Investigating the Relationship between Nursing Student Grit Scores and Course Exam Averages in First Semester Nursing Courses at a Midwestern Baccalaureate College of Nursing

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Abstract

Attrition rates from Bachelor of Science in nursing (BSN) programs nationally are reported to be too high (Harris, Rosenberg, & O'Rourke, 2013; Merkley, 2016; Newton & Moore, 2009). Nursing program administrators seek to identify and admit students who have the highest likelihood of success. Yet, traditional admission criteria for competitive BSN programs have not predicted student success and completion. Duckworth, Peterson, Matthews, and Kelly (2007) defined grit as "persistence and passion towards long-term goals" (p. 1087). Trait grit has been studied in various academic settings and has helped predict success in those programs. This study investigated the relationship between nursing students' total grit scores, obtained using the 12-item Grit Scale, and exam averages in each of the three first semester nursing courses at a Midwestern college of nursing. Nursing students must score a 75% or higher exam average in any course to pass the course and progress in the program. If they score lower than 75% in one nursing course, they are delayed by a full academic year; if they score lower in two nursing courses, they are dismissed from the nursing program. A quantitative correlational design using archival data was selected for the research design. A Pearson product-moment correlation coefficient was calculated to index the strength and direction of the relationship between the grit score and an average of exam scores in each course and the average for all three courses. The statistical analyses results indicated that students' total grit scores and the average of all exam scores in Foundations of Nursing Practice, Nursing Health Assessment, and Pathophysiology are not related to one another. This study is the first to study nursing student academic performance and grit directly. Although no relationship was found, this study contributes to the body of

research related to grit and student performance in health sciences, and includes

recommendations for further research.

Dedication

This work is dedicated to my parents, my mom Vicky, my dad, Frank, and my step-dad Roger; they taught me that hard work pays off and have always believed I can do anything I put my mind to; my husband, Tim, who is my rock, always supports me, and is willing to walk down any path alongside me; and to my children, Paige and Zach, who have motivated me in ways they will never know. My heart is full of gratitude.

Directors whom we could depend on for guidance throughout our careers. Two of my most dependable and likely over-used board members came from this cohort. Gretchen Heasty and Dale Marrant have been my long-suffering board members; they always listen, cheer me on, give me dependable advice, and never remind me when I said or texted something senseless or had some ill-advised plan in mind! I am forever grateful to be lifelong friends and colleagues. I look forward to all of the amazing work Cohort 17 will do in higher education!

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example for them as they embark on their own journeys. My dear Tim, I promised this was my last degree, and I plan to keep that promise!

My parents always taught me I could do whatever I set out to do; I learned from them, often through their unspoken words, education is essential, and I could and would have great success in my educational path. For that, I hope that I have made them proud.

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Chapter 1

Introduction

A shortage of registered nurses (RN) in the United States has been predicted for many years (American Association of Colleges of Nursing (AACN), 2020). The Bureau of Labor Statistics (BLS) (2020) projects that between 2019-2029 the nursing workforce will need approximately one million additional nurses to cover the predicted job growth and replacements of current RN jobs. The workforce needs will not be met with current nursing program completion rates (AACN, 2020). Many strategies to reduce the impact of this predicted shortage exists, including increasing enrollment in many nursing programs across the country. Nationally, 50% of students admitted to a Bachelor of Science in nursing (BSN) program do not persist in completing the program (Harris, Rosenberg, & O'Rourke, 2013; Merkley, 2016; Newton & Moore, 2009). Nursing program administrators and faculty need to identify tools to assist students who may need additional support to complete the rigorous BSN program successfully.

A Midwestern college of nursing (MCN) with a BSN program has experienced attrition rates as high as 21.9% in recent years (Nauser, personal communication, May 26, 2016). MCN faculty and administrators set a benchmark of < 15% attrition (Nauser, personal communication, May 26, 2016). Once prerequisite coursework is completed, admitted students may begin nursing coursework. In the first semester of nursing, students take three nursing courses. MCN policy states that students must have an average of 75% for all exams in each course to receive a passing grade. The 75% exam average requirement was implemented to ensure that students are able to pass exams throughout the program that are intended to prepare them to pass the licensure exam.

Early identification of factors that put nursing students at risk of not meeting the required exam average would allow faculty and administration to provide necessary resources to students before being unsuccessful in first-semester nursing courses.

This study investigated the relationship between nursing students' total grit scores, obtained using the 12-item Grit Scale, and the exam averages in each of the three first-semester nursing courses at MCN. If there is a relationship between grit scores and exam averages, faculty could use the 12-item Grit Scale to help identify students who need additional support or resources to succeed in the first-semester nursing courses.

Background

The AACN (2020) reports a 5.1% growth in enrollment in baccalaureate nursing programs in 2019, yet 80,407 qualified students were turned away from baccalaureate and graduate nursing programs in 2019. Merely growing enrollment will not be enough to meet the healthcare system's demands in the future (AACN, 2020). An alternative to increasing enrollment would be to address the attrition problem in nursing programs. Attrition in 4-year BSN program is a serious problem, given that the attrition rate nationwide is approximately 50% (Harris et al., 2013; Merkley, 2016; Newton & Moore, 2009). Increasing enrollment alone does not solve the nursing shortage problem. Students must persist to graduation and enter the workforce to impact the predicted shortage.

MCN has a traditional BSN program with nursing courses beginning in the spring semester of the sophomore year. Foundations of Nursing Practice, Nursing Health Assessment, and Pathophysiology are the three nursing courses taken in the semester where the attrition rates have risen from a low of 8.45% to a high of 21.87% from 2014-

2016, without any major changes in course placement, content, or admission requirements (Nauser, personal communication, May 26, 2016). MCN policy states that two nursing course failures will result in dismissal from the program. First-semester nursing is when many students often fail two courses in one semester (Nauser, personal communication, May 26, 2016).

A review of the literature revealed that, nationally, using only cognitive predictors has not been successful at predicting completion of BSN programs (Peterson, 2009; Sayles, Shelton, & Powell, 2003; Wolkowitz & Kelley, 2010). Cognitive measures, specifically science grade point average (GPA), scores on nursing school entrance exams, and prerequisite science course grades, have been shown to be predictive of nursing school completion, yet national attrition rates remain high (Herrera, 2013). Given the prescriptive nature of the nursing curriculum, students who are unsuccessful in a course in the first semester of the program cannot graduate on time. This delay leads to increased debt for students and slower entrance into the nursing workforce.

Nationally, nursing program administrators and faculty have been looking for non-cognitive predictors of success in BSN programs. Using multiple factors to determine the likelihood of success is recommended (Wolkowitz & Kelley, 2010). The literature is not clear about what non-cognitive factors should be used with cognitive factors to best predict student success in nursing programs (Ehrenfeld & Tabak, 2000; McLaughlin, Moutray, & Muldoon, 2008; Taylor & Reyes, 2012).

There is one trait recently explored and explained as possibly predictive of high levels of success called grit. Duckworth, Peterson, Matthews, and Kelly (2007) defined grit as "persistence and passion towards long-term goals" (p. 1087). Duckworth et al. go

further to describe grit as being willing to work hard over years despite barriers and failures to accomplish long-term goals. The BSN curriculum is known for being rigorous, and students must be able to maintain high levels of effort over the five-semester curriculum. Duckworth et al. (2007) stated that intelligence alone does not always translate into high achievement. Nursing students are admitted after meeting rigorous cognitive standards. Overall, these students are academically high performers, but too many are still unsuccessful.

Statement of the Problem

The administration and faculty at MCN are unable to accurately predict students who are at risk of attrition in the first semester of nursing courses. Admission criteria (Appendix A) among nursing programs nationally are rigorous, yet attrition rates remain high. Predicting success using cognitive measures has not been sufficient. Other non-cognitive measures of success, including resilience and self-efficacy, have been studied. None have been able to predict success in nursing programs or other academic programs accurately. Grit has not been sufficiently studied in nursing programs and its relationship with student academic success is unknown.

Given the high attrition rates from nursing programs nationally and at MCN, it is essential for nursing program administrators and faculty to identify ways to measure if students are at risk. Examining if there is a relationship between grit scores and exam averages may allow nursing program faculty and administration to identify students who need support early in the nursing program before course failure.

Purpose of the Study

The purpose of this study was to investigate the relationship between students' grit scores and exam averages in first-semester nursing courses at MCN. The study focused on three key nursing courses: Foundations in Nursing, Nursing Health Assessment, and Pathophysiology.

Significance of the Study

Increasing enrollment in nursing programs is not sufficient in addressing the need for more nurses if those students do not persist in completing the degree. Nursing program administrators and faculty at MCN must identify tools to help identify students at risk of being unsuccessful in meeting the required 75% exam average in early nursing coursework. Students at MCN must meet a minimum of 75% average of all exams in each course in the curriculum. If this requirement is not met, the student fails the course. If a student fails any of the three courses in the first semester of the program, they may repeat that course, but they must wait an entire year because these three courses are prerequisites for the rest of the nursing courses. If a student fails two courses, they are dismissed from the program. These students often have the cognitive ability to be successful and have met rigorous standards for admission.

This study will help understand a student's grit score in relation to exam averages in three courses early in the nursing program when students often attrite. If a relationship exists between the grit score and the exam average for a course, faculty could use the grit score to help identify students who may need additional support or resources at MCN. If a relationship does not exist, further research with larger populations of students could

give more information related to the nature of grit and achievement with nursing students, given that it has been shown to predict success in other fields.

Delimitations

Lunenburg and Irby (2008) defined delimitations as "self-imposed boundaries set by the researcher on the purpose and scope of the study" (p. 134). The researcher narrowed the focus of this study with the following delimitations:

- The sample was limited to two cohorts of nursing students, starting the nursing program in 2016 and 2017.

- The sample was limited to a single college of nursing.

- The study focused on three nursing courses at the beginning of the nursing program

Assumptions

Lunenburg and Irby (2008) defined assumptions as "postulates, premises, and propositions that are accepted as operational for purposes of the research" (p. 135). This study was conducted under the following assumptions:

- Students answer honestly on the Grit Survey.

- Students are motivated to succeed in the first semester of the nursing program.

- Data received from the college are complete and accurate.

- Data were entered correctly into the statistical analysis program.

Research Questions

The following research questions guided this study.

RQ1. Is there a relationship between total grit score and exam average in Foundations of Nursing Practice?

RQ2. Is there a relationship between total grit score and exam average in Nursing Health Assessment?

RQ3. Is there a relationship between total grit score and exam average in Pathophysiology?

RQ4. Is there a relationship between total grit score and the average of all exam scores in Foundations of Nursing Practice, Nursing Health Assessment, and Pathophysiology?

Definitions of Terms

Attrition: The number of students who do not complete a nursing program in the time intended.

Persistence: The number of students who complete the nursing program in the time intended.

Grit: "Passion and perseverance towards long-term goals" (Duckworth et al., 2007, p. 1087).

Exam average: The average of all exam scores for one course.

Prerequisite science courses: Science courses that students must pass with a minimum grade before beginning nursing coursework.

Successful Completion of MCN Nursing Courses: Students must have an average of 75% or higher for all exams in a course to receive a passing grade for that course.

Academic Dismissal from MCN Program: A student is dismissed from the program if they fail two courses at any time in the program.

Organization of Study

This chapter provided background information related to this study, the statement of the problem, and purpose of the study, its significance, delimitations, assumptions, research questions, and definitions of terms. Chapter 2 includes a review of the literature about nursing student admission process, historical perspective and context, models related to student retention and academic success in higher education, and grit. Chapter 3 contains the research design, selection of participants, as well as the measurement of each of the study's variables, data collection procedures, data analysis, and hypothesis testing, and limitations. Chapter 4 summarizes the data analyses and results of the hypotheses testing. Chapter 5 includes a summary of the study, findings as they relate to the literature, recommendations for future research, and conclusions.

Chapter 2

Review of the Literature

This literature review will explore the historical context of the nursing shortage and attrition in nursing programs, along with factors that may influence student success. This chapter is organized into four primary sections: 1) historical perspective and context for the study, 2) nursing program admission process, 3) theoretical framework, including models of retention and Big Five Model of Personality and 4) grit, including development of the Grit Scale and a review of existing research. Much of the literature related to grit and student success are outside nursing education. However, there is research related to student success and grit in other rigorous education programs, including pharmacy and medicine. Specific research related to the impact of grit's role in the success and retention of baccalaureate nursing students is lacking.

Historical Perspective and Context for the Study

Over three million nurses are practicing in the United States (US), according to the BLS Employment Projections 2019-2030 (2020), making nursing the largest health care profession. Therefore, the nursing workforce plays a vital role in the health care of the United States population. The BLS (2020) projected a 7% increase or 221,900 RNs between 2019 and 2029, much higher than many other professions. In the 1990s, AACN began noticing a nursing shortage was happening and would worsen over the next 20 years (AACN, 2010). One of the efforts to combat the nursing shortage has been to increase enrollment in nursing programs.

In 2014, the National League for Nursing reported 1,869 nursing programs in the United States. The most substantial portion of those programs were BSN programs,

numbering 1,092. Increasing enrollment to combat the nursing shortage depends on

students graduating and entering the workforce. For example, attrition rates in BSN

programs nationwide are as high as 50% (Harris et al., 2013; Newton & Moore, 2009).

Therefore, addressing attrition rates is crucial to combat the nursing shortage.

Nevertheless, attrition rates remain high, and nursing program administrators and faculty

have not been able to identify factors that promote the success of nursing students.

AACN (2020), the American Nurses Association (ANA) (2014), and the BLS

(2020) predicted the United States would experience a worsening shortage of RNs

between 2016 and 2030. The BLS (2020) projected the need for 175,000 RNs each year

from 2019-2029. In addition, the ANA estimated that one million nurses will retire

between now and 2030 (AACN, 2020). Two significant demographic factors include the

number of Baby Boomers and the aging of the nursing workforce. In 2017, the US

Census Bureau reported that the number of US residents 65 and over will reach 82

million by 2030. Their healthcare needs, including care related to chronic disease, mental

health, and comorbidities, will have a profound impact on the health care delivery system

(Department of Health and Human Services (DHHS), 2017). The National Nursing

Workforce Study reported that about 50% of the nursing workforce is over age 50

(National Council of State Boards of Nursing, 2018). This contributes to a large number

of RNs retiring, leaving vacancies. These vacancies are difficult to fill with the current

level of nurses graduating (AACN, 2020). This creates staffing shortages in hospitals

that increase the stress for the remaining nurses, who often leave a job due to poor

staffing, according to AACN. This problem is cyclic, requiring a break in the cycle,

increasing the pipeline of nurses is one solution.

Another contributing factor to the nursing shortage is that nursing schools across the country struggle to increase the capacity to meet the increase in demand for health care (AACN, 2020). There are predictions that the shortage of nurses may not be as severe as initially predicted. However, there are also cautions that the workforce saw an increase in nurses returning to work during the economic recession and that falsely impacted the prediction models (DHHS, 2014). Ultimately, experts predict a shortage is on the horizon and are looking to nursing education to help fill the gap.

AACN (2020) reports that nursing program enrollment is not growing fast enough to meet the predicted workforce demands. For example, nursing programs in the US turned away 80,407 qualified applicants from baccalaureate and graduate programs in 2019 (AACN, 2020). Additionally, AACN (2020) reports that nursing programs identified multiple reasons for not increasing enrollment: the reason cited most often is a nursing faculty shortage. Solutions to the nursing faculty problem are long-term solutions; in the short term, nursing programs need to ensure they are graduating as many qualified graduates as possible to help combat the nursing shortage. However, nurse educators must identify interventions to retain students when up to half of all undergraduate students attrite out of nursing programs. An essential factor to consider when identifying interventions to impact attrition is the timing of the attrition. According to researchers, the first semester of the nursing program is the time with the highest attrition, with reports of 18-30% of attrition taking place in the first semester of nursing coursework (Horkey, 2015; Peterson, 2009; Potolsky, Cohen & Saylor, 2003).

Traditional Nursing Program Admission Process

The admission process in many nursing programs is quite similar. Most focus on cognitive factors, including GPA, science grades, and standardized tests like the ACT or SAT. The measures of cognitive ability have shown varying levels of success at predicting students who will complete nursing programs.

The literature reveals that nursing programs look at high school GPA, two-year college GPA, and science course GPA in varying combinations (Herrera, 2013; Horkey, 2015; Westrick, 2016). GPA is a prevalent admission criterion used as a part of the admission process. However, even when the GPA requirement is set relatively high, attrition rates remain high (Horkey, 2015; Merkley, 2016). Most programs use more than a single criterion, but many report little to no evidence-based guidelines for setting admission criteria (Horkey, 2015; Potolsky, Cohen, & Saylor, 2003; Westrick, 2016).

Many programs have added the use of standardized nursing admission testing to predict success in nursing programs. Sayle, Shelton, and Powell (2003) recommended using standardized tests as an admission criterion. However, they do not recommend these scores as cut scores but rather to identify areas to support the students in pre-nursing courses, i.e., math or reading comprehension. Others also recommend using these standardized tests and have noted them to be an early predictor of success (Knauss & Willson, 2013; Underwood, Williams, Lee & Brunnert, 2013; Wolkowitz & Kelly, 2010). Many of the programs did note cost as a significant deterrent to using these standardized tests.

More commonly, programs and schools use ACT or SAT scores to admit students. There is no evidence of a clear cut-off point for admission (Westrick, 2016).

Westrick suggests that looking at a combination of ACT and high school GPA helps predict success in college. The study looked at predicting success in community college and found that the higher the high school GPA and ACT score, the higher probability of success. However, many nursing programs use an admission matrix to determine selection of successful students, yet attrition rates remain high (Westrick, 2016).

Lastly, looking at student success in pre-requisite science courses through either course grades or GPA has shown some prediction of success. Potolsky et al. (2003) reviewed the science course grades in Anatomy, Physiology, Microbiology, Organic and Inorganic Chemistry. They examined these grades in relation to students' success in two first-semester nursing courses and found that a course grade of B or higher correlated with higher course grades for the two nursing courses. These researchers have recommended that nursing programs require an average GPA for science courses of a B or 3.0 on a 4.0 scale or higher. MCN does have a pre-nursing GPA requirement and recently added a science course grade requirement, which has not shown a notable change in retention rate (Nauser, personal communication, May 26, 2016).

Some nursing programs are using various non-cognitive measures to try to admit students who will likely be successful. Two potential non-cognitive measures are interviews and admission essays. Ehrenfeld and Tabak (2000) reported that the use of 1:1 interviews was only partially successful in identifying potential dropouts from the program, yet when the interviews were discontinued, the attrition rate increased. Overall, Ehrenfeld and Tabak (2000) indicated that the interviews were not objective enough and did not believe an interview did a sufficient job of screening applicants. They recommended identifying other ways to determine risk.

Sadler (2003) compared the use of GPA and written essays to reveal that the written essays show a significant difference between the groups who dropped out and those who persisted. There was no significant difference with GPA. Sadler reported the critical difference in the essays related to how applicants related to or had a personal experience with a nurse. None of the non-completers described a personal experience with a nurse or a personal experience providing care to a family member. This category was robust in the essays of the completers. Overall, the score alone on the essays did not indicate attrition, only the themes related to personal experience or connection with a nurse. Although this is an important finding, reading and analyzing student essays requires both increased human and financial resources. However, Sadler indicated that this research supported the premise that an individual's motivations impact completion.

Lastly, Capponi and Barber (2020) published a review of the literature related to undergraduate nursing program admission criteria. The researchers review revealed that cumulative pre-nursing GPA is the most commonly cited criterion for predicting success in nursing programs. Capponi and Barber made two conclusions based on the review. First, no criterion or combination of criteria was or were identified as most predictive of student success. Second, there were significant gaps in the literature related to standards and benchmarks for determining admission to nursing programs.

Theoretical Framework

The literature review conducted for this study did not discover existing theories directly addressing the trait of grit and its impact on higher education student success and academic achievement. Due to the lack of an existing theory, the study's conceptual framework focuses on prominent models of student retention and personality traits.

Specifically, the models of retention (Jeffreys, 2012; Tinto, 1993), the conceptual

framework of the Big Five Model trait conscientiousness (Goldberg, 1990; John &

Srivastava, 1999), and the concept of grit (Duckworth et al., 2007) will be presented in

this section. Student retention is dynamic, multidimensional, and influenced by many

factors, some measurable and some not measurable.

Tinto (1993) and Jeffreys (2012) described the multifactorial nature of student

attrition and retention in higher education. These two models focus on the interactions

between many factors that impact retention. As indicated above, given the multifactorial

nature of student academic success and retention, a review of Tinto's and Jeffreys' models

of student retention follows.

Tinto's Model of Departure

Tinto (1975) describes the Model of Students Departure and defines students'

attrition as "a longitudinal process of interactions between the individual and the

academic and social systems of the college during which a person's experiences in those

systems…continually modify his goals and institutional commitments in ways which lead

to persistence and/or to varying forms of dropout" (p. 94). Tinto (1993) went further and

describes four groups of factors that impact a student's decision to depart an institution in

his Model of Students Departure. The first group is pre-entry attributes. These attributes

include family background, prior education, skills, and abilities. The second group of

factors include goals and commitments. Commitments both at the institution and

external to the institution and the individual's personal goals. The third group relates to

institutional experiences. This involves interactions with all aspects of the institution,

peers, faculty, and staff. Lastly, Tinto identified the importance of the impact of

academic and social interaction (1993). His primary premise derived from his work is that involvement in both types of interaction is essential and helps produce a sense of belonging.

Although the elements of Tinto's model of higher education students' retention has evolved and changed over many decades, many elements remain the same (Tinto, 1993). First, multiple factors impact a student's decision to leave an institution. Second, factors that influence students' decisions are cognitive/intellectual and non-cognitive/personality-related factors. Tinto points out that some of these factors are outside the institution's control, and some are very individual. However, Tinto does not necessarily identify specific factors that should be evaluated or measured to help support students.

Model of Nursing Undergraduate Student Retention and Success

Another model similar to Tinto's (1975) Model of Students Departure but specific to nursing education is Jeffreys (2012) Nursing Undergraduate Retention and Success (NURS) Conceptual Model (Appendix B). The models are similar in that they both investigate the interactions of many factors that impact student retention. Jeffreys' retention factors are labeled as (a) student characteristics, (b) student affective, (c) academic, (d) professional integration, and (e) environmental. These factors and students' interactions within them contribute to academic and psychological outcomes, including course grades, total GPA, stress, and satisfaction. According to Jeffreys, both academic and psychological outcomes directly affect retention and attrition. Students may choose to leave a program related to poor psychological or academic outcomes. Students may also experience dismissal because of poor academic outcomes.

Jeffreys' (2012) describes the purpose of the NURS model as three-fold. First, to identify at-risk students and develop strategies for success. Second, guide interactions in teaching and educational research. Lastly, to help evaluate the effectiveness of strategies to improve success. The following provides more specific descriptions of the factors and characteristics in the NURS model.

Student profile characteristics describe students before entering nursing coursework (Jeffreys, 2012). These characteristics include demographic information, family education background, prior work experience, enrollment status, and prior education. Prior education includes cognitive factors such as GPA, ACT, or grades in previous coursework. It also includes where the prior education took place, including the type of institution and physical location. Although looking at cognitive predictors and the impact on retention, Jeffreys indicates that the location of prior education might add some context to the actual GPA and grades.

Student affective factors are non-cognitive traits that contribute to attitudes, values, and beliefs about their ability to learn and perform the tasks to be successful in the nursing program. Jeffreys (2012) describes three factors: (a) cultural values and beliefs, (b) self-efficacy, and (c) motivation. Cultural values and beliefs impact thinking, decisions, and actions. Self-efficacy is the individual's perceived confidence for learning. Motivation is described as a power within that pushes the student to succeed. These are some of the non-cognitive factors that impact students' success and retention.

Academic factors directly look at the student's current behaviors in the academic setting (Jeffreys, 2012). These behaviors include study skills, study hours, attendance,

and services' availability to support them academically. These are areas institutions commonly offer support services for students.

Environmental factors are external to the educational process but influence performance and retention (Jeffreys, 2012). They include factors that may or may not be able to be altered by the student. Financial status, family commitments, support systems, living arrangements, and transportation are all in this category and may indirectly impact the students' ability to succeed.

Professional integration factors enhance students' interactions with the social part of the college environment within the profession (Jeffreys, 2012). Jeffreys takes the importance of this influence a step further than Tinto (1993) did. Tinto's (1993) model indicated the importance of the student's interactions within the institution and creating a sense of belonging. Jeffreys (2012) adds the importance of nursing students' interactions with the institution and the nursing profession to develop a sense of belonging. This sense of belonging, professional socialization, and career development improves satisfaction and impacts retention.

Lastly, Jeffreys (2012) describes the surrounding outside factors, which are more global. These include local, national, and international events; politics, economic climate, healthcare systems changes, and professional nursing issues. Some of these could impact the student view of the future of the profession or workforce that could impact success and retention.

The NURS Model represents the complexity of factors that contribute to the success and retention of nursing students. The model does not pose a hierarchical direction of the impact and indicates that each area could be equally important (Jeffreys,

2012). Specifically, Jeffreys suggests that because the cognitive factors are only a small part of the complex interaction of factors, retention issues should be looked at through different lenses. Mthimunye and Daniels' (2019) systematic review of the literature using the NURS model found factors that influence students' success. The researchers results suggests that nursing students should complete assessments related to non-cognitive factors or traits, including self-control, resilience, emotional intelligence, and motivational factors to help identify students at risk for attrition. These factors and traits were categorized in the NURS model as affective factors. Mthimunye and Daniels recommend further study of affective factors that may influence student success and persistence.

Further, Fowler and Norris (2009) found that attrition is complex and multifactorial when developing an attrition risk prediction tool. The researchers felt that multiple factors influence retention and identified many of the same categories that contribute to student retention in the NURS model. Given the multifactorial nature of attrition, Fowler and Norris believe that a broad overview of student risk is essential for nursing program faculty and administration when selecting the best student candidates.

Terry and Peck (2020a) described that the NURS model indicates "that students need the capacity to meet the challenge of tasks, need to be committed and diligent, and have high levels of motivation to obtain outcomes with persistence" (p. 1). Duckworth et al. (2007) described that although demographics and motivation are essential, grit, passion, perseverance, and commitment to long-term goals in the face of complex challenges leads to success. Terry and Peck (2020a) studied grit and its relationship to academic and clinical performance because the NURS model supports that the

components of grit, perseverance, passion and commitment to long-term goals are needed for students to persist and complete nursing programs. Terry and Peck also found that grit was a predictor of perceived academic and clinical success and recommended studying the relationship between grit and actual student grades.

Big Five Model of Personality

The Big Five Model of Personality describes five personality traits that may lead to student success (John & Srivastava, 1999). These traits are openness, agreeableness, conscientiousness, neuroticism, and extraversion. These traits are measured using the self-report 44-item Big Five Inventory (John & Srivastava, 1999). The Big Five Model of personality has been studied widely to predict success in academic pursuits (Busato, Prins, Elshout, & Hamaker, 1999; Komarraju, Karau, & Schmeck, 2009; Trapmann, Hell, Hirn, & Schuler, 2007). Specifically, Komarraju et al. (2009) found that conscientiousness most predicted exam performance. Likewise, Busato et al. (1999) found that conscientiousness correlated with higher GPA and academic success in college students. Conscientiousness is a trait that describes impulse control and self-regulation (Ivcevic & Brackett, 2014). The other Big Five factors do not show relationships to academic success like conscientiousness (Busato et al., 1999; Komarraju et al., 2009; Trapmann et al., 2007).

Traits like Big Five Conscientiousness and Grit have been shown to impact academic achievement (Busato et al., 1999; Duckworth et al., 2007; Komarraju et al., 2009; Trapmann et al., 2007). Given the links between conscientiousness and academic achievement (Busato et al., 1999; Komarraju et al., 2009) and retention (Trapmann et al., 2007), it is important to identify how conscientiousness differs from grit. In the

following section on grit, the original research by Duckworth et al. (2007) will be reviewed. Two of the studies identified grit as a distinct trait related to conscientiousness.

Grit

This section presents a definition of grit, a review of existing research related to the concept of grit in higher education, and the measurement of grit.

Grit Defined, Measurement, and Initial Studies

Duckworth et al. (2007) endeavored to answer the age-old question, "Why do some individuals accomplish more than others of equal intelligence?" when they began their investigation into the trait that has become known as grit (p. 1087). More specifically, they described that some traits might be more relevant to specific vocations but were looking to identify one trait that may be essential to success regardless of domain.

Grit, defined as "perseverance and passion for long term goals," is a trait that predicts success in rigorous academic and physical environments (Duckworth et al., 2007, p. 1087). The grit characteristic consists of two facets, perseverance of effort and consistency of interest. The trait includes working extremely hard and overcoming obstacles and failures while sustaining intense effort and interest for many years (Duckworth et al., 2007). The researchers hypothesized that grit is essential to high achievement. This hypothesis evolved from interviews with highly successful individuals (Duckworth et al., 2007). The researchers also reviewed the literature on intelligence and achievement to find that although intelligence can predict some achievement, there are still significant gaps among those of equal intelligence. They also

reviewed the psychology literature for other traits that may contribute to the achievement and explain the difference of achievement among equally intelligent individuals. Duckworth et al. (2007) concluded that although there are personality traits that have been defined and may contribute to achievement, none were adequate to answer the question, "Why do some individuals accomplish more than others of the same intellect?" (p. 1087).

Based on their initial review of the literature and research, Duckworth et al. (2007) developed and validated a tool to measure grit. They reviewed existing tools through this process, but none met the four criteria they set forth before review. The tool needed "evidence of psychometric soundness, face validity for adolescents and adults pursuing goals in a variety of domains (e.g., not just work or school), low likelihood of ceiling effects in high-achieving populations and most important, a precise fit with the construct of grit" (Duckworth, 2007, p. 1089). They were unable to find an existing tool and developed and validated the Grit Scale, a self-report tool (Duckworth et al., 2007).

In six individual studies, Duckworth et al. (2007) studied the potential relationship between grit and achievement. They included conscientiousness, self-control, and intelligence as other possible predictors of success in their students. The expectation was that there was a relationship between self-control and conscientiousness but that as a trait, grit accounted for higher levels of achievement. They also hypothesized that grit would be unrelated to intelligence.

The first study's purpose was to develop and validate the self-report questionnaire to measure grit. The researchers surveyed 1,545 adults aged 25 years or older. They began with a 27-item scale, and through psychometric evaluation, including item-total

correlations, internal reliability coefficient, and redundancy, they eliminated 10 items. Further evaluation lead to elimination of five more items. The researchers retained 12 items that was titled the 12-item Grit Scale (Duckworth et al., 2007). There were two main findings in this study. Post-college graduates were higher in grit than most other groups when controlling for age, and when controlling for education, grit seems to increase with age (Duckworth et al., 2007). The researchers concluded that the increase in grit with more education is evidence that higher grit scores improve the probability of graduating with a higher education degree (Duckworth et al., 2007)

The second study focused on seeing if the higher grit scores related to age and education would remain when they controlled for conscientiousness and other Big Five personality traits (Duckworth et al., 2007). This study included 706 participants 25 years of age and older who took the same survey as the first study participants. However, these participants also indicated how often they had changed jobs and took the 44-item Big Five Inventory. As expected, age and education predicted higher grit; this remained true when conscientiousness was added as a covariant (Duckworth et al., 2007). Interestingly, the individuals who were higher in grit were less likely to have frequent career changes (Duckworth et al., 2007).

The third study was the first time Duckworth et al. (2007) investigated grit related to predicting academic performance. In this study, the performance was measured by cumulative GPA among undergraduate students at an elite college (Duckworth et al., 2007). The participants were 139 undergraduate students who volunteered to participate. The researchers used SAT scores as a general measure of intelligence or mental ability.

They found that grit scores were associated with higher GPAs beyond SAT scores, although, as expected, SAT scores were also related to GPA.

The fourth study focused on what predicts success in highly challenging circumstances. The participants were West Point Cadets enrolled in the first summer of training when attrition is the highest (Duckworth et al., 2007). The rigorous admissions process depends mostly on the Whole Candidate Score (WCS), a weighted average of SAT score, class rank, leadership ability, and physical fitness (Duckworth et al., 2007). Of note, with this sample ($n = 1.218$), the grit scale had internal reliability of $\alpha = .79$ (Duckworth et al., 2007). Measures used were the Grit Scale, the Brief Self-Control Scale, the Whole Candidate Score, summer retention, academic GPA during the first year, and the Military Performance Score (MPS). Results showed that grit was not related to the WCS or its components, but as expected, grit was related to self-control. Grit, however, predicted persistence through the rigorous summer training program better than any other measure. However, the researchers also found that grit was not the best predictor of GPA or the MPS of the first year for those who remained. The self-control score and the grit score predicted the MPS score equally, but the self-control score predicted GPA better than the grit score. The researchers concluded that grit is related to the individual's significant accomplishments and then lends itself to intense, rigorous perseverance (Duckworth et al., 2007).

Study five replicated study four but looked at the predictive validity of grit related to the Big Five trait of conscientiousness. For this study, conscientiousness was related to the WCS, and grit was not (Duckworth et al., 2007). Grit and conscientiousness were

again highly related. However, as in study four, grit predicted summer retention better than both the WCS or conscientiousness.

Finally, study six was a prospective longitudinal investigation involving participants in a National Spelling Bee (Duckworth et al., 2007). The variables studied were grit, self-control, verbal IQ, study time, final round completed, and prior competitions. Grit was not the best predictor of the highest number of rounds completed, but grit had a significant relationship with study time. The researchers concluded that grittier students studied more with the natural consequence of performing better.

Above is a summary of the original research related to grit and also the differentiation from other possible factors and traits that may predict high achievement by individuals as performed by Duckworth et al. (2007). The researchers did identify four limitations with their original research:

1. The grit scale is a self-report questionnaire and, therefore, susceptible to social desirability bias.

2. The nature of the questionnaire asks the respondent to reflect on the past, which could support the argument that past behavior predicts future performance.

3. In the selected populations for studies 3-6, the range of IQs was limited; therefore, a more heterogeneous population is desirable.

4. These studies did not relate to other predictors of achievement, such as self-efficacy or locus of control.

Further Overview of Grit in the Literature

In 2017, Credé, Tynan, and Harms published a meta-analytic synthesis of the grit literature up to 2016. They focused on grit's structure, asking if there was a hierarchical

structure to grit's components, perseverance of effort, and consistency of interest. Second, they focused on "the relation between grit and performance, retention, conscientiousness, cognitive ability, and demographic variables" (Credé et al., 2017, p. 492). The results were "based on 584 effect sizes from 88 independent samples representing 60,807 individuals" (Credé et al., 2017, p. 492).

In the literature, grit is described as a higher-order trait with two sub-components, perseverance of effort and consistency of interest. Credé et al.(2017) note that grit is rarely analyzed at the sub-component level. The researchers indicate that the results related to the two sub-components find that perseverance is the more predictive component and that the measure of grit is related more closely to perseverance.

In terms of overall achievement related to academic achievement and retention, Credé et al. (2017) found that grit's relationship with academic achievement and retention were modest compared to other common predictors such as cognitive ability and study skills. However, many administrators are not looking to replace other predictors of achievement, particularly for admissions criteria. The researchers indicated that if the goal is to improve retention by designing interventions related to improving grit for at risk students, using grit as a measure can help.

Duckworth et al. (2007) indicated a strong relationship between grit and conscientiousness; however, the researchers found that grit was a better predictor of performance. Credé et al. (2017) found in the studies they reviewed that grit may very well be a "repackaging of conscientiousness or a facet of conscientiousness" (p. 502). The researchers discovered the correlations to prediction measures such as GPA in middle and high school and college remain similar between grit and conscientiousness,

and concluded grit may not be the best measure for this type of achievement. Credé et al. (2017) pointed out that because grit predicts retention as well as other traditional measures, it can be helpful when looking to identify interventions to improve retention. The researchers recommended that when a relationship between grit and retention is discovered, any interventions to improve grit and, therefore, retention will require further research.

There have been other studies related to grit since 2016, which will be reviewed in the following sections. The first section will discuss grit related to success and achievement in a variety of populations and settings. The second will describe grit and its relation to success, achievement, and retention in healthcare professional education. Lastly, the recommendations for further study in healthcare professional education, specifically nursing education, will be discussed in relation to the NURS model.

Grit's Relationship to Achievement

Duckworth et al. (2007) noted the relationship between grit and high academic achievement or success through GPA and overall student success. When studying student performance and success, it is crucial to understand that influencers are likely multifactorial (Jeffreys, 2012). Grit has been studied alone and with other academic criteria, both in health care education and other rigorous education programs, both in higher and secondary education. This section will review the literature about grit's relationship to different types of achievement, grit's relationship to other non-cognitive traits, and achievement in both academic settings in and out of healthcare.

The relationship between grit and more subjective measures of achievement has been documented. These areas include perceived achievement in the clinical and

classroom setting for nursing students, engagement in academic endeavors, and motivation to succeed (Hodge, Wright, & Bennett, 2018; Terry & Peck, 2020a; Vainio & Daukantaitė, 2016). Each of these has been studied in relationship with grit. Vainio and Daukantaitė (2016) described grit as motivational, meaning that grit improved motivation, which improved the pursuit of goals despite setbacks.

Indirectly grit was shown, in Hodge et al. (2018), to increase academic achievement through its relationship with engagement in academic activities. The researchers found a relationship between grit, engagement, and academic achievement among university students. Further analysis identified higher levels of grit, as measured using the Grit Scale, were associated with increased engagement, which predicted increased academic achievement (Hodge et al., 2018).

Lastly, Terry and Peck (2020a) identified that grit was a significant predictor of perceived academic and clinical performance among BSN students. They compared this to other performance predictors, including year in the nursing program, age, previous experience or education, gender, and employment. They found that grit was the only significant predictor of perceived academic or clinical performance. Terry and Peck did recommend studying grit related to direct measures of performance, such as grades or program completion.

The connection between grit and grades or direct academic performance has been documented (Duckworth et al., 2007; Pate et al., 2017; Rimfeld, Kovas, Philip & Plomin, 2016). A strong correlation between grit and conscientiousness provides a more accurate prediction of academic achievement than they do separately (Duckworth et al., 2007; Ivcevic & Brackett, 2014; McCabe, 2016; Rimfeld et al., 2016). Duckworth et al. (2007)

studied grit and its relationship to other non-cognitive factors, including traits in the Big Five Model of Personality. The researchers found grit predicts achievement better than IQ or conscientiousness, although there was a positive correlation with conscientiousness.

Rimfield et al. (2016) found that conscientiousness predicted higher scores on standardized exams and accounted for a 6% difference in scores; they found that grit added a small amount to this variance. Muenks, Wigfield, Yang, and O'Neal (2017) identified that although grit was associated with both conscientiousness and self-control, there were differences in the predictive ability. The researchers looked at the two facets of grit and found that the perseverance of effort predicted later grades in high school and college students. This supports Duckworth et al.'s (2007) findings that grit was similar but different from other traits like conscientiousness and self-control.

In a study of student pharmacists, Pate et al. (2017) found that grit predicted academic performance. The researchers used the Grit Scale-Short Form and found that the total grit score was an independent predictor for students who reported GPA $\geq$ 3.5 on a 4.0 scale. The researchers also identified that the same students were higher in both facets of grit, the perseverance of effort and consistency of interest, than students who reported GPAs 3.0-3.49. This finding was congruent with Cross (2014), who also used GPA to measure achievement with non-traditional doctoral students and found a small but significant relationship between grit scores and GPA. However, Palisoc, Matsumoto, Ho, Perry, Tang and Ip (2017) found no correlation between grit and academic performance among pharmacy students. Similarly, Huhn et al. (2021) found no correlation between grit or emotional intelligence and academic performance among Doctor of Physical Therapy first-year students.

Another indicator of achievement studied with grit is program completion or retention in a challenging academic program. Eskreis-Winkler, Shulman, Beal, and Duckworth (2014) found that grittier soldiers were more likely to complete training, and grittier students were more likely to graduate from high school. Robinson-Kraft and Duckworth (2014) found that grittier novice teachers outperformed and were less likely to leave than their less gritty counterparts. The grittier a person is, the more likely they were to persist, and this was compared to intelligence, physical aptitude, and Big Five personality traits.

Grit has been studied in health care academic settings, including rigorous programs like medicine, pharmacy, and Doctor of Physical Therapy programs. Burkhart, Tholey, Guinto, Yeo, and Chojnacki (2014) explored grit as a marker for risk for attrition in surgery residents. They found that although the study was underpowered, grit was a promising indicator of attrition risk. This study also suggested that faculty should focus resources on surgery residents identified to be more at risk of attrition based on grit scores. Similarly, researchers found that more gritty pharmacy students were more likely to be retained in the program (Palisoc et al., 2017; Pate et al., 2017). Ray and Brown (2015) found similar results with beginning medical students. They further recommended a holistic approach to the admissions process that more sufficiently accounts for other non-cognitive characteristics, such as grit, that impact students' success.

Interestingly, Miller-Matero, Martinex, MacLean, Yaremchuk, and Ko (2018) also studied grit in medical students. They identified that grit was related to the time of completion and rank in the class. Students with higher overall grit scores were more

likely to complete in four years versus five, and that grit increased with class rank (Miller-Matero et al., 2018). Similarly, Terry and Peck (2020b) studied nursing students and found a correlation between higher grit levels the further the students were in the nursing program. For example, overall, year five students had higher grit levels than year four students, in aggregate.

Stoffel and Cain (2018) completed a review of grit and resilience literature within health professions education and found that educators across health education programs are interested in other, non-cognitive factors to help explain which students will succeed in these rigorous programs. They reviewed literature from nursing, pharmacy, and medical programs. They also identified that the literature is limited and mixed related to the correlation between grit and academic achievement in health education programs. Stoffel and Cain concluded that grit and resilience should continue to be studied and investigated to determine their usefulness in helping faculty and others identify and support at risk students.

Summary

The literature review for this study highlights the importance of baccalaureate nursing student academic achievement and retention to the supply of qualified graduates. More specifically, this study's review concentrated on the existing literature that relates to the trait of grit and student academic achievement and retention. This literature review did not discover a specific theory addressing the trait of grit as it relates to higher education student academic achievement and retention. While previous research related to the trait of grit has been conducted in various higher education programs and settings, no studies were found that investigated the role of grit in direct measures of nursing

student academic achievement and retention. Chapter three describes this study's

research design, participants' selection, measurement, data collection procedures, data

analysis, hypothesis testing, and limitations.

Chapter 3

Methods

The purpose of this study was to investigate the relationship between grit scores and the average of all exam scores at the end of three first-semester nursing courses at MCN. The three nursing courses in the first semester of the nursing program are Nursing Health Assessment, Foundations in Nursing, and Pathophysiology. Grit scores are measured using the 12-item Grit Scale (Duckworth et al., 2007). Chapter 3 describes the methodology used in this study and includes the research design, selection of participants, measurement tools, data collection procedures, data analysis, and hypothesis testing and, the limitations of the study.

Research Design

A quantitative correlational design using archival data was selected for the research design. "Correlational design is based in "relationship" and "grounded" in the interaction of one variable with another" (Lunenburg & Irby, 2008, p. 35). The independent variable was the student's total grit score. The dependent variables were the average of all exams in three courses, Nursing Health Assessment, Foundations in Nursing and Pathophysiology.

Selection of Participants

Two cohorts of full-time nursing students enrolled in Nursing Health Assessment, Foundations in Nursing, and Pathophysiology were included in this study ($n = 129$). Convenience sampling was utilized for this study. Archival data were used from two cohorts of nursing students from the Spring semester of 2016 and 2017 at MCN.

Students in the three first semester nursing courses were chosen because attrition rates are the highest during the first semester.

Measurement

  Course exams. Students in Nursing Health Assessment took three exams, one 30 point exam and two 35 point exams for a total of 100 exam points. The purpose of the exams was to evaluate the students' knowledge and ability to apply knowledge, related to health assessment techniques and findings, to clinical scenarios. Each exam consisted of multiple-choice items and select all that apply items. The exams were administered using the institutions learning management system. The exams were developed by course faculty. The average of all three exams was used to measure academic achievement in the course.

  Students in Foundations in Nursing Practice took three exams; each exam was worth 50 points for a total of 150 exam points. The purpose of the exams was to evaluate the students' knowledge and ability to apply knowledge, related to nursing skills and communication, to clinical scenarios. Each exam consisted of multiple-choice items and select all that apply items. The exams were administered using the institutions learning management system. The exams were developed by course faculty. The average of all three exams was used to measure student performance in the course.

  Students in Pathophysiology took three exams and a comprehensive final exam, each exam was worth 50 points for a total of 200 exam points. The purpose of the exams was to evaluate the students' knowledge and ability to apply knowledge, related to the pathophysiology of common diseases, to clinical scenarios. Each exam consisted of multiple-choice items and select all that apply items. The exams were administered using

the institution's learning management system. The exams were developed by course faculty. The average of all three exams and the final was used to measure student performance in the course.

At the end of each course all exam scores are averaged and students must score 75% or greater to pass the course. A score of less than 75% results in course failure and students may not progress until the following year when the course can be retaken. If a student has two course failures they are dismissed from the program.

Grit Scale. The 12-item Grit Scale (see Appendix C) was developed and validated by Duckworth et al. (2007). The scale is made up of 12 items divided into two factors, Consistency of Interests and Perseverance of Effort. Duckworth et al. (2007) found that the two factors together were more predictive of outcomes than either factor alone, therefore, recommends using the total scores to measure grit. The 12-item Grit Scale "demonstrated high internal consistency for the overall scale (Cronbach's α = .85) and for each factor (Consistency of Interest, α = .84; Perseverance of Effort α = .78)" (Duckworth et al., 2007, p. 1091).

Similarly, Eskreis-Winkler et al. (2014) noted the adequate internal consistency of the 12-item grit scale in two studies, the first reliability coefficient is α = .77 and the second reliability coefficient is α = .79. The grit scale was shown to predict success in the rigorous first summer at West Point Naval Academy. Using the 12-item grit scale, Duckworth, et al. (2007) found that cadets with a grit score one standard deviation higher than average were 60% more likely to complete the training (β = .48, p <.001).

Perseverance of Effort factor includes six items, for example "I finish whatever I begin" to which the individual responds on a five-point Likert scale from "1-not at all like

me to 5-very much like me" (Duckworth et al., 2007, p. 1090). The six items associated

with the Consistency of Interest factor are reverse scored, for example, "I often set a goal

but later choose to pursue a different one" (Duckworth et al., 2007, p. 1090). The items

associated with Perseverance of Effort are scored awarding five points for the answer

"very much like me." The items associated with Consistency of Interest are scored

awarding 5 points for "not at all like me" (Duckworth et al., 2007). The mean of the six

items for each factor will be calculated. The maximum score is five, and the lowest score

is one per item. The higher the score, the more grit or "passion and perseverance towards

long-term goals" an individual has (Duckworth et al., 2007, p. 1037).

Data Collection Procedures

In February 2020, the researcher requested permission for data collection from the

MCN Human Subjects Committee and received approval on February 25, 2020 (see

Appendix D). In January 2021, the researcher requested permission for this study from

Baker University Institutional Review Board and received approval on January 26, 2021

(see Appendix E). Data for this study were archived course data maintained by the

Director of On-line Education at MCN and archived data collected as part of course

orientation by the researcher. Exam averages for Nursing Health Assessment,

Foundations in Nursing and Pathophysiology were archived in the institutions learning

management system.

Archival data were requested from the MCN Director of On-Line Education to

obtain the exam averages from Foundations in Nursing, Nursing Health Assessment, and

Pathophysiology from the Spring of 2016 and 2017 cohorts of nursing students. Students

completed the 12-item Grit Scale in orientation to the nursing program on the first day of

classes in the Spring semesters 2016 and 2017. Hard copies of the student's grit surveys were stored in a locked filing cabinet in the researchers locked office, and the total grit scores were entered into an Excel workbook and stored on the institutions secure servers.

Data Analysis and Hypothesis Testing

RQ1. Is there a relationship between total grit score and exam average in Foundations of Nursing Practice?

H1. There is a significant relationship between total grit score and exam average in Foundations of Nursing Practice.

RQ2. Is there a relationship between total grit score and exam average in Nursing Health Assessment?

H2. There is a significant relationship between total grit score and exam average in Nursing Health Assessment.

RQ3. Is there a relationship between total grit score and exam average in Pathophysiology?

H3. There is a significant relationship between total grit score and exam average in Pathophysiology.

RQ4. Is there a relationship between total grit score and the average of all exam scores in Foundations of Nursing Practice, Nursing Health Assessment, and Pathophysiology?

H4. There is a significant relationship between total grit score and the average of all exam scores for Foundations of Nursing Practice, Nursing Health Assessment, and Pathophysiology.

A Pearson product-moment correlation coefficient was calculated to index the strength and direction of the relationship between the grit score and an average of exam scores for each course and the average for all three courses. A one-sample *t*-test was conducted to test for the statistical significance of the correlation coefficient. The level of significance was set at .05.

Limitations

This study included nursing students from only two cohorts at one college of nursing. Therefore, the results may not be generalizable to other nursing students or colleges. The exams used in the three nursing courses were written by course faculty, the competence of the faculty in writing exam questions is unknown. Another limitation is students' performance on course exams which could be influenced by multiple factors, including other course workload or personal factors that were outside of the control of this researcher.

Duckworth et al. (2007) describe two major limitations of the Grit Scale. First, the Grit Scale is a self-report questionnaire used to measure grit, and the limitations of self-report questionnaires are well documented. For example, one limitation described by Duckworth et al. related to the Grit Scale is that the scale is relatively transparent and therefore is susceptible to social desirability bias. Another limitation to self-report questionnaires is the assumption that the participants are honest. Additionally, participants may not read and follow the directions on the questionnaire as well.

Summary

The research design used in this study was a quantitative correlational design. Two cohorts of students from a single college of nursing were participants in the study.

The existence of a relationship between total grit score and exam averages for three beginning nursing courses was investigated. Chapter 4 provides the results of the statistical analysis used for hypothesis testing in this study.

Chapter 4

Results

This study investigated the relationship between nursing students' grit

scores and exam averages in first-semester nursing courses at MCN. The study

focused on three key nursing courses, Foundations in Nursing Practice, Nursing

Health Assessment and Pathophysiology.

Descriptive Statistics

A total of 129 participants were included in this study. Detailed descriptive

analysis results are presented in Table 1.

Table 1

Descriptive Analysis of Variables

Variables	n	M	SD
Total Grit Score	129	3.87	0.40
Foundations of Nursing Practice	129	0.85	0.05
Nursing Health Assessment	129	0.78	0.11
Pathophysiology	129	0.81	0.10
Average of all three courses	129	0.81	0.07

Hypothesis Testing

RQ1. Is there a relationship between total grit score and exam average in Foundations of

Nursing Practice?

H1. There is a significant relationship between total grit score and exam average in

Foundations of Nursing Practice.

The correlation coefficient ($r = .07$) provided evidence for no relationship

between the variables. The hypothesis test for the correlation indicated no relationship

between total Grit Scores and exam averages in Foundations of Nursing Practice, $n =$

129, $p = 0.465$. The research hypothesis was not supported. This result indicated that nursing students' total grit scores and exam averages in Foundations of Nursing Practice did not change together and, therefore, are not related to one another.

RQ2. Is there a relationship between total grit score and exam average in Nursing Health Assessment?

H2. There is a significant relationship between total grit score and exam average in Nursing Health Assessment.

The correlation coefficient ($r = .13$) provided evidence for no relationship between the variables. The hypothesis test for the correlation indicated no relationship between total Grit Scores and exam averages in Nursing Health Assessment, $n = 129$, $p = 0.140$. The research hypothesis was not supported. This result indicated that students' total grit scores and exam averages in Nursing Health Assessment did not change together and, therefore, are not related to one another.

RQ3. Is there a relationship between total grit score and exam average in Pathophysiology?

H3. There is a significant relationship between total grit score and exam average in Pathophysiology.

The correlation coefficient ($r = .14$) provided evidence for no relationship between the variables. The hypothesis test for the correlation indicated no relationship between total Grit Scores and exam averages in Pathophysiology, $n = 129$, $p = 0.117$. The research hypothesis was not supported. This result indicated that students' total grit scores and exam averages in Pathophysiology did not change together and, therefore, are not related to one another.

RQ4. Is there a relationship between total grit score and the average of all exam scores in Foundations of Nursing Practice, Nursing Health Assessment, and Pathophysiology?

H4. There is a significant relationship between total grit score and the average of all exam scores for Foundations of Nursing Practice, Nursing Health Assessment, and Pathophysiology.

The correlation coefficient ($r = .15$) provided evidence for no relationship between the variables. The hypothesis test for the correlation indicated no relationship between total Grit Scores and the average of all exam scores in Foundations of Nursing Practice, Nursing Health Assessment, and Pathophysiology, $n = 129$, $p = 0.095$. The research hypothesis was not supported. This result indicated that students' total grit scores and average of all exam scores in Foundations of Nursing Practice, Nursing Health Assessment, and Pathophysiology did not change together and, therefore, are not related to one another.

Summary

Chapter 4 included the results of hypothesis testing for the research questions. The results were consistent across all four hypotheses. There was no relationship between total grit scores and the exam averages in all three courses and the average of exam averages for all three courses. Chapter 5 presents a summary of the study, interpretation of results, major findings, findings related to the literature, recommendations for future research, and conclusions.

Chapter 5

Interpretation and Recommendations

The intent of this study was to examine the relationship between total grit scores and academic achievement among nursing students in the first three nursing courses at a Midwestern college of nursing BSN program. Chapter 5 summarizes the study, including an overview of the problem, purpose statement, and research questions. A review of methodology and major findings from hypothesis testing are included. The major findings are discussed in context with the literature reviewed in Chapter 2. The chapter concludes with recommendations for future research and concluding remarks.

Study Summary

Grit has been shown to predict academic achievement in a number of academic settings; however, there are no studies investigating this relationship among nursing students. This study investigated BSN students' grit scores and its potential relationship to their academic achievement in three first semester nursing courses. The following sections will summarize the study including, an overview of the problem, purpose statement, research questions, research methodology, and major findings.

Overview of the problem. The administration and faculty at MCN cannot accurately predict students at risk of attrition in the first semester of nursing courses. Predicting success using cognitive measures has not been sufficient. Other non-cognitive measures of success, including resilience and self-efficacy, have been studied. None have been able to predict student academic achievement in nursing programs or other academic programs accurately. Grit's relationship to student academic achievement has not been studied in nursing programs, and currently the relationship is unknown.

Purpose statement and research questions. The purpose of this study was to investigate the relationship between grit scores and exam averages in three first-semester nursing courses at MCN. The study was guided by four research questions, asking if there is a relationship between the students' total grit score and their exam average for each course. The three fundamental nursing courses are Foundations in Nursing, Nursing Health Assessment, and Pathophysiology. Successful completion of these courses with a 75% exam average or greater is required to progress in the nursing program, and for the purpose of this study was equated as academic success in these courses.

Review of the methodology. The research design used in this study was a quantitative correlational design. Two cohorts of students from a single college of nursing were participants in the study. A potential relationship between students' total grit scores and exam averages for three beginning nursing courses was investigated. Archival data were used for exam averages and for total grit scores and were processed using Microsoft Excel and SPSS. Statistical analyses were performed in SPSS to identify if there was a statistically significant relationship between total grit scores and the exam averages.

Major findings. This study identified no significant relationship between total grit scores and the exam averages for two cohorts of students in three beginning nursing courses at MCN. These findings were consistent across exam averages for each course and the average for all three courses. Since exam averages are the measurement used to examine success in nursing courses at MCN and are indicators of academic achievement in a course, the findings suggested that the grit scores might not relate to students' academic achievement.

Findings Related to the Literature

This study was essential because it was the first to investigate the relationship between grit scores and nursing student academic achievement in the first three courses of a BSN program. Relationships between total grit scores and academic achievement and retention have been documented in other disciplines, including other health sciences like medicine and pharmacy, however, when viewed holistically, the results are mixed (Burkhart et al., 2017; Credé, Tynan, & Harris, 2017; Duckworth et al., 2007; Huhn et al., 2021; Miller-Matero et al., 2018; Palisoc et al., 2017; Pate et al., 2017; Ray & Brown, 2015).

The current study's findings were consistent with one study related to academic achievement and pharmacy students and inconsistent with the other study of pharmacy students and academic achievement (Palisoc et al., 2017; Pate et al., 2017). When comparing these two studies with the current study, some similarities and differences emerged. Pate et al. (2017) studied a large sample ($n = 700$) of pharmacy students in multiple institutions, but Palisoc et al. (2017) involved a smaller ($n = 98$) sample of students at one institution. The current study was conducted at a single institution with a smaller sample of first semester nursing students ($n = 129$) than Pate et al. (2017), and was similar to Palisoc et al.'s (2017) study. The current study found consistent results with Palisoc et al. (2017) findings with no statistically significant relationship between grit and GPA > 3.0. Perhaps a larger, more heterogeneous sample in the Pate et al. (2017) study had more statistical power to examine minor differences.

Another significant difference between Pate et al. (2017) and Palisoc et al. (2017) was the level of achievement, high achievers versus passing achievement, as it relates to

grit score. Specifically, Pate et al. (2017) used GPA to measure academic achievement among three groups of pharmacy students (i.e., one group with GPA higher than 3.5, one with GPA between 3.0 and 3.4, and one with GPA lower than 3.0). They found that the total grit score only correlated with students who achieved the highest GPA category (> 3.5). The current study and Palisoc et al.'s (2017) study focused on the minimum level achievement for success or progression, 75% exam average, and 3.0 GPA or higher, respectively. The essential difference being grit predicted the high performers in the pharmacy students (Pate et al., 2017), not necessarily those who passed or persisted. The current study was congruent with Palisoc et al.'s (2017) study in that there was no relationship found between the minimum level academic achievement of passing or progression and total grit scores.

Another study in health care that examined the correlation between grit score and academic achievement involved Doctor of Physical Therapy (DPT) students, and they found no correlation between grit score and passing level of academic achievement among DPT students (Huhn et al., 2021). The findings of the current study are consistent with Huhn et al.'s study. One possible explanation of this finding was provided by Palisoc et al. (2017) and Huhn et al. (2021) that the mean grit scores for each cohort of students in their studies were relatively high, 3.8 and 3.94, respectively, on a scale of 1-5, so it was possible that students who get admitted to health science programs are already more gritty than average; therefore, a larger sample size is needed to provide more statistical power to examine these minor differences in grit scores. The current study also included somewhat gritty students ($n = 128$, $M = 3.87$), and the sample size is comparatively small ($n = 129$). However, there have been no studies yet that specifically

test this speculation, unfortunately, the current study did not provide data to examine it either. Future research should include investigation of grit scores in health science students compared to other students in higher education.

In the context of nursing education research, Terry and Peck (2020a; 2020b) conducted studies that were relevant to this current study. These researchers studied nursing students' total grit scores and the students' perception of academic and clinical performance, and they discovered that the higher the grit score, the higher the students' perceived level of performance. Terry and Peck (2020a) recommended investigating further if there is a relationship between total grit score and actual academic achievement, and this current study investigated the relationship between grit scores and actual exam averages. A key difference between Terry and Peck's (2020a) study and the current study is that their study focused on students' perception of their academic and clinical performance and the students' grit scores, while this study examined the relationship between the students' grit scores and their exam averages in the first three courses of their BSN program. Investigating these three variables together, perceived performance, actual academic performance, and grit is recommended to increase understanding of grits' relationship with overall nursing student academic performance, and ultimately successful program completion.

Conclusions

The current study was designed to analyze the potential relationship between grit and nursing student academic achievement in the first three courses of a BSN program. This study contributes to the limited body of literature related to grit and nursing education and is the first study to investigate grit and academic achievement in beginning

nursing courses. This study has implications for higher education professionals interested in the retention of nursing students and future researchers studying predictors of nursing student retention and academic achievement. Although this study did not show a significant relationship between grit scores and exam averages in three beginning nursing courses, it provides a first step for further investigation related to grit and academic achievement of nursing students during their first semester.

  Implications for action. Given the importance of addressing the nursing shortage, the following actions are recommended based on the literature and the findings of the current study:

1. The researcher will share the results of this study and literature review with the institution's administration and recommend further investigation of the impact of grit on nursing student success, specifically program completion.

2. Given the importance of addressing the nursing shortage, nursing program administrators should continue to investigate the multitude of factors that impact nursing student retention to successful program completion. Utilizing Jeffery's (2012) NURS model is recommended to help identify factors to consider.

3. Timely intervention is necessary to impact students currently in nursing programs before they are not retained. Nursing program administrators, faculty and student support staff should develop plans, policies and procedures to identify students at risk for attrition early and intervene quickly to increase retention and program completion.

4. Given the importance of early intervention to impact the nursing shortage, nursing program faculty and administrators should consider policy requiring the utilization of academic support services.

Recommendations for future research. This research and the literature support the continued study of grit and its relationship or impact on attrition and retention of nursing students (Stoffel & Cain, 2018). However, this study was completed at a single institution with only two cohorts of students, making the result difficult to generalize. Given the mixed results in the literature related to grit and academic achievement and the importance of addressing the predicted nursing shortage, further study is recommended:

- This study was conducted at a single institution with a relatively small sample size. This study should be replicated at more institutions in the Midwest and other geographic locations.

- This study was conducted at a single-purpose for-profit hospital-based institution; this study should be replicated at other types of institutions offering Bachelor of Science in nursing programs.

- This study used a very specific metric for evaluating academic achievement; further research should use a more consistent metric across different institutions for example, nursing course GPA.

- Some studies have noted differences when the domain-specific scores for consistency of interest and perseverance of effort of the grit scale are used as variables (Credé, Tynan, & Harms, 2017; Muenks et al., 2017); further research should consider studying domain-specific scores and academic achievement.

- Terry and Peck (2020b) reported that grit developed exponentially in the second and third years of nursing programs; further research should investigate these variations to understand why the change in grit score over time.

- Terry and Peck (2020a) reported a relationship between students' perceived success in the academic and clinical setting and grit scores, further research should investigate relationships between nursing students' perceived success, in both clinical and academic settings, their actual academic performance, and grit.

- The literature review for this study has suggested that grit is related to retention in challenging health science programs; further research should investigate this phenomenon in nursing.

- The impact of demographic variables such as age, ethnicity, race, gender, etc. has been documented (Jefferys, 2012). Investigating the impact of various demographics on the relationship between grit and academic success and completion in nursing programs should be explored.

- This study focused on beginning nursing student academic achievement and grit. Examining the relationship between student's total grit scores and nursing program completion would provide nursing program administrators with further information related to program completers.

- This study only included students in a BSN program, investigating a relationship between grit and the academic success of students in other types

of nursing programs, including Associate of Science in Nursing or RN to BSN bridge programs, would increase the body of literature in nursing education.

- To additionally address the nursing shortage predicted by the current study's literature review, qualitative studies exploring recent nursing student graduates perceptions of what contributed to their successful program completion, and their perception of how well their nursing program prepared them for their role in health care should be considered.

- In order to enter the nursing workforce and have an impact on the nursing shortage, students need to become licensed. Investigation related to the impact of total grit scores and successful completion of the National Council Licensure Examination- Registered Nurse (NCLES-RN) is recommended.

Concluding remarks. Although this study did not show a significant relationship between grit and exam averages in BSN nursing students' first-semester nursing courses, this study provides a beginning foundation for future research on grit and academic achievement among nursing students. Grit is one non-cognitive measure that has not been well studied in this population. Given that grit has been shown to predict retention in other health-care related programs, there is still merit in further investigating its impact on nursing student academic achievement. Grit has been shown to change over time and be responsive to intervention (Hochanadel & Finamore, 2015; McCabe, 2016; Rimfeld et al., 2016; Stoffel & Cain, 2018; Terry & Peck, 2020a); therefore, better understanding of grit's impact on nursing students could provide avenues and potential future direction for programing that impacts retention and academic success.

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Appendices

Appendix A: Admission Criteria

Admission to the Undergraduate Programs

Admission to the undergraduate programs is based on the applicant's academic record, evidence of scholastic ability, and interest in the goals of the College. Admission decisions are made on a competitive basis for both the Traditional and Accelerated Option B.S.N. programs. Admission will be offered to applicants who are, in the view of the College, best qualified.

Prospective students for the undergraduate program should also review the Rockhurst University Catalog for additional information not covered in this catalog. Both publications should serve as a guide to students seeking undergraduate admission. The B.S.N. program is organized and available to qualified students in two undergraduate options: Traditional B.S.N. and Accelerated B.S.N. These options are designed to meet the needs of different populations, long term trends in health care delivery systems and, more specifically, the nursing profession.

The Traditional B.S.N. is designed for students who have completed high school or its equivalent and meet all the admission requirements. Many of these students are recent graduates of high school, however, there are increasing numbers of students who transfer from community colleges and other institutions and adults who are entering college for the first time or who are changing careers.

The Accelerated B.S.N. is designed for students who have an undergraduate degree in a field other than nursing. Accelerated students also must satisfactorily complete liberal arts and science prerequisites, nursing prerequisites, and complete 15 credit hours of residency at Rockhurst University. The required nursing coursework is completed in one 12 month calendar year.

Admission to the Traditional B.S.N. Program

Admission from High School
Application is made to the Director of Admission, Rockhurst University, 1100 Rockhurst Road, Kansas City, Missouri 64110-2561. Upon receipt of a completed application, the application fee, all official transcripts of credit and ACT or SAT scores, the applicant will be notified by the Rockhurst University Admission Office of his or her admission status.

Credit for Nontraditional Work
For advanced placement, dual credit, International Baccalaureate credit and College Level Examination credit, see the current Rockhurst University Catalog at www.rockhurst.edu.

Admission from Another College (Without Nursing Credits)
Students who wish to transfer to Research College of Nursing should apply online to NursingCAS to begin the nursing coursework in January of each year. The website to begin the application process is https://portal.nursingcas.org. The deadline to apply is February 15th prior to the January a student wishes to enroll. Admission decisions are made on or about March 1st. Students must have a minimum college GPA of 2.7 to be considered however the admission process is competitive and based on overall GPA as well as your science and math GPA. Transfer admission is very limited and the average admission GPA is 3.6 or higher. Students do not have to complete all the pre-requisites to apply. The nursing curriculum is 2.5 years from the January a student begins.

Admission with Nursing Credits
Students who wish to transfer from another college where nursing courses have been completed should follow the procedures as outlined in "Admission from Another College." In addition, the student should:

1. Present a letter of recommendation from the Dean or Director of the nursing program attended.
2. Recognize an interview with the Research College of Nursing Traditional B.S.N. Program Director may be required.

Transfer applicants must present evidence of a grade point average of not less than 2.7 (A=4.0) in courses taken at other institutions. In collaboration with course coordinators, the Dean of Nursing will determine if previously earned nursing course credits are equivalent to Research College of Nursing courses.

Admission from Rockhurst University (Internal Transfer)
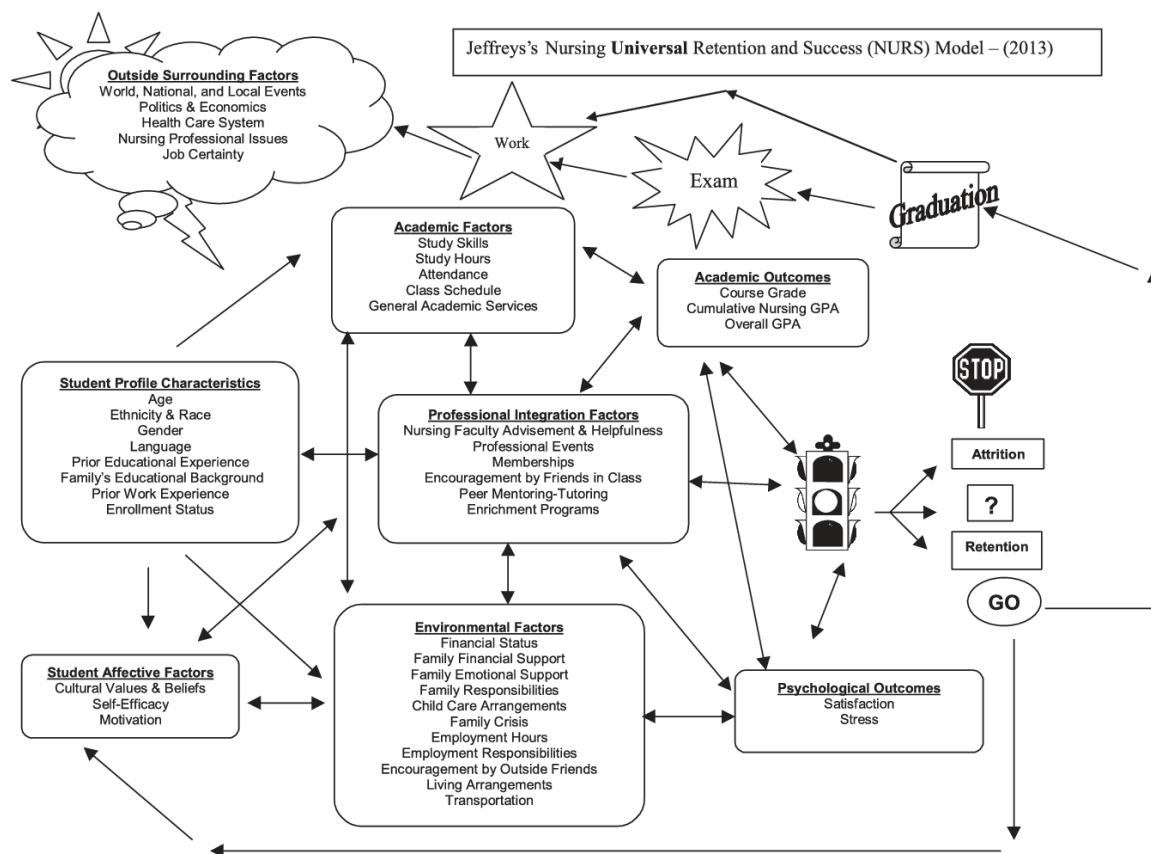Rockhurst students who wish to enroll in the nursing program should:
1. Submit an internal transfer application form. No application fee is required.
2. Schedule an appointment with the Director of Transfer and Graduate Recruitment.

Internal transfer applicants within Rockhurst University must present evidence of a cumulative grade point average of not less than 2.7 (A = 4.0) in courses taken to be eligible for admission to the nursing major. Space for the spring sophomore nursing courses is limited and admission is competitive.

Retrieved from Research College of Nursing Catalog, 2013- 2014
Note: 2016 entered under the 2013-2014 catalog and the 2017 cohort entered under the 2014-2015 catalog. Admission criteria for both cohorts was the same.

Appendix B: Model of Nursing Undergraduate Retention and Success

Jeffreys's Nursing **Universal** Retention and Success (NURS) Model – (2013)

Outside Surrounding Factors
World, National, and Local Events
Politics & Economics
Health Care System
Nursing Professional Issues
Job Certainty

Work

Exam

Graduation

Academic Factors
Study Skills
Study Hours
Attendance
Class Schedule
General Academic Services

Academic Outcomes
Course Grade
Cumulative Nursing GPA
Overall GPA

Student Profile Characteristics
Age
Ethnicity & Race
Gender
Language
Prior Educational Experience
Family's Educational Background
Prior Work Experience
Enrollment Status

Professional Integration Factors
Nursing Faculty Advisement & Helpfulness
Professional Events
Memberships
Encouragement by Friends in Class
Peer Mentoring-Tutoring
Enrichment Programs

STOP

Attrition

?

Retention

GO

Student Affective Factors
Cultural Values & Beliefs
Self-Efficacy
Motivation

Environmental Factors
Financial Status
Family Financial Support
Family Emotional Support
Family Responsibilities
Child Care Arrangements
Family Crisis
Employment Hours
Employment Responsibilities
Encouragement by Outside Friends
Living Arrangements
Transportation

Psychological Outcomes
Satisfaction
Stress

Adapted from Jeffreys's Nursing Undergraduate Retention and Success (NURS) Model – (2012).
In Jeffreys, M. R. (2012). *Nursing Student Retention: Understanding the Process and Making a Difference. (2nd Ed.).* New York: Springer, p. 12.
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Appendix C: 12-item Grit Scale

12-Item Grit Scale

Objective: *To learn about the concept of grit and how it applies to academic success*

Respond to the following 12 items. Be honest – there are no right or wrong answers.

1. I have overcome setbacks to conquer an important challenge.
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

2. New ideas and projects sometimes distract me from previous ones.*
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

3. My interests change from year to year.*
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

4. Setbacks do not discourage me.
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

5. I have been obsessed with a certain idea or project for a short time but later lost interest.*
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

7. I often set a goal but later choose to pursue a different one.*
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

8. I have difficulty maintaining my focus on projects that take more than a few months to complete.*
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

9. I finish what I begin.
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

10. I have achieved a goal that took years of work.
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

11. I become interested in new pursuits every few months.*
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

6. I am a hard worker.
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

12. I am diligent.
   - ☐ Very much like me
   - ☐ Mostly like me
   - ☐ Somewhat like me
   - ☐ Not much like me
   - ☐ Not like me at all

Grit Scale Scoring

<u>Step 1</u>: For questions **1, 4, 6, 9, 10,** and **12**, assign the following points:
   - 5 = Very much like me
   - 4 = Mostly like me
   - 3 = Somewhat like me
   - 2 = Not much like me
   - 1 = Not like me at all

<u>Step 2</u>: For questions **2, 3, 5, 7, 8,** and **11**, assign the following points:
   - 1 = Very much like me
   - 2 = Mostly like me
   - 3 = Somewhat like me
   - 4 = Not much like me
   - 5 = Not like me at all

<u>Step 3</u>: Add up all the points and divide by 12.

Grit Score: _____

What does my score mean?

- ➢ The maximum score on this scale is 5 for extremely gritty.
- ➢ The lowest score on this scale is 1 for not at all gritty.

What is Grit?

- ➢ Grit is defined as perseverance and passion for long-term goals
- ➢ It entails working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress
- ➢ Grit is unrelated to talent and can be built through a growth mindset

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Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, *92*(6), 1087–1101.
Permission for use on https://angeladuckworth.com/research/ "Researchers and educators are welcome to use the scales I have developed for non-commercial purposes."

Appendix D: Human Subjects Protocol #2020-2 Approval

February 25, 2020

HS Protocol # 2020-2 – Investigating the Relationship between Nursing Student Grit Scores and Course Exam Averages in First Semester Nursing Courses at a Midwestern Baccalaureate College of Nursing.

Dear Ms. Hammond,

The Research College of Nursing Human Subjects Committee reviewed your study on February 24, 2020. The committee deemed your study to be exempt and approves you to proceed.

If we can be of further assistance, please contact the committee.

Sincerely,

Sarah Prichard, PhD, RN, ONC
Research College of Nursing Human Subjects Committee Chair

Appendix E: Baker University Institutional Review Board Approval

Baker University Institutional Review Board

January 26th, 2021

Dear Christine Hammond and Arminda McCallum,

The Baker University IRB has reviewed your project application and approved this project under Exempt Status Review. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Please be aware of the following:

1. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
2. Notify the IRB about any new investigators not named in original application.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents of the research activity.
4. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.
5. If the results of the research are used to prepare papers for publication or oral presentation at professional conferences, manuscripts or abstracts are requested for IRB as part of the project record.
6. If this project is not completed within a year, you must renew IRB approval.

If you have any questions, please contact me at npoell@bakeru.edu or 785.594.4582.

Sincerely,

Nathan Poell, MLS
Chair, Baker University IRB

Baker University IRB Committee
Sara Crump, PhD
Nick Harris, MS
Christa Manton, PhD
Susan Rogers, PhD