

AN ANALYSIS OF GRIT SCORES ON FIRST-YEAR UNDERGRADUATE STUDENTS'
PERSISTENCE AT A LARGE PRIVATE UNIVERSITY

by

Nina M. Shenkle

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

Student persistence in higher education has become an increasingly high priority as institutions seek to improve undergraduate completion rates. Traditionally, cognitive abilities such as aptitude and intelligence have been used to measure and predict whether a student will be successful in college. However, there is evidence that noncognitive abilities such as determination or effort are as important and as indicative of success as cognitive abilities. This nonexperimental, causal-comparative study utilized a multivariate analysis of variance to analyze archival data of 832 undergraduate students from a large private university to determine the differences between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of students who persist and those who do not persist. For the purpose of this study, persistence was defined as a first-year undergraduate students' retention at the institution from the first term to second consecutive term. No significant difference was found between students who persisted and those who did not. The findings indicate the usefulness of measuring college students' overall grit scores and grit's subscores in order to determine whether or not they will persist at the institution, and further opportunities are presented in order to accomplish more research on the relation of noncognitive abilities to student persistence at the college level.

Keywords: student persistence, retention, noncognitive, grit, conscientiousness, perseverance of effort, consistency of interest

Dedication

This manuscript is dedicated to my family with overwhelming gratitude. To my husband, Michael, who gives me grace, over and over, and then gives me more grace. Michael—you *made* it possible for me to complete this journey over these past few years; and you *make* it possible for me to get past myself and move forward in all aspects of my life every single day. To my babies, Michael and Holden—what a privilege it is to be your Mummy. May you possess a love for reading, may you be lifelong learners, and may you do your best to help others with your knowledge. To my dear parents, Chuck and Louise, who have made lifelong sacrifices, financial and otherwise, so that I could receive a Christian education; and to my brother, CJ, for challenging me to not take things too seriously—finally, there will be a Dr. Matone (Shenkle). To my other parents, Pete and Jan, and my other brothers and sisters, nieces and nephews—your love and encouragement have been true gifts and sincere blessings to me over these past 10 years. I am proud to share your name.

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List of Abbreviations

Emotional Intelligence (EQ)

Grade Point Average (GPA)

Grit Original Scale (Grit-O)

Grit Short Scale (Grit-S)

Intelligence Quotient (IQ)

Multivariate Analysis of Variance (MANOVA)

Physical Symbol System Hypothesis (PSSH)

Socioeconomic Status (SES)

Statistical Package for Social Sciences (SPSS)

CHAPTER ONE: INTRODUCTION

Overview

The following chapter presents a summary of the noncognitive trait known as grit and its impact on society as well as its potential relationship to student retention in higher education. The sections will conclude with identification of a gap in literature as represented by a problem statement as well as the purpose and significance of the research, which is to identify opportunities to bolster retention practices in a university setting.

Background

Social psychology demonstrates that, throughout multiple facets of life, individuals tend to focus on completion of a goal or other achievement. One of the most commonly desired achievements among Americans remains a college degree (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014), yet only 59 percent of first-time, full-time undergraduate students who begin seeking a bachelor's degree at a four-year university persist to graduation (National Center for Education Statistics, 2017). Student persistence is defined as a student's ability to make progress in academia as evidenced by continued enrollment (Bahi, Higgins, & Staley, 2015). Additionally, first-year student persistence has shown to be positively influenced by a university's commitment to the academic and intellectual development of its students (Braxton & Francis, 2017). Postsecondary institutions face challenges in retaining students who will persist in a program of study and achieve academic goals such as above average grade point average and eventual degree completion, leading to the need to foster grit in college students (Hochanadel & Finamore, 2015).

Student persistence and university retention efforts often flow from an institution's commitment to two organizational factors: its own integrity and its students' welfare (Braxton &

Francis, 2017). One approach to developing students academically and intellectually to lead to persistence is to encourage enhanced task-based or extreme stamina applied toward efforts; this stamina is known as grit (Eskreis-Winkler et al., 2014). *Grit*, a term developed by Angela Duckworth (2016) to describe perseverance and passion for long-term goals, is similar to the trait of resiliency. Grit is measured by an overall score and two subscales created by Duckworth (2016): perseverance of effort and consistency of interest. Attention continues to be given to the topic of grit across multiple facets of education as a noncognitive indicator of potential for achievement (Duckworth, Peterson, Matthews, & Kelly, 2007; Hokanson & Karlson, 2013). Specifically, institutions of higher education are placing an increased focus on incorporating elements that promote grit within curriculum and cocurricular programming (Hochanadel & Finamore, 2015). Duckworth et al. (2007) measured grit's influence on academic performance at an elite institution. This research showed that grit has more predictive significance toward both performance and student retention than standardized test scores, high school performance, and individual self-control.

Grit, according to Stokas (2015), is “primarily a disposition that correlates with a high degree of individual achievement and the ability to have significant tolerance for the unpleasant sides of a practice” (p. 513). A notable assessment of the psychological reasons for high achievement shaped Galton's (1892) suggestion for a description of the importance of grit: that talent or ability cannot stand alone; it must be combined with zeal and “capacity for hard labour” (p. 38). The belief that talent is different from both interest and effort has been documented in literature for over a century (Eskreis-Winkler et al., 2014). Across the late 19th and early 20th centuries, development of grit in individuals was encouraged in both underprivileged and affluent youth and in both urban and rural settings as an ideal way “to toughen them up enough

to avoid downward mobility” (Ris, 2015, p. 4). Throughout the 20th century, grit was encouraged in youth through organized sports and participation in clubs like the Boy and Girl Scouts (Ris, 2015). Grit, however, declined midcentury as a popular societal topic, perhaps as individuals became less anxious about the upper class’s potential for downward mobility (Ris, 2015). Then, in 1968, Charles Portis released his novel, *True Grit*, which brought the discussion of the topic of the trait back to life over the next few decades. The work features a poor girl’s grueling perseverance to avenge the death of her father (Portis, 1968). Portis’s story led to the majority of society recognizing grit as a trait only needing development in disadvantaged individuals (Ris, 2015).

Current discussions about grit now offer further insight into all populations of individuals seeking to achieve, from the disadvantaged to the Ivy League student, through developing grit (Ris, 2015). Due to the increasing popularity in modern society of incorporating noncognitive skill-building into educational endeavors, the discussion of grit continues to become a fixture among professionals in education (Hokanson & Karlson, 2013). Grit is described as achievement at the intersection of talent and effort, whereby talent and effort are examples of noncognitive traits. In contrast, cognitive factors of achievement are traits such as aptitude and intelligence (Hammond, 2017). According to Hammond (2017), even when individuals demonstrate similar but slightly different cognitive capabilities, those with the lower cognition can compensate with higher work determination and effort, thus demonstrating grit. Grit encompasses the element of endurance, as well: it is the sustained application of talent and effort for a duration of time and with intensity (Hammond, 2017).

Intelligence quotient, or IQ, has long been established as a benchmark for success in educational endeavors because it has been connected with positive outcomes more consistently

that any other personality trait (Suzuki, Tamesue, Asahi, & Ishikawa, 2015). However, there are other dimensions of personality, namely grit, that have yet to be studied in order to determine their connection to what is known about achievement and desirable outcomes (Suzuki et al., 2015). According to Pink (2008), educational society has long valued “left-brain” thinking over “right-brain” traits such as empathy and inventiveness (p. 22). However, while content knowledge has its value, noncognitive character strengths are becoming more essential in a global society, and grit is one such noncognitive trait (Hokanson & Karlson, 2013).

The model of student departure developed by Tinto (1975) presents the most widely known theory behind student persistence through highlighting three factors influential in a student’s commitment to continue in college: the attributes of the individual, the experiences of the individual prior to college, and the individual’s family background. It has been found that the majority of students who drop out of college leave during the first year, and many of those individuals leave within the first six weeks (Chen, 2012; Ryan, 2004; Tinto, 1988). Tinto (1975) theorized that, in addition to these influencers, a student remains enrolled in college parallel to how integrated, or engaged, they are into college life. Tinto’s model has become a hallmark of institutions’ success strategies as they seek to increase student persistence rates (Davidson & Wilson, 2013). Since it focuses mainly on social engagement, Tinto’s (1988) theory holds to the idea that college relationships matter; therefore, institutions should determine how to leverage relationship-building across multiple facets in order to foster student engagement, thus theoretically leading to student persistence (Davidson & Wilson, 2013).

Duckworth (2016) theorized that the grit trait is primarily derived from a growth, rather than fixed, mindset. The theory underpinning grit, mindset theory, was developed and expanded upon by Carol Dweck (2006). A growth mindset is a state of mind whereby individuals

recognize they are capable of expending more effort in order to achieve (Dweck, 2006). As students recognized that they could further develop their intelligence, Dweck (2006) asserted that they sought deeper learning strategies and developed an inventory of their weaknesses to address them, which led to outperformance of their peers. The concept of grit aligns with the theory of growth mindset, which, according to Dweck (2006), is cultivated through praising students not for their intelligence but for engagement in the learning process. This praise encourages a growth mindset that places emphasis on learning resiliency (Dweck, 2006). Individuals who recognize that their abilities are constantly evolving exhibit a growth mindset (Ravenscroft, Waymire, & West, 2012); these individuals focus on processes rather than outcomes. The existence of a growth or fixed mindset in an individual may explain whether he or she determines to either put forth further effort or to give up in an area of life (Ehrlinger, 2008).

Problem Statement

Academic performance has traditionally been considered one of the strongest indicators of student persistence (Pascarella & Terenzini, 1980, 2005; Rochford, 2004). Though there exists empirical research to imply that grit is a contributor to student persistence, Duckworth (2016) recommended that further research be conducted in order to clarify which specific behaviors exist as a result of an individual's grit score or its two facets, perseverance of effort and consistency of interest. Duckworth et al. (2007) developed and validated an instrument, the Grit Scale, to measure students' overall grit scores and its two facets' subscores. Grit has been determined to be a significant predictor of a variety of successful outcomes, such as measured teacher effectiveness, academic performance at elite universities, and high-stakes academic competitions like the National Spelling Bee finals (Duckworth, 2016). Grit also proved to more strongly predict the retention of students at an elite university than SAT scores, high school

rankings, or self-control, but its association with student persistence has not been thoroughly investigated (Eskreis-Winkler et al., 2014). The problem is that current research does not adequately demonstrate the differences between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of students who persist and those who do not persist at a large private university.

Purpose Statement

The purpose of this quantitative study was to determine the differences between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of first-year undergraduate students who persisted and those who did not persist at a large private university during the 2017–2018 academic year. The study used a causal-comparative design. The independent variable was student persistence at the college level. Students were divided into two groups: Group 1 was students who persisted and Group 2 was those who did not persist. In this study, persistence was defined as a first-year undergraduate students' retention at the institution from the first term to a second consecutive term. The dependent variables were the student's overall grit score, perseverance of effort subscore, and consistency of interest subscore.

Significance of the Study

The significance of this study is found within the notion that grit, as measured by an overall score and two subscores, may play a significant role in student persistence, and if so, best practices in institutional retention may expand to include grit and its subscores. Traditionally, success in college has been predicted by academic assessments that measure cognitive abilities; however, research demonstrates that only approximately 10 percent of college students actually leave higher education due to low academic performance (Paulsen, 2016). It is additional noncognitive factors, such as grit, that educators are finding contribute to students' likelihood of

success (Paulsen, 2016). Hokanson and Karlson (2013) indicate that noncognitive characteristics such as grit may be more effective at predicting success long term and that it is valuable to inspect the full extent of impact. Research suggests that highly intelligent individuals may lack perseverance due to fear of failure. Since highly intelligent students may often be those admitted to a university and expected to persist (Hokanson & Karlson, 2013), examining noncognitive traits of college students is a worthy endeavor. The various facets of life across which individuals demonstrate noncognitive zeal are typically professional, relational, and educational contexts, and within each, there are varying amounts of long-term efforts (Eskreis-Winkler et al., 2014).

The “Big Five” are a full spectrum of personality traits that demonstrate positive relationships to achievement and negative relationships to dropouts in education (Eskreis-Winkler et al., 2014). Student achievement in the form of higher education persistence is often attributed to one of the Big Five, conscientiousness, according to Duckworth (2016). The significance of grit in relation student persistence, however, is that it takes into account the prolonged effort and interest applied toward an achievement over time (Duckworth, 2016).

Research Question

RQ1: Is there a difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of first-year undergraduate students who persist and those who do not persist at a large private university?

Definitions

1. *Grit* - Perseverance toward and passion for long-term goals (Duckworth, 2016).

2. *Grit-S* - A shorter version of the grit instrument used to determine an individual's grit score that retains the original structure of two factors, perseverance of effort and consistency of interest (Duckworth & Quinn, 2009).
3. *Perseverance of Effort* - According to Duckworth (2016), "working hard and bouncing back from setbacks" (p. 57).
4. *Consistency of Interest* - Described by Duckworth (2016) as "staying focused on consistent goals over time" (p. 57).
5. *Persistence* - A student's ability to make progress towards personal educational goals, evidenced by their continued successful enrollment (Bahi et al., 2015).
6. *Retention* - Long-term attendance of students in higher education, incorporating the "academic potential of the student and institutional social systems" (Kerby, 2015, p. 138).

CHAPTER TWO: LITERATURE REVIEW

Overview

The intent of this research was to determine whether there is a difference in undergraduate students' overall grit scores and grit subscores, perseverance of effort and consistency of interest, based on whether or not they persist in college. The following section explains the history, context, and statistics of persistence in higher education, then highlights multiple facets of the ideas and theories behind grit and the traits it and its subscores represent. This review of literature will also identify examples of efforts in research to analyze student persistence and the psychology and rationale associated with the grit trait in education.

Persistence in Education

During the late 1900s and early 2000s, less than half of all students who enrolled in four-year colleges and universities in the United States continued on to receive an undergraduate degree within six years (Allen, 1999; Astin, 1993; Bean, 1980; Sparkman, Maulding, & Roberts, 2012; Tinto, 1975). According to Ryan (2004), an average of 20 to 25 percent of college students nationally drop out of an undergraduate program by the end of their first year. The U.S. Department of Education (2017) indicates that the six-year graduation rate for first-time, full-time undergraduate students at a public four-year institution as of 2009 was 59 percent. For private nonprofit institutions, that rate increases to 66 percent, and for private for-profit, the rate drops to 23 percent. Undergraduate persistence trends also showed variance by several student demographics. For females, the six-year graduation rate was 62 percent; for males, it was 56 percent (U.S. Department of Education, 2017). Braxton and Francis (2017) indicated that the percent of students who do not return to the institution they initially attend between the first and

second year ranges from 20 percent at private, PhD-awarding colleges to over 40 percent at public, two-year colleges.

Fostering student persistence has been, and continues to be, a high-priority topic in higher education due largely to increased scrutiny over student completion rates that lead to job placement (Kerby, 2015). In addition, student persistence is a crucial element to the success and stability of colleges and universities, and institutional efforts to invest research and resources into analyzing the students' environment in order to continually maintain and improve the retention of students continues to be a focus (Braxton & Francis, 2017). Kerby (2015) stated that more recently, the major specific focus of university administrators has been first-to-second-year student persistence, as they recognize that students who stay beyond the first year are likely to continue to persist.

The latter half of the 20th century saw increasing concern from university administrators regarding how to address a lack of student persistence and how to create or improve models to predict that persistence (Kerby, 2015). Panos and Astin (1968) explored early theories surrounding why students drop out of institutions and suggested two primary patterns of dropping out related to a student's environment: interpersonal relationships and university-related influences. In this application, a student's interpersonal relationships include academic and social competitiveness, dating, and interactions with faculty and extracurricular activities, whereas the university-related influences include academic policies, faculty engagement, and various freedoms each student has that may lead to poor choices. Rather than focusing solely on the characteristics of the institution, Panos and Astin's (1968) research concluded that focusing on the complex characteristics and nature of student profiles provided more insight into why disenrollment occurs.

Other mid-20th century student persistence research focuses on academic and personal indicators, such as a student's IQ, academic performance in high school, and family socioeconomic status (SES). Like Panos and Astin (1968), Spady (1970) also contributed to student persistence research by identifying gaps in the process and literal definitions regarding student enrollment outcomes and delineating deliberate withdrawal and involuntary dismissal. Spady (1970) also hypothesized that major factors related to student performance in college were peer group influences, particularly related to a student's desire to attend college, and how those peer influences affect a student's year-to-year persistence. These individuals' early foundations on the topic of student persistence increased the national attention placed upon graduation and completion rates across all college types (Kerby, 2015).

Theoretical Framework of Persistence

Through attempts to determine why college students fail to persist at an institution, Tinto (1975) concluded that the many characteristics associated with nonpersistence must be delineated, thus leading to his theory of student departure. Tinto's (1975) work in student engagement laid the foundation for others to begin to develop more detailed student engagement models that moved beyond simply accounting for high school factors. Until Tinto's (1975) landmark theory, attention had been focused on mostly singular, specific reasons for student dropout. His research began to assess longitudinal reasons across the student lifecycle to explain why students do not persist. Tinto (1975) expanded upon Spady's (1970) work and asserted two primary types of student dropout: academic failure or voluntary dropout. Further, he proposed multiple dimensions that frame the context in which the dropout occurs: students may drop out permanently, they may drop out for a period of time and return, or they may drop out and transfer to another institution (Tinto, 1975). In distinguishing these various dimensions of

student persistence, Tinto (1975) sought to establish a theoretical model that suggests the interactions between student and institution lead to reasons for dropout and subsequent nonachievement.

Tinto's (1975) rationale for why a student does not persist is derived from two particular ideas. The first parent idea is Durkheim's theory of suicide, first incorporated into student retention studies by Spady (1970). This idea emphasized that individuals who are not integrated into societal communities and affiliations are more likely to commit suicide (e.g., unenroll from an institution) (Bean, 1980; Spady, 1970). The practice of cost-benefit analyses of investment in higher education is the second parent idea referenced by Tinto (1975) in regard to identifying dropout behaviors. Within these analyses exists the study of individual characteristics and how they are related to dropout behavior, and Tinto (1975) refers to four in particular: the student's family's characteristics, the student's own characteristics, the student's precollege educational experiences, and the student's future educational expectations.

Though Tinto (1988, 1993) later expanded upon his own model to identify multiple stages of student engagement or commitment, such as transition, incorporation, and learning, it was Bean (1985) who ultimately sought to define student persistence as actual intent on the part of the student to leave the university not because of failure on the part of the student or the university, but due to other factors, such as health problems or a crisis within the family. Bean's (1985) model is similar to Tinto's (1975) theory because it relies on social integration and academic performance to reflect student persistence. It is distinguishable from Tinto's (1975) theory, however, because it takes into account the student's background and characteristics as they relate to his or her goal commitment, with particular emphasis on how the student influences his or her own experience (Kerby, 2015). This goal setting is based upon the idea that

if an individual sets a goal, he or she is more likely to perform at a high level than those who do not set goals (Demetriou & Schmitz-Sciborski, 2011).

Student commitment, based upon interactions the student has with faculty, academic workload, and peers, became the primary objective institutions pursued in order to encourage persistence in the 1980s and 1990s (Astin, 1993; Bean, 1980, 1985). The student's own characteristics that lead to whether or not he or she drops out include academic ability, as measured by performance on standardized tests and previous high school grades, as initially determined by Tinto (1975). Bean (1980) found differences in student persistence depending on gender: for males, institutional satisfaction was not as important a factor as it was for females. Additionally, consistent across Chen's (2012) observations was the fact that students were more likely to drop out due to low SES or race, with African Americans and Hispanics most likely to drop out in the first year. Typically, a student's high school grade point average (GPA) and standardized test scores have been the two strongest predictors of college GPA (Astin, 1993; Bean, 1985; Bowen, Chingos, & McPherson, 2009; Pascarella & Terenzini, 1980, 2005); more recently, however, Akos and Kretchmar (2017) asserted that purely academic indicators only account for approximately 25 percent of a first-year college student's GPA. These hypotheses and suggestions indicate that empirical research can vary, and there is evidence that unique factors such as institution climate, mission, size, and type are most important to consider in building predictive models (Kerby, 2015).

It is the individual's commitment to college completion as a goal, and more specifically to the particular institution, that remains the basis for the emergence of focus on the noncognitive, rather than simply cognitive, traits associated with student persistence (Bean, 1985; Tinto, 1993). Braxton and Francis (2017) stated that institutions must demonstrate

integrity and be committed to the welfare of its students. In this application, commitment to student welfare includes commitment to the development and growth of the cognitive and noncognitive aspects of students (Braxton & Francis, 2017). Sparkman et al. (2012) measured the effects of noncognitive traits on persistence in college students, namely emotional intelligence. Emotional intelligence, or EQ, is a measure of an individual's sense of self and others, while IQ is a measure of an individual's mental capabilities, such as learning (Sparkman et al., 2012). Traits such as empathy, awareness, and impulse control comprise EQ (Sparkman et al., 2012).

Noncognitive Attributes

Over the past decade, the topic of EQ in higher education has continued to increase in popularity, challenging the previous reliance on IQ (such as test scores and GPA) as the primary indicators of student success in college (Sparkman et al., 2012). Emotional intelligence has been studied as a predictor of student success as the student learns to navigate the change from his or her rigid high school environment to a more flexible college environment. Effective management of these adjustments, which include building and sustaining relationships, creating academic habits, and making independent decisions, is generally considered a demonstration of appropriate emotional intelligence (Sparkman et al., 2012). Sparkman et al. (2012) concluded that elements of emotional intelligence (such as social responsibility and empathy) can empirically predict student persistence and graduation.

Noncognitive skills are connected to an individual's future outcomes, including academic performance, educational attainment, and labor outcomes, even after controlling for an individual's IQ (Egalite, Mills, & Greene, 2016; Zamarro, Cheng, Shakeel, & Hitt, 2018). Allen (1999) explored students' desire to finish college, recognizing a connection between a student's

motivation and persistence, believed to lead to individual goal commitment. Additionally, student motivation and persistence are noncognitive factors that cannot be excluded from any significant study of college student outcomes (Allen, 1999). Allen's (1999) research confirmed that motivation may be a factor that affects the behaviors of certain groups of college students as well as academic achievement. Additionally, a significant connection existed between how much motivation a student demonstrated and whether they persisted (Allen, 1999). Schuh (1999) furthered the idea that both standardized scores and GPA are unrelated to persistence to college graduation through his study of close to 100 undergraduate college students, finding that merit-based financial aid awards contributed more to persistence to graduation. Saunders-Scott, Braley, and Stennes-Spidahl (2017) concluded in their study of over 100 undergraduate college students that standardized scores and GPA were worthy predictors of college GPA but not of student persistence.

Traditionally, noncognitive skill-building has existed mainly within early childhood education, but increasingly, grade-level schooling and higher education are prioritizing it (Egalite et al., 2016). Inner city schools are focusing more on building strong work ethic and persistence in students by seeking to build moral, civic, and performance character (Seider, 2012). Similarly, institutions of higher education are evaluating whether admissions requirements should continue to be based solely upon cognitive indicators. Some universities are removing items such as standardized tests, like the SAT or ACT, from their admission procedures and instead are evaluating students' noncognitive skills through short answer questions (Egalite et al., 2016). Measurement of the validity of noncognitive traits, then, becomes the challenge for educational entities. The potential downsides to utilizing noncognitive trait assessment include comparison among different cultures or societal

backgrounds and skewed student responses. Ideally, educational entities could utilize a comprehensive strategy by incorporating a variety of measurements (Egalite et al., 2016).

One such instrument used for reliability testing of noncognitive traits by Zamarro et al. (2018) was the Grit Scale, with which they sought to measure students' self-reported passion and perseverance to achieve. In order to address whether assessment of noncognitive traits is biased due to its self-reporting nature instead of performance-based observation, Zamarro et al. (2018) conducted an analysis of self-reported results of grit, conscientiousness, neuroticism, and other traits using a special computer-based survey product typically used by economists. The researchers obtained information about the respondents through administered surveys in order to better understand how the completion of a survey may help to explain the nature of an individual's self-report of noncognitive traits. They argue that completion of a survey is similar to completion of a performance task that measures noncognitive traits, such as making a list, and can translate to reliable results about the individual's response patterns (Zamarro et al., 2018). Though correlated with conscientiousness, self-reported grit proved to be a stronger independent predictor than conscientiousness of educational attainment in the Zamarro et al. (2018) study. Additionally, results demonstrated that even careless answering of questions and nonresponses on the survey could be interpreted as valuable information to help illuminate real-world contexts; both types of responses were shown to be independently associated to educational attainment more than the conscientiousness assessment, as well (Zamarro et al., 2018).

Grit in Education

The national educational landscape has shifted in the last decade to focus more on noncognitive elements of student development. The U.S. Department of Education released recommended policies and procedures in 2013 that highlight the importance of promoting high-

need noncognitive skills such as grit, tenacity, and perseverance. The report suggests that these factors are essential in order for individuals to strive and succeed as well as persist despite challenges, both in and out of a school setting. The report also states that it is through shared efforts on the part of the student and the educational entity to provide opportunities such that these qualities may be honed and developed (U.S. Department of Education, 2013).

Grit, a trait that equates to long-term passion and perseverance, is a noncognitive behavior considered to be connected with individual success (Akos & Kretchmar, 2017; Duckworth et al., 2007; Egalite et al., 2016; Strayhorn, 2014). Grit, like other noncognitive traits, is increasingly studied as a potential predictor of academic success (Datu, Valdez, & King, 2016). It has been heralded as a solution to measuring achievement outcomes by essentially assessing an individual's capacity to endure difficult labor (Galton, 1892). Grit, though similar to self-control, is different from it, mainly in that it places emphasis on stamina. Grit has its origins in conscientiousness, which is the ability to overcome in order to achieve (Duckworth et al., 2007), and its framework is built upon a variety of dimensional theories found in cognitive psychology and an individual's mindset as it relates to his or her efforts and interests (Duckworth et al., 2007; Dweck, 2006). Duckworth (2016) pointed out that though grit encompasses both passion and perseverance, the two traits stand alone and "are not the same thing" (p. 57).

Theoretical Framework of Grit

The trait of grit, as it relates to student persistence in higher education, can be studied and interpreted through a cognitive psychology lens. The study of contemporary cognitive psychology has its foundation in the early 1900s with individuals like Margaret Washburn, who demonstrated a need to make connections between mental activity and bodily behaviors. Though tertiary theories strayed from this emphasis, in the 1960s and finally by the 1980s, a cognitive

revolution occurred in psychology community, and eagerness for study of the mind became an apparent priority of research (Glenberg, Witt, & Metcalf, 2013).

The approach to the study of cognition as it is known today was formulated by Alan Newell and Herbert Simon (1976) and is referred to as physical symbol system hypothesis (PSSH). Three components of PSSH help explain the processing of the human mind regarding the recognition of symbols, and these same components apply to the study of computer systems recognition processing (Newell & Simon, 1976). First, symbols have a physical representation, such as color or emotion. Second, symbols can be manipulated by directions or rules. Third, symbols may be, whether arbitrarily or not, related to the actual item or concept it represents. These observations led Fodor (1975) to conclude that thinking is an activity similar to learning or speaking a language: it is thinking as a language. The PSSH provides a foundation for other cognitive theories that rely on representation of symbols and how they relate to concepts and objects to create the language of the mind; however, there are realizations about cognitive psychology that contradict PSSH components. The limiting nature of static symbolism, which translates to repeated understanding, is one of the criticisms of PSSH, as is the role that memory and context plays in the activity of the mind (Glenberg et al., 2013).

An understanding of the foundation and theories of cognition is necessary in order to study the activities of the mind. More recent cognitive psychology research focuses on how mind activity, such as ideas, images, and thinking, are connected to body, sensory, and emotional system processing. The aggregation of these activities is commonly referred to as one's mindset (French, 2016; Glenberg et al., 2013). Mindset is the collection and activation of all active cognitive symbols, processes, and actions (French, 2016; Nenkov, 2012). Mindset theory identifies the processes initiated by cognitive mechanisms as well as successful performance of

such processes (French, 2016). The study of mindset is often conducted simultaneously with the study of theories, especially within the discipline of cognitive psychology (Dweck, 1999; Dweck & Leggett, 1988; Murphy & Dweck, 2016). Mindset a crucial component of the study of human behaviors and outcomes because it helps determine an individual's motivations (Murphy & Dweck, 2016).

Growth and Fixed Mindset

Dweck's (2006) research identified two distinct mindsets that determine how individuals approach circumstances: fixed and growth. Dweck (2006) described the concept of fixed mindset as the belief that the qualities an individual possesses are static—that individuals only have certain amounts of traits like character or personality. Dweck (2006) suggested that mindset is developed as a child, and often, children absorb and mimic adult mindsets. A child with a fixed mindset, then, might assume that simply being smart, rather than engaging in the process of learning and making mistakes, is a desirable goal. The child who focuses on the process of learning and being challenged would possess the growth mindset. Fixed mindsets cause individuals to question whether they are capable of demonstrating desirable traits at all (Murphy & Dweck, 2016). In contrast, the concept of growth mindset has its foundation in the idea that “basic qualities are things you can cultivate through your efforts” (Dweck, 2006, p. 7). Growth mindset submits that individuals can improve their intelligence if they seek to do so (Murphy & Dweck, 2016). Growth mindset is believed to be responsible for honing individuals' desires to challenge themselves and demonstrate effort (Dweck, 2006).

Mindset Related to Effort

An individual's approach toward effort is considered to be shaped by his or her mindset, though individuals may demonstrate a growth or fixed mindset at different times and in different

circumstances (Dweck, 2006; Mawer, 2014; Murphy & Dweck, 2016). Proponents of mindset theory generally hold that growth mindset is beneficial for a student and results in outcomes such as greater academic persistence and recognizing effort as valuable, while a fixed mindset is believed to be damaging, preventing student engagement (Hochanadel & Finamore, 2015; Macnamara & Rupani, 2017). A person with a fixed mindset eschews effort for ability, believing that a need for effort means an individual has no ability; an individual with a growth mindset relies on effort in order to propel success and development (Murphy & Dweck, 2016).

According to Murphy and Dweck (2016), one indication of a fixed mindset is the idea that “effortless success is the most rewarding” (p. 129). In an educational setting, the growth mindset is believed to be connected to student motivation, and that motivation is described as academic effort (Mawer, 2014). In addition, Mangels, Butterfield, Lamb, Good, and Dweck (2006) found that self-beliefs could affect learning achievement as students approach challenging academic tasks. Mawer (2014) reinforced Duckworth’s (2016) notion that effort can outperform ability when ability is unused. According to Mawer (2014), growth mindset in students can be fostered when students recognize that intelligence can be molded, effort can be felt, and both can be controlled in order to achieve outcomes of success and persistence.

Mindset and Grit

The intersection of growth mindset and grit (long-term persistence toward difficult goals) occurs when students who value effort also recognize that ability can be a learned skill and persevere despite being faced with challenges (Hochanadel & Finamore, 2015). The constructs of growth mindset and grit have demonstrated correlation in influencing academic and life achievement outcomes (Myers, Wang, Black, Bugescu, & Hoefft, 2016). Duckworth and Eskreis-Winkler (2013) also suggested that the two are associated, in that development of a

growth mindset may lead to the development of grit in an individual, as both growth mindset and grit are founded in motivational strategies. Myers et al. (2016) determined through a series of functional magnetic resonance imaging of the brain, known as fMRI, that small correlations do exist between growth mindset and grit, suggesting that noncognitive skill building is necessary in an educational approach to student intervention.

Understanding mindset and whether an individual operates with a fixed or growth mindset is crucial to one's understanding of grit. Historically, intelligence has been considered the best predictor of achievement (Duckworth et al., 2007). Dweck's (2006) mindset theory, however, suggests that if students possess a growth mindset, intelligence is challenged as the best predictor of success. Dweck (2006) studied the mindsets of students transitioning to junior high school and found that those with a fixed mindset, despite their previous academic history, showed a decline in their academic performance immediately and over the following two years; those with a growth mindset actually demonstrated improvement in their academic performance over the first two years of junior high school (p. 57).

Duckworth et al. (2007) conveyed a simple example of the individual who demonstrates higher grit through two children who are learning how to play a musical instrument. If both of the children are equally talented, it can be assumed that they would become more skilled at the same rate if both exerted the same amount of effort. Next, assuming that both demonstrate equal intensity of effort toward playing the instrument, it could happen that there arrives a crucial crossroads whereby each child must decide whether to increase his or her expertise in that one instrument or expand his or her skills to other instruments. No matter how the two children's skill levels or talents were matched, the child with more grit is the one who remained dedicated to the directed efforts put toward the original instrument. Therefore, the child that continues

with his or her single focus may have equal talent or gifts but will prove to have more grit due to the continued singular effort (Duckworth et al., 2007).

According to Terman and Oden (1947), particular noncognitive qualities such as “perseverance, self-confidence, and integration toward goals” (p. 351) possessed by a student were more predictive than intelligence regarding the students’ professional career selection. Duckworth et al. (2007) indicated that the idea of grit is based upon the descriptive framework of the Big Five model, or Five-Factor Model, which is a collection of personality traits that have historically predicted success in both career and other endeavors (Barrick & Mount, 1991). The Big Five traits are extraversion, emotional stability, agreeableness, conscientiousness, and openness to experience (Barrick & Mount, 1991).

Conscientiousness has been found to correlate to success, as evaluated by Barrick and Mount (1991) in a job performance study. Grit is closely associated with the aspects of conscientiousness that relate to achievement, but grit places emphasis on long-term endurance rather than short-term intensity (Duckworth et al., 2007). An individual’s grit predicts task completion as well as directed pursuits over a long period, and it is different from aspects of conscientiousness such as self-control and drive for goal-oriented achievement. An important distinction of those who exhibit grit is that they intentionally set long-term goals and do not waver, even without encouragement or positive feedback (Duckworth et al., 2007). Duckworth and Quinn (2009) determined that students who demonstrate conscientiousness, as assessed by the Big Five Inventory, academically outperform peers who demonstrate less conscientiousness, even when the less conscientious student has a higher IQ, leading to the theory that grit can predict academic achievement better than conscientiousness.

In order to gauge whether grit is in fact as impactful and essential as IQ to achievement or more, Duckworth et al. (2007) sought to establish an instrument to measure an individual's grit. The group began by analyzing over 25 traits, attitudes, and behaviors typically associated with high-achieving individuals in order to define what would come to be known as the construct of grit. They recognized that the construct should be able to be applied to any individual no matter his or her life stage so long as it defined the "ability to sustain effort in the face of adversity" (Duckworth et al., 2007, p. 1090). As the group narrowed down the traits, they eventually settled on a 12-question questionnaire to measure grit. They determined grit to contain dimensions, or subscores, known as perseverance of effort and consistency of interest (Duckworth et al., 2007). The questionnaire, named the Grit Original Scale, or Grit-O, was developed and validated. Duckworth et al. (2007) engaged in six different studies seeking to prove the validity of this instrument. The Grit-O in its final version contained 12 common factor analyses that accumulate the perseverance of effort and consistency of interest factors, the two subscores (Duckworth et al., 2007). The overall scale revealed high internal consistency ($\alpha = .85$) and for each factor (consistency of interest, $\alpha = .84$; perseverance of effort, $\alpha = .78$).

In other analyses, neither of the two subscores were more predictive of success outcomes than the other, and in most of the analyses, the two subscores together were more predictive than either alone (Duckworth et al., 2007). Later, Duckworth and Quinn (2009) sought to further validate the Grit-O by designing a more efficient series of questions using eight of the original twelve of the Grit-O, naming the shortened version the Grit-S. The Grit-S uses the same two subscores and, through validation, supports the concept of grit as a predictive trait (Duckworth & Quinn, 2009).

Six studies were originally used to further validate the first Grit Scale, the Grit-O. Four of the studies were associated with educational predictions in some way, using the Grit Scale, various other assessments, and student-reported data, such as age or SAT scores. The first study contained adults aged 25 and older who had completed various levels of education. After administering the Grit-O, the researchers observed that the adults who were more educated demonstrated higher grit than those less educated, despite being close in age (Duckworth et al., 2007). These results led to the researchers' assumptions that there is a positive association between grit and age, namely that grit grows with age, and, similarly, that persistence in long-term goals may be positively associated with the completion of higher levels of education (Duckworth et al., 2007).

The second study used to validate the Grit-O was conducted in order to determine grit's association with age and educational achievement while controlling for other behavioral and personality traits. In addition to the Grit Scale, the Big Five Inventory was administered to close to 700 participants age 25 and older. Participants in this study also disclosed the number of career changes they had undergone. Grit was found to be related to conscientiousness more than the other four of the Big Five traits (extraversion, emotional stability, agreeableness, and openness to experience) with reliable and significant results ($r = .77, p < .001$). Once again, the higher the educational attainment of the individual, the higher the grit; the higher the age of the individual, the higher the grit. Additionally, grit demonstrated some predictive validity for the number of career changes the individual had undergone (Duckworth et al., 2007).

In order to determine grit's association with academic achievement among undergraduate students, Duckworth et al. (2007) performed research to investigate whether grit would intersect with intelligence in order to explain variance in GPA. Their third study sampled 139

undergraduate psychology students. Again, the Grit Scale was administered, and additional data such as the student's GPA, gender, SAT scores, and expected graduation year were collected (Duckworth et al., 2007). Moutafi, Furnham, and Paltiel (2004) originally postulated that among individuals who demonstrate relative intelligence, those who are less intelligent show more determination; the result of this study echoed this, demonstrating that grit was higher in students with lower SAT scores (Duckworth et al., 2007). Grit's association with lower SAT scores indicates that students who are less intelligent perhaps make up for their lower intelligence by determining to put forth more effort (Duckworth et al., 2007).

The fourth study conducted by Duckworth et al. (2007) sought to determine what predicts success in difficult environments, specifically the most challenging military higher education institution, the United States Military Academy at West Point, New York. Historically, each year, around 1 in 20 incoming cadets withdraw from training after their first summer, considered cadet basic training, even after enduring an extremely competitive admission process (Duckworth et al., 2007). The researchers expected grit to predict the cadets' persistence over their transitional summer of cadet basic training as well as their academic performance after one year. In addition to the Grit Scale, various other assessments were administered, including the Whole Candidate Score, which is West Point's traditional measure of incoming cadets. The researchers found that the cadets' overall grit score was better at predicting persistence through cadet basic training than the other collected assessments (Duckworth et al., 2007).

Perseverance of Effort

Howe (1999) suggested that perseverance is as important as intelligence, and likewise, Ericsson and Charness (1994) indicated that inborn ability is less impactful than years of continued practice and effort. Perseverance of effort is considered to be the extent to which an

individual applies effort throughout challenges (Datu et al., 2016). Research has been conducted on the psychological characteristic of mental toughness, behaviors that are evident in the midst of difficult or demanding situations. Mentally tough individuals are defined as those with “persistence, effort, or perseverance . . . akin to the psychological concept of grit,” (Gucciardi, Peeling, Ducker, & Dawson, 2016, p. 81) or the persistence of an individual toward enduring goals. In relation to physical or bodily perseverance, as studied by Tenenbaum et al. (2005), effort under pressure (such as fatigue or exhaustion) is thought to be related to the individual’s motivation toward reaching a goal. Tenenbaum et al. (2005) stated that effort is required in order to persevere in difficult situations. In a study of a program used to identify individuals most suitable for entry into military training for special forces, those candidates who self-reported mental toughness were more than three times more likely to pass the test for selection than those who did not (Gucciardi et al., 2016).

Dweck (2006) stated that youth tend to be given the impression that talent trumps effort. One example to show the converse of this impression is the use of lessons such as the tortoise and the hare, where a hare loses a race to a tortoise only due to bad judgment, which reinforces the message that effort can occasionally triumph over talent. The message that can be absorbed by youth is that talent and effort are an either-or determination: “either you have ability or you expend effort,” according to Dweck (2006, p. 40). The fixed mindset reinforces this either-or, while the growth mindset defies it; Dweck (2006) stressed that all ability is kindled by some sort of effort, turning it into eventual achievement. Furthermore, fixed mindset tends to view effort as necessary only due to insufficiency within an individual—that those who are considered to have ability are actually reduced when they have to apply effort (Dweck, 2006). Duckworth (2016) also stressed that society makes unconscious biases toward talent, resulting in a

commonly held belief that talent is the pathway to achievement. The idea of talent as the explanation for achievement is thought to be easier for individuals to embrace, according to Duckworth (2016), since human nature desires “excellence fully formed” (p. 39). This mindset allows individuals to settle on the status quo, removing effort from consideration (Dweck, 2006).

Duckworth et al. (2007) identified perseverance of effort to be one of the two traits that make up an individual’s overall grit score on the Grit Scale. In more recent years, perseverance has become increasingly popular in research studies as a predictor rather than an outcome (Duckworth & Quinn, 2009). Other studies also suggest that perseverance of effort is a consistent predictor of students’ self-regulated learning and academic achievement, while consistency of interest did not show any relation to achievement (Crede, Tynan, & Harms, 2017; Wolters & Hussain, 2015). Perseverance of effort has been found to be more reliable in predicting students’ engagement and academic outcomes than consistency of interest (Bowman, Hill, Denson, & Bronkema, 2015; Datu et al., 2016; Wolters & Hussain, 2015). Crede et al. (2017) suggested that the perseverance of effort facet of grit displays higher validity for student grade outcomes than consistency of interest. Perseverance of effort has similarities to self-efficacy, which is defined as situational self-confidence (Bandura, 1977). Self-efficacy is considered to be a major factor of psychological models of student persistence in college, researchers have posited that as self-efficacy increases, students will become more academically and socially integrated. Self-efficacy has also been found to be positively correlated with purpose in life, which could lead to more and more positive experiences for college students (Demetriou & Schmitz-Sciborski, 2011).

Consistency of Interest

Consistency of interest, the second dimension of the Grit Scale, is known as the tendency of an individual to commit to a particular interest for an extended period of time (Datu et al., 2016; Duckworth et al., 2007). This trait is also referred to as the passion facet of grit (Grohman, Ivcevic, Silvia, & Kaufman, 2017). Crede et al. (2017) suggested that the consistency of interest dimension is less related to conscientiousness than the perseverance of effort dimension. Instead, consistency of interest is likened to traits such as an inclination to plan and commitment to carry out that planning (Crede et al., 2017). A passion, according to Vallerand et al. (2003), is a task or activity that individuals deem important and as something they like and to which they want to devote time and energy. Early writings from Descartes, a 17th century French philosopher, give the indication that passion is “the psychological energy underpinning engagement in valued activities” (as cited in Curren, Hill, Appleton, Vallerand, & Standage, 2015, p. 631). Duckworth (2016) made an important observation regarding passion as well, indicating that though the word lends itself to association with intensity or obsession, gritty passion is more connected to consistency over time.

Duckworth et al. (2007) referred to Vallerand et al.’s (2003) evaluation of passion in their initial definition of grit and the scale developed to measure it, stating that evaluating passion requires one to assess commitment to an activity (consistency of interest) but not necessarily perseverance of effort. There are two types of passion introduced by Vallerand et al. (2003): obsessive and harmonious. Research on harmonious passion, according to Bonneville-Roussy, Vallerand, and Bouffard (2013), is connected to mostly positive psychological behavior. Passion toward an activity results in long-term engagement toward the activity (Bonneville-Roussy et al. (2013). Vallerand et al. (2003) pointed out that individuals passionate about an activity feel as

though that activity is a major part of their identity. Bonneville-Roussy et al. (2013) found that actually taking part in an activity generally precedes an individual's developed passion for that activity.

Curren et al. (2015) conveyed seven core elements of passion: it is toward a specific activity; it involves a profound and enduring love of the activity, it is directed toward an activity that is personally meaningful, it is something that motivates an individual rather than just affecting that individual, it shows itself when the activity an individual takes part in becomes part of that individual's identity, it can result in many different personal outcomes, and finally, it is synonymous with increased amounts of "psychological energy, effort, and persistence" (Curren et al., 2015, p. 633). Likewise, passion demonstrates similarities to intrinsic and extrinsic motivation. Vallerand et al. (2003) compared harmonious passion to intrinsic motivation in that individuals are dedicated to specific activities due to the value an individual places on them, resulting in persistent engagement. Curren et al. (2015) also pointed out that there is delicate balance that exists between persistent passionate behavior and behaviors that lead to negative constructs, such as overcommitment or burnout.

The connection between passion and grit is demonstrated through grit's definition: perseverance and passion for long-term goals (Curren et al., 2015; Duckworth et al., 2007; Duckworth, 2016). The overlapping traits of passion and grit, particularly grit's consistency of interest dimension, are value, motivation, and persistence, but there are differences also. Unlike the core elements of passion, grit does not necessarily have to be rooted in a specific activity, according to Curren et al. (2015). Examples of the specific items on the Grit Scale that seek to determine an individual's consistency of interest are "My interests change from year to year"

(Duckworth et al., 2007, p. 1090) and “I have difficulty maintaining my focus on projects that take more than a few months to complete” (Duckworth et al., 2007, p. 1090).

Opposition to Grit

There are scholarly views that oppose the value and assessment of grit in individuals, creating gaps in and opportunities for research. Stokas (2015) holds one such view and warns against misinterpreting the importance of grit to mean that any failure on the part of an individual means he or she does not possess the trait, rather than understanding individual failure may be due to lack of access or resources. It is possible that by encouraging grit within the realm of education, students could be led to believe that without suffering, they will not achieve their goals; in fact, Stokas (2015) argued that students do not need more grit but, rather, need nurturing environments. Educators, then, must be prepared to address the individual situations that also contribute to whether or not a student can achieve and seek to create equal opportunities as much as possible (Stokas, 2015).

Additionally, there are opportunities to expand upon the research investigating whether the possession of grit is beneficial as a primary indicator of student success. Schreiner (2017) holds that grit may not account for an individual’s access to resources, which she describes as “privilege” (p. 1). Schreiner (2017) stated it is a misconception to believe that if students could just grow enough grit, they would be successful. Schreiner (2017) pointed out that Duckworth’s (2016) research admits that close to half of the variation of the grit trait in individuals is inherited, and that grit, which is essentially conscientiousness, is not always subject to interventions: meaning, it generally cannot be grown.

According to Schreiner (2017), grit, therefore, is primarily developed due to the environment in which a person grew up and the resources he or she had access to, whether

financial, academic, or interpersonal. An example of this privilege can be found by studying the income gap in college students. The National Center for Education Statistics reported that students from higher-income backgrounds with SAT scores in the lowest quartile have a greater chance of completing college than students from lower-income backgrounds with SAT scores in the highest quartile (Kena et al., 2015). Schreiner (2017) also pointed out that even in Duckworth's (2016) research, lower-income high school seniors' grit scores were a full point lower on the scale than higher-income high school seniors' grit scores. Schreiner (2017) insisted that grit may not be the secret to student success that others herald it to be and identified four dangers of encouraging grit. The first is that grit is too focused on the individual rather than the individual's environment and influences (Schreiner, 2017). The second danger regarding grit is that it is based upon ideology that forces individuals to focus on and seek to improve his or her deficiencies, reinforcing blame on an individual when they cannot succeed (Schreiner, 2017). Third, Schreiner (2017) believes it is dangerous to assume grit can be easily cultivated, recommending instead to invest academic resources into encouraging a growth mindset as defined by Dweck (2006) in individuals—particularly, that shaping a growth mindset is more cost-effective and dependable for college students' success. The fourth and biggest danger, according to Schreiner (2017), is the potential to measure grit and use it in determining college admission procedures. This perpetuates the cycle of what Schreiner (2017) believes to be the overarching flaw: that though grit may increase the odds of high institutional graduation rates and student success, those things would only be achieved at the expense of ignoring students who may be low income and marginalized or the students who, according to Schreiner (2017), did not have the privilege to ever develop grit.

Furthermore, criticism about the value of the grit subscores also presents an opportunity for more research about the trait. Datu et al. (2016) hypothesized that consistency of interest as a subscore is less valid in predicting academic outcomes than perseverance of effort since consistency may not have an equally high value across different cultures. Their research, using a sample of over 600 Filipino high school students, concluded that only perseverance of effort positively predicted life satisfaction and positive affect, while Duckworth et al. (2007, 2009) concluded that both subscores were positively connected to an individual's well-being. It is possible, then, that the potential for the Grit Scale to predict student outcomes may have implications or limitations cross-culturally (Datu et al., 2016). Additionally, Abuhassan and Bates (2015), in their measure of creativity achievement, found that only perseverance of effort was connected to achievement above and beyond IQ, not consistency of interest. Likewise, though Bonneville-Roussy et al. (2013) theorized that a student's harmonious passion leads to persistence in the educational context, there is little empirical research to confirm. Bonneville-Roussy et al. (2013) presented findings that show harmonious passion is more related to activity engagement than obsessive passion, but whether that activity engagement concretely leads to educational persistence is still questionable.

Egalite et al. (2016) found no significant relationship between high school students' self-reported grit scores and behavioral measures of their "persistence, conscientiousness, or ability to delay gratification" (p. 34). It was also found that in the group of participating students, those who showed high levels of persistence also showed lower scores on the Grit Scale (Egalite et al., 2016). The trio drew conclusions that either the self-reporting nature of the Grit-S instrument leads to bias or the behavioral measures (perseverance, conscientiousness, and ability to delay gratification) are unrelated to each other; the latter suggestion, however, was disproved by the

trio through another study of theirs which found correlation between persistence and delay of gratification (Egalite et al., 2016). Thus, the assumption is that there is a bias error with the students' self-report. Duckworth et al. (2007) themselves acknowledged that the Grit Scale could be biased due to its self-reporting nature, leading to individuals selecting certain answers that seem more favorable.

Lucas, Gratch, Cheng, and Marsella (2015) suggested that grit may actually be a prohibiting factor to an individual's sense of when to move on instead of persevering. Persevering may result in various outcomes for individuals who possess high grit. First, Lucas et al. (2015) suggested that grittier individuals may have a more difficult time with standardized tests if they cannot move past harder questions; the conscientiousness trait, though not the grit trait specifically, has been shown to predict poorer performance on certain intelligence tests, according to Moutafi et al. (2004). Next, those with high grit may also face difficulty while conducting research if they are unable to "induce failure" (Lucas et al., 2015, p. 16) in order to test hypotheses or "cut their losses" (Lucas et al., 2015, p. 16) in order to arrive at a desired outcome. Their findings suggest that in individuals who demonstrate grit, more and more effort was expended when confronted with failure (Lucas et al., 2015), even at the expense of monetary loss. The reason for this outcome, according to Lucas et al. (2015), is that the grittier individuals demonstrate more positive emotional responses toward the experimental tasks and a similar positive attitude when persisting through failure.

Schreiner (2017) suggested that grit should not be the primary indicator of student success yet recognized its value as a part of a complex strategy to ensure students of all ages and levels thrive through the use of psychological science. If the emphasis is placed on the student thriving rather than grit, according to Schreiner (2017), the responsibility is placed on the

facilitator/educator to create the best conditions for success, and the student is free to learn and focus on developing intellectually, interpersonally, and psychologically. Schreiner (2017) insisted that this holistic approach to development prepares the student to succeed not only in college but in life. Different versions of the Grit Scale have been proposed and modified by Duckworth and others, yet there still is not exhaustive research on the best way to truly capture and quantify grit and its progression. In the future, student cognitive and noncognitive assessment must be balanced, then, in order to deliver the necessary resources for well-rounded student development, and ultimately, student success in life (Egalite et al., 2016).

Grit Research in Secondary and Post-Secondary Education

In a study similar to one of Duckworth et al.'s (2007) original samples for validation of the Grit Scale, Kelly, Matthews, and Bartone (2014) used the 2006 West Point incoming class (1,310 cadets) and compared their persistence through their graduation in 2010; 1,046 cadets (79.8%) were retained until graduation. Using eight different predictor variables, including the cadet's Whole Candidate Score and grit score, Kelly et al. (2014) determined that those cadets who demonstrated sustained grittiness across their West Point experience were more likely to complete the program. This finding supported Duckworth et al.'s (2007) and Duckworth and Quinn's (2009) results that showed grit is a predictor of cadet basic training retention in West Point cadets. It also proved that while grit was slightly correlated to academic performance over the four years, grit appeared to be best utilized as a predictor during the cadets' first year transition (Kelly et al., 2014).

Bowman et al. (2015) pointed out that the two subscores of the grit trait, perseverance of effort and consistency of interest, have barely been explored separately as independent predictors of student outcomes in higher education. Their research utilizing the Grit-S sought to identify

whether these two distinct aspects of grit predict success indicators such as student engagement and persistence, career intentions, and satisfaction with the university (Bowman et al., 2015). Though the two subscores have shown to be highly correlated, consistency of interest predicted more variety in career changes in adults, while perseverance of effort more significantly predicted GPA in high school students, according to Duckworth and Quinn (2009).

Across the research conducted by Bowman et al. (2015), grit was found to predict both academic and nonacademic outcomes at the college level; within both of these contexts, perseverance of effort was the stronger predictor compared to consistency of interest. Additionally, perseverance of effort predicted an increase in students' college GPA. Overall, students with higher grit were generally more engaged in cocurricular college activities, were more satisfied with their college experience, felt as though they belonged, and indicated more interaction with faculty than those students who scored lower on the Grit-S (Bowman et al., 2015). In all of these instances, perseverance of effort showed a stronger relationship than consistency of interest on the variety of outcomes; however, consistency of interest is thought to be connected to long-term achievement, and a limitation of Bowman et al.'s research is that it only studied short-term results.

Hill, Burrow, and Bronk (2016) suggest that since the Big Five are typically associated with well-being as well as purpose in life, grit is associated with positive affect and purpose. Their research sought to establish a correlation between purpose and positive affect as predictors of grit by using the Grit Scale. Positive affect is defined as a person's feelings of enthusiasm and alertness (Watson, Clark, & Tellegen, 1988). Purpose is generally defined as that which gives one's life meaning (Bundick et al., 2006). Using a sample of over 100 U.S. college students and administering a variety of assessments, including the Grit Scale, Hill et al. (2016) determined

that grit was found in an individual if that individual demonstrated a sense of purpose. An individual who commits to a purpose in life develops characteristics that aid in achieving long-term goals (Hill et al., 2016).

In order to determine whether grit can significantly predict academic achievement as Duckworth et al. (2007) originally suggested, Lee (2017) used the measure of grit to determine whether the student's actual performance or perceived performance made a bigger impact on the student's stress level. A sample of college students in Asia were administered the Grit-S in addition to various other assessments to gauge stress and self-perceived failure. Findings showed that both of the grit subscores proved to be negatively associated with stress, leading to preliminary suggestions that institutions should consider how to foster students' grit and academic resilience (Lee, 2017).

Saunders-Scott et al. (2017) conducted a study to determine the strength of grit as an academic predictor in college student retention. The Grit-S was used due to its high reliability and validity (Saunders-Scott et al., 2017). Participants were 120 female and 45 male undergraduate students, and a second assessment was used to determine the student's perceived stress level. The findings demonstrated that the higher the students' perceived stress, the lower their grit (Saunders-Scott et al., 2017). For first-year students in the study, grit was a better predictor of retention than the student's perceived stress. The first-year students who demonstrated higher grit were more likely to be retained at least a year and a half into their college work, leading to the conclusions that for first-year college students, grit is an important facet of retention and that both noncognitive factors, stress and grit, though poor predictors of college GPA, actually predicted retention better than the traditional factors of standardized scores and high school GPA (Saunders-Scott et al., 2017).

Using the eight-item Grit-S, Cosgrove, Chen, and Castelli (2018) sought to capture whether grit (representing perseverance in overcoming common barriers to academic success such as absence) is related to academic performance while controlling for physical fitness indicators in just under 400 high school students. The researchers selected grit as one of the instruments used to represent perseverance, holding to the assumption that individuals demonstrate “stable, but modifiable” (Cosgrove et al., 2018, p. 2) endurance related to achieving goals. The findings demonstrated that grit has strong significance in predicting academic performance (Cosgrove et al., 2018).

In order to further understand the connection between noncognitive traits and college persistence, Bowman, Miller, Woosley, Maxwell, and Kolze (2018) collected retention data from over 10,000 college student participants across a variety of four-year institutions, utilizing survey questions about noncognitive traits (such as grit and academic self-efficacy) and student variables (such as high school GPA, college GPA, and whether or not the student persisted from the first to the second year of college). Bowman et al. (2018) found the following regarding noncognitive traits: first, they demonstrated a moderate positive relationship with how students adjust socially; second, they significantly affected commitment to the institution; third, they showed a positive relationship to college GPAs and also high school GPAs. Of note is that though this study showed a negative relationship between noncognitive traits and retention, ultimately, there was a positive raw correlation between noncognitive traits and college retention, and the researchers affirm that considering noncognitive traits is vital in order to better understand and predict college student success (Bowman et al., 2018).

In a study of 395 Australian college students, Hodge, Wright, and Bennett (2018) ultimately found grit to be a needed characteristic in students, leading to higher engagement.

The trio asserted that perhaps the most convincing explanation for how grit is related to improved academic outcomes may be just that it is strongly associated with engagement, and engagement with academic outcomes. Upon administering the eight-item Grit-S to their participants, the researchers found significant correlations between grit, engagement, and demographic factors; they also found that only the consistency of interest facet correlated with traits found in students who were first-generation college students (Hodge et al., 2018).

Summary

Since current research does not specifically address whether there is a difference in students' overall grit score, perseverance of effort subscore, and consistency of interest subscore for those who persist and do not persist at a large private university, study of this topic will add important facets to the overall literature on grit's value as a predictor of persistence in higher educational settings. Persistence in, and the eventual successful completion of, higher education creates a medium for an individual's recognition of educational goals and for furthering his or her knowledge, socialization, and discovery of self (Kerby, 2015). For much of the 20th century, evaluating whether a student would persist was largely based on academic performance or social engagement (Bean, 1980, 1985; Pascarella & Terenzini, 2005; Tinto, 1975). However, research by Akos and Kretchmar (2017), Bowman et al. (2018), and Braxton and Francis (2017) suggests that persistence in higher education is connected to more than just academic and social indicators: that both the institution's identity and individual student traits, cognitive and noncognitive, must also be considered. Similarly, noncognitive traits such as emotional intelligence, awareness, and grit have been increasingly noted as vital factors that make up a student's profile and whether he or she will ultimately persist and graduate (Sparkman et al., 2012). Grit, commonly defined as the continued passion and perseverance of an individual to

achieve a goal, is one such noncognitive trait related to student achievement (Bowman et al., 2018; Duckworth et al., 2007; Hodge et al., 2018). Empirical research indicates that individuals who demonstrate higher grit tend to exceed those with lower grit in both employment and educational settings (Duckworth et al., 2007; Duckworth & Quinn, 2009; Eskreis-Winkler et al., 2014), but more research is necessary in order to determine whether the score and subscores of the grit trait can routinely and significantly predict academic and nonacademic outcomes (Bowman et al., 2015).

CHAPTER THREE: METHODS

Overview

This study explored the differences between the independent variable (student persistence) and the dependent variables (overall grit score, perseverance of effort subscore, and consistency of interest subscore). The statistical methodology of this study is explained through the content that follows. Information is provided regarding research design, research questions, setting and participants, instrumentation, research procedures, and analysis for a one-way multivariate analysis of variance (MANOVA).

Design

This research study was a non-experimental, causal-comparative design. This approach was employed in order to determine whether there is a difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore (dependent variables) of first-year undergraduate students who persist, that is, retain to the institution, from their first term to a second consecutive term and those who do not persist at a large private university (independent variable). A causal-comparative design seeks to quantitatively investigate potential causes and effects of personal characteristics (Gall, Gall, & Borg, 2007). Therefore, a causal-comparative design was appropriate for the purposes of this study, which was to determine whether and how student persistence and students' grit scores are causally related to each other (Gall et al., 2007).

The independent variable was student persistence. Student persistence is defined by Bahi et al. (2015) as a student's ability to make progress toward his or her academic goals, shown by continued successful enrollment. For the purpose of this study, student persistence was defined by whether a matriculated first-year student officially enrolls in the next consecutive semester, as

indicated by course enrollment and a financial commitment. The dependent variable was grit. According to Duckworth (2016), grit consists of three variables: (a) overall grit, which is defined as passion and perseverance for long-term goals, (b) perseverance of effort, which is defined as “working hard and bouncing back from setbacks,” and (c) consistency of interest, which is defined as “staying focused on consistent goals over time” (p. 57).

Research Question

RQ1: Is there a difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of first-year undergraduate students who persist and those who do not persist at a large private university?

Null Hypothesis

H₀₁: There is no significant difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of first-year undergraduate students who persist and those who do not persist at a large private university.

Participants and Setting

The participants for this research study were a population of incoming residential undergraduate students at a large private university in southcentral Virginia who completed the Grit-S during the fall semester in the 2017–2018 academic year. Archival data were used for this study. The sampling procedures, completed by an academic department at the university, were as follows. The Grit-S questionnaire was sent to incoming resident undergraduate students at the beginning of the 2017 academic year. The questionnaire was sent through a mass email within three weeks after the new undergraduate students matriculated to the university. The students’ grit scores were recorded and then compared by that academic department to official re-enrollment records that were obtained from the university’s information services division.

For this study, the sample size was 832 students, which according to Warner (2013) exceeds the minimum requirement for a medium effect size ($N = 108$) with statistical power of 0.7 at a .05 alpha level. The median age of the sample was 19.4 years old. The ethnicity breakdown was 3 American Indian or Alaska Native, 15 Asian, 23 Black or African American, 53 Hispanic/Latino, 1 Native Hawaiian or Pacific Islander, 24 nonresident alien, 31 two or more races, 566 White, and 116 unknown (no ethnicity was reported). All students were new incoming resident undergraduate students at the university. The group who persisted (Group 1) consisted of 788 participants. The median age of the group was 19.3 years. The gender breakdown of the group was 478 females and 310 males. The ethnicity breakdown was 2 American Indian or Alaska Native, 13 Asian, 21 Black or African American, 48 Hispanic/Latino, 1 Native Hawaiian or Pacific Islander, 538 White, 24 nonresident alien, 31 two or more races, and 110 unknown (no ethnicity was reported). The group who did not persist (Group 2) consisted of 44 participants. The median age of the group was 20.6 years. The gender breakdown of the group was 18 males and 26 females. The ethnicity breakdown was 1 American Indian or Alaska Native, 2 Asian, 2 Black or African American, 5 Hispanic/Latino, 0 Native Hawaiian or Pacific Islander, 28 White, 0 nonresident alien, 0 two or more races, and 6 unknown (no ethnicity was reported).

Instrumentation

The purpose of this study was to determine whether there is a difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of students who persist and those who do not persist at a large private university during the 2017–2018 academic year. The instrument that was used to measure overall grit score and grit's two subscores was the Grit-S, administered by an academic department within the large private

university. Student persistence was defined as the official enrollment of a student that is consecutive from semester to semester. Students utilize a secure internet application in order to both register for courses and commit to a payment plan at the university for each semester of attendance, resulting in official persistence marked by re-enrollment. For the purpose of this study, persistence was defined as a first-year undergraduate students' retention at the institution from the first term to second consecutive term.

Grit-S Score, Perseverance of Effort Subscore, and Consistency of Interest Subscore

The instrument that was used to measure the dependent variables (overall grit score, perseverance of effort subscore, and consistency of interest subscore) was the Grit-S. The purpose of this instrument was to measure an individual's grittiness (Duckworth & Quinn, 2009). The Grit-S scale is a shorter version of the original validated instrument (Duckworth et al., 2007), used to determine an individual's grittiness (Duckworth & Quinn, 2009). The instrument was developed as a valid and reliable assessment in order to measure an individual's self-report of grit (Duckworth et al., 2007). The instrument has been used in numerous studies (e.g. Datu et al., 2016; Duckworth & Quinn, 2009; Wolters & Hussain, 2015).

In development of the Grit-O, or original Grit Scale, Duckworth et al. (2007) executed item-level correlations in order to determine outcomes for four different sample populations. The predictive validity measures were extracted from the initial samples in the Duckworth et al. (2007) research. The two subscores are perseverance of effort and consistency of interest (Duckworth et al., 2007). After ranking the correlations, Duckworth and Quinn (2009) then eliminated four total questions (two from each subscore), resulting in the Grit-S, or short Grit Scale (see Appendix C for instrument information). The Grit-S was developed by Duckworth and Quinn (2009) based upon attempts to validate a shorter assessment for grit that would be

more efficient (i.e., take less time to complete). The new eight-item assessment, the Grit-S, demonstrated acceptable internal consistency. The four samples possessed a Cronbach's alpha that ranged from .73 to .83 (Duckworth & Quinn, 2009). The four-question consistency of interest subscore demonstrated alphas ranging from .73 to .79, and the four-question perseverance of effort subscore demonstrated alphas ranging from .60 to .78 (Duckworth & Quinn, 2009).

The Grit-S consists of eight questions. The instrument utilizes a five-point Likert scale that includes a range of five responses: very much like me, mostly like me, somewhat like me, not much like me, and not like me at all. Questions 2, 4, 7, and 8 measure the subscore perseverance of effort, which was developed from the original Big Five Inventory to measure an individual's will to continue toward a goal (Duckworth, 2016). Questions 1, 3, 5, and 6 measure the subscore consistency of interest, which was also developed from the Big Five Inventory to measure an individual's will to continue toward a goal for the long term (Duckworth, 2016).

The highest possible combined overall score on the Grit-S is 5 (extremely gritty), and the lowest score is 1 (not at all gritty; Duckworth, 2016; Duckworth et al., 2007; Duckworth & Quinn, 2009). The instrument is scored by collecting the initial highest possible score (between 8 and 40 points) and dividing it by the total number of questions, which is eight (Duckworth & Quinn, 2009). Similarly, the highest possible score for the perseverance of effort subscore is 5 (extreme effort) and the lowest is 1 (not much effort; Duckworth, 2016; Duckworth et al., 2007; Duckworth & Quinn, 2009). In contrast to the perseverance of effort subscore, the consistency of interest subscore is reverse scored, resulting in a range from 1 (extreme interest) to 5 (not much interest; Duckworth et al., 2007; Duckworth & Quinn, 2009; Duckworth, 2016). The two subscores are scored in a similar way to the overall score: the highest possible score across the

four assigned subscore questions is collected (between 4 and 20) and then divided by the total number of questions, which is four (Duckworth & Quinn, 2009). Duckworth (2016) made the prediction that individuals' perseverance of effort subscore will generally be moderately higher than his or her consistency of interest subscore, further indicating that the two facets of grit, passion (consistency) and perseverance, are "not the same thing" (p. 57).

Procedures

Formal approval was obtained through the university's Institutional Review Board process in order to conduct the analysis. Upon receipt of this approval (see Appendix A), data for the independent variable (student persistence) were retrieved from the university's database and matched with enrollment information for those who completed the grit questionnaire. The students were separated into two groups, those who persisted and those who did not. Persistence was defined as a first-year undergraduate students' retention at the institution from the first term to the second consecutive term. The dependent variables were overall grit score, perseverance of effort subscore, and consistency of interest subscore (see Appendix B for permission to use archival data for students' grit scores and persistence information). The data were coded by the researcher and scanned to account for incomplete information or outliers. The following sections will describe the specific procedures for each variable.

Student Persistence Data Collection (Independent Variable)

The independent variable was student persistence. The measure of whether a student did or did not persist came from the university's student database, Banner INB, which is the official student management information system. For the purpose of this study, student persistence was defined as the official enrollment of a student that is consecutive from one semester to the next. Students utilize a secure Internet application, known as Financial Check-In, in order to register

for courses and commit to a payment plan at the university for each semester of attendance. Once a student completes Financial Check-In, the electronic record is updated in Banner to indicate the official enrollment. After the census date for official student enrollment passes (two weeks after each term begins), students are considered to have persisted if their record indicates they have completed Financial Check-In and are enrolled in courses, which is shown in a Banner field that lists the semester (for example, Fall 2017) and a *Y* indicator that affirms Financial Check-In is complete. A formal request was made to the information services division of the university by the academic department conducting the grit assessment to arrange the independent variable (student persistence) data in an Excel spreadsheet for analysis (see Appendix B for permission to use database information). This request was made through the university's procedural system with a requested turnaround time of two weeks, as is standard procedure. The Excel spreadsheet included the overall grit score, perseverance of effort subscore, consistency of interest subscore, student age in years, student ethnicity, and student Financial Check-In status. The researcher separated the students into two groups within the Excel spreadsheet: those who persisted (Group 1, indicated by a 1) and those who did not (Group 2, indicated by a 0), according to the student Financial Check-In status. The researcher saved and protected the Excel spreadsheet and the subsequent data in order to ensure only clean data remained.

Grit Scores Data Collection (Dependent Variables)

The Grit-S instrument was administered through an electronic questionnaire to all incoming resident undergraduate students by the university's professional advising division. Students were not required to respond to the questionnaire. The electronic questionnaire containing the Grit-S was introduced through a mass email with a link that offered the option for students to take the assessment. The purpose of obtaining student responses to the questionnaire

was to allow the university's professional advising division to better understand students' needs for resourcing and success coaching based on their Grit-S scores. The academic department scored the instrument results (grit scores). The data for the independent variables (students who did or did not persist) were retrieved from the university's systems and matched to the students' grit scores by the academic department. The grit score columns ranged from 1–5, demonstrating a sum of total points in order to represent the overall grit score. The perseverance of effort subscore questions were scored according to the designer's instructions, while the consistency of interest subscore questions were reverse scored according to the designer's instructions (Duckworth, 2016), in separate columns of the same Excel spreadsheet. The highest possible score for the perseverance of effort subscore was 5 (extreme effort) and the lowest was 1 (not much effort; Duckworth, 2016; Duckworth et al., 2007; Duckworth & Quinn, 2009). The consistency of interest subscore was reverse scored, resulting in a range from 1 (extreme interest) to 5 (not much interest; Duckworth, 2016; Duckworth et al., 2007; Duckworth & Quinn, 2009). The highest possible score across the four assigned subscore questions was collected (between 4 and 20) and then divided by the total number of questions, which is four (Duckworth & Quinn, 2009). In order to retrieve the data to satisfy the dependent and independent variables, formal approval was requested from the dean of the college hosting the questionnaire data, and the results were sent to the researcher in a Microsoft Excel file (see Appendix B for permission to use archival data for students' grit scores). The data was then analyzed using IBM's Statistical Package for Social Sciences (SPSS) software.

Data Analysis

In order to determine whether there were differences between the independent variable (student persistence) and dependent variables (the overall grit score, perseverance of effort

subscore, and consistency of interest subscore), a one-way MANOVA was conducted to test the null hypothesis. A MANOVA was an appropriate approach for this research because it involves an analysis of variance between group means (Gall et al., 2007). In this case, the MANOVA examined whether the set of means on the three grit scores differed across the two outcome measures, students who persisted and those who did not. Warner (2013) considers a MANOVA a more prudent choice than multiple separate ANOVAs because including multiple outcome measures has the potential of providing stronger detailed information about overall patterns. The MANOVA was conducted at a 95% confidence interval. Multivariate testing included Wilk's lambda and partial eta squared (Green & Salkind, 2013). Post hoc analysis was not necessary. The following sections will list the data screening and assumption testing procedures.

Data Screening

Data screening was conducted by the researcher by reviewing the results captured in the Excel spreadsheet containing the independent and dependent variable data, and then once again after entering the student data into SPSS. Data screening included analyzing the independent variable to ensure that results showed either a 0 (that a student did not persist) or 1 (that a student did persist) as well as dependent variables to ensure the data were clean (meaning, there was an appropriate score for each of the three scales). Box-and-whisker plots were used to scan for extreme data outliers, and any extreme outliers for the dependent variables (i.e., overall grit score, perseverance of effort subscore, and consistency of interest subscore) were eliminated from the data pool.

Assumptions

In order to test the assumption of normality, the Kolmogorov-Smirnov test was used. Additional assumption testing included multivariate normal distribution, whereby the researcher

searched for linear relationships between the independent variables by achieving proper histograms and Q-Q plots to ensure reasonability (Warner, 2013). In order to perform the assumption testing for homogeneity of variance-covariance, the researcher executed the Levene's Test ($p < .05$). Multicollinearity was tested on the dependent variable using the Pearson product moment test (Pearson's r).

CHAPTER FOUR: FINDINGS

Overview

This study explored the differences between the independent variable (student persistence) and the dependent variables (overall grit score, perseverance of effort subscore, and consistency of interest subscore). The following content will explain the premise for research and present descriptive statistics and details about the MANOVA used to conduct the research analysis.

Research Question

The research question for this quantitative study was:

RQ1: Is there a difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of first-year undergraduate students who persist and those who do not persist at a large private university?

Null Hypothesis

The null hypothesis for this study was:

H₀1: There is no significant difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of first-year undergraduate students who persist and those who do not persist at a large private university.

Descriptive Statistics

The data obtained for the dependent variables (overall grit score, perseverance of effort subscore, and consistency of interest subscore) can be found in Table 1.

Table 1

Descriptive Statistics

Value	Group	Mean	<i>SD</i>	<i>n</i>
Overall Grit Score	Did Not Persist	3.457	0.761	44
	Did Persist	3.479	0.541	788
	Total	3.480	0.554	832
Effort Subscore	Did Not Persist	3.847	0.748	44
	Did Persist	3.911	0.553	788
	Total	3.908	0.564	832
Interest Subscore	Did Not Persist	3.068	0.875	44
	Did Persist	3.047	0.732	788
	Total	3.048	0.740	832

The 788 students who persisted from one term to the next had higher overall grit scores ($M = 3.48$, $SD = 0.54$) than the 44 students who did not persist ($M = 3.46$, $SD = 0.76$). The highest values existed for the perseverance of effort subscore, in which students who persisted scored higher ($M = 3.91$, $SD = 0.55$) than those who did not ($M = 3.85$, $SD = 0.75$). Regarding the consistency of interest subscore, however, students who did not persist scored higher ($M = 3.07$, $SD = 0.88$) than those who did persist ($M = 3.05$, $SD = 0.73$).

Results

Data Screening

Data screening was conducted on each group's dependent variable (overall grit score, perseverance of effort subscore, and consistency of interest subscore) in pursuit of any inconsistencies and extreme outliers. The data were sorted into categories and manually scanned for inconsistencies. No data errors or inconsistencies were identified. Box-and-whisker plots were utilized to detect outliers on each dependent variable. One extreme outlier case, Case #3, was found and eliminated for the effort subscore. No extreme outliers were found for the overall grit score or the interest subscore. See Figure 1 for box-and-whisker plot.

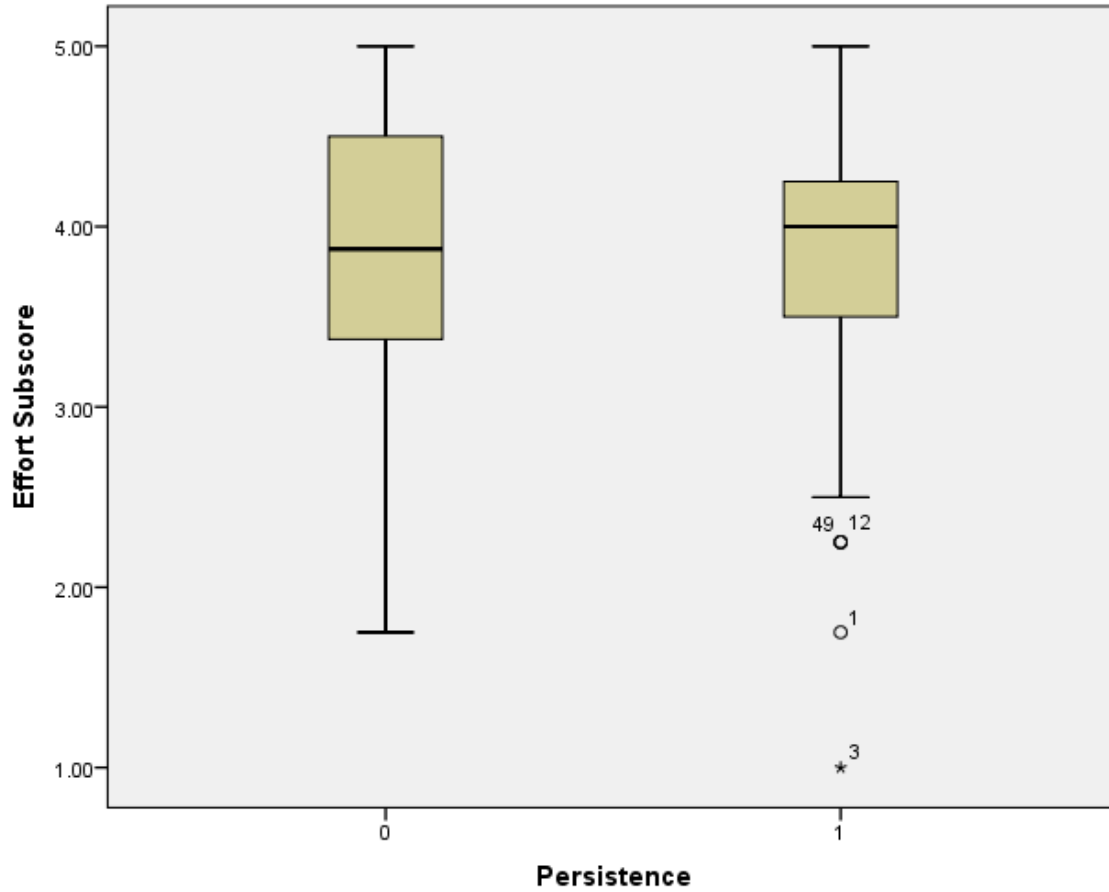


Figure 1. Box-and-whisker plot for effort subscore (with extreme outlier).

The researcher eliminated Case #3 in order to remove the effect of its extreme value on the mean score (Warner, 2013). See Figure 2 for the box-and-whisker plot for overall grit score, perseverance of effort subscore, and consistency of interest subscore.

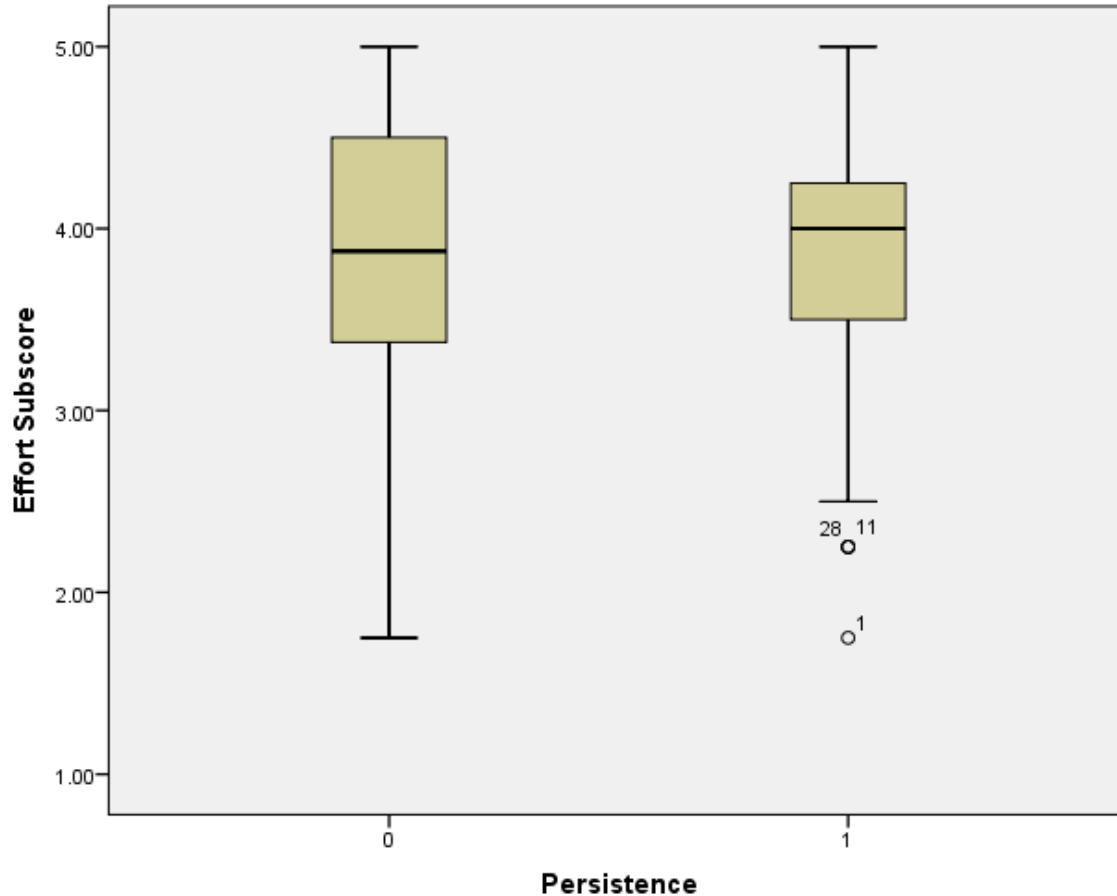


Figure 2. Box-and-whisker plot for effort subscore (extreme outlier removed).

Assumptions

In order to test the null hypothesis, a one-way MANOVA was used, which examined the differences in undergraduate students who persisted from one term to the next and those who did not, based upon the dependent variables: overall grit score, perseverance of effort subscore, and consistency of interest subscore. The MANOVA requires the following assumptions met: normality, multivariate normal distribution, homogeneity of variance-covariance, and absence of multicollinearity (Warner, 2013).

A Kolmogorov-Smirnov test was used to examine normality. Kolmogorov-Smirnov was used since the sample size consisted of more than 50 participants ($N = 831$). No violation of normality was found in Group 1 (those who did not persist). However, violations of normality

were identified in all three scores for Group 2 (those who did persist). See Table 2 for Kolmogorov-Smirnov test.

Table 2

Tests for Normality

Value	Group	Statistic	df	p
Overall Grit Score	Did Not Persist	.093	44	.200*
	Did Persist	.075	787	.000
Effort Subscore	Did Not Persist	.104	44	.200*
	Did Persist	.110	787	.000
Interest Subscore	Did Not Persist	.106	44	.200*
	Did Persist	.095	787	.000

Though the Komolgorov-Smirnov test was violated for the group that did not persist, the researcher continued with the MANOVA, consulting histograms and Q-Q plot testing to ensure the plots were reasonably within range. According to Warner (2013), this approach was acceptable because an ANOVA is considered robust enough to withstand a violated normality assumption. See Figures 3, 4, and 5 for histograms.

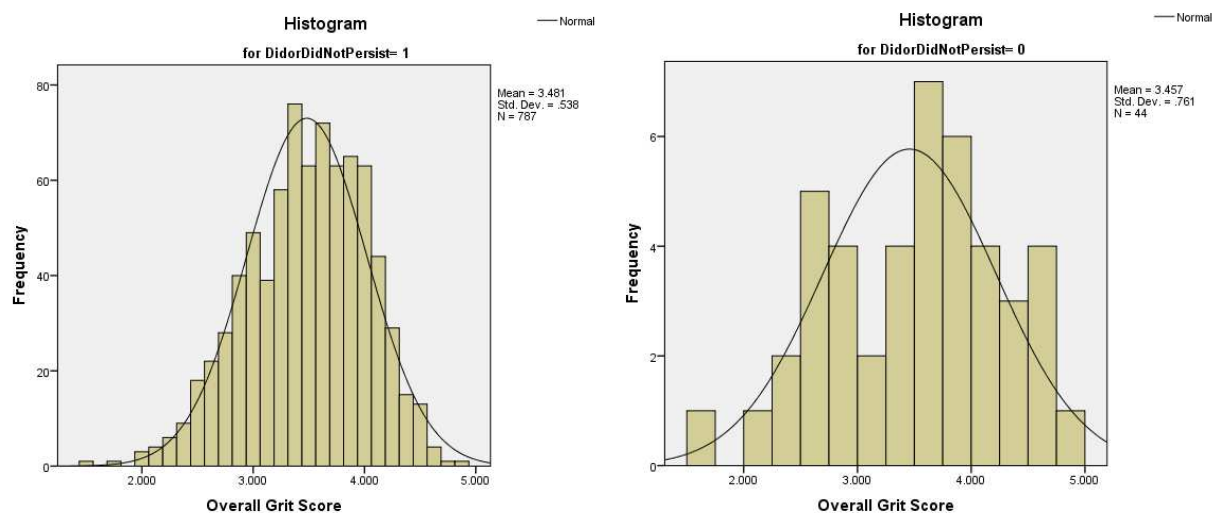


Figure 3. Histograms of overall grit score for students who did (1) and did not (0) persist.

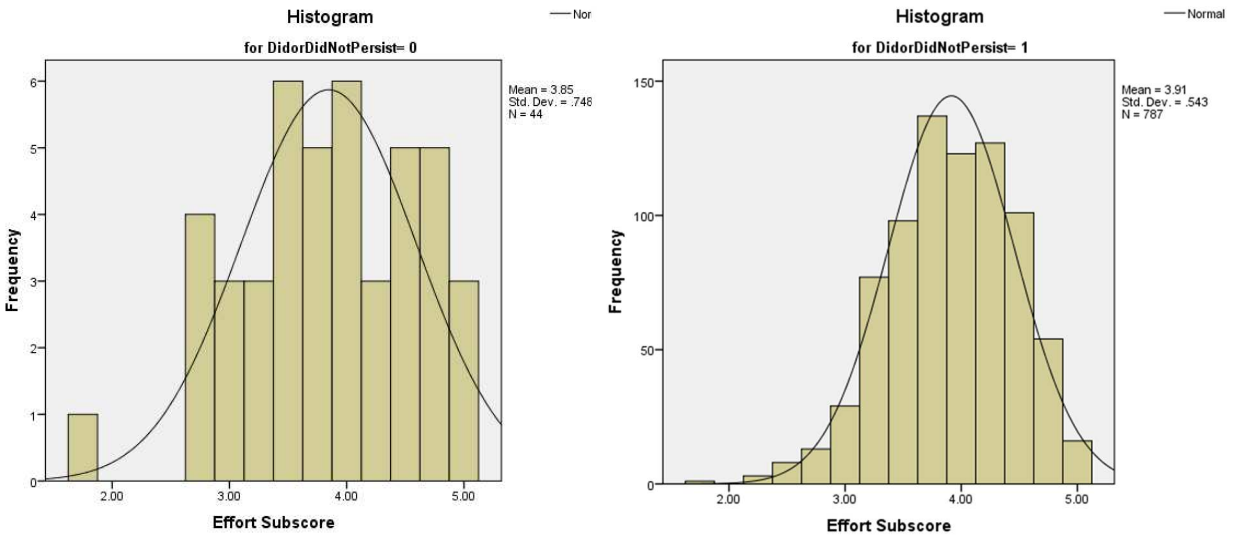


Figure 4. Histogram of effort subscore for students who did (1) and did not (0) persist.

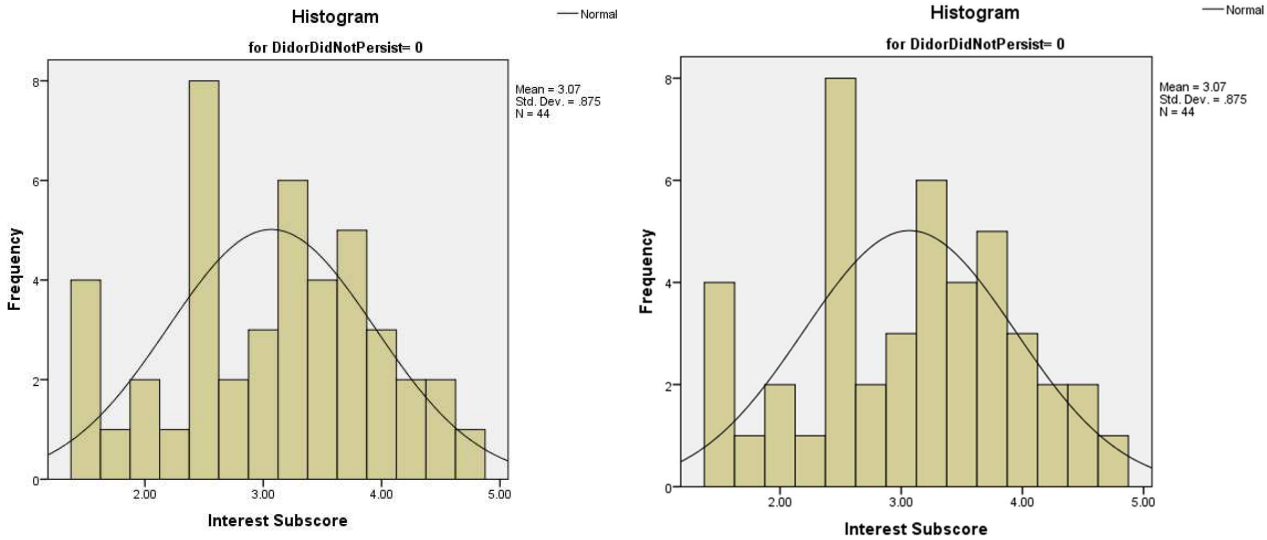


Figure 5. Histogram of interest subscore for students who did (1) and did not (0) persist.

The assumption of multivariate normal distribution was tested using a series of scatterplots matrices for the dependent variables (overall grit score, effort subscore, and interest subscore). The scatterplot demonstrated multivariate normal distribution across all three dependent variables; therefore, the assumption was met. See Figure 6 for scatterplots.

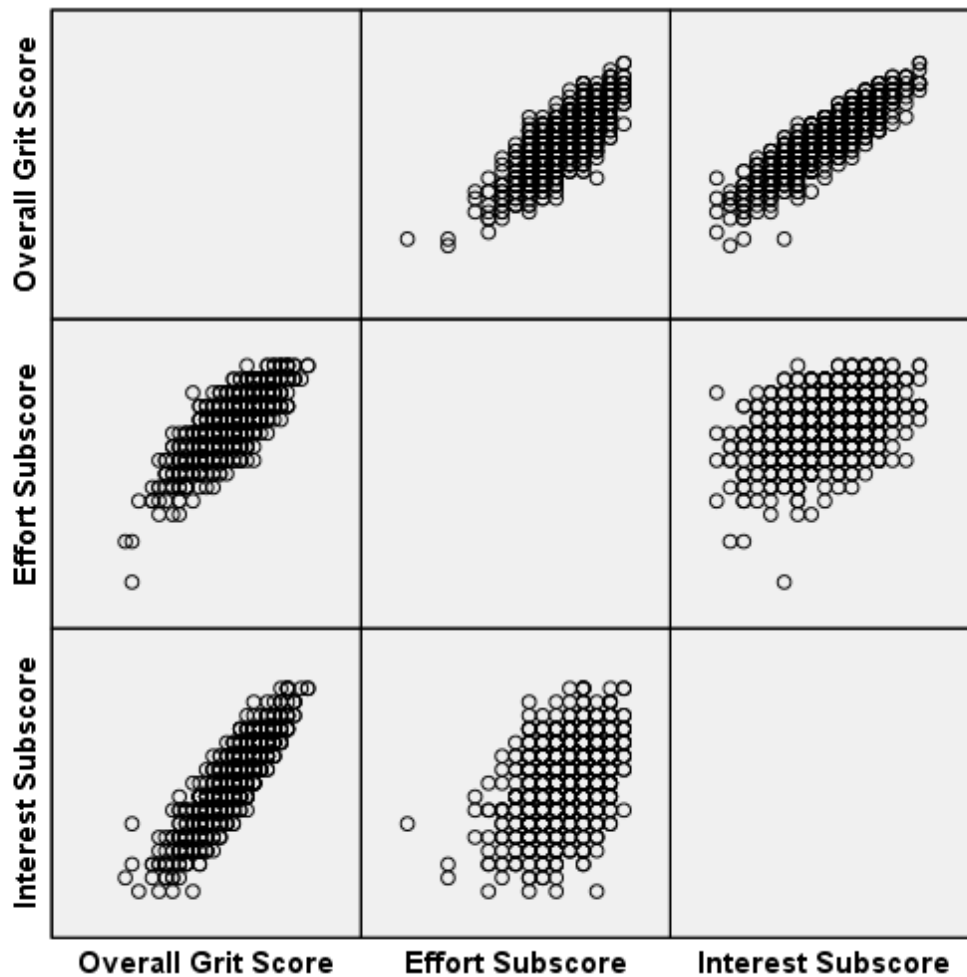


Figure 6. Scatterplots for overall grit score, effort subscore, and interest subscore.

The assumption of homogeneity of variance was examined using the Levene's Test of Equality of Error Variances. The assumption of equal variance was violated for dependent variables overall grit score ($p < .001$) and perseverance of effort subscore ($p = .001$). However, the consistency of interest subscore was met ($p = .053$). Thus, the researcher continued with the analysis since the sample sizes were large. The ANOVA is a robust test and can handle the violation of equal variance, especially when the sample size is extremely large (Warner, 2013). See Table 3 for Levene's Test.

Table 3

Levene's Test of Equality of Error Variances

Value	<i>F</i>	<i>df1</i>	<i>df2</i>	<i>p</i>
Overall Grit Score	12.343	1	829	.000
Effort Subscore	11.014	1	829	.001
Interest Subscore	3.742	1	829	.053

In order to test for multicollinearity, the researcher conducted a Pearson product-moment test. The overall grit score and effort subscore collinearity was $r = .797$. The overall grit score and interest subscore collinearity was $r = .891$. The effort subscore and interest subscore collinearity was $r = .437$. The assumption for multicollinearity was met. See Table 4 for Pearson's r test.

Table 4

Correlations

	Overall Grit Score	Effort Subscore	Interest Subscore
Overall Grit Score			
Pearson Correlation	1	.797**	.891**
Sig. (2-tailed)		.000	.000
<i>N</i>	831	831	831
Effort Subscore			
Pearson Correlation	.797**	1	.437**
Sig. (2-tailed)	.000		.000
<i>N</i>	831	831	831
Interest Subscore			
Pearson Correlation	.891**	.437**	1
Sig. (2-tailed)	.000	.000	
<i>N</i>	831	831	831

Null Hypothesis

A one-way MANOVA was conducted to test the null hypothesis, that there is no significant difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of first-year undergraduate students who persist and those who

do not persist at a large private university. An alpha level of .05 was used for all statistical testing. A Wilks' lambda statistic was obtained. No significant difference was found within the statistical model, $F(2, 828) = .484, p = .617$, partial $\eta^2 = .001$. Therefore, the researcher failed to reject the null hypothesis at a 95% confidence interval. The effect size, as measured by partial eta squared, was small (Warner, 2013). Since the researcher failed to reject null hypothesis, post hoc analysis was not required. See multivariate testing and Wilks' lambda row in Table 5.

Table 5

Multivariate Tests^a

Effect	Value	F	Hypothesis <i>df</i>	Error <i>df</i>	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^c
Wilks' Lambda	.999	.484 ^b	2.000	828.000	.617	.001	.967	.129

^aDesign: Intercept + DidorDidNotPersist

^bExact statistic

^cComputed using alpha = .05

CHAPTER FIVE: CONCLUSIONS

Overview

The following content will highlight the results of the MANOVA by discussing the results of the research organized around the research question and null hypothesis. Implications of the study include how the results add to the existing literature about the noncognitive trait grit. Furthermore, limitations of the study and recommendations for further research about grit and its facets will be addressed.

Discussion

The purpose of this quantitative study was to determine whether there was a statistically significant difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of students who persist and those who do not persist at a large private university. The significance of the study was situated around the notion that grit may play an important role in determining student persistence, and, if so, best practices in institutional retention may expand to include grit and its facets as a factor for implementation in programming.

The study used a causal-comparative design in order to determine whether students' grit scores and term-to-term student persistence are causally related to each other (Gall et al., 2007). The independent variable was student persistence at the college level, consisting of two groups: students who persisted and those who did not persist. For the purpose of this study, persistence was defined as first-year undergraduate students' retention at the institution from their first term to the subsequent term. The dependent variables were the student's overall grit score, perseverance of effort subscore, and consistency of interest subscore. The null hypothesis stated that there is no significant difference between the overall grit score, perseverance of effort

subscore, and consistency of interest subscore of first-year undergraduate students who persist and those who do not persist at a large private university. Archival data in the form of an Excel spreadsheet, containing 832 students' scores, were provided to the researcher by the university. One extreme outlier was removed from the data set, resulting in a final sample of 831 students. The archival data were then analyzed through IBM's SPSS software using a one-way MANOVA. MANOVA was an appropriate approach since there was a distinct relationship between the dependent variables (Warner, 2013): overall grit score and the two subscores.

Upon conducting a MANOVA to test the hypothesis, the resulting data revealed that there was no significant difference between the overall grit score, perseverance of effort subscore, and consistency of interest subscore of students who persisted and those who did not persist at a large private university, $F(2, 828) = .484, p = .617, \text{partial } \eta^2 = .001$. Therefore, the null hypothesis failed to be rejected. Though prior research indicated there might be statistically significant differences in the overall grit score, perseverance of effort subscore, and consistency of interest subscore between the two groups of students, this study showed there were no significant differences in the three scores between students who do or do not persist in college. These results do not appear to support results found in related research, which indicate that the overall grit score's results can be utilized as a significant predictor for incoming college students' persistence (Duckworth et al., 2007; Kelly et al., 2014). In these studies, the researchers found that after first-year cadets enrolled in basic training at the United States Military Academy were administered the grit assessment, their persistence beyond cadet basic training was more likely to be predicted by their grit scores than any other traditional item, such as their SAT scores or high school ranking (Duckworth et al., 2007; Kelly et al., 2014).

Research also indicates that perseverance of effort subscore results can be used as a significant predictor of student achievement more consistently than the consistency of interest subscore results (Bowman et al., 2015; Crede et al., 2017; Wolters & Hussain, 2015), but in this study, neither perseverance of effort nor consistency of interest appeared to show significance. Additionally, the results do not support Crede et al. (2017), who found a modest relationship between grit and student retention and academic performance. Crede et al. (2017) indicated that assessing grit and its facets may be beneficial in realms where achieving retention can be challenging, such as higher education.

The findings of this study, however, do support alternative assertions relating to grit. Stokas (2015) maintained that students would benefit more from nurturing environments rather than increased grit, stating that a pitfall of grit is the notion that it teaches individuals that they must suffer in order to endure and succeed. Additionally, Schreiner (2017) postulated that grit has been overemphasized and may not actually be as related to success as others have hypothesized, suggesting that the individual's environment and influences be taken into equal consideration as the grit of an individual. Based on these nonsignificant outcomes and research which opposes the renown of the importance of grit, this researcher suggests that while grit and its facets are important noncognitive traits to study and interesting to measure and discuss, it may not be prudent to invest resources into further developing curriculum or programming which focuses singularly on either one of grit's facets.

Though significant differences between variables were not found, the data found in this study indicated that the overall grit score of the students who persisted ($M = 3.48$, $SD = 0.54$) was moderately higher than that of the students who did not persist ($M = 3.46$, $SD = 0.76$). These results support research which indicates that individuals who demonstrate higher grit

scores tend to outperform those with lower grit scores in both employment and educational settings (Duckworth et al., 2007; Duckworth & Quinn, 2009; Eskreis-Winkler et al., 2014). These results also support Duckworth et al.'s (2007) findings that higher grit scores hold predictive significance of persistence and academic achievement as well as Saunders-Scott et al.'s (2017) findings that first-year students who demonstrate higher grit scores are more likely to persist at least a year and a half in college. The data from this study also showed that students who persisted scored higher for perseverance of effort ($M = 3.91$, $SD = 0.55$) than those who did not ($M = 3.85$, $SD = 0.75$). These results appear to support similar findings from Bowman et al. (2015), which indicate that higher degrees of perseverance of effort are a predictor of academic and nonacademic outcomes. Lower degrees of consistency of interest were noticeable for students who did not persist ($M = 3.07$, $SD = 0.88$) compared to those who did persist ($M = 3.05$, $SD = 0.73$). Note that the consistency of interest subscore was reverse scored, resulting in a range from 1 (extreme interest) to 5 (not much interest; Duckworth et al., 2007; Duckworth & Quinn, 2009). As such, this finding appears to support the results which indicate that those students who did not persist demonstrated a higher degree of showing “not much interest.” These results seem to indicate that the higher a student's grit, the more likely he or she may be to stay engaged and persist; therefore, introducing the concept and assessment of grit may be a worthwhile and interesting activity for college students, though it may not demonstrate reliable significance related to whether or not the student persists.

Implications

The study of differences in a college student's overall grit score, perseverance of effort subscore, and consistency of interest subscore holds important implications regarding student achievement in higher education and whether achievement appears to be related to or predicted

by one or more of those scores. Since there was no significant difference in the three scores, academic entities providing resources intended to promote persistence should continue to consider to what extent including grit or one of its facets in programming may or may not relate to improving student persistence. However, the relatively high means for overall grit score and perseverance of effort subscore may be interpreted to indicate that by assessing grit, institutions may be able to further investigate student populations to learn whether there is a relationship between students' scores and achievement outcomes, or at the very least, undergo analysis that can assist to encourage design of intervention strategies. Bowman et al. (2015) concluded that students who demonstrated higher grit “were more satisfied with college, had a greater sense of belonging, engaged in more co-curricular activities, and even reported more interactions with faculty” (p. 645). The debate, then, is not necessarily whether a high degree of grit is a valuable trait that practitioners desire to cultivate in students, but rather to what extent grit can be relied upon as a significant indicator or predictor routinely related to student success and achievement outcomes.

Limitations

There are four limitations of the study considered by the researcher to have potentially affected both internal and external validity. The first is that since the sample population was incoming residential undergraduate students enrolled at a large private university, results may differ for smaller private universities and any public university. Results may also differ for online students within these settings, including the online students enrolled at the university setting designated for this study. A large private university's residential undergraduate population was selected because of the researcher's professional and personal experiences.

The second limitation of the study is regarding the selection of grit and its facets as the dependent variables. Research on noncognitive traits has generally included more measurements than just grit in order to provide a comprehensive view of student outcomes (Braxton & Francis, 2017; Zamarro et al., 2018). Grit and its facets were selected by the researcher because the academic department within the university had recently introduced the Grit-S as an intake procedure for residential undergraduate advising appointments.

Since the grit assessment was simply an option for students to complete and not mandated, another limitation of the study is that the sample population was moderately skewed toward females. Of the 832 students whose scores were available, 505 were female (60.1%). The university's overall male-female ratio is 45:55 for its residential programs, indicating that there is a higher gender differential for the sample results, and the findings may be less applicable for male students.

A fourth and final limitation echoes limitations found in other research about grit: the condensed nature of the observed time period. This study used student persistence from one term to the next consecutive term rather than longitudinally studying grit and its facets' impact across a broader spectrum of college persistence. The researcher selected this time period based upon a variety of internal factors associated with persistence initiatives, but it may be the case that expanding the time period of measurement of persistence could lead to significant outcomes or realizations.

Recommendations for Further Study

Upon discussion of the conclusions, implications, and limitations of this study, further research is recommended in order to add to literature on the topic of grit: namely, the analysis of grit as a noncognitive trait and its relationship to students' persistence in college.

1. Future research should seek to identify the differences between noncognitive indicators in addition to grit (such as effort and self-efficacy) and cognitive indicators (such as aptitude or intelligence) as they relate to student persistence in higher education. Additionally, Bowman et al. (2018) suggested that practitioners may benefit from extra analysis regarding how to program the building of noncognitive traits into intervention strategies. While academic performance in college continues to demonstrate the strongest relationship to student persistence (Mayhew et al., 2016), noncognitive factors may also be connected to persistence and graduation (Bowman et al., 2018). As multiple studies have suggested, the noncognitive traits incoming college students possess may affect their experiences and engagement in college, both academic and otherwise, affecting academic outcomes such as GPA and, ultimately, persistence (Bowman et al., 2018; Hodge et al., 2018). Bowman et al. (2018) recommend further longitudinal research that collects data regarding both noncognitive and cognitive traits.
2. Future research might consider whether analysis of student demographics compared against students' grit scores may reveal further insight about student persistence. Although Bowman et al. (2015) found that neither of the two facets of grit (perseverance of effort nor consistency of interest) were significantly correlated with student demographics, it may be beneficial for future research to further expand upon these dimensions. Hodge et al. (2018) made reference to the conflicting research that exists about gender differences related to grit as well as the lack of research that exists regarding grit and first-generation college students.
3. Research should be conducted that studies the differences in grit scores between domestic and international students in higher education. According to Datu et al. (2016), perseverance of effort and consistency of interest may differ according to societal or cultural values and

priorities. Most research that exists on grit and its subscores is from Western culture; therefore, adding variables which take into account cross-cultural items may further clarify grit's limitations or implications in educational settings (Datu et al., 2016).

4. Research should seek to further expand upon the consistency of interest subscore facet for undergraduates in relation to their persistence. Examples of the specific questions on the grit scale that seek to determine an individual's consistency of interest are "My interests change from year to year" and "I have difficulty maintaining my focus on projects that take more than a few months to complete" (Duckworth et al., 2007, p. 1090). Abuhassan and Bates (2015), in their measure of achievement, found that perseverance of effort was connected to achievement above and beyond IQ but did not find the same connection for consistency of interest, also recommending further study to explore this facet of grit. In this study, those students who did not persist demonstrated higher mean scores for consistency of interest ($M = 3.07$) than those who did persist ($M = 3.05$), illustrating how those who departed from the university had lower consistency of interest due to the reverse scoring method for the consistency of interest subscore (Duckworth & Quinn, 2009); therefore, realization of this potential for student attrition based on low consistency of interest warrants further investigation across student populations.

REFERENCES

- Abuhassan, A., & Bates, T. C. (2015). Grit: Distinguishing effortful persistence from conscientiousness. *Journal of Individual Differences, 36*, 205–214. doi:10.1027/1614-0001/a000175
- Akos, P., & Kretchmar, J. (2017). Investigating grit at a noncognitive predictor of college success. *Review of Higher Education, 40*(2), 163–186. doi:10.1353/rhe.2017.0000
- Allen, D. (1999). Desire to finish college: An empirical link between motivation and persistence. *Research in Higher Education, 40*(4), 461–485. doi:10.1023/A:1018740226006
- Astin, A. W. (1993). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education*. New York, NY: American Council on Education.
- Bahi, S., Higgins, D., & Staley, P. (2015). A time hazard analysis of student persistence: A US university undergraduate mathematics major experience. *International Journal of Science and Mathematics Education, 13*(5), 1139–1160. doi:10.1007/s10763-014-9538-9
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191–215.
- Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*, 1–26.
- Bean, J. P. (1980). Dropouts and turnover: The synthesis and test of a causal model of student attrition. *Research in Higher Education, 29*(2), 155–187.
- Bean, J. P. (1985). Interaction effects based on class level in an explanatory model of college student dropout syndrome. *American Educational Research Journal, 22*(1), 35–64. doi:10.2307/1162986

- Block, J. (1995). A contrarian view of the five-factor approach to personality description. *Psychological Bulletin, 117*, 187–215.
- Bonneville-Roussy, A., Vallerand, R. J., & Bouffard, T. (2013). The roles of autonomy support and harmonious and obsessive passions in educational persistence. *Learning and Individual Differences, 24*, 22–31. doi:10.1016/j.lindif.2012.12.015
- Bowen, W. G., Chingos, M. M., & McPherson, M. S. (2009). *Crossing the finish line: Completing college at America's public universities*. Princeton, NJ: Princeton University Press.
- Bowman, N. A., Hill, P. L., Denson, N., & Bronkema, R. (2015). Keep on truckin' or stay the course? Exploring grit dimensions as differential predictors of educational achievement, satisfaction, and intentions. *Social Psychological and Personality Science, 6*(6), 639–645. doi:10.1177/1948550615574300
- Bowman, N. A., Miller, A., Woosley, S., Maxwell, N. P., & Kolze, M. J. (2018). Understanding the link between noncognitive attributes and college retention. *Research in Higher Education, 1*–18. doi:10.1007/s11162-018-9508-0
- Braxton, J. M., & Francis, C. H. W. (2017). Organizational assessment to improve college student persistence. *Strategic Enrollment Management Quarterly, 5*(2), 80–87. doi:10.1002/sem3.20105
- Bundick, M., Andrews, M., Jones, A., Mariano, J. M., Bronk, K. C., & Damon, W. (2006). *Revised youth purpose survey*. Unpublished instrument, Stanford Center on Adolescence, Stanford, CA.

- Chen, R. (2012). Institutional characteristics and college student dropout risks: A multilevel event history analysis. *Research in Higher Education, 53*(5), 487–505.
doi:10.1007/s11162-011-9241-4
- Cosgrove, J. M., Chen, Y. T., & Castelli, D. M. (2018). Physical fitness, grit, school attendance, and academic performance among adolescents. *BioMed Research International, 2018*
doi:10.1155/2018/9801258
- Crede, M., Tynan, M., & Harms, P. (2017). Much ado about grit: A meta-analytic synthesis of the grit literature. *Journal of Personality and Social Psychology, 113*(3), 492–511.
doi:10.1037/pspp0000102
- Curran, T., Hill, A. P., Appleton, P. R., Vallerand, R. J., & Standage, M. (2015). The psychology of passion: A meta-analytical review of a decade of research on intrapersonal outcomes. *Motivation and Emotion, 39*(5), 631–655. doi:10.1007/s11031-015-9503-0
- Datu, J. A. D., Valdez, J. P. M., & King, R. B. (2016). Perseverance counts but consistency does not! Validating the short grit scale in a collectivist setting. *Current Psychology, 35*(1), 121–130. doi:10.1007/s12144-015-9374-2
- Davidson, C., & Wilson, K. (2013). Reassessing Tinto's concepts of social and academic integration in student retention. *Journal of College Student Retention, 15*(3), 329–346.
doi:10.2190/CS.15.3.b
- Demetriou, C. & Schmitz-Sciborski, A. (2011). Integration, motivation, strengths and optimism: Retention theories past, present and future. In R. Hayes (Ed.), *Proceedings of the 7th National Symposium on Student Retention*. The University of Oklahoma, Norman.
- Duckworth, A. L. (2016). *Grit: The power of passion and perseverance*. New York, NY: Simon and Schuster.

- Duckworth, A. L., & Eskreis-Winkler, L. (2013). Grit. *Observer*, 26(4), 1–3.
- 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. doi:10.1037/0022-3514.92.6.1087
- Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the short grit scale (Grit-S). *Journal of Personality Assessment*, 91(2), 166–174.
doi:10.1080/00223890802634290
- Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York, NY: Random House.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256–273.
- Egalite, A. J., Mills, J. N., & Greene, J. P. (2016). The softer side of learning: Measuring students' noncognitive skills. *Improving Schools*, 19(1), 27–40.
doi:10.1177/1365480215616313
- Ehrlinger, J. (2008). Skill level, self-views and self-theories as sources of error in self-assessment. *Social and Personality Psychology Compass*, 2(1), 382–398.
- Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist*, 49, 725–747.
- Eskreis-Winkler, L., Shulman, E. P., Beal, S. A., & Duckworth, A. L. (2014). The grit effect: Predicting retention in the military, the workplace, school and marriage. *Frontiers in Psychology*, 5, 36. doi:10.3389/fpsyg.2014.00036
- Fodor, J. (1975). *The language of thought*. Cambridge, MA: Harvard University Press.

- French, R. P., II, (2016). The fuzziness of mindsets: Divergent conceptualizations and characterizations of mindset theory and praxis. *International Journal of Organizational Analysis*, 24(4), 673–691. doi:10.1108/IJOA-09-2014-0797
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction* (8th ed.). New York, NY: Allyn and Bacon.
- Galton, F. (1892). *Hereditary Genius: An inquiry into its laws and consequences*. London, England: Macmillan.
- Glenberg, A. M., Witt, J. K., & Metcalfe, J. (2013). From the revolution to embodiment: 25 years of cognitive psychology. *Perspectives on Psychological Science*, 8(5), 573–585. doi:10.1177/1745691613498098
- Green, S. B., & Salkind, N. J. (2013). *Using SPSS for Windows and Macintosh: Analyzing and understanding data* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
- Grohman, M., Ivcevic, Z., Silvia, P., & Kaufman, S. (2017). The role of passion and persistence in creativity. *Psychology of Aesthetics Creativity and the Arts*, 11(4), 376–385. doi:10.1037/aca0000121
- Gucciardi, D. F., Peeling, P., Ducker, K. J., & Dawson, B. (2016). When the going gets tough: Mental toughness and its relationship with behavioural perseverance. *Journal of Science and Medicine in Sport*, 19(1), 81. doi:10.1016/j.jsams.2014.12.005
- Hammond, D. A. (2017). Grit: An important characteristic in learners. *Currents in Pharmacy Teaching and Learning*, 9(1), 1–3. doi:10.1016/j.cptl.2016.08.048
- Hill, P. L., Burrow, A. L., & Bronk, K. C. (2016). Persevering with positivity and purpose: An examination of purpose commitment and positive affect as predictors of grit. *Journal of Happiness Studies*, 17(1), 257–269. doi:10.1007/s10902-014-9593-5

- Hochanadel, A., & Finamore, D. (2015). Fixed and growth mindset in education and how grit helps students persist in the face of adversity. *Journal of International Education Research, 11*(1), 47–50.
- Hodge, B., Wright, B., & Bennett, P. (2018). The role of grit in determining engagement and academic outcomes for university students. *Research in Higher Education, 59*(4), 448–460. doi:10.1007/s11162-017-9474-y
- Hokanson, B., & Karlson, R. W. (2013). Borderlands: Developing character strengths for a knowmadic world. *On the Horizon, 21*(2), 107–113. doi:10.1108/10748121311323003
- Howe, M. J. A. (1999). *Genius explained*. New York, NY: Cambridge University Press.
- Kelly, D. R., Matthews, M. D., & Bartone, P. T. (2014). Grit and hardiness as predictors of performance among West Point cadets. *Military Psychology, 26*(4), 327–342. doi:10.1037/mil0000050
- Kena, G., Musu-Gillette, L., Robinson, J., Smith, W., Nelson, V., Robles-Villalba, V., . . . Zhang, J. (2015). *The condition of education 2015*. Washington, DC: National Center for Education Statistics.
- Kerby, M. B. (2015). Toward a new predictive model of student retention in higher education: An application of classical sociological theory. *Journal of College Student Retention: Research, Theory & Practice, 17*(2), 138–161. doi:10.1177/1521025115578229
- Lee, W. (2017). Relationships among grit, academic performance, perceived academic failure, and stress in associate degree students. *Journal of Adolescence, 60*, 148–152. doi:10.1016/j.adolescence.2017.08.006

- Lucas, G. M., Gratch, J., Cheng, L., & Marsella, S. (2015). When the going gets tough: Grit predicts costly perseverance. *Journal of Research in Personality, 59*, 15–22.
doi:10.1016/j.jrp.2015.08.004
- Macnamara, B., & Rupani, N. (2017). The relationship between intelligence and mindset. *Intelligence, 64*, 52–59. doi:10.1016/j.intell.2017.07.003
- Mangels, J., Butterfield, B., Lamb, J., Good, C., & Dweck, C. (2006). Why do beliefs about intelligence influence learning success? A social cognitive neuroscience model. *Social Cognitive and Affective Neuroscience, 1*(2), 75–86. doi:10.1093/scan/nsl013
- Mawer, J. (2014). A simple use of Dweck's mindset theory. *Australian Educational Leader, 36*(2), 50–52.
- Mayhew, M. J., Rockenbach, A. N., Bowman, N. A., Seifert, T. A., Wolniak, G. C., & Pascarella, E. T. (2016). *How college affects students: 21st century evidence that higher education works* (Vol. 3). San Francisco, CA: Jossey-Bass.
- Moutafi, J., Furnham, A., & Paltiel, L. (2004). Why is conscientiousness negatively correlated with intelligence? *Personality and Individual Differences, 37*, 1013–1022.
- Murphy, M. C., & Dweck, C. S. (2016) Mindsets shape consumer behavior. *Journal of Consumer Psychology, 26*, 127-136.
- Myers, C., Wang, C., Black, J., Bugescu, N., & Hoefft, F. (2016). The matter of motivation: Striatal resting-state connectivity is dissociable between grit and growth mindset. *Social Cognitive and Affective Neuroscience, 11*(10), 1521–1527. doi:10.1093/scan/nsw065
- National Center for Education Statistics (2017). *Fast facts: Graduation rates*. Retrieved from <https://nces.ed.gov/fastfacts/display.asp?id=40>

- Nenkov, G. Y. (2012). It's all in the mindset: effects of varying psychological distance in persuasive messages. *Marketing Letters*, 23(3), 615–628.
- Newell, A., & Simon, H. A. (1976). Computer science as empirical enquiry. *Communications of the ACM*, 19, 113–126.
- Panos, R. J., & Astin, A. W. (1968). Attrition among college students. *American Educational Research Journal*, 5(1), 57–72. doi:10.2307/1161701
- Pascarella E. T., & Terenzini, P. T. (1980). Predicting freshman persistence and voluntary dropout decisions from a theoretical model. *Journal of Higher Education*, 51, 60–75.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research*. San Francisco, CA: Jossey-Bass.
- Paulsen, M. (2016). *Higher education: Handbook of theory and research* (31st ed.). New York, NY: Springer.
- Pink, D. H. (2008). *A whole new mind (Why right-brainers will rule the future)*. Grand Haven, MI: Brilliance.
- Portis, C. (1968). *True grit: A novel*. New York, NY: Simon and Schuster.
- Ravenscroft, S. P., Waymire, T. R., & West, T. D. (2012). Accounting students' metacognition: The association of performance, calibration error, and mindset. *Issues in Accounting Education*, 27(3), 707–732.
- Ris, E. W. (2015) Grit: A short history of a useful concept. *Journal of Educational Controversy*. 10(1), 1–18.
- Rochford, R. A. (2004). Improving academic performance and retention among remedial students. *The Community College Enterprise*, 10(2), 23–36.

- Ryan, J. F. (2004). The relationship between institutional expenditures and degree attainment at baccalaureate colleges. *Research in Higher Education, 45*(2), 97–114.
- Saunders-Scott, D., Braley, M. B., & Stennes-Spidahl, N. (2017). Traditional and psychological factors associated with academic success: Investigating best predictors of college retention. *Motivation and Emotion, 42*(4), 1–7. doi:10.1007/s11031-017-9660-4
- Schreiner, L. A. (2017). The privilege of grit. *About Campus: Enriching the Student Learning Experience, 22*(5), 11-20.
- Schuh, J. H. (1999). Examining the effects of scholarships on retention in a fine arts college. *Journal of College Student Retention, 1*(3), 193–202. doi:10.2190/FP58-T6P4-0DP9-8RJW
- Seider, S. (2012). *Character compass: How powerful school culture can point students toward success*. Cambridge, MA: Harvard Education Press.
- Spady, W. G. (1970). Lament for the letterman: Effects of peer status and extracurricular activities on goals and achievement. *American Journal of Sociology, 75*(4), 680–702. doi:10.1086/224896
- Sparkman, L. A., Maulding, W. S., & Roberts, J. G. (2012). Noncognitive predictors of student success in college. *College Student Journal, 46*(3), 642–652.
- Stokas, A. G. (2015). A genealogy of grit: Education in the new gilded age. *Educational Theory, 65*(5), 513–528. doi:10.1111/edth.12130
- Strayhorn, T. L. (2014). What role does grit play in the academic success of black male collegians at predominantly white institutions? *Journal of African American Studies, 18*(1), 1–10. doi:10.1007/s12111-012-9243-0

- Suzuki, Y., Tamesue, D., Asahi, K., & Ishikawa, Y. (2015). Grit and work engagement: A cross-sectional study. *PLoS One*, *10*(9), E0137501. doi:10.1371/journal.pone.0137501
- Tenenbaum, G., Lidor, R., Lavyan, N., Morrow, K., Tonnel, S., & Gershgoren, A. (2005). Dispositional and task-specific social-cognitive determinants of physical effort perseverance. *The Journal of Psychology*, *139*(2), 139-158.
- Terman, L. M., & Oden, M. H. (1947). *The gifted child grows up: Twenty-five years' follow-up of a superior group*. Oxford, England: Stanford University Press.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, *45*(1), 89–125. doi:10.2307/1170024
- Tinto, V. (1988). Stages of student departure: Reflections on the longitudinal character of student leaving. *Journal of Higher Education*, *59*(4), 438–455.
- Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition (2nd ed.)*. Chicago, IL: University of Chicago Press.
- United States Department of Education. (2013). *Promoting grit, tenacity, and perseverance: Critical factors for success in the 21st century*. Retrieved from <http://pgbovine.net/OET-Draft-Grit-Report-2-17-13.pdf>.
- Vallerand, R. J., Blanchard, C., Mageau, G. A., Koestner, R., Ratelle, C., Léonard, M., & Marsolais, J. (2003). Les passions de l'âme: On obsessive and harmonious passion. *Journal of Personality and Social Psychology*, *85*(4), 756–767. doi:10.1037/0022-3514.85.4.756
- Warner, R. M. (2013). *Applied statistics: From bivariate through multivariate techniques*. Thousand Oaks, CA: Sage.

- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070. doi:10.1037/0022-3514.54.6.1063
- Wolters, C. A., & Hussain, M. (2015). Investigating grit and its relations with college students' self-regulated learning and academic achievement. *Metacognition and Learning, 10*(3), 293–311. doi:10.1007/s11409-014-9128-9
- Zamarro, G., Cheng, A., Shakeel, M. D., & Hitt, C. (2018). Comparing and validating measures of noncognitive traits: Performance task measures and self-reports from a nationally representative internet panel. *Journal of Behavioral and Experimental Economics, 72*, 51–60. doi:10.1016/j.socec.2017.11.005

APPENDIX A: Institutional Review Board Approval**LIBERTY UNIVERSITY.**
INSTITUTIONAL REVIEW BOARD

May 11, 2018

Nina M. Shenkle

IRB Application 3287: An Analysis of Grit Scores on First-Year Undergraduate Students' Persistence at a Large Private University

Dear Nina M. Shenkle,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Your study does not classify as human subjects research because it will not involve the collection of identifiable, private information.

Please note that this decision only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued non-human subjects research status. You may report these changes by submitting a new application to the IRB and referencing the above IRB Application number.

If you have any questions about this determination or need assistance in identifying whether possible changes to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,



G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
The Graduate School

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APPENDIX B: Permission to Use Data

Ms. Shenkle,

Thank you for your willingness to investigate the value of the grit assessment taken by our students. You have my full support, permission and approval to access the information requested.

Best,

Brian C. Yates, Ed.D.

Dean | Professor of Education

From: Shenkle, Nina Marie ([REDACTED])

Sent: Sunday, April 1, 2018 9:15 PM

To: Yates, Brian C ([REDACTED]) < [REDACTED] >

Subject: Permission to Access and Use [REDACTED] Data

Dean Yates,

I am continuing to prepare a dissertation manuscript that presents the relevance of grit (defined by Angela Duckworth as perseverance and passion for long-term goals) in higher education. I appreciate you taking the time to discuss this study over the past 6+ months and how it could benefit your college's efforts to promote student persistence.

As we discussed early last fall, the focus of my study is whether a student's grit score can predict their college persistence. I have knowledge that students' grit scores were collected last fall as an advising initiative within your college ([REDACTED]) to better understand a resident undergraduate student's likelihood to persist from one semester to the next, based on his or her grit score.

Therefore, I am asking for your permission and approval to access archival data from [REDACTED] Qualtrics and Banner database systems in order to conduct this quantitative study and, ultimately, provide insight to your college regarding the study's outcomes. The data from Qualtrics will be total point values of students' overall grit score and each subscale; the Banner data will be persistence records from Fall 2017 to Spring 2018 of those students who completed the grit assessment. Upon receipt of the raw data, I will score the grit assessment and combine and match it with the persistence data on my own.

I appreciate your review of this request, and look forward to sharing the results with you. Thank you in advance for your consideration.

Sincerely, Nina Shenkle

APPENDIX C: Short Grit Scale

Short Grit Scale

Directions for taking the Grit Scale: Here are a number of statements that may or may not apply to you. For the most accurate score, when responding, think of how you compare to most people - not just the people you know well, but most people in the world. There are no right or wrong answers, so just answer honestly!

1. 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
2. Setbacks don't discourage me.
 - Very much like me
 - Mostly like me
 - Somewhat like me
 - Not much like me
 - Not like me at all
3. 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
4. I am a hard worker.
 - Very much like me
 - Mostly like me
 - Somewhat like me
 - Not much like me
 - Not like me at all
5. 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
6. 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

7. I finish whatever I begin.

- Very much like me
- Mostly like me
- Somewhat like me
- Not much like me
- Not like me at all

8. I am diligent.

- Very much like me
- Mostly like me
- Somewhat like me
- Not much like me
- Not like me at all