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# Cognitive Test Anxiety, Course Grades, and Course Repetition in Associate Degree Nursing Students

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Walden University
2023

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## Abstract

Students with high levels of cognitive test anxiety (CTA) score lower on their exams than students with low levels of CTA. Prevalence of CTA among associate degree nursing (ADN) students and whether there was a relationship between CTA and course grades was unknown. Furthermore, the correlation between course repetition and CTA was also unknown. The purpose of this quantitative study was to determine the relationship between CTA and course grades and the correlation between course repetition and CTA among first-year ADN students at a multicampus Midwestern community college. Jeffreys' nursing universal retention and success (NURS) model was the theoretical framework for this study. This study involved using a quantitative methodology with a nonexperimental design. An online survey was used to collect data from a convenience sample of 72 first-year ADN students. Data analysis was completed using a bivariate linear regression and point biserial correlation. A statistically significant inverse relationship was found between CTA and course grades. There was not a statistically significant correlation between course repetition and CTA. Since a relationship was found between CTA and course grades, all nursing students should be screened for CTA at the beginning of their program. Students with high levels of CTA can then be provided with the necessary interventions and services to help decrease their CTA and increase their retention and success.

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# Dedication

This study is dedicated to the nursing faculty who work tirelessly to improve their students' lives.

# Acknowledgments

I would first like to thank my wonderful husband, Chris. Without his love, support, and encouragement, I would not have been able to accomplish everything that I have.

I would also like to thank my parents, Sam and Leafy. They have always given me unconditional love and supported me in my dreams.

Finally, I would like to thank my committee chairs for their support and guidance through this dissertation process. Their dedication to teaching and furthering students in the nursing profession has been an inspiration.

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# Chapter 1: Introduction to the Study

The demand for registered nurses (RNs) in America is expected to increase by 6% between 2021 and 2031 (Bureau of Labor Statistics, U. S. Department of Labor, 2022). Associate degree nursing (ADN) programs comprise 58% of RN programs in the country and are expected to supply more new nurses to help alleviate this nursing shortage (Eudy & Brooks, 2022; National League of Nursing [NLN], 2022). One factor affecting the nursing shortage is the low retention of nursing students. In a study by Eudy and Brooks (2022), 19.4% of ADN students surveyed were unsuccessful in a first-year nursing course. Furthermore, Dries (2020) found that 70.1% of students who were readmitted to their program and allowed to repeat a failed nursing course were unsuccessful in their program. ADN student retention is significant because 58% of RN programs in America are ADN programs, and 38% are Bachelor of Science in Nursing (BSN) programs (NLN, 2022). Student retention is a complex phenomenon influenced by multiple factors (Pence & Suerth, 2020).

One factor that may influence student attrition and retention is cognitive test anxiety (CTA). CTA is defined as students' mental reactions or internal dialogue regarding exams that can occur before, during, or after the exam (Thomas et al., 2018). CTA involves multiple factors, including students' fear of failure, self-deprecating thoughts, and other distracting thoughts while studying for and during tests (Burhan et al., 2020). Students with high levels of CTA were found to have exam *T* scores that were 3-5 points lower than students with low CTA levels, which is enough to cause them to fail the exam (Duty et al., 2016). According to Salking and Frey (2020), *T* scores are a standard

score that are used to compare scores between two different groups. Duty et al. (2016) chose to use *T* scores instead of actual exam grades because *T* scores are standardized and allow for the comparison of exam grades between different classes. However, more research is needed to determine if high levels of CTA are enough to result in students failing a class, not just an exam. Knowing how CTA affects course failure is an important factor to understand so that students with high levels of CTA can be identified at the start of the nursing program, and they can then be referred to support services and taught interventions to lower their CTA. By reducing their CTA levels, these nursing students could score higher on exams and pass their nursing courses. Social change implications are that if more students are retained in nursing programs until graduation, it will result in more nurses entering the workforce, which will help alleviate the current nursing shortage.

Although CTA has been studied among BSN students, ADN students are a unique population and have different factors than BSN students that affect their retention and completion (Pence & Suerth, 2020). Course repetition is one factor that may affect CTA. Course repetition has been shown to be a significant problem for ADN students that can impact their retention. Lewis et al. (2018) found that 13% of students in public ADN programs had to repeat at least one required nursing course during the program compared to 4% of students in public BSN programs. Among ADN, BSN, and master's programs across America, 11.5% of nursing students failed and were required to repeat a course in one year (Lewis et al., 2022). Although course repetition is prevalent in nursing

programs, no studies were found that specifically addressed CTA among repeating students.

In Chapter 1, I present the background, problem, purpose, research questions and hypotheses, theoretical framework, nature of the study, definitions, assumptions, delimitations and limitations, and significance.

## Background

Generalized test anxiety is students' physiological and mental reactions to exams, which can occur before, during, or after the exam (Burhan et al., 2020; Cassady, 2004; Stojanovic et al., 2018). The physiological reactions to an exam are called emotionality, and the mental reactions are called worry or cognitive test anxiety (Cassady & Finch, 2020). Literature demonstrates nursing students worldwide experience high levels of generalized test anxiety. Most studies on generalized test anxiety in nursing students have been conducted with BSN students. Students with higher levels of generalized test anxiety typically have lower academic outcomes compared to students with lower levels of generalized test anxiety (Khalaila, 2015; Moore et al., 2021; Pence & Suerth, 2020). Only two studies that included ADN students were found. Using the Motivated Strategies for Learning Questionnaire (MSLQ), Pence and Suerth (2020) found ADN students at a Midwestern community college who experienced high levels of test anxiety had lower cumulative GPAs than students with low levels of test anxiety. Custer (2018) surveyed diploma, ADN, and BSN students in western Pennsylvania using the Test Anxiety Inventory (TAI). They discovered ADN students had significantly higher levels of

generalized test anxiety than diploma students. Interestingly, there was no difference in TAI scores between the ADN and BSN students.

CTA negatively affects student academic outcomes more than the physiological reactions of generalized test anxiety (Cassady, 2004; Cassady & Johnson, 2002; Hembree, 1988). CTA is measured using the Cognitive Test Anxiety Scale–Second Edition (CTAS-2), which can be divided into low (scores of 24-43), moderate (scores of 44-66), and high (scores of 67 or above) levels of CTA (Thomas et al., 2018). Midwestern psychology students with low levels of CTA performed better on exams than students with high levels of CTA (Cassady, 2004; Cassady & Johnson, 2002). Pate et al. (2021) found that 31.8% of American pharmacy students with high levels of CTA failed their licensure exam on the first attempt. Duty et al. (2016) found American BSN students with high CTA levels had exam *T* scores 3 to 5 points below those with low CTA levels. Knowing that students with high CTA levels have lower academic outcomes is important since 46.7% of American BSN students had high levels of CTA (Parrish, 2022).

My study contributed to nursing education's knowledge by addressing the gap in the literature regarding the impact of CTA on course grades among ADN students. This study was needed because ADN students are a demographically unique population compared to BSN students, who have been studied regarding CTA. Furthermore, while CTA has been shown to decrease exam scores, it has not been correlated with course grades. The other studies that investigated the correlation between CTA and exam scores did not investigate if the decrease in scores is enough to impact student retention and

progression (Cassady, 2004; Cassady & Johnson, 2002; Duty et al., 2016). This study was also needed because no previous studies examined course repetition's impact on CTA. If course repetition was shown to impact CTA, it would be important for educators to screen repeating students for CTA and provide interventions if they experience high CTA levels.

## Problem Statement

The problem was that nursing education scholars did not know the relationship between CTA and course grades among ADN students. Furthermore, nursing education scholars did not know the correlation between course repetition and CTA. No studies regarding CTA had been performed with ADN students. Other studies regarding CTA were conducted with BSN students or pharmacy students (see Burhan et al., 2020; Duty et al., 2016; Johnson, 2019; Pate et al., 2021). BSN students are demographically different than ADN students. For example, 42% of ADN students are over 30 years old, compared to 18% of BSN students (NLN, 2022). BSN students with high levels of CTA had exam scores 3 to 5 points below those with low CTA levels (Duty et al., 2016). In the seminal work on CTA, Cassady and Johnson (2002) showed educational psychology students with high CTA levels scored worse on exams than students with low levels of CTA. A study among American pharmacy students showed that 40% of students with high CTA had to repeat a class, and 22% had their graduation delayed, but students' course grades were not reported (Pate et al., 2021).

With the current nursing shortage and the predicted need for new nurses, nursing programs need to increase their retention and graduation rates as much as possible

(Ingram et al., 2022). If CTA is shown to decrease course grades and decrease ADN student retention, faculty could screen students for CTA at the beginning of a program. Students with high CTA levels could then be taught interventions to lower their CTA, which could lead to higher course grades and increased student retention. Considering that increased CTA has been shown to decrease exam scores over a semester, the cumulative effect could reduce a course grade into a failing range. Nursing schools traditionally have stringent grading scales and policies. For example, many nursing schools require a passing grade of 75% or higher, and rounding grades are not allowed. Increasing student retention and the number of nursing graduates is a significant factor that could help alleviate the nursing shortage. Failing a nursing course not only affects the nursing community by losing a potential nurse but also has detrimental effects on students. Repeating a course is expensive and can cause financial burdens for students and their families (Lewis, 2020). Furthermore, students who fail can experience academic anxiety, shame, and low self-esteem (Lewis et al., 2018). This is significant because these students are at higher risk for a second failure when they repeat the class, and many nursing programs have strict rules about only being able to retake a course once (Lewis et al., 2022).

Given the nursing shortage and the need to increase retention and graduation rates in nursing programs, identifying and addressing high CTA levels among ADN students could lead to higher course grades and increased student retention. Failing a nursing course affects the nursing community and has negative consequences for students, including emotional distress and financial hardships. Therefore, further research on CTA

and its impact on ADN students was warranted to support their success in nursing programs.

## Purpose of the Study

The purposes of this quantitative study were to determine the relationship between CTA and course grades and determine the correlation between course repetition and CTA among first-year ADN students at a multi-campus Midwestern community college. CTA was assessed after a first-year final exam using the CTAS-2 (Thomas et al., 2018). Data on CTA and course grades were analyzed to address the strength and direction of the relationship. For this relationship, the independent variable was CTA, and the dependent variable was course grades. Data on course repetition and CTA were also analyzed to address the strength and direction of the correlation. For this correlation, the independent variable was course repetition, and the dependent variable was CTA.

## Research Questions and Hypotheses

This quantitative study had two research questions:

RQ1: Among first-year ADN students, is there a relationship between CTA and course grades?

$H_0$1: Among first-year ADN students, there is no relationship between CTA and course grades.

$H_a$1: Among first-year ADN students, there is a relationship between CTA and course grades.

RQ2: Among first-year ADN students, is there a correlation between course repetition and CTA?

$H_0$2: Among first-year ADN students, there is no correlation between course repetition and CTA.

$H_a$2: Among first-year ADN students, there is a correlation between course repetition and CTA.

## Theoretical Framework

This study used Jeffreys' nursing universal retention and success (NURS) model. This theoretical framework involves multidimensional factors affecting nursing students' retention and success (Jeffreys, 2012). According to Jeffreys (2015), the model was initially called the nursing undergraduate retention and success model, but it was renamed the nursing universal retention and success model after she realized the framework could be globally applied to undergraduate and graduate nursing students. The NURS model contains eight multidimensional factors that affect nursing student retention and success. These are academic factors, academic outcomes, environmental factors, outside surrounding factors, professional integration factors, psychological outcomes, student affective factors, and student profile characteristics. Psychological outcomes (including stress and satisfaction) directly affect academic outcomes, which include course grades, cumulative nursing GPA, and overall GPA. The NURS model was used to explain how CTA could affect students' course grades and retention in a nursing program. Student retention is supported by positive psychological outcomes like low stress levels (Jeffreys, 2015). Generalized test anxiety is an academic stressor that can affect student retention (Jeffreys, 2002). CTA is the component of generalized test anxiety that results in interfering thoughts regarding exam performance and lower levels

of comprehension, organization, and study skills (Thomas et al., 2018). A more detailed explanation of the NURS model is provided in Chapter 2.

## Nature of the Study

I used surveys to collect data after the final exam of a first-year ADN course. With the nonexperimental design, variables are not manipulated; the phenomenon of interest is observed, and any relationships between variables are identified (Rutberg & Bouikidis, 2018). Online surveys were used for data collection directly from students. Surveys included demographic information, course grades, course repetition status, and answers to the CTAS-2. Course grades and course repetition were analyzed separately to address the relationship's strength and direction with scores obtained from the CTAS-2. For RQ1, CTA, the independent variable, was reported as a score from 24 to -96 points, which was an interval-ratio level of measurement. Course grades, the dependent variable, were reported in terms of percentages. Bivariate linear regression was used to analyze data. Bivariate regression analysis is used to determine how changes to one independent variable affect the value of a corresponding dependent variable (Frankfort-Nachmias et al., 2021). With regression analysis, the dependent variable must be an interval-ratio level of measurement, and the independent variable can be an interval-ratio or dichotomous level of measurement (Warner, 2013).

For RQ2, course repetition was reported as a binary factor (no or yes), then dummy coded as 0 and 1, respectively. CTA, the dependent variable, was again reported as a score from 24 to 96 points. I used a point biserial correlation to analyze data for RQ2. A point biserial correlation determines the strength of the association between

independent and dependent variables (Warner, 2013). For a point biserial correlation, the independent variable must be dichotomous, and the dependent variable needs to be an interval-ratio level of measurement (Warner, 2013).

I invited 346 first-year ADN students across 17 campuses in a singly accredited Midwestern college to participate in the survey. A G*Power a priori analysis of a one-predictor variable regression indicated that 55 completed surveys needed to be returned to detect a medium-sized effect ($\alpha = .05$, 1-$\beta$ err prob = 0.8). In addition, a G*Power a priori analysis of a two-tailed point biserial correlation indicated 82 completed surveys needed to be returned to detect a medium-sized effect ($\alpha = .05$, 1-$\beta$ err prob = 0.8. For a population of 346 students, 82 surveys would result in a 23.7% return rate, which was considered feasible for this study. I chose a significance level of $\alpha = .05$ and a power of 80% because they are standards in nursing research.

## Definitions

*Associate degree nursing (ADN) students:* Students enrolled in an accredited two-year nursing program who are eligible to take the National Council Licensure Examination for Registered Nurses (NCLEX-RN) upon graduation.

*Cognitive test anxiety (CTA)*: Students' mental reactions or internal dialogue regarding exams that can occur before, during, or after the exam (Thomas et al., 2018). Cognitive test anxiety is often referred to as worry in earlier works regarding test anxiety (Cassady & Johnson, 2002).

*Course grade*: The final grade a student receives in their nursing course, which includes all graded work. The community college uses the following grading scale: A

(92.00-100%), B (83.00-91.99%), C (75.00-82.99), D (70.00-74.99%), and F (0.00-69.99%). Failure of a course in this college is defined as a grade of 74.99% or less.

*Course repetition:* Having to retake a nursing course due to a failing grade or withdrawing before the end of the course.

*Course success*: Passing a nursing course with a 75.00% grade or higher.

*Generalized test anxiety*: Students' physiological and mental reactions to an exam (Burhan et al., 2020)

*Student retention*: Successful sequential completion of required courses in the least amount of time designated by the program without failing or withdrawing from a course (Jeffreys, 2012).

## Assumptions

I assumed participants honestly reported their final course grades and whether they were repeating the course. A second assumption was that participants truthfully answered questions on the CTAS-2. These assumptions were necessary for my study to help decrease the risk of response bias.

## Scope and Delimitations

My study was designed to focus on course repetition, CTA, and course grades among first-year ADN students at a two-year community college in the Midwestern U.S. ADN students were chosen as the focus population because they were a sample I had access to as a community college faculty member. I conducted a descriptive correlational study using bivariate regression and point biserial correlation. I did not consider using any other design for my study. I did consider using the attentional control theory or

Lazarus and Folkman's psychological stress and coping theory as theoretical frameworks for my study (Biggs et al., 2017; Eysenck et al., 2007). I chose Jeffreys' NURS model because it addresses factors that can impact student retention and success.

Delimitations are exclusionary factors in a study (Burkholder et al., 2016). Students under 18, enrolled in the practical nursing (PN) program, or in their second year of the ADN program were excluded from the study. Students in other years or the college's PN program may have different results. This study is generalizable to first-year ADN students in the Midwestern U.S. Students were only asked about their final course grade, not each exam grade. A potential threat to internal validity was the points associated with other assignments in the course besides exams. I drew the sample population from multiple campuses, each with a different number of points in the class. For consistency across the college, the nursing program requires that a minimum of 90% of all course grades come from exams. This policy lessened the threat to the internal validity of this study.

## Limitations

A limitation of my study was issues with returned surveys from participants. To achieve a medium effect size, 55 completed surveys were needed for RQ1, and 82 surveys were needed for RQ2. Not enough surveys were returned during the first round of invitations, so a reminder email was sent 4 weeks after the initial invitation. Only 72 completed surveys were returned. Another limitation was that I am a department chair and instructor at this college. While this study involves first-year students, I am a second-year instructor. Per the preference of the community college's Institutional Review Board

(IRB), campuses in my service area were excluded, which limited the participant pool by approximately 70 students.

According to Burkholder et al. (2016), surveys are vulnerable to bias due to participants intentionally or unintentionally answering survey questions falsely. Furthermore, social desirability, which is a form of response bias, can occur because participants may want to appear positively and, therefore, answer questions in a certain way. Students might report their final course grades as higher than they actually were. One way to reduce social desirability bias was to make the survey anonymous and explain to participants that their answers were anonymous. In my invitation email, students were informed that the survey they were invited to take was anonymous (see Appendix A). Since each participant received the same online survey, it decreased the chance of researcher bias and limited threats to my study's internal validity (Burkholder et al., 2016).

## Significance

My study was significant because it was the first to measure CTA among ADN students. Similarly, it was significant because it was the first study to investigate the impact of course repetition on CTA in ADN students. Since the study showed that 44.4% of first-year students experienced high CTA levels, nursing students can be screened at orientation or during their first year using the CTAS-2. Students with high CTA levels can then be referred to support services. If students with high levels of CTA are identified and provided with appropriate support services, they will hopefully experience less CTA and, consequently, have higher course grades, making them successful in their nursing

program. This will result in social change by providing needed careers for students and helping to mitigate the nursing shortage. Low nursing student retention negatively impacts society because nursing students are delayed from graduating and entering the workforce (Lewis et al., 2022). There will be an estimated 203,200 openings for RNs annually through 2031in the U.S. (American Association of Colleges of Nursing [AACN], 2022). Therefore, it is important to examine factors that impact nursing student attrition and retention so that faculty can screen and help students who are at risk for failure.

## Summary

With the current nursing shortage and anticipated future deficit of nurses, nursing schools need to do all they can to increase student retention rates. Multidimensional factors can affect student retention, including CTA. Previous studies have investigated CTA's effects on academic outcomes among undergraduate psychology and BSN students, but none have looked at CTA in ADN students (Cassady, 2004; Cassady & Johnson, 2002; Duty et al., 2016). Nursing scholars did not know the relationship between CTA and course grades in ADN students. The purpose of this study was to determine the relationship between CTA and course grades in first-year ADN students. This study also determined the correlation between course repetition and CTA. By understanding how CTA affects course grades in ADN students, instructors can screen students for CTA at the beginning of the program and provide interventions to those who experience high levels of CTA, thus hopefully increasing course grades and student retention. Similarly, by understanding how course repetition affects CTA, students

repeating a course can be provided with interventions for CTA. Hopefully, these interventions will decrease students' CTA, increase their course grades, and improve student retention.

Chapter 2 includes discussions of the literature search strategy, theoretical framework, and key concepts. Key concepts that are addressed are generalized test anxiety in nursing students and CTA.

# Chapter 2: Literature Review

The purpose of my study was to determine the relationship between CTA and course grades in first-year ADN students at a Midwestern community college. I also investigated the correlation between course repetition and CTA. In the literature, one of the many factors impacting student retention was generalized test anxiety. Approximately 39-59% of nursing students experience moderate or high levels of generalized test anxiety (Ahmed Qalawa & Soliman, 2021; Stojanovic et al., 2018; Vaz et al., 2018). CTA is a dimension of generalized test anxiety that particularly affects nursing students (Burhan et al., 2020). In a study of BSN students in the southeastern U.S., 46.7% experienced high levels of CTA (Parrish, 2022). Students with high levels of CTA were found to score lower on their nursing exams than students with low levels of CTA (Duty et al., 2016). Nonnursing students with high CTA levels consistently scored lower on their classroom exams and had a higher percentage of failures on standardized exams (Cassady, 2004; Cassady & Johnson, 2002; Pate et al., 2021). One variable that may affect CTA and student academic outcomes is course repetition. Approximately 13-19.4% of ADN students fail a nursing course, but these studies have not investigated the correlation between course repetition and CTA (Eudy & Brooks, 2022; Lewis et al., 2018).

I discuss the literature search strategy, theoretical framework, and key concepts. Key concepts that are addressed are generalized test anxiety in nursing students, CTA, and course repetition.

## Literature Search Strategy

I searched for relevant literature using the following databases: APA PsycInfo, CINAHL Plus, and MEDLINE. I limited my search to peer-reviewed scholarly articles in academic journals using the following search terms: cognitive test anxiety, test anxiety, course repetition, student nurse, nursing student, undergraduate nurse, NURS model, nursing undergraduate retention and success, and nursing universal retention and success.

## Theoretical Foundation

The theoretical framework for this study was the NURS model. Jeffreys (2012) said the NURS model explains multidimensional factors affecting nursing students' retention and success. The widespread global application of this model is important when considering the complexities of different kinds of nursing programs. The model can be applied to all types of undergraduate and graduate nursing programs, including accelerated, face-to-face, full-time, hybrid, online, and part-time learning environments (Jeffreys, 2015).

### Theoretical Concepts and Assumptions

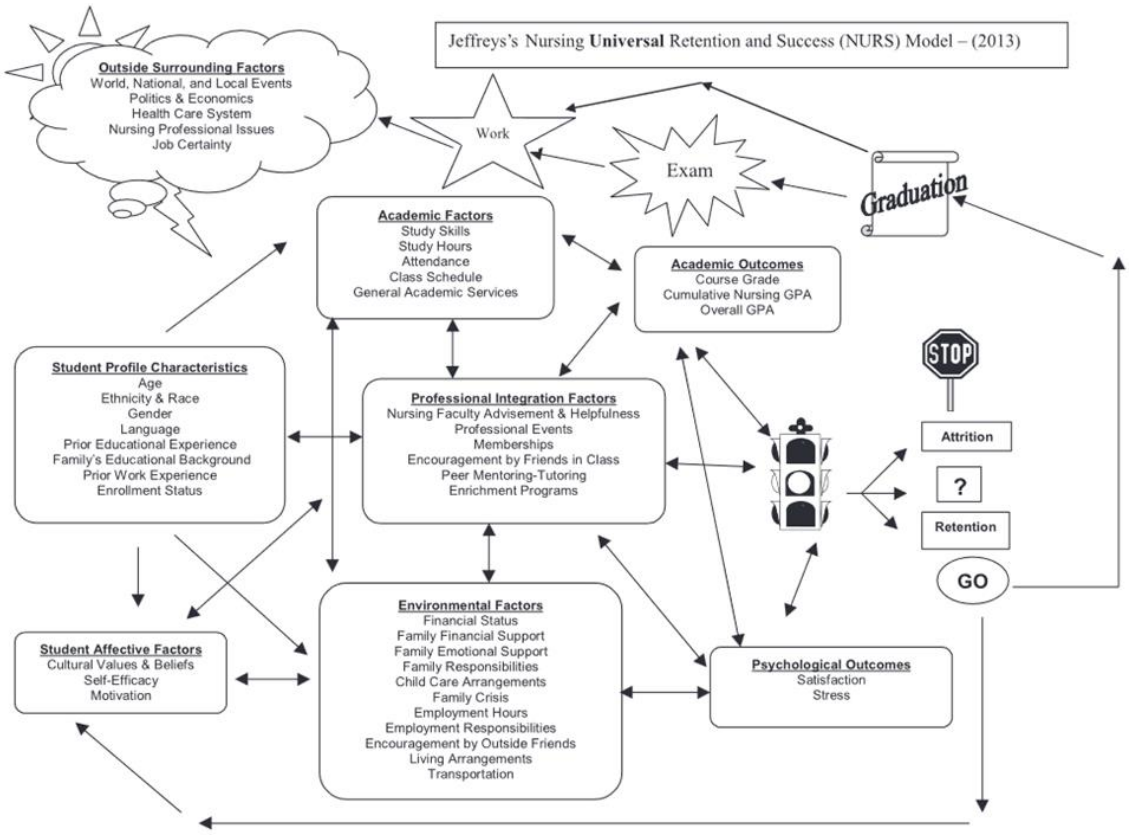
Unlike many other higher education models, the NURS model focuses on student retention and success rather than attrition (Jeffreys, 2015). Jeffreys (2012) explained program retention is continuous enrollment in a nursing program (part or full-time) by taking required courses sequentially until the program's graduation requirements are met. This can include courses that are repeated due to previous withdrawal or failure. Ideal program retention involves successful sequential completion of required courses in the

least amount of time designated by the program without failing or withdrawing from a class. Course success is defined as passing a nursing course (Jeffreys, 2012).

Jeffreys's NURS model contains eight multidimensional factors that interact and directly or indirectly affect nursing student retention and success (see Figure 1). These are academic factors, academic outcomes, environmental factors, outside surrounding factors, professional integration factors, psychological outcomes, student affective factors, and student profile characteristics. The model can be thought of as a wheel, with professional integration factors in the center and all other factors (except outside surrounding factors) circling it. Like wheel spokes, unidirectional or bidirectional arrows connect each factor to its neighboring factors, thus demonstrating how these factors affect and can be affected by others.

**Figure 1**

*Jeffrey's NURS Model*




From "Jeffreys's Nursing Universal Retention and Success Model: Overview and Action Ideas for Optimizing Outcomes A–Z," by M.R. Jeffreys, *Nurse Education Today*, *35*(3), p. 427 (https://doi.org/10.1016/j.nedt.2014.11.004). Copyright 2012 by Springer Publishing and 2015 by Elsevier Ltd. Reprinted with permission.

According to Jeffreys (2012), students enter the model with their student profile characteristics and affective factors. Student profile characteristics are background demographics that are present before starting a nursing course and include age, enrollment status, ethnicity and race, gender, language, prior educational experience, and

prior work experience. These factors are unchangeable during a nursing program. For my study, student profile characteristics included course repetition, which was considered prior educational experience. Jeffreys (2012) defined prior educational experience as "precollege variables (high school performance or general equivalency diploma [GED]), prenursing program variables such as prenursing college course performance, and postsecondary education and degrees" (p.34). While the number of times a student has taken a course is a characteristic that occurs during the nursing program, it is an unchangeable characteristic at the start of each nursing course. Student profile characteristics directly affect academic, environmental, and student affective factors. In addition, they affect and are affected by professional integration factors. When assessed at the beginning of a nursing program, these characteristics can help faculty identify students at risk of failing and not being retained in the program. Student affective factors include cultural values and beliefs, self-efficacy, and motivation. These affect and are affected by environmental and professional integration factors (Jeffreys, 2012).

Jeffreys (2012) showed that after starting a nursing program, students move through the wheel with the other factors that can affect their retention and success. Academic factors include things like attendance, class schedule, general academic services, and study skills, which are directly affected by student profile characteristics. Academic factors affect and are affected by academic outcomes, environmental factors, and professional integration factors. Environmental factors include the characteristics of employment hours and responsibilities, encouragement by outside friends, family responsibilities, financial status, living arrangements, and transportation. These

environmental factors are directly affected by student profile characteristics. They also affect and are affected by academic outcomes, professional integration factors, psychological outcomes, and student affective factors.

According to Jeffreys (2012), the three factors that directly influence student retention are professional integration factors, academic outcomes, and psychological outcomes. Professional integration factors are in the model's center and include encouragement by friends in class, enrichment programs, nursing faculty advisement and helpfulness, memberships, peer mentoring/tutoring, and professional events. In addition to directly impacting student retention, these professional factors affect and are affected by the other six surrounding factors in the model. Academic outcomes include cumulative nursing GPA, course grades, and overall GPA. These outcomes affect and are affected by academic factors, professional integration factors, and psychological outcomes. Academic outcomes directly affect students' retention. Psychological outcomes are comprised of stress and satisfaction. One characteristic of stress is generalized test anxiety (Jeffreys, 2012). Generalized test anxiety is a psychological condition in which students experience anxiety and severe distress regarding testing (Kamel, 2018). CTA is a component of generalized test anxiety and involves the student's psychological reactions to exams (Cassady & Finch, 2020). Psychological outcomes directly impact student retention in addition to affecting and being affected by academic outcomes, environmental factors, and professional integration factors (Jeffreys, 2012). Therefore, according to the NURS model, CTA may directly impact the academic outcome of course grades.

Jeffreys (2012) depicted outside surrounding factors as a lightning cloud because they can strike anytime during the model. The outside surrounding factors are located outside the wheel and include the health care system, job certainty, nursing professional issues, politics, and world, national, and local events.

In addition to the concepts described above, there are seven assumptions in the NURS model. These assumptions are that:

1) Nursing student retention is a priority concern of nurse educators worldwide;

2) Student retention is a dynamic and multidimensional phenomenon that is influenced by the interaction of multiple variables (factors);

3) Environmental factors and professional integration factors greatly influence nursing student retention;

4) Psychological outcomes and academic outcomes interact and influence persistence;

5) All students, regardless of prior academic performance and work experience can benefit from professional socialization and enrichment throughout pre-professional and professional education;

6) Nursing student retention is best achieved by focusing more comprehensively on success as going beyond minimal standards towards optimizing outcomes aimed at achieving peak performance potentials; and

7) Optimizing outcomes necessitates a holistic approach that focuses on proactive inclusive enrichment (PIE) and avoids exclusive remediation (ER) (Jeffreys, 2015, p. 426).

**Previous Application of the Theory in the Literature**

The NURS model has been used as the theoretical framework in previous studies regarding nursing student retention. Several authors investigated factors that affected the retention of ADN students. Dries (2020) found non-academic barriers to student success among readmitted students were the inability to pay for college expenses, hours worked, and life events like illness or a death in the family. Eudy and Brooks (2022) identified factors that affected ADN students' successful completion of their fundamentals course. Pence and Suerth (2020) studied multidimensional variables, including age, motivation, and learning strategies, that might affect ADN students' completion and retention rates.

Dries (2020) discovered a positive correlation between students' passing their fundamentals course and successful program completion. They also found a negative correlation between the readmitted students' age and successful program completion. Students older than 33 years were found to have decreased odds of completing their nursing program. Eudy and Brooks (2022) found that 19.4% of students failed their fundamentals course. Students' success in completing the course was significantly associated with race, increased ACT scores, and high psychology grades. Student success was not correlated with a change of major, a second attempt in the course, gender, demographic living location, or taking anatomy and physiology concurrently. Using the MSLQ, Pence and Suerth (2020) found a significant negative correlation between GPA and test anxiety.

The NURS model has also been used as a framework in other studies. Ingram et al. (2022) studied the effect of using the Exam Analysis (TEA) procedure with first-

semester ADN students to help with retention rates. Williams and Dahn (2022) used the Student Perception Appraisal-Revised 1 and 2 (SPA-R1 and SPA-R2) surveys, which are part of the NURS model, to evaluate students' perceptions of academic, environmental, and professional integration risk factors in their nursing program.

In the TEA procedure used by Ingram et al. (2022), students review a failed exam with a facilitator and mark each missed question according to the TEA Worksheet categories of lack of knowledge, English skills, exam anxiety, exam skills, or other (which in clues mathematics and any other reasons identified by the student and facilitator). The TEA worksheet can help students identify factors that affected their exam scores and, thus, their retention in the program. Their pilot study found that students who used the TEA procedure had a 90% retention rate into the next semester. Williams and Dahn (2022) found that 38.4% of students surveyed have at least one of four risk factors: low personal/college support, financial challenges, excessive work hours, and substantial family obligations. These at-risk students were provided support services, resulting in a 94.4% retention rate.

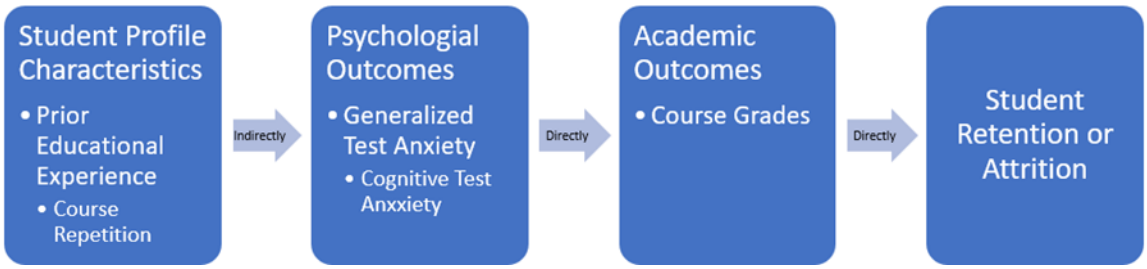
**Rationale for the NURS Model and how it Relates to the Present Study**

The NURS model relates to my study because this model explains how multidimensional variables can affect student retention and success. I investigated the relationship between the variables of CTA (psychological outcomes) and final course grades (academic outcomes) in undergraduate nursing students. CTA is the dimension of generalized test anxiety that results in interfering thoughts regarding exam performance and lower levels of comprehension, organization, and study skills (Thomas et al., 2018).

In Jeffreys's NURS model, psychological outcomes directly impact student academic outcomes. Psychological outcomes are comprised of satisfaction and stress. According to Jeffreys (2012), one aspect of stress is generalized test anxiety. Students might experience high levels of generalized test anxiety in nursing programs due to the emphasis on exam scores and the post-graduation licensing exam. Generalized test anxiety is an academic stressor that can affect student retention. Student retention occurs when there are positive psychological outcomes like low-stress levels (Jeffreys, 2015). The relationship between the variables of CTA (psychological outcomes) and final course grades (academic outcomes) as it relates to the NURS model can be seen in Figure 2. Furthermore, this was the first study to use the NURS model as a theoretical framework to investigate CTA in ADN students

**Figure 2**

*Relation of the NURS Model to the Present Study*




This study also investigated the correlation between course repetition and CTA. The NURS model demonstrates how student profile characteristics (course repetition) can indirectly affect psychological outcomes (CTA) (Figure 1). Course repetition (student profile characteristics) and CTA (psychological outcomes) indirectly affect each other through environmental, student affective, and professional integration factors. The NURS

model states that nursing students who drop out, fail, or withdraw and then return to the program are at a greater risk for attrition (Jeffreys, 2012).

Student retention and success are affected by many multidimensional factors that are outlined in the NURS model. One factor that can affect nursing student success is CTA, which is a dimension of generalized test anxiety. A factor that may affect CTA and, therefore, student retention is course repetition.

## Literature Review Related to Key Concepts

I have divided the literature review into three sections: generalized test anxiety in nursing students, CTA, and course repetition. While CTA is the main concept focused on by this study, I included a section on generalized test anxiety because there has been a substantial amount of research conducted on the subject in undergraduate nursing students, which can provide a broader understanding of the reason for this study.

### Generalized Test Anxiety in Nursing Students

Generalized test anxiety is a student's physiological and mental reactions to an exam (Burhan et al., 2020). Generalized test anxiety can occur before, during, or after an exam (Cassady, 2004; Stojanovic et al., 2018). According to Cassady and Finch (2020), there are two dimensions to generalized test anxiety: emotionality and worry. Emotionality is the physiological symptoms of test anxiety, such as increased heart rate, nausea, and agitation. Worry, also called CTA, is students' mental reactions to an exam, and it is characterized by cognitive overload, unproductive distracting thoughts, and continually thinking about the fear of failure (Cassady & Finch, 2020).

The literature demonstrates that nursing students experience high levels of generalized test anxiety. In a study of Iranian BSN students, 22.8% of surveyed students reported high test anxiety levels, while 36.6% had moderate levels, and 40.7% had low levels (Ahmed Qalawa & Soliman, 2021). Similarly, a study of Malaysian BSN students found that 1.7% of students surveyed did not experience generalized test anxiety, 36.7% had mild test anxiety, 58.3% had moderate test anxiety, and 3.3% had severe test anxiety levels (Hamzah et al., 2018). In a study of third-year Spanish nursing students, 49.6% reported having high levels of generalized test anxiety (Ortega-Donaire et al., 2023). Likewise, Kumar (2022) found that among first-year Indian BSN students, 53.3% had high levels of test exam anxiety, 39.7% had medium levels, and 7.0% had low levels. In another study, a statistically significant number of Canadian nursing students reported high anxiety and stress levels related to testing compared to the non-nursing students in a normative sample (Brown et al., 2021). Furthermore, Stojanovic et al. (2018) found that 46.46% of Serbian BSN students surveyed experienced some level of test anxiety. Another study of Israeli BSN students found that 61% of the students surveyed did not experience test anxiety, 25% had mild test anxiety, 12% had moderate test anxiety, and 2% had severe test anxiety (Vaz et al., 2018). Although the depiction of the levels of test anxiety varies, studies report between 2% and 28% of nursing students experience high levels of test anxiety. This is significant because students with higher generalized test anxiety typically have lower academic outcomes than students with lower levels of generalized test anxiety (Khalaila, 2015; Moore et al., 2021; Pence & Suerth, 2020).

Generalized test anxiety has been shown to affect nursing students' academic outcomes. Khalaila (2015) found that Israeli BSN students who experienced test anxiety had decreased academic achievement, which was measured by averaging each student's clinical and didactic grades for nursing classes. They did not investigate how much test anxiety impacted each specific course grade. Ortega-Donaire et al. (2023) found that Spanish BSN students with moderate test anxiety levels scored higher on a knowledge-based test over nursing course material than students with high levels of generalized test anxiety (Spearman's $r = -0.222$; $p = 0.015$). They also found that students experienced more of the worry aspect of generalized test anxiety ($M = 29.33$, $SD = 6.08$) than emotionality ($M = 22.82$, $SD = 6.05$). The authors did not state if this 15-question knowledge test was included in the students' final Tgrades or if it was only used for the study.

In American BSN students, Moore et al. (2021) found that students with low test anxiety levels on the TAI scored higher on the standardized HESI Exit Exam ($M = 988.4$, $SD = 96.87$) than students with high levels of test anxiety ($M = 952.05$, $SD = 87.12$, $p < .001$). Although this was significant, they found that test anxiety levels did not significantly predict students' HESI Exit Exam scores ($p = .88$). Pence and Suerth (2020) found that ADN students with high levels of test anxiety had lower GPAs than students with low test anxiety levels. This demonstrates that test anxiety is a significant problem for ADN students and may affect their completion and retention. The authors investigated factors that could affect program completion and retention using student GPAs as the academic outcome. Pence and Suerth (2020) did not look at the impact of test anxiety on

course grades. These studies demonstrate that high generalized test anxiety levels can significantly affect nursing students' academic outcomes in the areas of course grades, GPA, and standardized tests (Khalaila, 2015; Moore et al., 2021; Pence & Suerth, 2020).

Most studies on generalized test anxiety in nursing students have been conducted with BSN students. Only two studies that included ADN students were found. Using the MSLQ, Pence and Suerth (2020) found a significant negative correlation between cumulative GPA and test anxiety in ADN students. Students with increased test anxiety had lower cumulative GPAs ($r$ = -.193, $\alpha$ = .003, $p$ < .01) (Pence & Suerth, 2020). Custer (2018) surveyed diploma, ADN, and BSN students using the TAI. They discovered that ADN students had significantly higher levels of generalized test anxiety ($M$ =53.2, $SD$ = 14.9) than diploma students ($M$ = 44.64, $SD$ = 13.1). Interestingly, there was no difference in TAI scores between the ADN and BSN students ($p$ < .01). They also found that there was a moderate correlation between the total TAI score and the Procrastination Assessment Scale for Students (PASS) Fear of Failure subscale ($r$ =.40, $p$ < .01) and between the TAI Worry and the PASS Fear of Failure subscales ($r$ =.38, $p$ <.01) which indicates that students who are afraid of failure, experience more worry (CTA) (Custer, 2018). Repetitive thoughts of failure are a key component of CTA and can significantly impact student performance (Cassady & Johnson, 2002).

**CTA**

In their seminal work, Cassady and Johnson (2002) used the term cognitive test anxiety instead of worry when describing the mental characteristics of test anxiety:

> Cognitive test anxiety is composed of individuals' cognitive reactions to evaluative situations, or internal dialogue regarding evaluative situations, in the times prior to, during, and after evaluative tasks. Thoughts commonly entertained by individuals dealing with high levels of cognitive test anxiety center on (a) comparing self-performance to peers, (b) considering the consequences of failure, (c) low levels of confidence in performance, (d) excessive worry over evaluation, (e) causing sorrow for their parents, (f) feeling unprepared for tests, and (g) loss of self-worth. (Cassady & Johnson, 2002, p. 272)

Cassady and Johnson (2002) developed and validated the Cognitive Test Anxiety Scale (CTAS). Correlational analysis showed that CTAS was a valid and reliable measure of CTA (internal consistency, $\alpha = .91$). Many studies focused on the impact that the physical symptoms of test anxiety have on students. CTA focuses on the mental symptoms students experience and explains why well-prepared students can perform poorly on exams (Cassady & Johnson, 2002).

Thomas et al. (2018) identified severity standards for CTA and revised the original CTAS to the Cognitive Test Anxiety Scale–Second Edition (CTAS-2). They determined that CTA could be divided into low (scores of 24-43), moderate (scores of 44-66), and high (scores of 67 or above) levels (Thomas et al., 2018). Cassady and Finch (2020) explored different levels of CTA and when anxiety begins to negatively affect students' learning experiences. Students perform optimally when their CTA levels are low or moderate, indicating a relationship between their CTA scores increasing and their performance (grades) decreasing (Cassady & Finch, 2020).

While generalized test anxiety can affect student academic outcomes, studies have shown that CTA, rather than physical symptoms, has a more significant negative effect on student academic outcomes (Cassady, 2004; Cassady & Johnson, 2002; Hembree, 1988). One reason students with high levels of CTA perform poorly on exams is due to cognitive interference (Cassady & Johnson, 2002). Cognitive interference is the intrusive thoughts that keep a person from directing their full attention to their current task (Sarason, 1984). In the case of CTA, students cannot suppress competing thoughts during their exams (Cassady & Johnson, 2002). Qualitative studies with nursing students regarding test anxiety have shown that they experience repetitive, distracting thoughts (Edelman & Ficorelli, 2005; Liu & Xu, 2017). In the study by Liu and Xu (2017), students reported being unable to move past distracting thoughts such as being the "dumbest person" in class, that they did not want to be the student that failed, or that they should not even be in nursing school (p. 15). In Edelman and Ficorelli (2005), a student described how her in-laws would babysit for her so that she could study. She worried about the "grief" her in-laws would give her if she failed an exam because they stayed home all weekend for her (Edelman & Ficorelli, 2005, p. 57). These distracting thoughts not only affect students while taking their exams but also while they are trying to study. Cassady (2004) found that cognitive interference occurred while students were studying for their exams and caused them to be poorly prepared.

### *CTA's Relationship to Student Academic Outcomes*

CTA can affect college students' academic outcomes. Cassady and Johnson (2002) found that psychology students with low levels of CTA consistently performed

better on exams than students with high levels of CTA. Cassady (2004) found that undergraduate psychology students with high levels of CTA scored significantly lower on their exams than students with moderate or low levels of CTA ($p < .001$). Pate et al. (2021) found that 31.8% of the pharmacy students surveyed with high levels of CTA failed their licensure exam on the first attempt.

Duty et al. (2016) were the first to investigate CTA in nursing students. They found that American BSN students with high CTA levels scored 3 to 5 points lower on exams than those with low CTA levels. They concluded that although 3 to 5 points may seem like a small difference, but it is enough to cause a student to fail an exam. CTA significantly affected nursing students' exam performance ($p = .02$). Knowing that CTA has detrimental consequences for students, faculty need to be aware of students with high levels of CTA (Duty et al., 2016). This is important, considering a study of American BSN students found that 46.7% had high levels of cognitive test anxiety (Parrish, 2022). Therefore, research needed to be conducted on ADN nursing students to determine if CTA affects course grades in this population.

**Course Repetition**

Course repetition is a significant problem for ADN students and is a factor that can impact their retention. Lewis et al. (2018) found that 13% of students in public ADN programs and 28% of students in private ADN programs had to repeat at least one required nursing course during the program. This is compared to 4% of students in public BSN programs and < 1% of students in private BSN programs (Lewis et al., 2018). A study of diploma, ADN, BSN, and master's programs across America found that 11.5%

of nursing students failed and were required to repeat a course in one year (Lewis et al., 2022). According to Custer (2018), 7.4% of the students participating in the study were currently repeating a nursing course, and 27% reported having to repeat a course in the prior semester. Dries (2020) found that 70.1% of readmitted ADN students did not successfully complete their program. Similarly, Harding et al. (2017) found that students who were readmitted to a nursing program had a 43% attrition rate (Harding et al., 2017). Eudy and Brooks (2022) found that 19.4% of ADN students failed their fundamentals course. Although they did not find a statistically significant correlation between successful course completion and repeating the course, they did not look at personal factors such as cognitive test anxiety that could have affected students' successful course completion.

No studies in the literature specifically addressed CTA in repeating students. Stojanovic et al. (2018) found that students with a history of failing an exam had higher levels of test anxiety on the TAI. They did not specify if this applied to students repeating the course or taking it for the first time and failing their exams. In addition, they did not investigate if the anxiety caused students to fail exams or if they had anxiety because of their past performance (Stojanovic et al., 2018). Custer (2018) found that students who were afraid of failure scored higher on the worry section of the TAI. One reason that repeating students may worry more about failure is that many nursing programs have strict policies about the number of times a student can repeat a course. Lewis et al. (2022) found that 64% percent of programs allowed students only to repeat one course, while

27% of programs allowed students to repeat a course twice. Further studies needed to be conducted to determine the correlation between course repetition and CTA.

## Summary and Conclusions

Generalized test anxiety can be divided into two dimensions: CTA and physical symptoms. Parrish (2022) found that 46.7% of BSN students experienced high levels of CTA. CTA includes students' fear of failure, thoughts of inadequacy, self-deprecating thoughts, and distracting thoughts while trying to study and during exams (Burhan et al., 2020). High levels of CTA can negatively affect students' exam scores (Duty et al., 2016).

This study contributed to knowledge in the field of nursing education. It filled a gap in the literature by investigating the relationship between CTA, course grades, and course repetition in first-semester ADN students. While CTA has been studied among university students, only three studies were conducted with nursing students, and no studies were found involving ADN students. Although other studies have looked at CTA among BSN, psychology, and pharmacology students, they did not use final course grades as their outcome variable. Studies have shown that 7.4% to 24% of nursing students must repeat a course (Custer, 2018; Lewis et al., 2018). However, it is unknown if students who repeat a course have a greater fear of failure and thus have more worry.

In Chapter 3, I describe the methodology for this study. I address the research design and rationale, intended population, sampling and sampling procedures, procedures that were used for recruitment and data collection, instrumentation, data analysis plan, ethical considerations, and threats to validity.

# Chapter 3: Research Method

The purpose of this quantitative study was to determine the relationship between CTA and course grades in first-year ADN students at a multi-campus Midwestern community college. I also investigated the correlation between course repetition and CTA. In Chapter 3, I address the research design, data analysis plan, and threats to validity.

## Research Design and Rationale

I used a quantitative methodology with a nonexperimental design to answer this study's research questions and hypotheses. In a nonexperimental design, variables are not manipulated, but the phenomenon of interest is observed, and any relationships between variables are identified (Rutberg & Bouikidis, 2018). I used surveys to collect data after the final exam of a first-year ADN course. Online surveys allowed for data collection directly from students. I collected demographic information on participants' age, sex, and race to determine if the sample was similar to ADN populations across the country (see Appendix B). This study involved a small population of ADN students in the Midwest. State and regional statistics on ADN student demographics were unavailable; only national statistics were available for comparison. I analyzed the information on course repetition and course grades for the strength and direction of the relationship with scores obtained from the CTAS-2.

In quantitative research, the independent variable is the factor that causes a change in the phenomenon being studied, and the dependent variable is the factor to be explained (Burkholder et al., 2016; Frankfort-Nachmias et al., 2021). For RQ1, I

considered CTA as the independent variable and course grades as the dependent variable. On the CTAS-2, CTA is reported as a score from 24 to 96 points, which is an interval-ratio level of measurement (Thomas et al., 2018). Course grades were reported as percentages, which is also an interval-ratio level of measurement. For RQ2, the independent variable was course repetition (answered as yes or no), and the dependent variable was CTA as measured using the CTAS-2. Yes and no answers were then dummy coded as 0 for no and 1 for yes.

The design choice was consistent with research designs needed to advance knowledge in nursing education. The research design for this study was a cross-sectional design using a group comparison approach. This was the first study correlating CTA with ADN students' course grades. It was also the first study to correlate course repetition with CTA.

**Population**

The target population for this study was first-year ADN students at a multi-campus Midwest community college. Brady et al. (2018) found first-year psychology students had more worry than second-year students. Second-year Serbian BSN students had more test anxiety ($M$ = 49.74, $SD$ = 11.49) than third-year students ($M$ = 43.25, $SD$ = 12.90; Stojanovic et al., 2018). Furthermore, first-year Indian BSN students were found to have higher levels of generalized test anxiety than students in any other year of the nursing program (Kumar, 2022). Dries (2020) found Midwestern ADN students were more likely to fail their first nursing course than any other course in the program. They

also found a positive correlation between students passing their fundamentals course, which is a first-year course, and successful program completion.

The community college where the data were collected has 19 nursing programs spread across the state at different campuses. The number of first-year ADN students enrolled in the summer semester courses varied from 2 to 73 students across campuses. I am the department chair and instructor at two campuses, so those two campuses were excluded from the study per the preference of the community college IRB. The sample population for the study consisted of 346 students from 17 campuses.

**Sampling and Sampling Procedure**

I collected a convenience sample of first-year ADN students from the community college. I requested a list of emails for the first-year Pharmacology for Nursing class students from the office of the college's Vice President of Nursing. Practical nursing students and students under 18 were excluded from the study.

I conducted a G*Power a priori analysis for a one-predictor variable regression, which indicated 55 completed surveys needed to be returned to detect a medium-sized effect ($\alpha = .05$, 1-$\beta$ err prob (power) = 0.8). A significance level of $\alpha = .05$ and power of 80% were chosen because they are the standards in nursing research. Similarly, I conducted a G*Power a priori analysis for a two-tailed point biserial correlation, which indicated that 82 completed surveys needed to be returned to detect a medium-sized effect ($\alpha = .05$, 1-$\beta$ err prob = 0.8). In a population of 346 students, 82 surveys would be a 23.7% return rate. For online surveys where researchers do not have a relationship with participants, response rates can be as high as 20-30% (Porter, 2023). According to Wu et

al. (2023), online surveys have an average response rate of 44.1%. Therefore, a 23.7% return rate was a feasible expectation for this study.

**Procedures for Recruitment, Participation, and Data Collection**

I sent recruitment emails to potential participants containing information about my study and a link to the survey via SurveyMonkey. I sent individual emails from my Walden University email. The recruitment email (see Appendix A) linked to the survey with screening questions.

If participants answered yes to all questions, then the next screen was the consent form. If participants answered no to any of the screening questions, they were thanked for their time, and the screen closed. If they decided to participate, there was an informed consent form outlining the study's intent, minimizing risks to participants, and ensuring anonymity. If participants clicked the next button indicating their consent, the following screen was demographic information.

After demographic information (see Appendix B) was completed, participants began the CTAS-2, a 24-item instrument that is scored using a 4-point Likert-like scale from 1 (not at all typical of me) to 4 (very typical of me; Thomas et al., 2018). The maximum estimated time to complete all 28 items was 25 minutes. I collected data through SurveyMonkey. I used the anonymous responses feature in SurveyMonkey that delinked participants' information from their responses. Data were stored electronically on a secure external device and cloud storage service, to which only I have access. All data were password-protected. All raw data will remain in my possession and be maintained for 5 years as the Walden IRB requires. Students received a $5 Starbucks

electronic gift card to encourage participation and as a thank you for their time. The survey was left open for 7 weeks. After 4 weeks, a reminder email was sent to everyone on the email list. The survey was turned off after not receiving a response for 2 weeks.

**Instrumentation and Operationalization of Constructs**

I used the CTAS-2 to assess CTA. I chose the CTAS-2 because it is the latest version of the scale. The CTAS-2 is the only instrument that solely assesses the worry component of generalized test anxiety, and it is free for research use. I received permission from Jerrell Cassady to use and reproduce the instrument (see Appendix C).

The CTAS-2 has been shown to be a valid and reliable instrument. Reliability is an instrument's ability to produce consistent results, while validity is how well an instrument measures what it is designed to measure (Warner, 2013). Studies have verified the reliability of the CTAS-2, showing high internal consistency in different populations. Thomas et al. (2018) had an internal consistency of (Cronbach's $\alpha = .96$) in Midwestern undergraduate students. In pharmacy students, Pate et al. (2021) had an internal consistency of (Cronbach's $\alpha = .90$). Hall (2022) also surveyed pharmacy students with the CTAS-2, but they did not report their internal consistency. Parish (2022) used the CTAS-2 to survey American BSN students, but no other study has used the CTAS or CTAS-2 to survey ADN students. Although ADN students have not been surveyed with the CTAS-2, the scale was designed to be used with any undergraduate population (Ball State University, 2023; Thomas et al., 2018). Previous versions of the CTAS were used with undergraduate students in Turkey, psychology students in the Midwest, and American BSN students (Burhan et al., 2020; Cassady, 2004; Cassady & Johnson, 2002;

Duty et al., 2016; Johnson, 2019). Concurrent validity of the CTAS was determined by correlating it to the worry portion of Sarason's Reactions to Test scale ($r$ = .81; Cassady & Johnson, 2002). Using Cramer's $V$, Thomas et al. (2018) tested the concurrent validity of the CTAS-2 to the Motivated Strategies for Learning Questionnaire and FRIEDBEN Test Anxiety Scale (Cramer's $V$ = .93, $p$ < .001).

***Operationalization***

For my study, CTA was operationally defined as a student's mental reactions before, during, and after an exam. CTA was measured using the CTAS-2. The CTAS-2 is a 24-item self-report questionnaire that used a four-point Likert-like scale to answer the questions as either: 1 = Not at all typical of me, 2 = Somewhat typical of me, 3 = Quite typical of me, or 4 = Very typical of me (Thomas et al., 2018). The scores on the instrument ranged from 24-96. A score of 24-43 is considered a low level of CTA, 44-66 is moderate CTA, and 67 and greater is a high level of CTA. Example questions from the CTAS-2 include "I get distracted from studying for tests by thoughts of failing" and "At the beginning of a test, I am so nervous that I often can't think straight" (Thomas et al., 2018, p. 505; see Appendix B).

Course repetition was operationally defined as whether the participant had taken the class before. Participants were asked: Have you ever taken Pharmacology for Nursing before? They were able to answer yes or no (see Appendix B).

Course grades were operationally defined as the final percentage a student received in their first-year course. Participants were asked: What was your final grade (percentage) in Pharmacology for Nurisng (see Appendix B)? At the community college,

92-100% is an A, 83-91% is a B, 75-82% is a C, 70-74% is a D, and 69% and below is an F. Students fail a course if they score below 75%.

## Data Analysis Plan

I used IBM SPSS Statistics Version 28 to analyze the data. Before data analysis could begin, I needed to sum the scores for the 24 questions on the CTAS-2 to provide a total CTAS-2 score. My research questions were as follows:

RQ1: Among first-year ADN students, is there a relationship between CTA and course grades?

$H_0$1: Among first-year ADN students, there is no relationship between CTA and course grades.

$H_a$1: Among first-year ADN students, there is a relationship between CTA and course grades.

I used bivariate linear regression for statistical analysis to determine the relationship between CTA and course grades. According to Frankfort-Nachmias et al. (2021), bivariate regression shows how the changes in the independent variable affect the value of the dependent variable. Both the independent and dependent variables must be measured as interval-ratio levels. CTA was reported as a number between 24 and 96, while course grades were reported as a percentage between zero and 100%, which fulfills this requirement. The significance level was set at $\alpha = .05$. The results were interpreted according to the procedure outlined by the Walden University Academic Skills Center (2021). Descriptive statistics (mean and standard deviation of the variables) and the correlation between the two variables (Pearson's *r* significance, direction, and strength)

were first reported. An Analysis of Variance (ANOVA) showed the linear regression's significance and whether one can fail to reject the null hypothesis. The effect size (R-square value) and unstandardized beta were also reported for the model. If the null hypothesis is rejected, the unstandardized coefficient describes how students' course grades increase/decrease by a certain percentage for every point their CTA increases or decreases. SPSS was used to create a graph of the model with the regression line. I also conducted a Cronbach's alpha on the CTAS-2 results.

RQ2: Among first-year ADN students, is there a correlation between course repetition and CTA?

$H_0$2: Among first-year ADN students, there is no correlation between course repetition and CTA.

$H_a$2: Among first-year ADN students, there is a correlation between course repetition and CTA.

I calculated a point biserial correlation to determine the association between course repetition and CTA. The independent variable was dichotomous, and the dependent variable was measured as interval-ratio level. Course repetition was reported as no or yes, then dummy coded to 0 and 1, respectively. CTA was reported as a number between 24 and 96, which fulfills this requirement of interval-ratio levels of measurement. The significance level was set at $\alpha = .05$. The results were interpreted by calculating the descriptive statistics (mean and standard deviation of the variables) and the correlation between the two variables (point biserial's significance, direction, and strength; Walden University Academic Skills Center, 2021).

## Threats to Validity

Threats to internal validity are other factors that could influence the dependent variable besides the independent variable (Burkholder et al., 2016). Other factors that could have impacted course grades besides CTA are the number of points associated with other assignments in the course besides exams. The sample population was drawn from multiple campuses. Each campus may have had a different number of points associated with exams and assignments. However, for consistency across the college, the nursing program requires that a minimum of 90% of all course grades come from exams, which lessens the threat to internal validity. In previous studies, the CTAS-2 has been shown to demonstrate high internal validity (Pate et al., 2021; Thomas et al., 2018).

According to Burkholder et al. (2016), external validity is the extent to which the study's findings will remain consistent in different contexts. One threat to external validity is treatment variations (Burkholder et al., 2016). Since no treatment variations existed in this study, there should have been little threat to external validity. Students were invited to participate in the study via email and received the same electronic survey. Another way to limit potential threats to external validity is by restricting the research focus (Burkholder et al., 2016). This study focused on CTA and course grades in first-year ADN students. Students in other years of the program or the college's PN program may have different results, but they were not included in this study.

Another form of validity is construct validity, which is defined as the degree to which variables are operationalized in a study (Burkholder et al., 2016). One threat to construct validity is operationalizing an interval-ratio variable as a nominal or ordinal

variable (Lund Research, 2012). An interval-ratio level of measurement is more precise than a nominal or ordinal level of measurement, and it will more accurately reflect the behavior of a variable (Lund Research, 2012). In my study, CTA and course grades are interval-ratio levels of measurement. CTA was not operationalized into low, moderate, and high levels for statistical analysis, which decreased the threat to my study's construct validity. Course repetition is a dichotomous nominal variable. It cannot be measured as an interval-ratio level of measurement and subsequently was not a threat to construct validity.

## Ethical Procedures

I obtained IRB approval from Walden University and the Midwestern community college before any student was contacted or data were collected. Walden University served as the IRB of record. The Assistant Vice President of Nursing for the college consented to the study, and her office provided a list of student emails for the study after IRB approval was received.

Participation in the study was entirely voluntary, and students could stop the survey anytime. Non-participation did not affect how the researcher or the community college treated them. Student responses to the electronic survey were kept anonymous as I used SurveyMonkey's anonymous survey collection function. All students were offered a $5 Starbucks gift card as a thank-you. To receive the electronic gift card, students entered their email in a separate link that kept their email separate from their responses. As Walden University requires, data will be stored in SurveyMonkey and on my personal computer for five years. Since directory information (emails) was the only Personally

Identifiable Information (PII) collected in this study, data will be electronically cleared from the computer after five years (Kissel et al., 2014). Only I have the password for the online survey. My personal computer has up-to-date virus protection and a screen lock that comes on after 15 minutes of non-use.

I am employed as an associate professor and department chair at the community college where the study occurred. While this study involved first-year students, I am an instructor for these students in their second year. All communication with the participants came from my Walden University email to avoid a conflict of interest. Per the preference of the community college's IRB, the students from two campuses where I am the department chair and instructor were excluded from receiving a survey. In the invitation email to the students, participants were informed of my role at the community college and that the study was separate from this role (Appendix A).

## Summary

I used a nonexperimental quantitative research design to answer the research questions. I recruited first-year ADN students at the community college where I am a department chair. The population was 346 students, but only 82 needed to participate in the study to achieve a medium effect size. Participants were asked to complete an anonymous online survey that included their demographic information, final course grade as a percentage, and questions from the CTAS-2. Participants received a $5 Starbucks gift card for their time.

Bivariate regression was used to analyze survey data and determine the relationship between CTA and course grades. This was an appropriate analysis method

because bivariate regression can be used when both independent and dependent variables are interval-ratio levels of measurement (Warner, 2013). Reported results included means and standard deviations as well as Pearson's *r*, linear regression significance, effect size, unstandardized beta, and regression line. I used a point biserial correlation to determine the association between course repetition and CTA. This was an appropriate analysis method because a point biserial correlation can be used when the independent variable is dichotomous and the dependent variable is an interval-ratio level of measurement (Warner, 2013).

To maintain ethical compliance standards in this study, IRB approval was sought from Walden University and the community college. The electronic survey was anonymous, and participation was completely voluntary. Although the community college employs me, I did not anticipate having any connections with participants.

In Chapter 4, I describe the results of this study. I address data collection, treatment fidelity, and results.

# Chapter 4: Results

The purpose of this quantitative study was to determine the relationship between CTA and course grades among first-year ADN students at a multi-campus Midwestern community college. I also investigated the correlation between course repetition and CTA. This study had two research questions.

RQ1: Among first-year ADN students, is there a relationship between CTA and course grades?

$H_0$1: Among first-year ADN students, there is no relationship between CTA and course grades.

$H_a$1: Among first-year ADN students, there is a relationship between CTA and course grades.

RQ2: Among first-year ADN students, is there a correlation between course repetition and CTA?

$H_0$2: Among first-year ADN students, there is no correlation between course repetition and CTA.

$H_a$2: Among first-year ADN students, there is a correlation between course repetition and CTA.

In Chapter 4, I present information about data collection, treatment fidelity, and results.

## Data Collection

Recruitment emails were sent to 346 potential participants from my Walden University email during the final week of the students' summer semester. Potential

participants were a convenience sample of first-year ADN students finishing their Pharmacology for Nursing class. The email contained information about my study and a link to the survey via SurveyMonkey. The survey was left open for 7 weeks. After 4 weeks, a reminder email was sent to everyone on the email list. A total of 98 students responded to the survey, but only 76 answered more than the three screening questions. Four students did not answer all survey questions regarding their course grade or CTAS-2 questions. These four incomplete surveys were removed from the analysis. The response rate for 98 surveys was 28.3%, and the response rate for 72 usable surveys was 20.8%.

I had anticipated surveying students at 17 separate campuses, each with approximately 30 first-year students; therefore, the target population size would have been approximately 510 students. This estimate was based on sending my survey out during the fall or spring semesters. Since I was not able to send out my survey until the end of the summer semester, the number of potential participants was diminished, and only 346 survey invitations were sent out because not every campus held classes during the summer semester.

Most of this study's participants were under 30, female, and White non-Hispanic (see Table 1). While these are the same majorities seen in the nationwide demographics for ADN students and from the Midwest community college's ADN population, the percentages for each category in my study differed. For example, 77.8% of respondents were under 30. Furthermore, only 8.3% of participants identified as male compared to the expected 15-16%. The number of minorities who responded to the study was also lower than Midwest community college and national population averages.

**Table 1**

*Sample Demographics Compared to Sample Population and National ADN Demographics*

| Demographic category | Study sample | Community college ADN population* | National ADN population* |
|---|---|---|---|
| Age | | | |
| Under 30 years old | 77.8% | 62% | 58% |
| Over 30 years old | 20.8% | 38% | 42% |
| Gender | | | |
| Female | 91.7% | 84% | 85% |
| Male | 8.3% | 16% | 15% |
| Race | | | |
| White Non-Hispanic | 73.6% | 68% | 67% |
| Hispanic | 8.3% | 6% | 8% |
| Multiracial/Other | 8.3% | 2% | 7.5% |
| African American | ** | 20% | 12.2% |
| Asian | ** | 3% | 5.9% |

*Note*. *Demographics for the national ADN population came from NLN (2022), and community college ADN population demographics came from the study college's internal surveys.

** African American and Asian demographics were too small to report.

## Treatment Fidelity

The survey was administered as planned via SurveyMonkey. The only challenge was that all study approvals were not received until the summer semester. My G*Power a priori analysis for a one-predictor variable regression indicated that 55 completed surveys needed to be returned to detect a medium-sized effect ($\alpha = .05$, 1-$\beta$ err prob = 0.8). In addition, a G*Power a priori analysis for a two-tailed point biserial correlation indicated that 82 completed surveys needed to be returned to detect a medium-sized effect ($\alpha = .05$,

1-β err prob = 0.8). Rather than delay 16 weeks before sending out the survey after the fall semester, I determined that 82 surveys from 346 potential participants would be a 23.7% return rate. A 23.7% return rate was considered feasible for this study since online surveys typically have a 20-44% return rate (Porter, 2023; Wu et al., 2022). During data collection, no adverse events occurred with the surveys.

## Results

In this sample of 72 midwestern ADN students, 44.4% of respondents had high levels of CTA, 38.9% had moderate levels, and 16.7% had low levels of CTA (see Table 2). Nine respondents failed their first-year Pharmacology for Nursing course (12.5%), while 63 passed (87.5%). Fifty-two students (72.2%) took Pharmacology for Nursing for the first time, while 20 (27.8%) repeated the course. Of the nine students who failed, five (55.6%) had high levels of CTA, and four (44.4%) were repeating the course. In this study, the Cronbach's Alpha for the CTAS-2 was .965.

**Table 2**

*CTA Levels*

| Cognitive test anxiety | Sample percentage | Course repetition | Course failure |
|---|---|---|---|
| High level | 44.4% | 55% (11) | 55.6% (5) |
| Moderate level | 38.9% | 25% (5) | 33.3% (3) |
| Low level | 16.7% | 20% (4) | 11.1% (1) |

*Note*. For the entire sample $N = 72$, students who were repeating the course $n = 20$, and students who failed the course $n = 9$.

To answer RQ1, a bivariate linear regression was used to evaluate the relationship between CTA and course grades among first-year ADN students. According to Laerd Statistics (2015), there are seven assumptions for a bivariate linear regression analysis.

1. There is one dependent variable, and it is measured as a continuous (interval-ratio) level of measurement.
2. There is one independent variable, and it is measured as an interval-ratio level of measurement.
3. There is a linear relationship between the two variables.
4. There is an independence of observations.
5. There are no significant outliers.
6. The data should show homoscedasticity.
7. The residuals of the regression line need to be approximately normally distributed.

The following points address these assumptions:

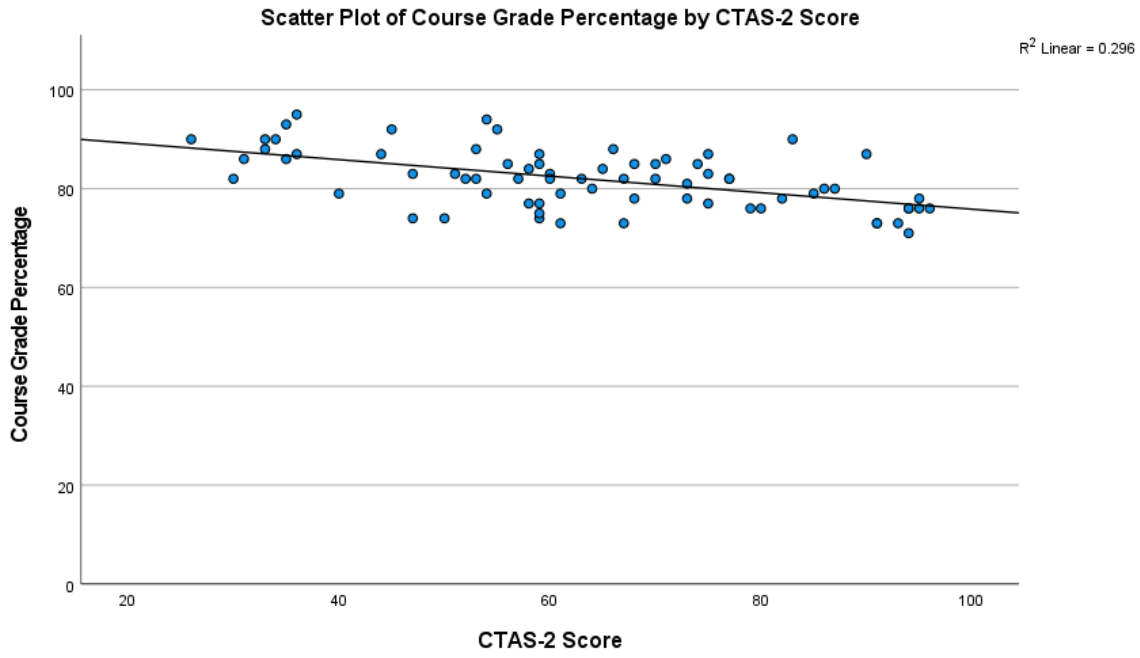
- The first two assumptions were met because the independent variable, CTA, was reported as a score from 24 to 96 points, which is an interval-ratio level of measurement, and the dependent variable, course grades, was reported as a percentage which was also an interval-ratio level of measurement.
- Figure 3 shows that a linear relationship exists between the two variables, and Assumption 3 was met.
- Assumption 4 was met, as assessed by a Durbin-Watson statistic of 1.258. A Durbin-Watson statistic between 1 and 3 shows that no autocorrelation is present, and an independence of observations exists (Pearson, 2010).
- Assumption 5 was met because all data fit within ± 3 standard deviations, and there were no outliers.

- Assumption 6, homoscedasticity, was met by visually inspecting a plot of standardized residuals versus standardized predicted values (Laerd Statistics, 2015).

Residuals were normally distributed, meeting Assumption 7, as assessed by visual inspection of a normal probability plot.

**Figure 3**

*Linear Relationship Between CTA and Final Course Grades*




A bivariate linear regression was performed to assess the relationship between CTA and course grades in first-year ADN students. The descriptive statistics for the CTA were ($M$ = 63.79. $SD$ = 18.93, $N$ = 72), and the statistics for course grades were ($M$ = 81.90. $SD$ = 5.81, $N$ = 72) (Table 3). A Pearson's correlation showed a statistically significant, strong negative correlation between CTA and course grades, $r(72) = -.544$, $p < .001$ (Table 3), with CTA accounting for 29.6% of the variation in final course grades

with adjusted $R^2$ = 28.6%, and a large effect size ($R$ = .544; see Warner, 2013). CTA scores significantly predicted course grades, $F(1, 71) = 29.496$, $p < .001$. Therefore, the null hypothesis for RQ1 was rejected. A one-point increase in CTA resulted in a .167 decrease in final course grade percentages (Table 4). A G*Power post hoc analysis for a one-predictor variable regression for 72 completed surveys and a medium-sized effect indicated (α = .05, 1-β err prob = 0.9; Walden University Academic Skills Center, 2021)

**Table 3**

*Means, Standard Deviations, and Correlations between CTA and Course Grades*

| Variable | *M* | *SD* | 1 | 2 |
|---|---|---|---|---|
| 1. CTA | 63.79 | 18.93 | - | -.544* |
| 2. Course Grades | 81.90 | 5.81 | -.544* | - |

*Note*. $N$ = 72 for both variables.

* $p < .001$

**Table 4**

*Significance of the Model*

| Model | *df* | *F* | *p* |
|---|---|---|---|
| Regression | 1 | 29.496 | <.001 |
| Residual | 70 | | |

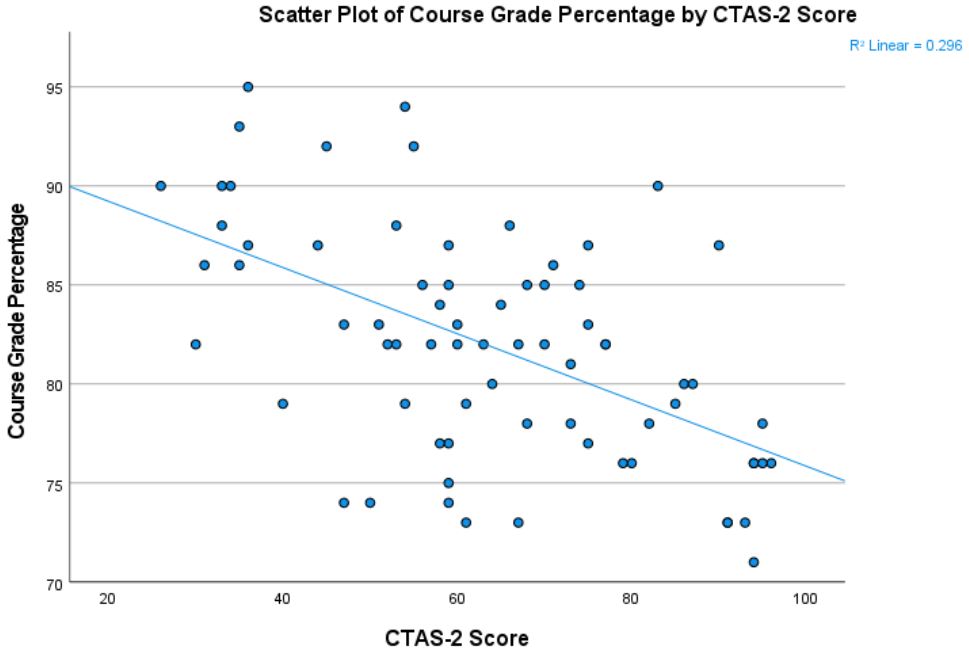
**Table 5**

*Regression Coefficients of CTA and Course Grades*

| Variable | *B* | β | *SE* |
|---|---|---|---|
| Constant | 92.566 | | 2.047 |
| CTA | -.167 | -.544 | .031 |

**Figure 4**

*Scatter Plot With Fit Line for Linear Regression*




A point biserial correlation was used to answer RQ2. According to Laerd Statistics (2017), there are six assumptions for a point biserial correlation.

1. One variable must be a continuous (interval-ratio) level of measurement.
2. The other variable must be dichotomous.
3. The two variables must be paired.
4. There should be no significant outliers.
5. There should be a homogeneity of variances.
6. The interval-ratio variable should be normally distributed for the dichotomous group.

The following points address these assumptions:

- The first two assumptions were met because the independent variable, course repetition, was dichotomous and answered as yes or no. The dependent variable, CTA, was reported as a score from 24-96 points, which is an interval-ratio level of measurement.
- Assumption 3 was met because there was a corresponding CTA score for every answer about course repetition.
- Assumption 4 was met. There were no outliers in the data, as assessed by an inspection of a boxplot (Laerd Statistics, 2017).
- Assumption 5, homogeneity of variances, was met by performing Levene's test for equality of variances ($p = .691$).
- Assumption 6 was shown to be met by performing the Shapiro-Wilk's test. CTA scores for each level of course repetition were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$).

A point-biserial correlation was performed to assess the correlation between course repetition and CTA in first-year ADN students. Twenty students were repeating the course, and 52 students took it for the first time. Although the CTA was higher in students repeating the course ($M = 66.80$, $SD = 18.95$) than first-time students ($M = 62.63$, $SD = 18.98$; Table 5), there was no statistically significant correlation between course repetition and CTA, $r_{pb}(72) = .099$, $p = .407$ (Table 6). Therefore, one must fail to reject the null hypothesis. Course repetition accounted for less than one percent of the variability in CTA, $r_{pb}^2(72) = .0098$. A G*Power post hoc analysis for a two-tailed point

biserial correlation for 72 completed surveys to detect a medium-sized effect indicated (α = .05, 1-β err prob = .749; Walden University Academic Skills Center, 2021).

**Table 6**

*Means and Standard Deviations for Course Repetition and CTA*

| Variable | *N* | *M* | *SD* |
|---|---|---|---|
| First time taking the course | 52 | 62.63 | 18.98 |
| Repeating the Course | 20 | 66.80 | 18.95 |

*Note.* First time taking the course was dummy coded as 0, and repeating the course was dummy coded as 1.

**Table 7**

*Point Biserial Correlation Between Course Repetition and CTA*

| Variable | 1 | 2 |
|---|---|---|
| Course Repetition | - | .099* |
| CTA | .099* | - |

*Note*. *N* = 72

* *p* = .407

## Summary

A bivariate linear regression and point biserial correlation were used to answer RQ1 and RQ2. For RQ1, there was a statistically significant relationship between CTA and course grades in ADN students, and the null hypothesis was rejected. For RQ2, there was not a statistically significant correlation between course repetition and CTA, and the null hypothesis was not rejected. In Chapter 5, I present my interpretations of findings, limitations of the study, recommendations, implications, and a conclusion.

# Chapter 5: Discussion, Conclusions, and Recommendations

The purposes of this study were to determine the relationship between CTA and course grades and the correlation between course repetition and CTA among first-year ADN students at a multi-campus Midwestern community college. High percentages of nursing students experiencing CTA is significant because students with higher levels of CTA typically have lower academic outcomes than students with lower levels of CTA (Cassady, 2004; Cassady & Johnson, 2002; Duty et al., 2016; Pate et al., 2021). Furthermore, 13% to 28% of ADN students repeat a course during their nursing program (Custer, 2018; Lewis et al., 2018). Parrish (2022) reported that 46.7% of BSN students had high levels of CTA, but scholars had not examined the relationship between CTA and course grades among ADN students. Likewise, scholars did not know the correlation between course repetition and CTA among ADN students.

There were two key findings for this study. First, a statistically significant inverse relationship existed between CTA and course grades. For every point that a student's CTA increased, their course grade decreased by .167%. Secondly, there was no statistically significant correlation between course repetition and CTA.

## Interpretation of the Findings

In this study, 44.4% of ADN students experience high levels of CTA. Parrish (2022) reported that 46.7% of first-semester BSN students had high levels of CTA. I found a statistically significant inverse relationship between CTA and course grades among first-year ADN students. These findings were similar to those of Cassady (2004), Cassady and Johnson (2002), Duty et al. (2016), and Pate et al. (2021) that high CTA

levels decrease academic outcomes. While these authors investigated the academic outcome of exam grades, my study specifically showed a relationship between high CTA levels and course failure. Fifty-five percent of students who failed their Pharmacology for Nursing class had high levels of CTA. These results further the work of Duty et al. (2016) and imply that high levels of CTA are enough to result in students failing a class, not just an exam. In this sample, 12.5% of students failed their Pharmacology for Nursing course, which is similar to the average BSN nursing pharmacology failure rate of 11.92% (Parrish, 2022).

Course repetition was not found to correlate with CTA. Although no other study has looked at the correlation between CTA and course repetition, this was surprising since high levels of CTA were shown to correlate with lower course grades, and the attrition rate for repeating ADN students is 43% to 70% (Dries, 2020; Harding et al., 2017). While the correlation was not significant, there is a 25.1% chance that a Type II error occurred due to an insufficient sample size. Eighty-two respondents were needed to detect a medium effect size, and only 72 students completed the survey. Even though the required G*Power was not met, I did receive 86.7% of the needed responses. This might indicate that course failure is not an important factor in student retention. In contrast, if I had achieved the required G*Power and an additional 10 respondents with high levels of CTA were repeating the course, the correlation might have been significant. Further studies on course repetition are needed to determine which is the case.

In the context of Jeffreys' NURS model, I found that psychological outcomes directly impact academic outcomes. Students with increased levels of CTA (a

psychological outcome) had lower course grades (an academic outcome). For every point of increase on the CTAS-2 scale, students had a .167% decrease in their course grades. This decrease in final course grades implies that CTA levels significantly affect student retention. Furthermore, CTA was responsible for 29.6% of the variation in course grades. Jeffreys (2015) said, "good academic performance results in retention only when accompanied by positive psychological outcomes" (p. 429). Also, it furthers the work of Marianne Jeffreys by indicating that CTA, not just generalized test anxiety, is a form of stress, and, therefore, a negative psychological outcome that affects student academic outcomes and retention. Course repetition, which was considered a student profile characteristic for this study, was not shown to correlate with psychological outcomes.

## Limitations of the Study

There were some limitations to my study. The population for this study was a convenience sample of first-year ADN students who took Pharmacology for Nursing during the summer term. Different results may have occurred with a Fundamentals or Medical Surgical I class or a fall or spring semester class. In addition, the required number of respondents to reach a medium effect size for RQ2 was not achieved. Only 72 students completed the survey when 82 were needed. This reduced number resulted in a 1-β error probability of .749 rather than .80, indicating a 25.1% chance that I inaccurately failed to reject the null hypothesis. To not discourage participants from completing the survey, they were not required to answer every question in the survey. Therefore, 26 incomplete returned surveys had to be eliminated from the study analysis. Furthermore, since I am a department chair for one of the college's service areas, students in my

service area were not included in the study, eliminating approximately 70 potential participants.

Another limitation of my study was the risk of bias. According to Burkholder et al. (2016), participants intentionally or unintentionally falsely answer survey questions due to social desirability. Participants may have wanted to appear positively and responded to questions in a certain way. For example, students might have reported their final course grade as higher than it was. This is perhaps why 20 students did not answer any other questions in the survey after the three screening questions. The study survey was anonymous to reduce social desirability. In my invitation email, students were informed that the survey they were invited to take was anonymous (see Appendix A). Since each participant received the same online survey, the chance of researcher bias was decreased and limited the threat to my study's internal validity.

## Recommendations

Although enough surveys were returned to determine a statistically significant and strong negative correlation between CTA and course grades, it is unknown whether these results are generalizable to the broader population of ADN students or if the results were unique to this sample of students. Further studies need to be conducted with other ADN students across the country who are enrolled in other first-year classes besides pharmacology.

Although course repetition did not correlate with increased CTA, further studies with larger sample sizes need to be conducted to determine if these findings are generalizable or unique to this study sample. It might also benefit the body of literature

for future studies to investigate if there is a correlation between course repetition and course grades. This would help determine if course repetition is a significant factor in terms of student retention and success. Currently, there is minimal literature on course repetition. Furthermore, different factors, such as stressful life events, may influence students' CTA levels. According to Jeffreys (2012), stress decreases academic outcomes. A future study on the relationship between the Holmes-Rahe Social Readjustment Rating Scale and CTA in ADN students would further knowledge in the discipline.

## Implications

Based on the results of this study, there are some implications for social change. This study showed a statistically significant negative correlation between CTA and course grades in first-year ADN students. Therefore, ADN students should be screened for CTA using the CTAS-2 during orientation or at the beginning of their first class. Nursing faculty need to be aware of interventions that can decrease CTA and teach these interventions to their students. Nursing schools should consider creating a program-wide test anxiety service to help students and teach them these interventions. A variety of interventions are effective in decreasing test anxiety in students, including aromatherapy, music therapy, and guided breathing techniques (İnangil et al., 2020; Johnson, 2019; Ortega-Donaire et al., 2023; Son et al., 2019). If students with high levels of CTA can be identified and provided with appropriate support services, they will hopefully experience less CTA and consequently have higher course grades, making them successful in their nursing programs.

Increasing course grades and student retention is not the only reason students with CTA must be taught intervention techniques. After graduation, nursing students must pass the NCLEX-RN standardized test. Pate et al. (2021) found that 31.8% of pharmacy students surveyed with high levels of CTA failed their licensure exam on the first attempt. Furthermore, Moore et al. (2021) found that BSN students with low generalized test anxiety levels scored higher on the standardized HESI Exit Exam than students with high levels of generalized test anxiety. The HESI exam has been shown to be a strong predictor of how students will perform on the NCLEX-RN. For example, the average HESI Exit Exam score for ADN students who passed the NCLEX on their first attempt was higher ($M$ = 919.64, $SD$ = 109.08) than those who failed ($M$ = 832.75, $SD$ = 116.60; Shah et al., 2022). Since students with generalized test anxiety have been shown to score lower on the HESSI Exit Exam and lower HESI Exit Exam scores have been shown to correlate with a decreased probability of passing the NCLEX on the first attempt, students need to be taught intervention to help alleviate their test anxiety (Moore et al., 2021; Shah et al., 2022). Helping nursing students pass the NCLEX-RN is vital to nursing student success.

Nursing student success will provide needed careers for the students and help mitigate the nursing shortage. Low nursing student retention and success negatively impact society because nursing students are delayed from graduating and entering the workforce (Lewis et al., 2022). There will be an estimated 203,200 openings for registered nurses annually through 2031 (AACN, 2022). The need for RNs in America is expected to increase 6% from 2021 to 2031 (Bureau of Labor Statistics, U. S. Department

of Labor, 2022). With the current nursing shortage, the nursing profession cannot afford to lose qualified nursing students due to CTA (Johnson, 2019).

In addition to helping mitigate the nursing shortage, increasing student retention and success will improve students' lives. Failing a course has detrimental effects on the students. Repeating a course is expensive and can cause a financial burden for the student and their family (Lewis, 2020). Furthermore, students who fail can experience academic anxiety, shame, and low self-esteem (Lewis et al., 2018). Therefore, it is important that faculty screen students early in the program and help students with high levels of CTA who might be at risk for failure.

## Conclusion

ADN programs comprise 58% of the RN programs in the country (NLN, 2022). In this study, 44.4% of first-year ADN students experienced high levels of CTA. Furthermore, CTA and course grades had a statistically significant negative relationship. There was no correlation between course repetition and CTA. If nursing faculty understand the severity and consequences of CTA, they can screen their students at the beginning of the program using the CTAS-2. Students with high levels of CTA can then be provided with the necessary interventions and services to help decrease their CTA and increase their success.

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# Appendix A: Email Invitation

**Subject line:**
20 min anonymous survey on cognitive test anxiety, $5 Starbucks gift card

**Email message:**
Hello Nursing Student,
I am inviting you to participate in an online survey to learn more about the effects of cognitive test anxiety (CTA) on course grades in associate degree nursing students. In the future, this could help instructors understand the severity of CTA, and provide screenings and interventions for students who do experience high levels of CTA. For this study, you are invited to complete an anonymous online survey about your feelings regarding aspects of CTA.

**About the study:**

- One 25-minute anonymous online survey consisting of 28 questions
- Participants will receive a $5 Starbucks gift card as a thank you
- To protect your privacy, your answers to the survey questions will be kept separate from the email you provide to receive the electronic gift card.

**Volunteers must meet these requirements:**

- 18 years old or older
- Associate degree nursing students
- Are enrolled in or recently completed their first year of nursing classes

This interview is part of the doctoral study for Crystal Jones, a Ph.D. student at Walden University. You might already know the researcher as a department chair and instructor for the college at another campus in the state, but this study is separate from that role. The survey will be open from June 6 – June 20, 2023

If you feel you understand the study and wish to volunteer, please indicate your consent by clicking the link below.

# Appendix B: Survey Questions

What is your age?
_____ Over 30 years old
_____ Under 30 years old
_____ Prefer not to answer

What is your gender?
_____ Female
_____ Male
_____ Non-binary
_____ Transgender
_____ Other
_____ Prefer not to answer

What is your Race?
_____ American Indian
_____ Asian
_____ African American
_____ Hispanic
_____ Multiracial
_____ White Non-Hispanic
_____ Other
_____ Prefer not to answer

What was your final grade (percentage) in Pharmacology for Nursing (NRSG 106)?

_____%

Have you ever taken Pharmacology for Nursing (NRSG 106) before?
_____ yes
_____no

Please complete the following items using the four-point scale below.
**1 = Not at all typical of me**
**2 = Somewhat typical of me**
**3 = Quite typical of me**
**4 = Very typical of me**

| | | | | | |
|---|---|---|---|---|---|
| 1 | I lose sleep over worrying about examinations. | 1 | 2 | 3 | 4 |
| 2 | I worry more about doing well on tests than I should. | 1 | 2 | 3 | 4 |
| 3 | I get distracted from studying for tests by thoughts of failing. | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | I have difficulty remembering what I studied for tests. | 1 | 2 | 3 | 4 |
| 5 | While preparing for a test, I often think that I am likely to fail. | 1 | 2 | 3 | 4 |
| 6 | I am not good at taking tests. | 1 | 2 | 3 | 4 |
| 7 | When I first get my copy of a test, it takes me a while to calm down to the point where I can begin to think straight. | 1 | 2 | 3 | 4 |
| 8 | At the beginning of a test, I am so nervous that I often can't think straight. | 1 | 2 | 3 | 4 |
| 9 | When I take a test that is difficult, I feel defeated before I even start. | 1 | 2 | 3 | 4 |
| 10 | While taking an important examination, I find myself wondering whether the other students are doing better than I am. | 1 | 2 | 3 | 4 |
| 11 | I tend to freeze up on things like intelligence tests and final exams. | 1 | 2 | 3 | 4 |
| 12 | During tests, I find myself thinking of the consequences of failing. | 1 | 2 | 3 | 4 |
| 13 | When I take a test, my nervousness causes me to make careless errors. | 1 | 2 | 3 | 4 |
| 14 | My mind goes blank when I am pressured for an answer on a test. | 1 | 2 | 3 | 4 |
| 15 | During tests, the thought frequently occurs to me that I may not be too bright. | 1 | 2 | 3 | 4 |
| 16 | During a course examination, I get so nervous that I forget facts I really know. | 1 | 2 | 3 | 4 |
| 17 | I do not perform well on tests. | 1 | 2 | 3 | 4 |
| 18 | During tests, I have the feeling that I am not doing well. | 1 | 2 | 3 | 4 |
| 19 | I am a poor test taker in the sense that my performance on a test does not show how much I really know about a topic. | 1 | 2 | 3 | 4 |
| 20 | After taking a test, I feel I should have done better than I actually did. | 1 | 2 | 3 | 4 |
| 21 | My test performances make me believe that I am not a good student. | 1 | 2 | 3 | 4 |
| 22 | I often realize mistakes I made right after turning in a test. | 1 | 2 | 3 | 4 |
| 23 | When I finish a hard test, I am afraid to see the score. | 1 | 2 | 3 | 4 |
| 24 | I don’t seem to have much control over my test scores. | 1 | 2 | 3 | 4 |

# Appendix C: Permission for Use of CTAS-2