxious, professors who teach these students need to pay much more attention to their mental health and well-being. They should provide more opportunities for students to put what they have learned in the course into practice and application, which may reduce students' anxiety and stress and promote their curiosity and confidence.

Finally, students themselves should discover means to mitigate their anxiety. They need to make good preparation before their exams and practice more before their presentations. Students may also enrich their social life, make more connections with their peers, friends and family members. Academically, they may construct a close tie with their professors. Especially for international students, language is the main barrier to their study. Zheng (2008) cited Worde's findings that half of students self-reported they were experiencing language anxiety. Marcos-Llinas and Garau (2009) found that advanced international language learners had higher levels of language anxiety. Humphries (2011) suggested that a close bond between professors and international students should be built to help international students relieve their language anxiety. According to MAYO Clinic Heath System (2021), a list of strategies that help combat anxiety are offered, including deep breathing, exercise, journaling, meditation, reading, socializing, speaking with health care providers, thought reframing, behavioral therapy, etc. Most importantly, students have to recognize and identify their anxiety first, which is the key element in dealing with too much worry and concern in their study and life. If students cannot handle the excessive anxiety, they may turn to professionals for help, such as counselors, psychologists, therapist, medical providers, etc.

4. Conclusion

In order to mitigate college students' anxiety level, higher education institutions need to implement various and effective policies, procedures and practices to improve students'' mental health and well-being. According to SAMHSA (2021), there are four strategies that may be helpful for higher educational institutions. They are: Assess organizational needs and readiness, improve access to care, promote a culture of well-being, and establish supportive policies. As a minority group, international students are faced with more challenges, stress and anxiety. They need more personal, social, and academic support, encouragement and assistance. Therefore, special attention should be given to them to ensure their safety, mental health and well-being, if higher educational institutions continue to benefit from international students politically, economically and academically. Administrators, faculty and staff, and students need to work closely together to relieve students' anxiety, improve their health and well-being, and thus promote their learning outcomes.

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