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Analysis of Test Anxiety in Human Anatomy and Physiology I Students at the University of Mississippi

Anne Piazza

ANALYSIS OF TEST ANXIETY IN HUMAN ANATOMY AND PHYSIOLOGY I

STUDENTS AT THE UNIVERSITY OF MISSISSIPPI

By

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A thesis submitted to the faculty of the University of Mississippi in partial fulfillment of

the requirements of the Sally McDonnell Barksdale Honors College.

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ABSTRACT

ANNE STEWART PIAZZA: Gateway Course Analysis of Student Anxiety in Human

Anatomy and Physiology I at the University of Mississippi

(Under the direction of Dr. Carol Britson)

Student anxiety, specifically test anxiety, is common hindrance to student

performance in various courses including Human Anatomy and Physiology at the

University of Mississippi. Through a sequence of three surveys we collected

demographic information, anxiety data related to the course, and test anxiety in general

We researched factors that could potentially influence student anxiety such as at what

point in the semester the student is evaluated, when students feel the most stressed,

outcomes on previous evaluations, and perceived outcomes of the course. We also

examined what effect the anxiety has on the student such as lowered performance,

lowered test scores, and course withdrawal. Our results showed that those who entered

the course anxious were likely to remain anxious throughout its entirety despite how they

were doing in the course. We also found that those who reported higher levels of test

anxiety were more likely to receive lower scores on exams and other assessments. Lastly,

our analysis showed that females were more likely to report higher levels of anxiety, but

it also should be noted that the sample size of females was relatively large compared to

the sample size of males. This data can be used to gain further insight on when and what

type of student is most likely to have detrimental effects due to test anxiety. We believe

further research could investigate which levels of stress provide beneficial and which

prove to be deterrents to success in the course.

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Introduction

Stress and anxiety are factors that play a significant role in student attitudes, adaptability, and course outcomes. The American College Health Association implemented a nationwide survey of undergraduate students in the United States to identify the largest factors that influence academic outcomes. The survey found that stress (40% of all students) and anxiety (29% of all students) are the two most common hindrances to academic performance (Hsu and Goldsmith 2021). To deter these hindrances, the roles and triggers of stress and anxiety in students must be evaluated. Typically, college students might perceive that a certain situation or course exceeds their ability to succeed. This perception of potential failure, in turn, can lead to stress. Stress can then lead to anxiety which can be described as "ambiguous feelings that arise from unresolved stress" (Hsu and Goldsmith 2021).

High levels of perceived stress in courses have been found to lower academic performance (Häfner, et al., 2013). This high level of stress is largely derived from students' perceptions of how their performance in the course will affect their future (Fournier, et al., 2017). Gateway courses that are necessary for students to progress through their chosen major, are known to cause high levels of stress and anxiety in undergraduate students. This can specifically result in test anxiety, which is described as "the set of phenomenological, physiological, and behavior responses that accompany concern about possible negative consequences or failure on an exam or similar evaluative situation" (Zeidner, 1998). Anxiety can be experienced before, during, and following an

examination (Pintrich and DeGroot 1990). It has also been found that performance anxiety in STEM courses can lead to avoidance of the situation as a whole and low levels of motivation as a result. Similarly, studies show that less than 40% of students that begin college as STEM majors will actually complete their STEM degree (England et al., 2017). The healthcare and STEM fields are growing each day and it is imperative that we find ways for students to cope with anxiety and persevere in their respective major. Prerequisite courses are vital for STEM and healthcare fields and need to be further studied by students and researchers, rather than avoided. The role of anxiety during a course makes it an important factor to explore when trying to manage student anxiety.

Human Anatomy and Physiology (HAP) is a course that often serves as a requirement for an undergraduate major or as a prerequisite for a graduate program. HAP is a prerequisite for a variety of occupations including, but not limited to, nursing, physical therapy, physician assistant, and occupational therapy graduate programs. Typically, prerequisites are implemented because the information used in these occupations is extremely complex and is most successfully learned through a structure where information is layered on rather than inundating the student with all the information at once (Shaffer et al., 2016). Pre-requisite courses such as HAP are vital steppingstones in preparing students to enter graduate programs, but also are commonly a significant source of stress due to the gateway nature.

Beginning with low order cognitive skills in one course and then elevating that skill in another course can provide a sense of confidence and familiarity in the student. This layering allows students to understand the information and apply it to future situations, thus becoming more scientifically literate more readily. For example, studies

have found that students who had taken any undergraduate histology or anatomy course earned a significantly higher course grade in a medical school histology or anatomy course in turn (Shaffer, et al, 2016).

HAP is a high stakes two semester course and in order to proceed to the second semester, the student must make a C or better in the first semester. To proceed in their degree path, the students must pass the entire sequence, which can be daunting for many. This creates two barriers to success in the student's mind thus elevating the perceived stress and anxiety around the course. Due to this sense of alarm, if the student fails the course, the individual is more likely to change majors or reconsider their respective path (Koch, 2017). Student failure in HAP courses is common, as is student attrition (Diviney and Lunsford, 2020). It is also a common issue for the student to forgo the course in general or obtain the course through what they view as a slightly "easier" path such as online or through a community college while still attending their respective university. In order to combat student stress and anxiety, we must first understand the factors that can cause them. It has been found that there are three major components of stress: daily hassles, perceived stress, and stress outcomes. Daily hassles can be anything such as going to class or completing a homework assignment. The next component is the perceived stress from the individual hassle. When perceived stress is at higher levels, it has been found to affect academic performance more heavily, which then influences stress outcomes such as anxiety or depression (Häfner, et al., 2013).

Gateway courses specifically are known to cause high levels of stress and anxiety in college students. Courses must meet three criteria to be considered a gateway course: the course has high enrollment, the course is foundational for the students' course work,

and the course is high stakes (Koch, 2017). There is no set threshold on how many students must be enrolled to be considered high enrollment due to various factors at different universities. Koch describes this fluxion in size by stating, "all institutions, whether they enroll 400 or 40,000 undergraduates, have high-enrollment courses. What constitutes high enrollment at one institution differs from another—but the courses are a ubiquitous feature in U.S. higher education." Gateway courses are considered fundamental in that they are usually general education courses and are required in order to proceed to the next level of education. From an educator's standpoint, "high stakes" refers to the rate of D, Fail, Withdrawal, or Incomplete grades given across the course (Koch, 2017). From a student's perspective, "high stakes" refers to the fact that much of their future lies in passing the course. This perception can in turn induce stress (Fournier, et al, 2017). In turn, stress in gateway courses often leads to anxiety, ambiguous feelings that arise from unresolved stress, or test anxiety, the set of phenomenological, physiological, and behavior responses that accompany concern about possible negative consequences or failure on an exam or similar evaluative situation (Zeidner, 1998). These factors create an environment in which the role of anxiety could be counter-productive to the success of both educators and students.

Students who experience test anxiety have been found to score lower on examinations than their less anxious peers. Similar to stress, test anxiety can be broken down into four different levels which are cognitive (worry), emotional, physiological, and behavioral levels (Klug, et al., 2019). For this study we will be evaluating levels of cognitive anxiety and emotional anxiety associated with examinations. Cognitive test anxiety, also known as worry, is described as the anxiety felt before, during, and after an

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examination. Emotional test anxiety can be referred to as the physical symptoms experienced due to anxiety such as nausea (Cassady and Johnson, 2002).

The goal of this research is to take a deeper look at student anxiety in a Human Anatomy and Physiology undergraduate course at the University of Mississippi in hopes of gaining a better understanding of course anxiety and to identify methods to prevent or manage it. Using this information, we will identify the point in the semester students are most anxious and what aspects of the course make students anxious. In turn, our goal is to identify to what level the anxiety affects grades in the course, positively or negatively. We will compare general levels of test anxiety among students in HAP compared to others using the Test Anxiety Inventory (TAI), Spielberger (1980). We hope to identify factors that trigger student anxiety in a way that will be useful to educators across the country who are fighting course withdrawal and course drop out.

Methods

To begin our research, 297 students were recruited from the HAP I course at the University of Mississippi to participate in the study. Students enrolled in HAP I at UM are traditionally pursuing careers in nursing, physical therapy, occupational therapy, physician assistant, or dietetics (Hillhouse and Britson, 2018; O'Connor and Britson, 2017). This class is considered to be a large enrollment course for the University of Mississippi with fall semester enrollments ranging from 200-390 students per semester. The course also is offered during the summer term as well. When the course is full it allows 390 students to be enrolled in one lecture section and 13 lab sections. 390 students were enrolled in A&P I in the fall of 2017 (Hillhouse and Britson, 2018). Conversely, only 297 students were originally enrolled in HAP in the fall semester of 2021. This is about a 23.8% decrease in enrollment in the course for Fall 2021. This decrease in enrollment could be due to numerous factors. We believe student anxiety and the daunting reputation of the course are factors to consider in this decline in enrollment, but this is only a potential factor due to enrollment rates across the nation at various universities and institutions of higher education have declined in the past five years (Whitford, 2021).

The HAP I course covers topics such as anatomy and physiology of cells, tissues, the integumentary system, skeletal, muscular, and nervous systems of the human body. These topics are explored during the traditional lecture as well as the lab section. Five separate, multiple choice examinations covering lecture content are spread throughout the semester. There are also two lab practical assessments carried out during the respective lab sections where students must correctly identify anatomical structures covered during

the semester. The lab practical assessments are structured as fill in the blank. There are also other assessments provided to the students throughout the course such as online homework assignments, lab quizzes, in-lab assignments, and extra credit reinforcement modules.

This study was approved as Exempt by the University of Mississippi IRB 45 CFR 46.101(b)(#2) (Protocol #21x-258) before the fall semester began. Students received a consent form, demographic profile sheet, and the initial survey in their respective lab sections the week of September 7-9 (the week before the first examination). The consent form confirmed that students were at least 18 years of age and that their course scores could be used in this research. The demographic sheet asked for lab section, seat number, year in school, major, reason for taking the course, and gender (optional). This was an in-house survey that contained Likert-style questions and was given on paper. The first survey consisted of eleven questions and assessed student anxiety in various aspects such as in lecture, throughout preparing for exams, during exams, and the extent this anxiety affected the individual and their performance (Appendix A). The purpose of this survey was to gauge student anxiety levels based on their perception of how they were going to perform in the course before their first exam to provide a baseline for each student. Student responses were recorded on whether they strongly disagree, disagree, neutral, agree, or strongly agree to each question. The number of responses for each option were then tallied for each question. Out of the 297 students enrolled in the course, 225 students signed the consent form that they were 18 years of age or older and gave permission to use their scores in the study.

The second survey to be given was the Test Anxiety Inventory (TAI) (Spielberger, 1980). This survey was distributed October 12-14, 2022, which was after exam two and the first lab practical. This survey was completed to gauge overall test anxiety levels in students taking HAP at the University of Mississippi. 243 students completed survey 2, but only 219 of these students had also completed and signed the consent form and completed survey 1. There are three scoring components to the TAI survey: emotionality, worry, and the total score. The TAI Emotionality Subscale is calculated by adding the circled values (1, 2, 3, or 4) marked for items # 2, 8, 9, 10, 11, 15, 16, and 18. The minimum score is 8 and the maximum score is 32. The TAI Worry Subscale (W) is calculated by adding the circled values (1, 2, 3, and 4) for items # 3, 4, 5, 6, 7, 14, 17, and 20. The minimum score is 8 and the maximum score is 32. For the TAI total score (T) items # 1 (values of item 1 are reversed), 12, 13, and 19 are added together and combined with E and W scores. The minimum score is 20 and the maximum score is 80.

The third survey (Appendix B) was given November 16-18 after the 4th examination. This survey included questions that related directly to HAP at the University of Mississippi. Student responses were recorded on whether they strongly disagree, disagree, neutral, agree, or strongly agree to each question. The number of responses for each option were then tallied for each question. After the third survey, the only graded assessments students had left to complete were the second lab practical and the fifth exam. We hypothesized that student anxiety levels would rise or lower depending on how they had been doing in the course up to this point. 223 students completed survey 3, but only 200 of these students completed the consent form. 190

students complete the consent form along with all three surveys with 179 of those consenting to use their scores for analysis as well.

Descriptive statistics were calculated for all variables. A two-way analysis of variance, with gender and year in college as the independent variables, was used to test for effects on survey responses. Correlation analyses between student exam and lab practical scores, gender, year in college, and selected survey questions were also conducted. The level of significance was set at alpha = 0.05 and all tests were performed using SPSSV2 software licensed to the University of Mississippi. Effect size of significant results were estimated through calculation of the partial Eta value and Pearson's r for ANOVA and correlation tests, respectively. Through these analyses we hope to determine at which point students are most anxious and what factors play a role in this anxiety, in order to create methods to combat student anxiety

Results

Student Profiles

Survey responses reflect that most students are in their second year while taking HAP but there is a range of students from year one to post-undergraduate. Survey data showed specifically that 52% were in their second year and 31% in their third year, meaning students in their second and third year accounted for over 80% of students taking the course. The majority of students are in a science based major and are on a pre-nursing or pre-health track. Out of the students enrolled in HAP in the fall of 2021, 24% were Allied Health Studies, 31% were Exercise Science, 13% were Nutrition and Dietetics, 26% were pre-nursing, and 17% stated another pre-health track. Approximately 70% of students stated they were taking the course for a their major or as a prerequisite for a graduate program. Additionally, 78% of students taking the course identified as female.

Survey #1

All questions were graded on a Likert type scale from strongly agree to strongly disagree. For survey 1, "strongly agree" was given a numerical equivalent of 5, "agree" a value of 4, "neutral" a value of 3, "disagree" a value of 2 and "strongly disagree" a value of 1. Question 1 stated, "I was nervous to sign up for this course based on things I heard about the nature of the course." There was a significant interaction effect of gender and year (F= 2.466, df= 5, p= 0.034, partial Eta = 0.058; Fig. 1). Fourth year females and males were more likely to agree that the reputation of the course caused feelings of nervousness before beginning the course. Across years in college, females were more

likely to agree that the reputation of the course played a role in anxiety levels. First year students reported significantly lower levels of perceived anxiety about the course compared to upper-class students.

Question 2 stated, "I was nervous to sign up for this course based on the content of this course." There was a significance effect of gender in the student responses (F= 3.420, df= 2, p= 0.035, partial Eta= 0.033). 175 students identifying as female had a mean score of 3.3257 ($\pm$ 0.005); 34 students identified as male and had a mean score of 2.5588 ($\pm$ 1.050), and 6 students declined to specify gender and had a mean score of 2.5 ($\pm$ 1.378). These questions show us that on average females were more likely to have increased anxiety before the course started due to prior ideas of what the course content would be like. Males were more likely to respond "disagree" to this question compared to females where the average response was "agree."

Question 3 stated, "It makes me anxious that I have to pass this course to further my degree." There was a significant effect of year (F = 2.993, df = 4, p = 0.020, partial Eta = 0.056) with students in their first year reported lower levels of anxiety related to passing the course with a mean score of 3.3750 ($\pm$ 1.302) relative to those further in their degree. The groups that reported the highest levels were those in their third year with a mean score of 3.6522 ($\pm$ 1.026) and those in their fifth year with a mean score of 4.5 ($\pm$0.707).

Students were asked to rate their agreement with questions regarding anxiety and test taking itself. Question 7 stated "Taking an Anatomy and Physiology exam makes me anxious." There was a significant interaction effect of gender and year in response to the

statement (F = 2.693, df = 5, p = 0.005, partial Eta = 0.079; Fig. 2). Females were more likely to agree or strongly agree with this statement whereas males were more likely to feel neutral about this statement. Students in their second year had the highest rates of agreement and first years with the lowest level. For question 7 responses there were significant, positive correlations with survey 1, questions one (df = 215, p < 0.001, r = 0.346), two (df = 215, p <0.001, r = 0.416), and three (df = 215, p <0.001, r = 0.521).

Question 8 stated, "When taking an Anatomy and Physiology test, I get so anxious that I feel as if I forget concepts I know." There was a significant interaction effect for gender and year to this statement (F = 3.185, df = 5, p = 0.009, partial Eta = 0.078; Fig. 3).   Correlation analyses showed that students who agreed with this statement scored lower on all examinations in the course [e.g., a negative correlation; Exam 1 (df = 201, p = 0.008, r = -.186); Exam 2 (df = 201, p = 0.031, r = -0.152); Exam 3 (df = 200, p = 0.001, r = -0.233); Exam 4 (df = 200, p = 0.032, r = -0.151); Exam 5 (df = 201, p = 0.041, r = -.0144); Lab practical 1 (df = 201, p= 0.046, r = -0.141). Question responses were positively correlated with responses for survey one, questions one (df = 201, p<0.001, r = 0.304), two (df = 201, p<0.001, r = 0.309), three (df = 201, p<0.001, r = 0.476), and seven (df = 201, p<0.001, r = 0.524).

Survey #2, Test Anxiety Inventory (TAI)

There was significance found for the cofactors of gender and year for the TAI emotionality score (F = 2.818, df = 4, p = 0.027, partial Eta = 0.058; Fig. 4). First year females were most likely to have higher scores on the emotionality subsection, whereas first year males were the most likely to report the lowest scores on the emotionality

subsection. There was also significance found for the cofactors of gender and year for the TAI total score ($F = 2.901$, $df = 4$, $p = 0.023$, partial Eta = 0.060). Data also showed that students who reported high scores for Survey 1 questions one ($df = 194$, $p = 0.001$, $r = 0.236$), two ($df = 194$, $p = 0.0014$, $r = 0.177$), three ($df = 194$, $p<0.001$, $r = 0.288$), seven ($df = 194$, $p <0.001$, $r = 0.425$), and eight ($df = 180$, $p<0.001$, $r = 0.457$), were also more likely to have higher emotionality and total scores for the TAI. For emotionality correlations with survey 3 data, it was found that those who reported higher levels of anxiety on questions two ($df =168$, $p<0.001$, $r = - 0.433$), four ($df =168$, $p < 0.001$, $r = - 0.386$), six ($df = 168$, $p<0.001$, $r = -0.449$), and nine ($df = 168$, $p<0.001$; $r = -0.551$, also scored higher on the emotionality subsection of the TAI. It was also found that those that had higher total scores on the TAI were more likely to end with a lower grade in the class ($df = 196$, $p = 0.005$, $r = -0.202$).

Survey #3

For survey 3 strongly agree was given a numerical equivalent of 1, agree an equivalent of 2, neutral an equivalent of 3, and strongly disagree an equivalent of 5. Questions 2, 6, and 9 on survey #3 further addressed specific factors that might play a role in test anxiety. Question 2 stated, "I feel anxious that I have to take a final examination for this course." There was significance found for the cofactor of gender ($F= 4.450$, $df = 2$, $p = 0 .013$, partial Eta = 0.051). 146 individuals identified as female and had a mean score of 2. 3151 (±1.074). 26 individuals identified as male and had a mean score of 3.2692 ($\pm0 .777$). Five individuals declined to specify gender and had a mean score of 2.2 (±1.095). Overall, females were much more likely to agree or strongly agree with this statement. Question 6 states, "I feel most anxious right before an examination in

this course." The factors of gender and year together were found to be significant (F= 3.043, df = 4, p =0 .019, partial Eta = 0.069; Fig. 5). Third year females most strongly agreed with this statement, whereas second- and third-year males were likely to feel neutral in response to this statement. Question 9 states "I think about how much my test will impact my grade average while I am taking it." The factors of gender and year together were found to be significant (F= 3.993, df = 4, p = 0.004, partial Eta = 0.088). First year females most strongly agreed with this statement and third year males were more likely to feel neutral regarding this statement. Further research found that those who disagreed with this statement were more likely to score higher on exams one, two, three, both lab practicals, and the course as a whole.

Questions 4 and 5 addressed feelings of anxiety across the semester. Question 4 states "My anxiety in this course increased as the semester progressed." There was a significance effect of gender (F= 5.218, df = 2, p = 0.006, partial Eta = 0.059). 146 individuals identified as female and had a mean score of 2.5890 ($\pm$1.054). 26 individuals identified as male and had a mean score of 3.4615 ($\pm$ 0.646). Five individuals declined to specify their gender and had a mean score of 2.6 ($\pm$0.894). Thus, females were more likely to feel neutral or agree with this statement compared to males who were more likely to feel neutral or disagree with this statement. Further analysis indicated that those who agreed with this statement also were more likely to have score poorly on every examination. Question 5 states, "My anxiety in this course decreased as the semester progressed." There was a significant difference found for gender (F= 4.191, df= 2, p= 0.017, partial Eta = 0.048). 146 individuals identified as female and had a mean score of 3.7945 ($\pm$ 0.769). 26 individuals identified as male and had a mean score of 3.1154

($\pm$0.909). Five individuals declined to specify gender and had a mean score of 3.8 ($\pm$ 0.837). Females were more likely to disagree with this statement compared to males who widely felt neutral about this statement. Further analysis of data found that those who disagreed with this statement were more likely to have scored better on all examinations and the course as a whole. Thus, higher scores (less anxiety) on survey 3 questions two (df = 178, p< 0.001, r = 0.268), four (df = 178, p < 0.001, r = 0.326), and nine (df = 178, p = 0.028, r = 0.165) showed a correlation to higher final grade in class.

Discussion

  The goals of our study were to understand the timing of anxiety development, determine factors that heighten anxiety levels, and identify the role of test anxiety in individual performance. Through a sequence of three surveys we collected demographic information, anxiety data related to the course, and test anxiety in general. Many students in this course have very high levels of stress that ultimately lead to poor course performance.

  Survey one was completed before the first examination in order to gauge levels of anxiety before a true evaluation in the course. It was found that students who reported higher scores to question 7, "Taking an Anatomy and Physiology exam makes me anxious," were more likely to also report higher scores to survey one, questions one, two, and three. These questions regarded anxiety about the reputation of the course. This indicates that these students were highly anxious before the course began and believed they would be nervous on the first examination, despite never taking one.

  The Test Anxiety Inventory (TAI) (Spielberger, 1980) was completed after exam two and the first lab practical. The TAI contains questions about test anxiety in general not specifically related to the HAP course. We used this test to determine whether students' anxiety was related to test taking in general or course related. Those who had higher perceived levels of difficulty and anxiety induced from the course also scored higher on the TAI. For the emotionality subsection specifically, students reported higher scores for survey one, questions one, two, three, seven, and eight in the correlation analysis. Considering the questions from survey one dealt with course reputation and test

anxiety, it is possible that students with high perceived stress of the course have an underlying issue of generalized test anxiety, as the TAI surveys assess test anxiety in general and not for a specific course.

Finally, survey three was given after the third and fourth examinations, exam five was still to be taken at this point. This was a crucial point in determining course anxiety since most grades were completed, but there was still one examination to complete. For correlation analysis with survey 3 data, it was found that those who reported higher levels of anxiety on questions two, four, six, and nine, also reported higher levels of anxiety on the emotionality subsection of the TAI. Question 6 states, "I feel most anxious right before an examination in this course" and Question 9 states "I think about how much my test will impact my grade average while I am taking it" indicating that the majority of the anxiety derived from the course at this point in the semester might be from examinations themselves. Question 4 states "My anxiety in this course increased as the semester progressed." The correlation between all of these questions and the TAI scores indicate that those who enter the course test anxious are more likely to remain anxious throughout the course despite other factors. This anxiety correlated with final grades as well. It was found that higher total scores on the TAI survey were more likely to end with a lower grade in the class compared to less anxious students. This is supported by previous studies that have found evidence of high emotionality being associated with declining performance, but only when the individual is also experiencing high levels of worry (Morris et al., 1981; Schwarzer, 1984). This data is also supported by a study done by Cassady and Johnson that investigated the relationship between test anxiety and academic perform. The study included 4,000 undergraduate and 1,414 graduate students. Their

results showed a significant but small inverse relationship between test anxiety and grade point average (GPA) in both groups (Cassady and Johnson, 2002). Our analysis did not find significance between the worry score and course grades.

It is also important to discuss other factors involved such as gender, year, and the interaction of gender and year. Several questions had significant relationships between student responses and gender in the ANOVA analyses. For survey 1 questions one, two, and seven and for survey 3 questions two, four, and five were found to be significant for the cofactor of gender, showing that females were more likely to respond in the affirmative to all these questions. This indicates that females are either more likely to experience anxiety in HAP or are more likely to acknowledge their anxious feelings. A factor analysis study done by Bentler (1980) found results consistent with what we have found. His results also showed that females were more likely to report higher levels of anxiety on the TAI. Specifically, "The two factors, worry and emotionality, were correlated (0.67 in the female sample and 0.54 in the male sample). Item analysis was also performed for internal consistencies of Emotionality Subscale (0.91 for girls, 0.86 for boys) and Worry Subscale (0.75 for girls, 0.71 for boys)" (Shabbir and Mohsin, 2013). Similarly, a study done by Stallworth-Clarket al., (1998) found that Test Anxiety Inventory total scores for female students were 3 to 5 points higher than those of male students. It is also interesting to note that a previous study done using the TAI on graduate students, found that while females reported higher levels of test anxiety, they also had significantly higher GPAs than their male counter parts (Chapell et al., 2005). For survey 1 questions one, three, and seven the factor of year was found to be significant. For survey one question one, on average students in their first year were more

likely to agree with the statement. This is interesting because this means students in their fourth year were intimidated by the course due to its reputation, despite having had completed significant coursework at this point. For question 3, students beyond their fourth year were most likely to agree with this statement. This statement concerned passing the course to finish a degree, which could play a factor in this response data. For question 7, those beyond their fourth year were most likely to agree with this statement as well. The factors of gender and year were also analyzed together. For question one of survey one, fourth year females and fifth year males were found to most strongly agree with this statement. For question seven of survey one females in their second year and males in their fifth year were the most likely to agree with this statement. For question eight of survey one, first year females and fifth year males were more likely to strongly agree with this statement. We are reluctant to draw fine conclusions about this data due to the relatively small sample size of males to females and the small amount of those in their first, fourth, and post fourth years.

In order to maximize academic success in a gateway course teachers must reevaluate the teaching methods which play an integral role in fostering a positive learning environment in order to reach the pinnacle potential for academic success (Diviney and Lunsford, 2020). We believe this information will be vital to not just HAP courses but to gateway courses at various colleges as students everywhere are stressed and often feel anxious in gateway courses. This idea is reinforced by a study done on undergraduate and graduate students that found test anxiety to be correlated with lower GPAs (Chapell et al., 2005). We also believe that this data will aid educators in creating methods to reduce anxiety in order to improve performance and course retention. To

completely understand stress levels which are necessary for success, eustress, and levels

that are detrimental, distress, further research needs to be conducted.

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**Table 1.** Demographic information for Human Anatomy and Physiology I at the University of Mississippi.

| Demographic Information	
Gender (optional)	
Female	195
Male	35
Year	
1st	9
2nd	129
3rd	77
4th	24
5th+	3
Major	
Allied Health Studies	62
Exercise Science	75
Pre-Nursing	74
Nutrition and Dietetics	32
Other Pre-Health	41
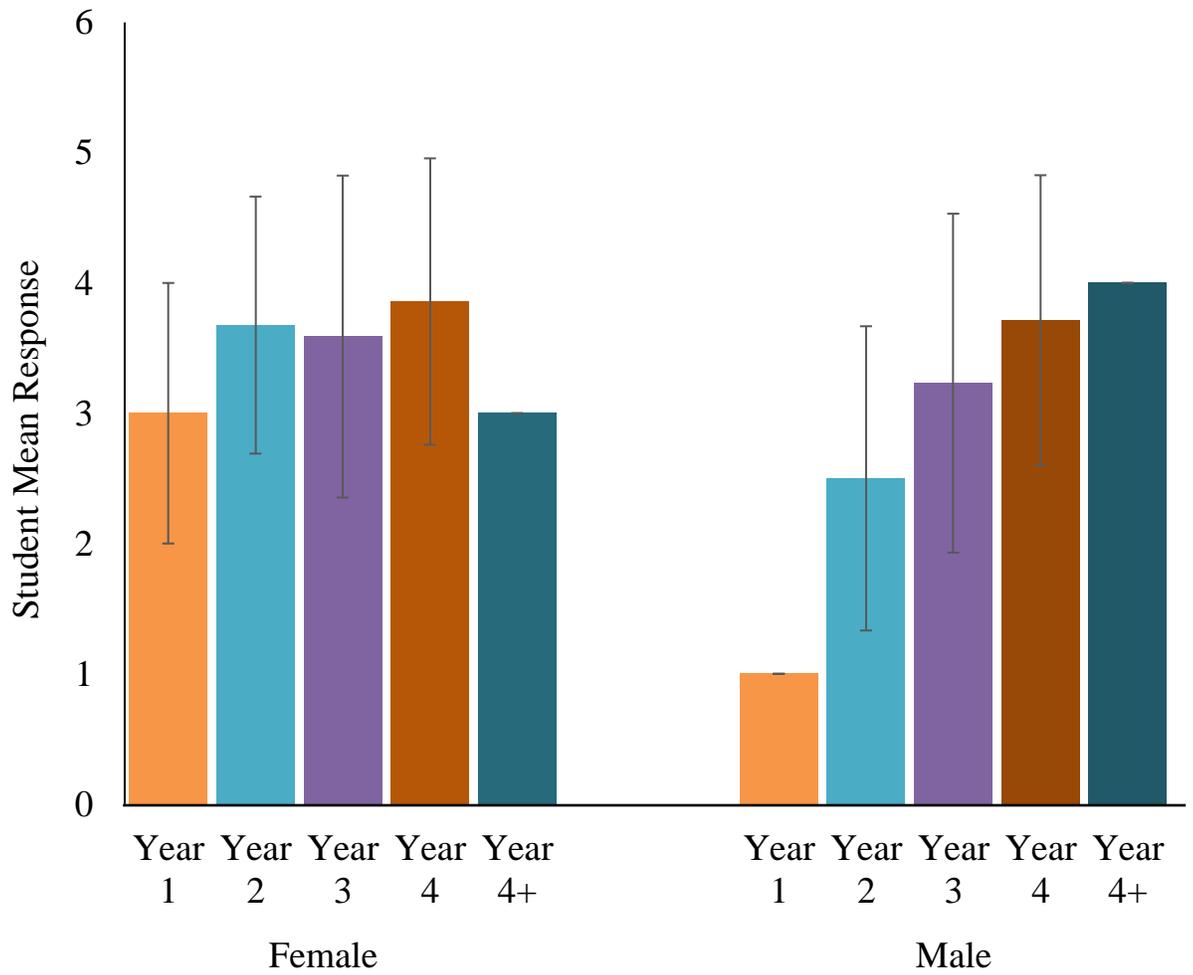
Figure 1. Human Anatomy and Physiology I student responses for survey 1 question 1 "I was nervous to sign up for this course based on things I heard about the nature of the course."
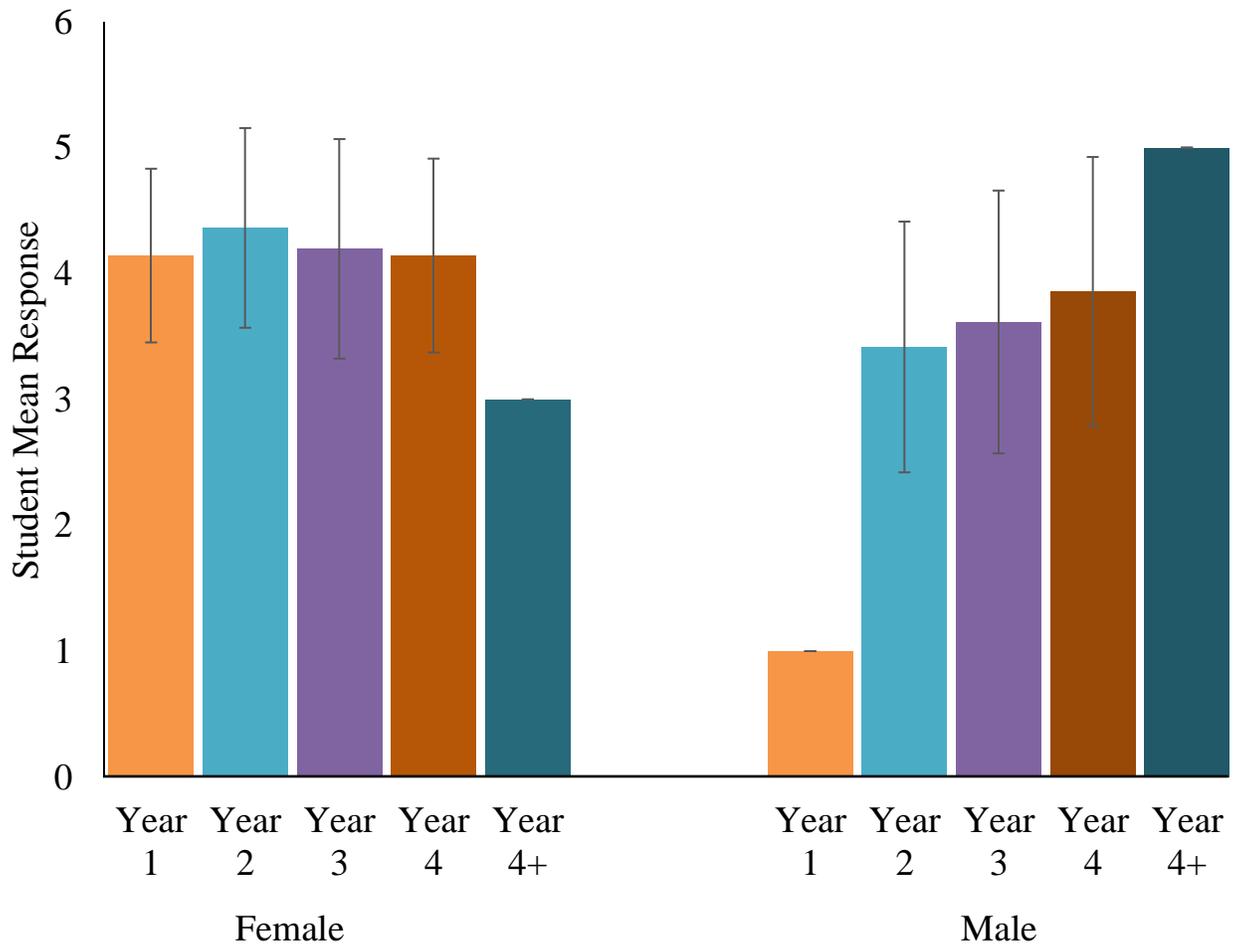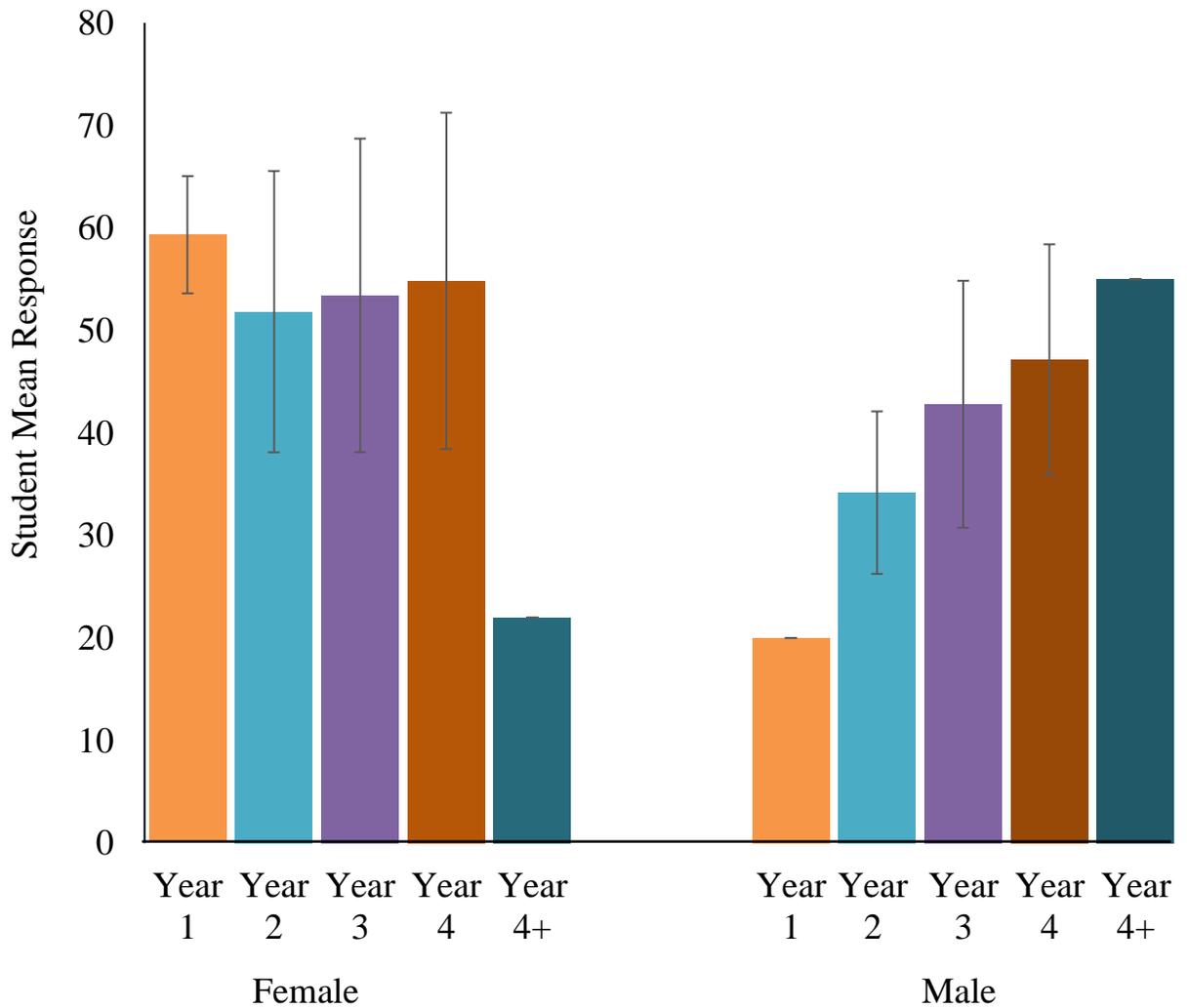
Figure 2. Human Anatomy and Physiology responses Survey 1 Question 7 "Taking an Anatomy and Physiology exam makes me anxious."
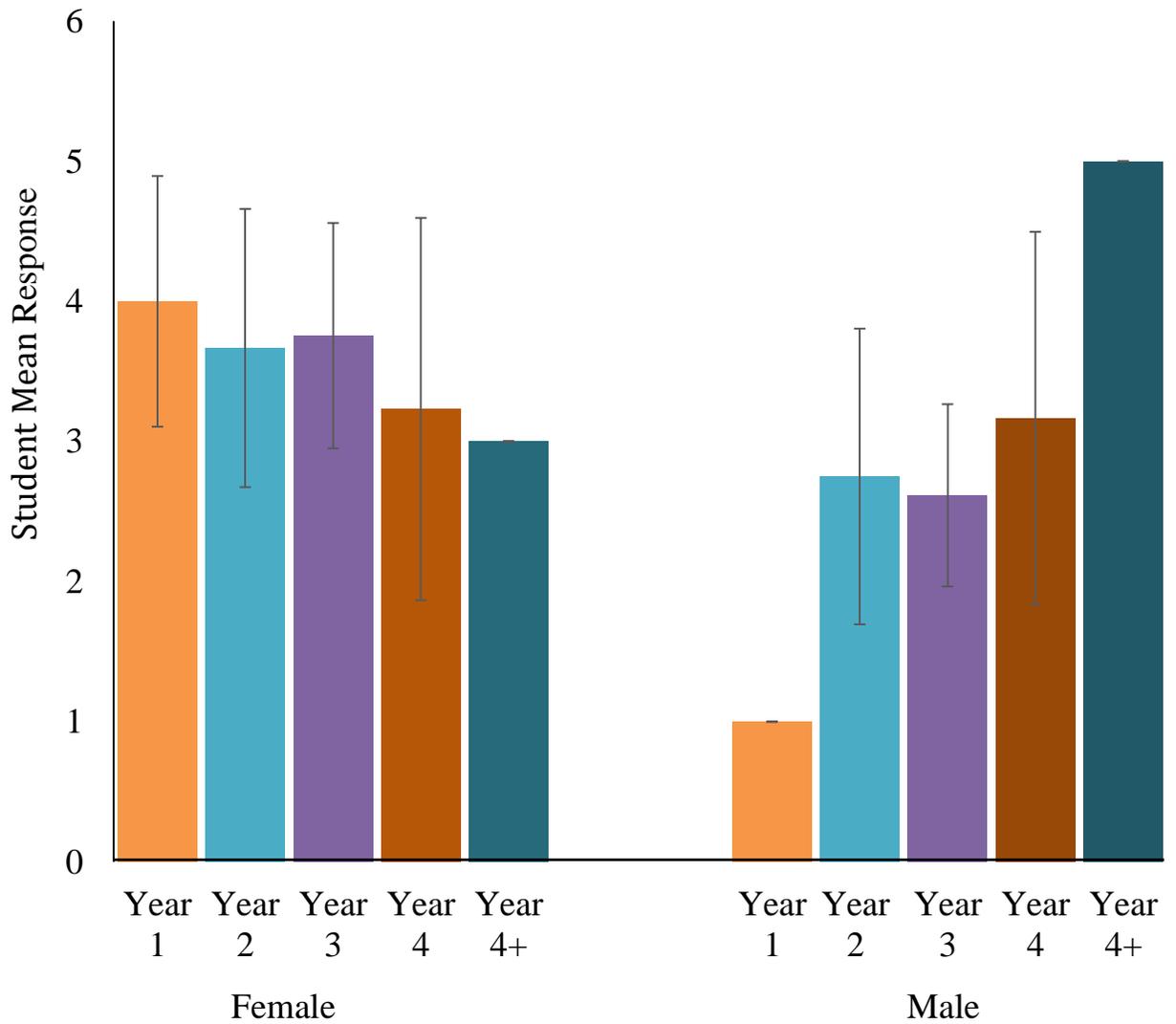
Figure 3. Human Anatomy and Physiology responses Survey 1 Question 8 When taking an Anatomy and Physiology test, I get so anxious that I feel as if I forget concepts I know."
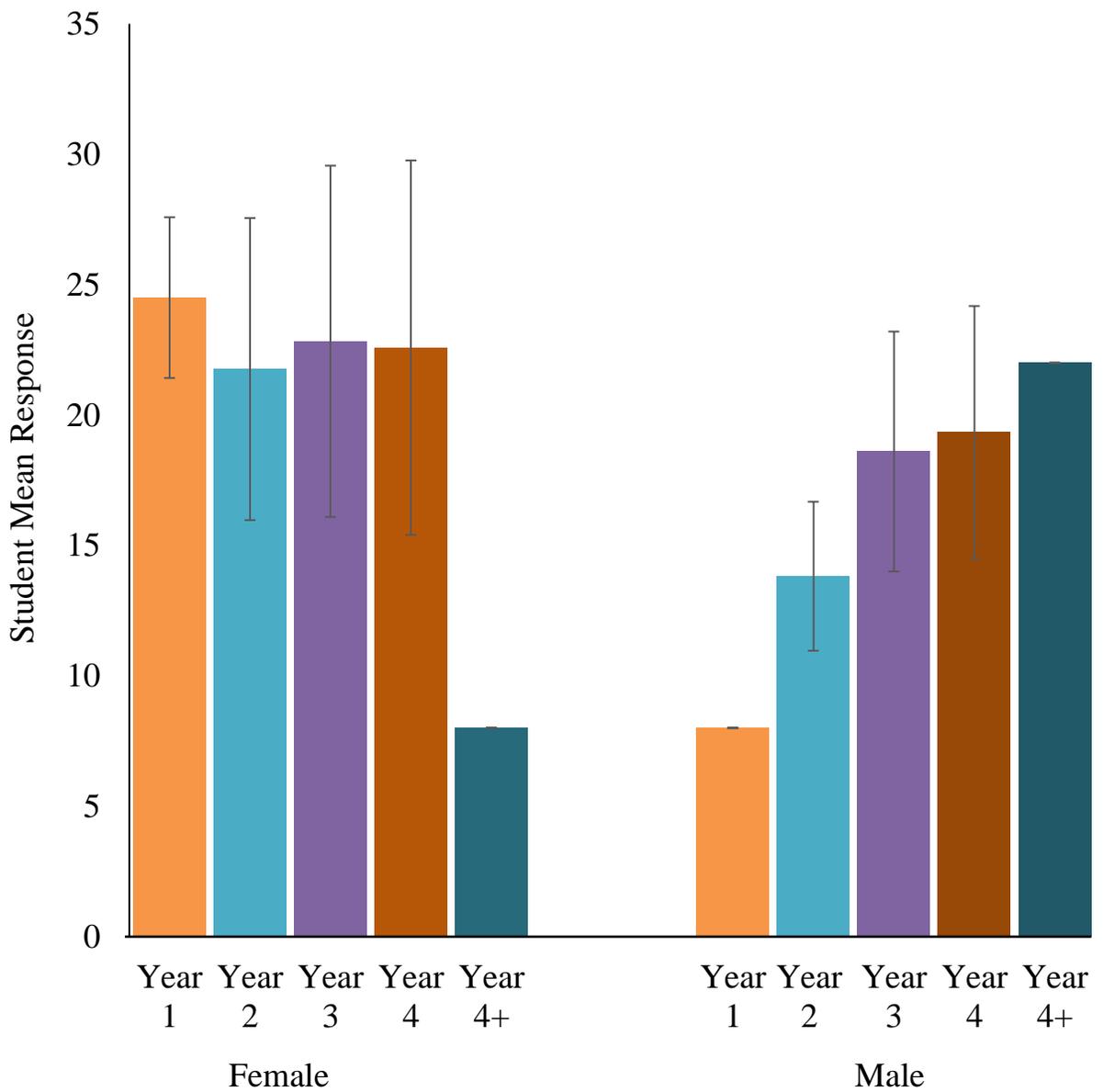
Figure 4. Human Anatomy and Physiology I student results for TAI Emotionality sub-score. . The TAI Emotionality Subscale is calculated by adding the circled values (1, 2, 3, or 4) marked for items # 2, 8, 9, 10, 11, 15, 16, and 18. The minimum score is 8 and the maximum score is 32.

Figure 5. Human Anatomy and Physiology I student results for TAI total score. For the

TAI total score (T) items # 1 (values of item 1 are reversed), 12, 13, and 19 are added

together and combined with E and W scores. The minimum score is 20 and the maximum

score is 80.

Appendix A.

Survey 1

1. What is your gender (optional)? _____
2. How old are you? _____
3. What is your academic classification? (freshman, sophomore, etc.)_____
4. What is your major? _____
5. Have you taken this course before? _____
6. Is there anything else you would like us to know about yourself? _____

Answer the following questions based on how they pertain to your feelings in this course.

1. I was nervous to sign up for this course based on things I heard about the nature of the course.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

2. I was nervous to sign up for this course based on the content of this course.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

3. It makes me anxious that I have to pass this course to further my degree.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

4. I would not take this course if it was not required for my degree, due to the level of difficulty.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

5. Anatomy and Physiology lectures make me anxious.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

6. Studying for Anatomy and Physiology makes me anxious.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

7. Taking an Anatomy and Physiology exam makes me anxious.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

8. When taking an Anatomy and Physiology test, I get so anxious that I feel as if I forget concepts I know.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

9. When taking an Anatomy and Physiology test I start to feel physical signs of stress such as nausea.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

10. If I do poorly on a test, I will drop the course.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

11. If I do poorly in this course I will change my major.

Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

Appendix B

Survey #3

Answer the following questions based on how they pertain to your feelings in this course.

1. I feel like this course was as difficult as I perceived it would be.

   Strongly Agree   Agree   Neutral   Disagree   Strongly
   Disagree

2. I feel anxious that I have to take a final examination for this course.

   Strongly Agree   Agree   Neutral   Disagree   Strongly
   Disagree

3. Making good grades on examinations reduced my anxiety in this course.

   Strongly Agree   Agree   Neutral   Disagree   Strongly
   Disagree

4. My anxiety in this course increased as the semester progressed.

   Strongly Agree   Agree   Neutral   Disagree   Strongly
   Disagree

5. My anxiety in this course decreased as the semester progressed.

Strongly Agree   Agree   Neutral   Disagree   Strongly
Disagree

6. I feel most anxious right before an examination in this course.

Strongly Agree   Agree   Neutral   Disagree   Strongly
Disagree

7. I feel most anxious during an examination in this course.

Strongly Agree   Agree   Neutral   Disagree   Strongly
Disagree

8. I feel physically ill when I think about taking a test for this course.

Strongly Agree   Agree   Neutral   Disagree   Strongly
Disagree

9. I think about how much my test will impact my grade average while I am taking it.

Strongly Agree   Agree   Neutral   Disagree   Strongly
Disagree

10. I believe that this course made my anxiety for future courses increase.

Strongly Agree   Agree   Neutral   Disagree   Strongly
Disagree