

November 2017

Grit and Academic Performance of First- and Second-Year Students Majoring in Education

Lindsey N. Williams

University of South Florida, LNWilliams@usf.edu

Follow this and additional works at: <http://scholarcommons.usf.edu/etd>

 Part of the [Educational Administration and Supervision Commons](#)

Scholar Commons Citation

Williams, Lindsey N., "Grit and Academic Performance of First- and Second-Year Students Majoring in Education" (2017). *Graduate Theses and Dissertations*.

<http://scholarcommons.usf.edu/etd/7109>

This Dissertation is brought to you for free and open access by the Graduate School at Scholar Commons. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Scholar Commons. For more information, please contact scholarcommons@usf.edu.

Grit and Academic Performance of First- and Second-Year Students Majoring in Education

by

Lindsey N. Williams

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
in Curriculum and Instruction with an emphasis in
Higher Education Administration
Department of Leadership, Counseling, Adult, Career and Higher Education
College of Education
University of South Florida

Major Professor: Thomas E. Miller, Ed.D.
John M. Ferron, Ph.D.
Jean R. McCarthy, Ed.D.
William H. Young III, Ed.D.

Date of Approval:
November 8, 2017

Keywords: non-cognitive traits, undergraduate academic achievement, academic predictors

Copyright © 2017, Lindsey N. Williams

DEDICATION

To my sweet Ellie Joy, being your mother is the greatest gift. May you grow to be kind, humble, ... and gritty!

ACKNOWLEDGEMENTS

Thank you to the members of my committee for your expertise, insight, and guidance; from you all I have learned so much. To my major professor, Dr. Thomas Miller, you have served as a source of unwavering support and encouragement. Once I learned that a paper with zero errors does not earn a perfect score from you, I knew that you would challenge me! I hope I have met that challenge. I am beyond grateful for your mentorship and the opportunity to learn from you. To my committee member, supervisor, and dear friend, Jeany, you consistently encourage me to view life from a different angle, understand a perspective other than my own, and grant acceptance and grace to others, and for that I am eternally thankful. To Dr. William Young, thank you for your feedback and real-world advice. I appreciate your candor and humor! To Dr. John Ferron, thank you for your statistical know-how. You have a way of making a challenging subject intriguing, and your approachable demeanor is so appreciated. To Diep Nguyen, thank you for your time and attention to detail. My Chapter Four thanks you both!

To my family and friends who have supported me, I am so appreciative. To my mom, thank you for helping me foster my lifelong love for learning and for teaching me the value of hard work through your example. To my sister, Mandi, thank you for your thoughtful ear to listen and your careful eye for detail in proofreading and editing my papers throughout the years (I'd like to think I taught you all you know!). To my grandparents, Chuck and Nina, when I recall every major event in my life, from cheerleading camps to commencement ceremonies, I can think of no instance when I could not see your smiling faces in the crowd; thank you for always being there. I cannot believe I am fortunate enough to have grandparents as amazing as you two. (I promise, there will be no more commencement ceremonies for you to attend on my

behalf!) To Aimee, I am not sure how I became lucky enough to have a friendship with you that has spanned across decades. Thank you for always knowing what to say; I will never tire of your positivity! To Chad, CSA was grand, but the “Chad and Lindsey Ph.D. Cohort” was my favorite. Thanks for keeping me sane! To the students I have the pleasure of working with, you inspire me beyond measure.

And finally, to Scott, I remember cracking open my fortune cookie during the time when I was contemplating applying to this doctoral program (perhaps an ode to the many nights of take-out we would endure throughout the years of late-night classes and writing) and reading: “Now is a great time to expand your repertoire of skills and knowledge.” This was a journey we were both a part of; thank you for continuously helping me seek serenity and laughter among chaos. I am a better person because of you.

TABLE OF CONTENTS

List of Tables	iii
List of Figures	v
Abstract	vi
Chapter One: Introduction	1
Statement of the Problem	2
Theoretical Framework	3
Purpose of the Study	4
Research Questions	5
Significance of the Study	5
Definition of Terms	6
Limitations	7
Delimitations	8
Organization of the Study	8
Chapter Two: Literature Review	10
Postsecondary Enrollment, Persistence, and Completion	10
Theories of Student Outcomes	13
Traditional Predictors of Academic Performance	16
Standardized Tests	17
HSGPA	19
Non-Cognitive Variables and Academic Performance	20
Grit	20
Duckworth’s Initial Studies of Grit	22
Opposition to Grit	26
Grit and Teachers	27
Conclusion	30
Chapter Three: Methods	32
Restatement of the Problem	32
Research Questions	32
Research Design	33
Setting and Participants	34
Variables	34
Instrument	36
Instrument Administration	37
Data Collection	38
Data Analysis	38
Researcher Bias	40

Chapter Four: Analysis of the Data	43
Demographic Profile of the Sample and Population	43
Establishing Reliability of the Instrument	47
Assumption Checking	49
Correlation Assumptions	49
Level of Measurement	49
Related Pairs	49
Absence of Outliers	49
Normality	49
Homoscedascity	50
Regression Assumptions	50
Independence	50
Normality	50
Homoscedasticity	51
Multicollinearity	53
Analysis of the Research Questions	54
Research Question One	54
Research Question Two	56
Research Question Three	58
Research Question Four	60
Chapter Five: Discussion	63
Summary of the Study	63
Findings	64
Research Question One	64
Research Question Two	65
Research Question Three	65
Research Question Four	66
Implications for Practice	67
Recommendations for Future Research	68
Conclusion	70
References	73
Appendix A: Consent to Use Short Grit Scale	88
Appendix B: Short Grit Scale	89

LIST OF TABLES

Table 1:	Summary Statistics for Grit Scale Across Studies	25
Table 2:	Variables and Research Questions	42
Table 3:	Demographic Profile of the Sample and Population	44
Table 4:	Academic Performance of the Sample	45
Table 5:	Grit Scores of the Sample	46
Table 6:	Item-Level Descriptive Statistics ($n = 130$)	47
Table 7:	Internal Consistencies for the Grit-S, Consistency of Interest Subscale, and Perseverance of Effort Subscale ($n = 130$)	48
Table 8:	Item-Total Statistics for the Consistency of Interest Subscale and Perseverance of Effort Subscale ($n = 130$)	48
Table 9:	Normality of the Sample for the Pearson Product-Moment Correlation Coefficient ($n = 130$)	49
Table 10:	Normality of the Sample for the Regression Models ($n = 130$)	51
Table 11:	Multiple Regression Model Multicollinearity ($n = 130$)	54
Table 12:	Pearson Product-Moment Correlation Coefficient Results for Grit-S Scores and Student Yearly Institutional GPA	55
Table 13:	Pearson Product-Moment Correlation Coefficient Results for Grit-S Scores and Student Yearly Institutional GPA for First-Year Students	56
Table 14:	Pearson Product-Moment Correlation Coefficient Results for Grit-S Scores and Student Yearly Institutional GPA for Second-Year Students	56
Table 15:	Simple Linear Regression Models of HSGPA, SAT Scores, Grit-S Scores, Consistency of Interest Subscale Scores, and Perseverance of Effort Subscale Scores Predicting Student Yearly Institutional GPA ($n = 130$)	58
Table 16:	Multiple Regression Models of Consistency of Interest Subscale Scores and Perseverance of Effort Subscale Scores Predicting Student Yearly Institutional GPA	58

Table 17: Multiple Regression Model of HSGPA, SAT Scores, and Grit-S Scores Predicting Student Yearly Institutional GPA	60
Table 18: Multiple Regression Model of HSGPA, SAT Scores, Consistency of Interest Subscale Scores, and Perseverance of Effort Subscale Scores Predicting Student Yearly Institutional GPA	62

LIST OF FIGURES

Figure 1: Student Yearly Institutional GPA and Grit-S Scores Scatterplot	50
Figure 2: Student Yearly Institutional GPA and HSGPA Scatterplot	51
Figure 3: Student Yearly Institutional GPA and SAT Scores Scatterplot	52
Figure 4: Student Yearly Institutional GPA and Consistency of Interest Subscale Scores Scatterplot	52
Figure 5: Student Yearly Institutional GPA and Perseverance of Effort Subscale Scores Scatterplot	53

ABSTRACT

Postsecondary student performance has been studied in great detail by higher education systems and their stakeholders in attempts to identify what may contribute to increased rates of retention and degree completion. Research on predictors of postsecondary performance has focused significantly on the relationship between performance and traditional cognitive measures, yet a growing body of literature examines other factors that may play a role, including that of grit, a non-cognitive trait described as a disposition toward perseverance and passion for long-term goals. Moreover, for graduates who enter the workforce in a profession as demanding as teaching, characteristics such as grit have proven significant in terms of their linkage with success in the profession. This quantitative study was an examination of the relationship between grit and academic performance in order to more accurately identify what may contribute to students' postsecondary academic performance. Specifically, this study compared the predictive value of grit scores to that of high school GPA and SAT scores, two cognitive variables which have long been considered the best predictors of student academic performance. This study also investigated the role of grit in predicting student GPA in postsecondary study. The study sample was comprised of 130 native first- or second-year students majoring in education. Data for this quantitative study come from the online administration of the Grit-S survey in conjunction with institutional data on student performance. The overall findings of this study contribute to the increased understanding of the complexities related to predictors of postsecondary student performance, specifically in regard to undergraduate students pursuing degrees in education. The findings illustrate a positive, statistically significant relationship

between grit and academic performance. Consistent with previous studies, HSGPA was identified as a significant predictor of success at the postsecondary level. Additional key findings and their implications for practice in higher education are presented along with offerings for further research opportunities.

CHAPTER ONE: INTRODUCTION

In recent years, the national focus on higher education has intensified, with attention moving from increasing access for traditionally underserved or underrepresented students to highlighting the necessity of improving rates of degree completion. Policymakers, community leaders, and private foundations join higher education systems and institutions in adopting a vested interest in the so-called “college completion agenda” (Russell, 2011). Stimulated by former President Obama and his proposed goal for the U.S. to have the highest proportion of college graduates in the world, the emphasis on college completion has provoked these stakeholders to develop and implement policies, practices, and strategies to increase rates of educational attainment. This is an issue with a substantial economic impact: by 2018, employers will need 22 million new workers with postsecondary credentials (Carnevale, Smith, & Strohl, 2010). If current college completion rates remain the same, employers will be short 3 million workers by 2018 (Carnevale et al., 2010).

Compounding this issue is the importance of retaining students pursuing degrees in one specific—and declining—academic discipline: education. The number of new teachers entering the profession is low, with shortages stemming back to dwindling numbers of college students pursuing degrees in teacher preparation programs (Eagan et al., 2016; Sutcher, Darling-Hammond, & Carver-Thomas, 2016). Between 2009 and 2014, teacher preparation program enrollments dropped 35%, from 691,000 to 451,000, with projections estimating a continued decline (Sutcher et al., 2016). The nationwide decrease in enrollment in teacher preparation programs is an issue of particular concern for the University of South Florida (USF) College of

Education. In order to improve the educational attainment of students, specifically those pursuing enrollment in teacher preparation programs, competent and motivated students will need to enter postsecondary institutions, declaring with confidence their desire to pursue a career as an educator, and be effectively supported while there.

Currently, postsecondary institutions place significant attention on students' demonstrated cognitive aptitude in an effort to determine their potential for success, despite inconsistent evidence regarding the relationship between high school grades or standardized test scores and academic performance. Recently, interest has grown around the area of non-cognitive factors and their predictability of performance. One noteworthy characteristic with a demonstrated link to performance in a variety of realms is grit, a personality trait described as the disposition to pursue long-term goals with passion and perseverance (Duckworth, Peterson, Matthews, & Kelly, 2007).

Statement of the Problem

Rates of student enrollment in postsecondary education have demonstrated steady growth over the past 40 years, with increases expected to continue (Shapiro et al., 2016). Although record numbers of students are enrolled, not all persist toward graduation. As legislation in many states ties budget allocations to metrics addressing persistence and completion, colleges and universities are investigating more effective ways to support student success. A substantial body of literature exists that identifies factors that cause, predict, or contribute to student performance; much is focused on the relationship between performance and traditional cognitive measures, such as high school GPA (HSGPA) and scores on standardized tests (Atkinson & Geiser, 2009; Kobrin, Patterson, Shaw, Mattern, & Barbuti, 2008), yet is important to note that

“higher intelligence improves the odds of success in school and work. It is an advantage, not a guarantee. Many other things matter” (Gottfredson, 1997, p. 116).

In an effort to identify some of these additional predictors of performance, researchers have explored a second line of inquiry in the examination of the effects of non-cognitive factors. One such factor is grit, or a disposition toward perseverance and passion for long-term goals (Duckworth et al., 2007). To date, researchers have examined the role of grit in predicting academic performance among postsecondary students (Duckworth & Quinn, 2009; Rojas, Reser, Usher, & Toland, 2012). Researchers have also investigated the role of grit in teacher performance in an effort to understand what may lead some in the profession to outperform others (Robertson-Kraft & Duckworth, 2014; Duckworth, Quinn, & Seligman, 2009). Yet, to the best of the researcher’s ability, no studies were found that examine the relationship between grit and the academic performance of first- and second-year students studying education, an academic discipline facing historic declines (U.S. Department of Education, 2016). If grit is determined to play a role in the effectiveness of both undergraduate students and teachers, perhaps the grit levels of those postsecondary students pursuing a degree in education and subsequent entry into the teaching workforce should be studied. The present study addresses this gap in the literature.

Theoretical Framework

Students enter the postsecondary environment with varying levels of academic preparedness, life experiences, and personality traits, all of which contribute to their academic performance (Duckworth et al., 2007; Engle, Reilly, & Levine, 2004; Karp & Bork, 2012). Many theories of involvement and persistence inform the present research; however, the theoretical framework chosen for this study will be primarily based on Alexander W. Astin’s

Theory of Student Involvement and expanded Input-Environment-Output (I-E-O) data analysis model and subsequent comprehensive model of student persistence conceptualized by Patrick T. Terenzini and Robert D. Reason (Astin, 1984, 1993; Terenzini & Reason, 2005). Astin investigated the ways in which students become engaged in the educational process and how this engagement influences various measures of student success (1984). As an extension to his original Theory of Student Involvement, Astin developed the I-E-O model, asserting that college outcomes are a function of three components: inputs, environments, and outputs of attending college (1993). Terenzini and Reason (2005) extended Astin's model, presenting what they believe to be a more multifaceted understanding of what affects student performance. Students entering the postsecondary environment do so with a variety of backgrounds and characteristics; as such, measured outcomes may not accurately reflect the impact of an environment, but instead the differences among students (Astin, 1984, 1993; Terenzini & Reason, 2005). Taking into account these differences, researchers may be able to more accurately assess the impact of environmental variables and craft appropriate support systems. These models were used to guide the literature review for this study and created a foundation for a multifaceted approach to postsecondary student performance, as they both place significant emphasis on not only the institutional environment but also the background characteristics students bring with them to the college setting.

Purpose of the Study

The purpose of this quantitative study was to examine the relationship between grit and academic performance of first- and second-year students majoring in education in order to more accurately identify what may play a role in the performance of students in the USF College of Education. Specifically, this study compared the predictive value of grit scores to that of

HSGPA and SAT scores, two cognitive variables which have long been considered the best predictors of student academic performance. This study also investigated the role of grit in predicting student GPA in postsecondary study.

Research Questions

The following research questions guided the study:

1. What is the relationship between grit, as measured by scores on the Grit-S of first- and second-year students majoring in education, and student academic performance, as measured by student yearly institutional GPA for most recent academic year?
2. To what extent do scores on the Consistency of Interest subscale of the Grit-S and scores on the Perseverance of Effort subscale of the Grit-S predict student academic performance, as measured by student yearly institutional GPA for most recent academic year?
3. To what extent do HSGPA, SAT scores, and grit, as measured by scores on the Grit-S of first- and second-year students majoring in education, predict academic performance, as measured by student yearly institutional GPA for most recent academic year?
4. To what extent do HSGPA, SAT scores, scores on the Consistency of Interest subscale of the Grit-S, and scores on the Perseverance of Effort subscale of the Grit-S predict student academic performance, as measured by student yearly institutional GPA for most recent academic year?

Significance of the Study

Grit has been identified as a predictor of performance of undergraduates at elite universities (Duckworth & Quinn, 2009) and achievement of novice teachers (Duckworth et al., 2009; Robertson-Kraft & Duckworth, 2014) but at this juncture has not been studied in the role

of potentially predicting the academic performance of students majoring in education. Identifying factors that contribute to postsecondary academic performance is important for extending the existing research on the topic. The results from this study will contribute to the emerging body of knowledge on grit and academic performance by examining the relationship between the two variables. There are many categories of at-risk students, including age, socioeconomic status, disability status, self-concept, and access to support and resources (Bulger & Waston, 2006; Jayaprakash, Moody, Lauría, Regan, & Baron, 2014; Trolian, 2014; Yeh, 2002). If grit is found to play a role in the prediction of academic performance, this study has the potential to inform postsecondary administrators on methods of identifying another subpopulation of at-risk students and providing subsequent support. In turn, this added level of support and intervention may contribute to increased student persistence and completion rates.

The intent is not to retain students who are not well-suited, for a myriad of reasons, for a profession in education. The frequency with which students change majors and the rationale behind it is well-documented (Beggs, Banthan, & Taylor, 2008; St. John, 2000). However, if we are able to identify a separate cohort of at-risk students and engage them in supportive interventions, we may be able to influence their persistence toward a degree in education—one that leads to a profession that is needed and beneficial to our society.

Definition of Terms

The following terms have been defined, as they are central to the understanding of the research study:

Academic performance for the purpose of this study is defined as a measure of student institutional GPA for most recent academic year.

Completion rates are defined as the percentage of an institution's first-time, first-year undergraduates who graduate with their baccalaureate degree (U.S. Department of Education, 2016).

Grit is defined as perseverance and passion for long-term goals (Duckworth et al., 2007).

Non-cognitive factors are defined as personality and temperament traits, interests, values, and goals; they are patterns of behavior that influence student learning not measured by traditional assessments of cognitive ability and knowledge (Duckworth et al., 2009; West et al., 2016).

Persistence rate is defined as the percentage of an institution's first-time, first-year undergraduate students who continue at that institution the next year.

Limitations

Limitations of self-report questionnaire measures are well-known. One such limitation is the social desirability bias, or the suggestion that in self-reported measures, people may report inaccurately in order to present themselves in the best possible light (Fisher, 1993). This can be due to both self-deception and other-deception (Nederhof, 1985). In the version of the Grit-S the participants will complete, they must enter their university identification number. Although it will be noted that the researcher will not publish the students' responses with identifiable information, the students' responses may be impacted.

Another noteworthy limitation is the use of student GPA to measure, in part, the variable of academic performance, as registration is not consistent in either specific courses or number of credit hours for all students in the population. Both first- and second-year students will be included in this population; in an attempt to address this, students will be prompted to reply to the instrument as it relates to their most recent year of academic study, such that an attempt will be made to align their grit scores with their GPA during the period of time in question. As such,

some second-year students may find it difficult to separate their academic study into distinct periods and therefore may respond to the instrument as it relates to their entire undergraduate experience rather than the specific timeframe in question.

To calculate the HSGPA used for admissions purposes, USF recalculates the GPA based on core academic subject areas in conjunction with grades in approved accelerated options. Therefore, course selection and performance can impact students' recalculated HSGPA, resulting in GPAs that are comprised of different variables for different students.

Further, those who are gritty have passion and perseverance, yet they do not necessarily engage in all activities with equal levels of passion and perseverance (Duckworth, 2017). As students will be directed to respond to the Grit-S as it relates to their academic pursuits in their most recent year of postsecondary study, results should not be used to make generalizations about their grit levels in other aspects of their lives.

Delimitations

This study was delimited to a homogenous sample of first- and second-year students majoring in education from one university campus and college major who range in age from 18-22; as such, the results may not be generalizable to other populations.

Organization of the Study

Chapter One presented the necessity to conduct research concerning the relationship between grit scores and academic performance of first- and second-year students majoring in education. It elaborated on the problem statement as well as established the theoretical framework to ground the research in Astin's Theory of Student Involvement and Terenzini and Reason's expanded framework on college student success. The purpose of the study and the

research questions were developed. This chapter also set forth the significance of the study, definitions of relevant terms, and limitations and delimitations.

The remaining chapters are organized as follows: Chapter Two consists of a review of the relevant literature related to student enrollment, persistence, and completion in postsecondary institutions; predictors of academic performance, including both cognitive and non-cognitive measures, focusing on the concept of grit as a proposed determinant of achievement. Finally, it includes a discussion on grit as it relates specifically to college graduates in the teaching profession. Chapter Three includes a restatement of the problem and research questions, explanation of the research design, overview of the setting and participants, explanation of the variables, clarification of the instrument and its administration, data collection procedures, description of how the data will be analyzed, and role of the researcher. Chapter Four provides the characteristics of the sample, results of the data analysis, and interpretation of the data to determine the relationship between grit and students' academic performance. Chapter Five is comprised of a summary of the research study, as well as a discussion of the research findings, implications for practice, and recommendations for future research.

CHAPTER TWO: LITERATURE REVIEW

Enrollment for first-year college students has steadily increased for decades, yet persistence and completion rates often fail to keep up, with some academic disciplines experiencing declines more drastically than others (Shapiro et al., 2016). The purpose of this study was to examine the relationship between grit and academic performance of first- and second-year students in the University of South Florida (USF) College of Education. Included in this chapter will be a highlight of the literature related to student enrollment, persistence, and completion in postsecondary institutions. Further, it will contain predictors of academic performance, focusing on traditionally used cognitive measures: standardized test scores and high school GPA (HSGPA). Additionally, it will present an investigation of non-cognitive variables used to predict student academic performance, including a review of studies addressing the concept of grit as a proposed determinant of achievement. Finally, it will include a discussion on grit as it relates specifically to college graduates in the teaching profession.

Postsecondary Enrollment, Persistence, and Completion

The career and economic advantages typically enjoyed by those with a college education are often touted, demonstrated in part through the nationwide focus on improving the persistence and completion rates of postsecondary students (Baum, Ma, & Payea, 2010; Glynn, Sauer, & Miller, 2002; Lee, Edwards, Menson, & Rawls, 2011; Lumina Foundation for Education 2017; National Conference of State Legislators, 2015; Pascarella & Terenzini, 2005; Shapiro et al., 2016;). The National Center for Education Statistics differentiates between retention and persistence, defining “retention” as a measure of institutional effectiveness and “persistence” as a

measure of student performance (Hagedorn, 2006, p. 6). Beyond that, completion rates identify the percentage of an institution's first-time, first-year undergraduates who graduate with their degree (U.S. Department of Education, 2016). Most often, completion rates are reported in two cohorts: four- and six-year graduation rates (U.S. Department of Education, 2016).

Although American colleges and universities have no shortage of students, not all students are successful at the postsecondary level, leading many educational stakeholders to adopt a vested interest in improving student success rates (Hussar & Bailey, 2016; Shapiro et al., 2016; Snyder, de Brey, & Dillow, 2016). Three organizations dedicated to supporting educational attainment are The College Board, the Bill & Melinda Gates Foundation, and the Lumina Foundation for Education. The College Board set forth a primary goal of increasing the percentage of college-educated adults to 55% by 2025 (Hughes, 2012; Lee et al., 2011). The Bill & Melinda Gates Foundation targeted their energies toward increasing completion rates for specific cadres of students, focusing on diversifying the pool of college graduates with their Completion by Design initiative (Hughes, 2012). The foundation dedicated \$69 million in initial grants to support efforts aimed at doubling the number of low-income students who earn a postsecondary degree (Bill & Melinda Gates Foundation, 2008). The Lumina Foundation for Education embarked on efforts to attain a similar objective. In their 2009 annual report, they presented their "Big Goal," striving to increase the percentage of Americans with high-quality degrees and credentials to 60% by 2025 (Lumina Foundation for Education, 2009, p. 1).

The National Student Clearinghouse Research Center, whose efforts are largely supported by a grant from the Lumina Foundation for Education, regularly publishes research on national college data (Shapiro et al., 2016). Their reports include figures on student enrollment, persistence, movement, and completion (Shapiro et al., 2016). The National Student

Clearinghouse's network of reporting institutions includes approximately 96.7% of the total postsecondary enrolled population (Shapiro et al., 2016). In their fifth annual report of national college completion rates, researchers examined a cohort of students' pathways to degree completion and completion rates and compared these statistics to the outcomes of the previous year's cohort (Shapiro et al., 2016). Researchers followed students initially enrolled in two- and four-year colleges and universities classified as public, private, nonprofit, and private-for-profit from fall 2010 through spring 2016 and found that, although individual completion rates varied depending on a variety of factors, namely student enrollment intensity (part- or full-time registration), age, gender, and type of institution, six years after the students began college, the overall completion rate was 54.8% (Shapiro et al., 2016). Although only slightly more than half, this number represents an increase of 1.9% from the year prior, a growth researchers expect to continue (Shapiro et al., 2016).

Of all students who started college in fall 2015, 72.1% persisted at any U.S. institution in fall 2016, while 60.6% were retained at their starting institution (Shapiro et al., 2016). For students who started in four-year public institutions in 2010, 62.4% graduated within six years, an increase of 1.2% percentage points from the 2009 cohort (Shapiro et al., 2016). Of that 62.4%, 49.5% earned their degree from their starting institution while 13.0% graduated from a different institution (Shapiro et al., 2016). Differences exist between student enrollment intensity: 81.3% of full-time students graduate within six years, while part-time students do not fare as well (Shapiro et al., 2016). Researchers suggest the lower completion rates for part-time students is likely attributed to the decreased likelihood in completing a four-year degree in six years while only enrolled part-time (Shapiro et al., 2016).

There is considerable value in being able to make predictions of the academic performance of college students, with economic investment in higher education being one prominent reason (Baum et al., 2010; Bill & Melinda Gates Foundation, 2008; Lumina Foundation for Education, 2017; Shapiro et al., 2016). Performance-based funding is one mechanism driving change in education, as state and federal policymakers are among those with a vested interest in public education and institutions' abilities to demonstrate healthy rates of student success (National Conference of State Legislators, 2015). In 2015, 32 states had policies providing fiscal incentives for institutions meeting performance indicators in areas such as course completion or time to degree, with other states moving in the direction of adopting similar legislation (National Conference of State Legislators, 2015). In some arenas, performance-based funding has been re-branded as outcomes-based funding, as metrics move toward defining institutional success in terms of degree completion rates rather than enrollment (Jones, 2013).

Theories of student outcomes. Interest in postsecondary student success is not new, as student persistence and completion have been studied since the 1970s, a time when Vincent Tinto presented his research on student integration (Tinto, 1975). In his Model of Student Departure, Tinto suggested that high levels of academic and social integration led students to a greater commitment to the institution, thereby reducing the probability of student attrition (1975). Since that time, several theories have emerged in an attempt to address student success at the postsecondary level, taking into consideration both individual and institutional aspects at play (Pascarella & Terenzini, 1978; Pascarella & Terenzini, 1980; Pascarella & Terenzini, 2005; Spady, 1971; Tinto, 1975;). One such theory is Alexander W. Astin's Theory of Student Involvement (Astin, 1984). Astin defines student involvement as "the amount of physical and psychological energy that the student devotes to the academic experience" (1984, p. 297). This

theory is based on five core assumptions. First, involvement is the investment of energy (Astin, 1984, p. 298). Second, involvement occurs along a continuum, as different students experience different degrees of involvement at different times (Astin, 1984, p. 298). Third, involvement has both quantitative and qualitative aspects; the extent of a student's involvement in academic work can be measured quantitatively (how many hours the student spends studying) and qualitatively (whether the student reviews and comprehends reading assignments or simply stares at the textbook and daydreams) (Astin, 1984, p. 298). Fourth, the amount of student learning is directly proportional to the quality and quantity of involvement (Astin, 1984, p. 298). Fifth, the effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement (Astin, 1984, p. 298). Astin emphasized that students learn by being involved, but both the student and the institution are accountable for successful student involvement (1984). As an extension to his original Theory of Student Involvement, Astin developed the Input-Environment-Output (I-E-O) model (1993). The I-E-O model asserts that college outcomes are a function of three factors: inputs, environments, and outputs of attending college (Astin, 1993). Inputs are a collection of the academic experiences, social experiences, and motivation or intent students bring to college, including demographic characteristics, family backgrounds, educational experiences, political orientation, behavior patterns, degree aspirations, reasons for selecting an institution, financial status, disability status, career choice, major field of study, life goals, and reasons for attending college (Astin, 1993). These input variables establish a basis for determining the effect of the college or program environment (Astin, 1993). Environments include the people, academic programs, policies, campus culture, and experiences students have while in college (Astin, 1993). Finally, outputs are comprised of the student characteristics, knowledge, skills, attitudes, and beliefs as they exist

post-college (Astin, 1993). Put simply, outputs "refer to the 'talents' we are trying to develop in our educational program" (Astin, 1993, p. 18). Astin's I-E-O model emphasizes the need to have an understanding of student qualities and characteristics upon entry into an educational institution, the nature of the educational environments, and student qualities and characteristics as they exit the institution in order to be able to fully evaluate the effectiveness of a program, service, or intervention (Astin, 1993).

Patrick T. Terenzini and Robert D. Reason (2005) presented a conceptual framework on student learning and persistence to extend Astin's model (1984, 1993) and integrated it with other models conceptualized by Tinto (1975, 1993), Pascarella (1985), and Berger and Milem (1999) (Terenzini & Reason, 2005, p. 1). Terenzini and Reason define these models as "college impact models" because of their "emphasis on environmental and interindividual origins of student change" (2005, p. 2). They concluded that these existing models, although beneficial in the study of student persistence, were too narrowly focused, and subsequently presented a framework that incorporated the wide array of influences on student outcomes indicated in the research literature (Terenzini & Reason, 2005). They positioned their framework on four constructs: student precollege characteristics and experiences, the organizational context, the peer environment, and the individual student experience (Terenzini & Reason, 2005). As such, it too is identified as a "college impact model" because of the framework's recognition of the multiple variables affecting student performance (Terenzini & Reason, 2005). This framework posits that "students come to college with a variety of personal, academic, and social background characteristics and experiences that both prepare and dispose them, to varying degrees, to engage with the formal and informal learning opportunities" (Terenzini & Reason, 2005, p. 6). An institution's organizational context is comprised of three clusters: internal structures, policies,

and practices; academic and student affairs program policies and practices; and the faculty culture (Terenzini & Reason, 2005). The peer environment undoubtedly contributes to a student's performance. According to Astin, "Every aspect of the student's development—cognitive and affective, psychological and behavioral—is affected in some way by peer group characteristics, and usually by several peer characteristics" (1993, p. 363). Researchers' definition of "the peer environment" differs from both general student-to-student interactions as well as from students' interactions with others in their peer group or set of close or moderately close friends (Terenzini & Reason, 2005). Although these interactions play a role in how students learn about a campus' peer environment, for the purpose of their framework, researchers explained "the peer environment" to mean "the system of dominant and normative values, beliefs, attitudes, and expectations that characterize a campus' student body" (Terenzini & Reason, 2005, p. 11). Finally, students' individual academic and non-academic experiences include those curricular, classroom, and out-of-class experiences that comprise the postsecondary environment (Terenzini & Reason, 2005). Researchers suggested that ultimately, students' background characteristics work in conjunction with their interactions with the institution's organizational context, the peer environment, and their individual experiences to present a comprehensive conceptualization of what shapes student performance (Terenzini & Reason, 2005).

Traditional Predictors of Academic Performance

With the heightened focus on student performance comes an increased pressure to identify applicants most likely to complete their postsecondary studies (Shapiro et al., 2016). In an effort to recognize such applicants, many undergraduate admissions offices make decisions on admission based on traditional cognitive predictors of academic performance, including scores

on standardized admission tests and high school grades (Clinedinst, Hurley, & Hawkins, 2011; Sawyer, 2010). Although the assembly of an academically adept student body is one approach to making admission decisions, it is important to note alternative considerations, including the desire to create a culturally diverse student population or one with extracurricular or athletic advantages (The College Board, 2002).

Standardized tests. The use of standardized test scores for college admission has developed into a substantial movement since the College Entrance Examination Boards, or College Boards, were first administered in 1901 (Atkinson & Geiser, 2009). Since that time, many standardized tests that have emerged are not designed to measure intelligence itself but instead a related concept, such as scholastic aptitude, school achievement, or specific abilities (Atkinson & Geiser, 2009; Neisser et al., 1996). One such test is the Scholastic Aptitude Test, or SAT, introduced in 1926 by psychologist Carl Brigham with the intention of measuring students' general analytic abilities and aptitude for learning (Atkinson & Geiser, 2009). When the SAT was established, the postsecondary student population was primarily comprised of those from privileged social and economic backgrounds (Barnes, 2002). By creating a test to measure students' innate ability and not their affluence, Brigham intended to provide an opportunity to all students with a desire to pursue higher education, regardless of socioeconomic status (Neisser et al., 1996). In this way, the original SAT and earlier tests to measure intelligence were similar: creators of both set out to achieve the same basic goal of creating an equal opportunity for students from different backgrounds by measuring their cognitive abilities (Barnes, 2002).

In 1959, E. F. Lindquist created the American College Test, or ACT, a test designed to measure achievement rather than ability and one which emerged as the main competitor to the SAT (Atkinson & Geiser, 2009). Both the SAT and ACT have undergone several revisions since

their first introductions. Historically, the SAT was made up of two sections, math and verbal, each with a potential high score of 800 points (Barnes, 2002). In 1946, the SAT was revised, a change through which logic questions were removed in favor of reading passages (Barnes, 2002). This marked a transition in what the test was set to measure; from that point forward, the SAT was no longer considered an intelligence test but instead one that gauged a student's reasoning ability (Barnes, 2002). A new version of the SAT was released in 2005 and included, among other changes, a new writing section that asked students to complete an essay and answer questions related to appropriate grammar use (Kobrin & Schmidt, 2005). The SAT and ACT have seemingly converged over time, as almost all postsecondary institutions now accept both tests for admission purposes and often treat them interchangeably (Atkinson & Geiser, 2009).

Fewer than 1,000 students took the first College Boards; now, millions of high school seniors take the SAT or ACT annually (Atkinson & Geiser, 2009). For college applicants, test scores are important, as they are a commonly used criterion for making admission decisions (Fusch, 2012; Hiss & Franks, 2014; Kuncel, Credé, & Thomas, 2005). Despite their widespread use, the validity and worth of standardized tests are sometimes questioned (Barnes, 2000; Hiss & Franks, 2014). Some criticize the foundation of standardized testing by arguing that intellectual ability is neither fixed nor measurable and therefore cannot be gauged with scores on a standardized test (Barnes, 2002). Others question whether racial differences in student test results indicate standardized tests measure economic disadvantage as opposed to ability, despite efforts to accomplish otherwise (Barnes, 2002).

For these and other reasons, some postsecondary institutions have adopted "test optional" or "test flexible" admission policies, no longer requiring standardized test scores as a necessary component of admission requirements (Hiss & Franks, 2014). In an exploration of 33 colleges

and universities that have adopted these optional standardized testing policies, researchers found no significant difference between the success rates of students who submitted standardized test scores and those who did not (Hiss & Franks, 2014). Further, they found no significant differences in either cumulative GPA or graduation rates between students who submitted their scores and those who did not (Hiss & Franks, 2014).

HSGPA. Although other variables are considered, a student's high school grades remain the most important factor in college admission decisions (Atkinson & Geiser, 2009; Clinedinst, et al., 2011; Geiser & Santelices, 2007; Kuncel et al., 2005; Pascarella & Terenzini, 2005; Therriault & Krivoshey, 2014). In a study of the best predictors of college grades, high school GPA emerged as a stronger predictor than SAT or ACT scores (Richardson, Abraham, & Bond, 2012). Some standardized test items, including the SAT's verbal analogies and quantitative comparisons, are rarely encountered in mainstream high school classrooms; students are tested on materials they have not studied in schools and feel as though their grades could be devalued by a test that is unrelated to their coursework (Atkinson & Geiser, 2009).

Although the use of grades as a measure of academic performance is customary, their reliability has been questioned much in the same way as that of standardized tests (Johnson, 1997). Differences in curriculum from one high school to the next, as well as grade inflation, or the tendency to provide higher grades for the same basic performance at different levels of study, are among the reasons leading some to question whether student GPAs are effective measures of student performance (Godfrey, 2011; Johnson, 1997). Regardless, grades remain important as students transition into the postsecondary environment, as they stand as one of the most consistent predictors of student persistence in college (Pascarella & Terenzini, 2005).

Non-Cognitive Variables and Academic Performance

Although standardized test scores and high school grades are regularly used as indicators of academic success and serve an important function, they may predict what an individual is capable of, whereas certain non-cognitive traits may be more representative of what an individual will do with that ability (Stemler, 2012). That notion combined with inconsistencies surrounding the reliability of standardized test scores and high school grades provoked some to investigate additional contributing factors to achievement and academic success outside of those widely used cognitive measures (Borghans, Duckworth, Heckman, & ter Weel, 2008; Almlund, Duckworth, Heckman, & Kautz, 2011; Farrington et al., 2012; Goleman, 2011; Jackson, Connolly, Garrison, Levin, & Connolly, 2015; Poropat, 2009; Richardson et al., 2012; Duckworth et al., 2007; Terman & Oden, 1947; Tough, 2012; Yeager & Walton, 2011). One such study investigating non-cognitive variables as predictors for success was the Terman Study of the Gifted, a seminal investigation in which researchers examined the development and characteristics of gifted individuals from childhood into adulthood (Terman & Oden, 1947). In this landmark study, researchers found only a five-point difference between the IQ scores of the most accomplished over the least accomplished (Terman & Oden, 1947). Researchers concluded it was not their IQ scores but instead their perseverance, self-confidence, and integration toward goals that were more predictive of whether gifted children grew up to be accomplished professionals (Terman & Oden, 1947). Since that study, many have set out to further explore what makes some more successful than others.

Grit

American philosopher and psychologist William James encouraged psychologists to engage in practice to address two questions: (1) what are the types of human abilities and (2) by

what diverse means do individuals unleash these abilities (James, 1907). In an effort to answer an iteration of the second question, Duckworth et al. (2007) explored why some individuals accomplish more than others of equal intelligence. The importance of talent and opportunity have long been established as indicators of success, yet it is evident that individuals with comparable levels of both talent and opportunity have varying degrees of success. As part of their efforts to better understand other individual differences that might predict success, researchers established the term grit, a concept rooted in the theories of positive psychology and conscientiousness and defined as perseverance and passion for long-term goals (Duckworth et al., 2007; Goldberg, 1990; Judge & Bono, 2000). Duckworth suggests two equations for outlining how one moves from talent to achievement: talent multiplied by effort leads to skill, and skill multiplied by effort results in achievement (2016, p. 42). Through those equations, Duckworth asserts that talent, or how fast one improves in a skill, is important, but not as much so as effort (2016, p. 42). Effort both builds skill and makes skill productive, and that combination is what leads to achievement (Duckworth, 2016, p. 42). Those with high levels of grit “work strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress” (Duckworth et al., 2007; 1087-1088). Gritty individuals view the pursuit of their life goals as a marathon, not a sprint (Duckworth, 2016). Further, they are characterized by an orientation toward purpose, as opposed to pleasure, as a means of achieving happiness in life (Von Culin, Tsukayama, & Duckworth, 2013).

Grit is related to two other characteristics: self-control and conscientiousness (Duckworth & Gross, 2014). Self-control, or the capacity to regulate attention, emotion, and behavior in the presence of temptation, is one important determinant of success (Duckworth & Gross, 2014). A second important determinant is grit. Although self-control and grit are strongly correlated, there

are some exceptions; that is, some people with high levels of self-control handle temptations but do not consistently pursue one central goal (Duckworth & Gross, 2014). Instead, some exceptional achievers have high levels of grit but may succumb to temptations in domains other than their chosen life passion (Duckworth & Gross, 2014).

In previous studies, researchers examined Big Five Personality Traits and their predictive validity (Goldberg, 1993). D. W. Fiske conceptualized the initial Big Five Personality Traits, a model later expanded on by a series of researchers (Goldberg, 1993; McCrae & Costa, 1987; Norman, 1963; Tupes & Christal, 1992). The Big Five Personality Traits consist of five broad dimensions used to describe the human personality and psyche: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (Duckworth, et al., 2007; Goldberg, 1993). Duckworth et al. (2007) suggested that similarities exist between grit and conscientiousness but point out recognizable differences between the two: grit overlaps with the achievement aspects of conscientiousness but differs in its emphasis on long-term stamina rather than short-term intensity.

Duckworth's initial studies of grit. In an initial examination of the importance of grit, Duckworth et al. (2007) conducted a series of six studies across several populations: adults aged 25 and older, Ivy League undergraduates, West Point cadets, and National Spelling Bee participants. An underlying purpose of these six studies was to develop and validate a self-report questionnaire to measure grit (Duckworth et al., 2007). Participants in all six studies completed a version of the Grit-Original, or Grit-O, the instrument initially used to measure grit (Duckworth et al., 2007).

Participants in Study 1 were adults aged 25 and older; this range provided researchers with the opportunity to investigate whether grit grows with age (Duckworth et al., 2007).

Researchers concluded that there was a correlation between age and grit, such that as one grows older and has more life experiences, grit increases (Duckworth et al., 2007). Researchers' predictions were further validated, as results from Study 1 demonstrated that adults with advanced levels of educational attainment were higher in grit than less educated adults of the same age, suggesting that pursuing long-term goals over time makes the attainment of advanced levels of education possible (Duckworth et al., 2007, p. 1092). Yet, researchers acknowledged an alternate interpretation in that academic accomplishments may have been prominent in individuals' self-evaluation, thereby leading to inflated grit scores (Duckworth et al., 2007, p. 1092).

In Study 2, a second study of adults aged 25 and older with varying levels of education, researchers tested whether the relationship between educational attainment and age would remain when controlling for the Big Five Personality Traits, specifically conscientiousness (Duckworth et al., 2007). Participants in this study completed both the Grit-O and the Big Five Inventory (Duckworth, et al., 2007). The Big Five Inventory is a 44-item questionnaire with subscale measures for the five broad dimensions (Duckworth et al., 2007; Goldberg, 1993). In Study 2, researchers' predictions were validated, as the predictive validity of grit for education and age beyond and conscientiousness and other Big Five traits was supported (Duckworth et al., 2007, p. 1093). Both Study 1 and Study 2 verified researchers' projected correlation between educational attainment and grit (Duckworth et al., 2007).

In Study 3, researchers focused specifically on a population of high achievers, surveying a sample of 139 Ivy League undergraduates to determine how grit and GPA were related (Duckworth et al., 2007). Results demonstrated that grit scores were associated with higher college GPAs, "a relationship that was even stronger when SAT scores were held constant"

(Duckworth et al., 2007, p. 1093). A noteworthy finding was that grit and lower SAT scores were associated, suggesting that among these prestigious undergraduates, smarter students may be slightly less gritty than their peers (Duckworth, et al., 2007). These results were consistent with that of Moutafi, Furnham, and Paltiel (2005), who found in a large sample of job applicants that conscientiousness and general intelligence were inversely correlated. Together, these findings suggested that among relatively astute individuals, those with less intelligence than their peers compensate with grit: they work harder and with more determination (Duckworth et al., 2007; Moutafi et al., 2005).

In Study 4, researchers examined the class of 2008 West Point cadets, a group of individuals subjected to a rigorous admissions process with acceptance based on a candidate's academic, physical, and leadership potential; SAT scores; class rank; and physical aptitude; among other variables (Duckworth et al., 2007). Despite this arduous evaluation, approximately one in 20 cadets drops out during the "Beast Barracks," the institution's initial summer training program (Duckworth et al., 2007). Researchers found that grit was the variable that predicted completion of the demanding training program better than any other (Duckworth et al., 2007).

Study 5 was a replication and extension of Study 4. Participants in Study 5 were West Point cadets, class of 2010. Results again demonstrated that progression beyond the summer training program was better predicted by grit than any other variable (Duckworth et al., 2007).

In Study 6, researchers examined 2005 Scripps National Spelling Bee finalists, a group of 175 participants ranging in age from 7 to 15 (Duckworth, et al., 2007). Researchers determined that grittier competitors spent more hours involved in the study of spelling words than did their less-gritty counterparts (Duckworth et al., 2007). These same gritty individuals tended to perform better and advance to higher rounds of competition (Duckworth et al., 2007).

Throughout these six studies, grit was found to significantly contribute to successful outcomes beyond that explained by IQ or other measured variables (Duckworth et al., 2007). Throughout their work, Duckworth et al. (2007) observed that in addition to cognitive ability, attributes of high-achieving individuals, regardless of academic discipline or profession, would likely include creativity, vigor, emotional intelligence, charisma, self-confidence, emotional stability, and physical attractiveness, among other qualities. Researchers proposed that grit is one trait in particular that may be as important as other measures of intelligence to high achievement and success in life (Duckworth et al., 2007). After interviewing professionals in fields such as banking, art, medicine, and law, researchers suggested the most prominent leaders in every field are gritty (Duckworth et al., 2007). Increases in grit levels across the lifespan suggest that grit is a characteristic that can be taught and developed (Duckworth et al., 2007; Duckworth & Quinn, 2009). Learning environments can be designed to promote grit, tenacity, and perseverance (Shechtman, DeBarger, Dornsife, Rosier, & Yarnall, 2013). Summary statistics for all six studies are provided in Table 1 (Duckworth et al., 2007).

Table 1

Summary Statistics for Grit Scale Across Studies

Sample Characteristics	α	N	M	SD
Study 1: Adults aged 25 and older	.85	1,545	3.65	0.73
Study 2: Adults aged 25 and older	.85	690	3.41	0.67
Study 3: Ivy League undergraduates	.82	138	3.46	0.61
Study 4: West Point cadets in Class of 2008	.77	1,218	3.78	0.53
Study 5: West Point cadets in Class of 2010	.79	1,308	3.75	0.54
Study 6: National Spelling Bee Finalists	.80	175	3.50	0.67

Note. Adapted from “Grit: Perseverance and Passion for Long-Term Goals.”

Opposition to grit. It is important to investigate potential drawbacks of grit, as it is not always beneficial or appropriate to pursue all goals on either a short- or long-term basis. Working toward an endeavor that stems from external pressures, is deemed insignificant by the individual, or is inappropriate in some other way can potentially induce stress, anxiety, and distraction (Shechtman et al., 2013, p. viii). Although individuals with high levels of grit may pursue meaningful, worthwhile tasks, a gritty demeanor may also lead some to the continued pursuit of counterproductive or harmful endeavors (Duckworth, 2016). Likewise, some may identify a long-term goal but be unaware or incapable of accomplishing what it takes to get there (Duckworth, 2016; Oettingen, 1996). Those who mentally indulge in a positive future without realistically determining how to accomplish what it takes to get there are not necessarily demonstrating high levels of grit but instead engaging in positive fantasizing (Duckworth, 2016; Kappes & Oettingen, 2011). Through positive fantasizing, individuals envision a romanticized version of the future that likely includes the attainment of desired goals, as well as a smooth, idealized process of working toward these goals (Kappes & Oettingen, 2011; Oettingen & Mayer, 2002). Although not necessarily unattainable, positive fantasies depict the best form of the future, which may be realistic or unrealistic (Kappes & Oettingen, 2011). In a series of four studies on achievement, researchers discovered that positive fantasies predict poor achievement partially because of their inability to generate energy to pursue the desired outcome (Kappes & Oettingen, 2011). Engaging in positive fantasizing, although an act that may be indicative of an awareness of one's passion, does not require the perseverance found in those with high levels of grit (Kappes & Oettingen, 2011; Duckworth, 2016).

Grit and Teachers

Prior to her work as a psychologist and emergence as a primary researcher of grit, Duckworth was a middle school teacher. During her years in the classroom, she made several observations about her students' cognitive and non-cognitive traits and their subsequent influence on the students' educational outcomes (Duckworth, 2016; Hochanadel & Finamore, 2015). Duckworth noted that the students with the highest IQs did not have top grades; instead, it was the students with lower IQs who often outperformed their peers (Hochanadel & Finamore, 2015). Duckworth's classroom observations influenced her studies as a psychologist and subsequent exploration of achievement from a psychological and motivational standpoint (Duckworth, 2016; Hochanadel & Finamore, 2015). Through her extensive research on grit and the related concept of self-control, Duckworth has examined a variety of populations, determining that among the attributes of high-achieving individuals, some appear more critical than others in terms of their benefits for a particular field of study or career choice (Duckworth et al., 2007). Among her study participants have been individuals in the teaching profession, a career field that welcomes approximately 190,000 graduates from traditional teacher preparation programs in the U.S. annually and one facing significant declines (Pomerance, Greenberg, & Walsh, 2016; Sutcher et al., 2016). Feeling overwhelmed with the sense of responsibility and challenge in their work, many beginning teachers pursue an alternate career path soon after entering the teaching profession (Buchanan et al., 2013; Kopkowski, 2008). As such, teacher retention is one of the most pressing issues educational leaders face (Buchanan et al., 2013; Kopkowski, 2008; Sutcher, et al., 2016). Between 2009 and 2014, enrollment in postsecondary teacher education programs dropped from 691,000 to 451,000, a reduction of 35%, with projections showing a continued decline (Sutcher et al., 2016).

The challenges and demands associated with the teaching profession are well-documented; as such, many who have examined what factors influence teacher performance suggest the importance of certain personal qualities that some propose may be difficult to measure objectively (Farkas, Johnson, & Foleno, 2000; Greenberg, Walsh, & McKee, 2014; Johnson & Birkeland, 2003; Labaree, 2000; Robertson-Kraft & Duckworth, 2014). In regard to individuals who prove effective in the teaching profession, researchers suggest the relevance of one personal quality and its corresponding measure in particular: grit and the Grit-S, respectively (Duckworth et al., 2009; Duckworth & Yeager, 2015; Robertson-Kraft & Duckworth, 2014). Duckworth et al. (2009) investigated teacher grit to help explain why some teachers are more effective than others. Participants were Teach for America (TFA) teachers, members of the highly selective non-profit organization that recruits recent college graduates to teach for two years in under-resourced schools (Duckworth et al., 2009). Participants completed three self-report questionnaires measuring grit, life satisfaction, and optimistic explanatory style (Duckworth et al., 2009). Results demonstrated that TFA teachers were “especially gritty, satisfied, and optimistic when compared to age-matched comparisons” (Duckworth et al., 2009, p. 543). Teachers one standard deviation higher in grit, life satisfaction, or optimistic explanatory style were respectively 31%, 43%, and 20% more likely to outperform their peers, as measured by the academic gains of the students (Duckworth et al., 2009). The results indicated that although all three traits individually predicted teacher performance, only grit and life satisfaction remained significant predictors when entered simultaneously (Duckworth et al., 2009). Based on these results, researchers suggested that grit, life satisfaction, and optimism, all positive traits that lend to commitment in the face of adversity, should be considered when identifying and training teachers (Duckworth et al., 2009). It is important to note researchers’

recognized limitations of their conclusions. Their findings might not be generalizable to veteran teachers, as literature on expertise suggests that once a novice teacher masters the initial challenges of the profession, those challenges are replaced with others (Ericsson, 2014). Also, the standard TFA teacher differs from the average teacher, as the selection process for TFA targets graduates of elite colleges and universities with no prior teaching experience who often gain certification through state-approved alternative certification methods (Duckworth et al., 2009). Another noted limitation was the researchers' measure of teacher effectiveness: student outcomes (Duckworth et al., 2009). Researchers suggested that although student outcomes are important, there may be additional variables, such as student engagement, that may have contributed value to the study (Duckworth et al., 2009).

Recognizing an important omission in the literature concerning characteristics that are both detectable before teachers enter the classroom and that may influence teachers' subsequent effectiveness, Robertson-Kraft and Duckworth (2014), investigated how to predict teacher performance during the interview process. They examined personal qualities found to be somewhat stable over time and situation that might predict teachers' motivation and effectiveness (Robertson-Kraft & Duckworth, 2014). In their longitudinal study, Robertson-Kraft & Duckworth (2014) collected data from two samples of novice teachers assigned to schools in low-income districts. Coders reviewed participants' résumés and assigned each a grit score based on evidence of perseverance and passion demonstrated in lists of college activities and work experience (Robertson-Kraft & Duckworth, 2014). Resulting grit scores were used to predict teacher retention through the academic year and, among teachers who remained in the classroom, effectiveness measured in terms of students' academic gains (Robertson-Kraft & Duckworth, 2014). Researchers compared the predictive validity of grit scores to that of other

variables available at the time of hire, including college GPA, interviewer ratings of leadership experience, and demographic variables (Robertson-Kraft & Duckworth, 2014). Their findings suggested that grit predicted effectiveness and retention among a cadre of novice teachers in low-income districts (Robertson-Kraft & Duckworth, 2014). They found grittier teachers not only outperformed their less gritty colleagues but were also not as likely to leave the classroom prior to the year's end (Robertson-Kraft & Duckworth, 2014).

Federal policy has focused on ensuring that all teachers are “highly qualified,” as indicated by degree, state-level certification, and subject-matter knowledge (U.S. Department of Education, 2004). However, research suggests that assessing teacher quality by those measures predicts only minimal differences in student outcomes (Kane, Rockoff, & Staiger, 2008; Rivkin et al., 2005). Instead, researchers have proposed recruiting teachers with certain non-cognitive personality traits, such as grit, to improve teachers' effectiveness and subsequent student performance (Kane et al., 2008; Robertson-Kraft & Duckworth, 2014).

Conclusion

Despite efforts to recruit students most likely to persist, many postsecondary institutions fail to see portions of their student populations reach graduation in a timely manner. Academic credentials are often considered when making college admission decisions, yet certain non-cognitive variables may prove helpful in identifying and supporting those individuals most likely to achieve a long-term goal, such as completion of a college degree. Furthermore, for students who graduate and enter the workforce, specifically in a profession as rigorous and demanding as teaching, some attributes may be more critical than others in terms of their links to success in this profession. In addition to informing policy and practice surrounding teacher recruitment, current literature contributes to a better understanding of what leads some teachers to outperform others

and remain committed to the profession. One may logically deduce that if grit plays an important role in teacher recruitment, retention, and effectiveness, perhaps the grit levels of individuals pursuing a degree in education at the postsecondary level should be studied.

CHAPTER THREE: METHODS

This chapter will include an outline of the methods that were used in this study.

Contained in Chapter Three is a restatement of the problem and research questions, outline of the research design, overview of the setting and participants, explanation of the variables, clarification of the instrument and its administration, data collection procedures, description of how the data will be analyzed, and role and bias of the researcher.

Restatement of the Problem

Researchers have explored factors that cause, predict, or contribute to postsecondary student performance, a topic growing in importance as budget allocations are increasingly tied to metrics addressing persistence and completion. Much is focused on the relationship between performance and traditional cognitive measures, yet a growing body of literature is devoted to exploring other factors that contribute to one's performance, in both school and life. In an effort to identify additional predictors of performance, researchers have studied the effects of grit, a non-cognitive factor described as a disposition toward perseverance and passion for long-term goals (Duckworth, 2007). The present study addressed the relationship between grit and academic performance of undergraduate students pursuing a degree in education.

Research Questions

The following research questions guided the study:

1. What is the relationship between grit, as measured by scores on the Grit-S of first- and second-year students majoring in education, and student academic performance, as measured by student yearly institutional GPA for most recent academic year?

2. To what extent do scores on the Consistency of Interest subscale of the Grit-S and scores on the Perseverance of Effort subscale of the Grit-S predict student academic performance, as measured by student yearly institutional GPA for most recent academic year?
3. To what extent do HSGPA, SAT scores, and grit, as measured by scores on the Grit-S of first- and second-year students majoring in education, predict academic performance, as measured by student yearly institutional GPA for most recent academic year?
4. To what extent do HSGPA, SAT scores, scores on the Consistency of Interest subscale of the Grit-S, and scores on the Perseverance of Effort subscale of the Grit-S predict student academic performance, as measured by student yearly institutional GPA for most recent academic year?

Research Design

This quantitative research study followed a correlational research design, a type of design often used to explore the relationship between two or more variables (Glass & Hopkins, 1996, p. 103). The correlational design was selected to investigate the degree and direction of the relationship between grit and academic performance. Because this study aimed to explore the relationship between grit and academic performance rather than explain cause, correlation is the appropriate methodology. Additionally, this study was designed to provide correlational statistics to examine the differences in relationships between academic performance and HSGPA, SAT score, and grit. Further, it included an investigation of the differences between the two subscales of the Grit-S and their subsequent relationships with HSGPA, SAT score, and postsecondary academic performance.

Setting and Participants

The University of South Florida (USF), a large, public research institution situated in Tampa, Florida, is the setting for this research study. USF is a member of the State University System, an association encompassing 12 public universities in the state of Florida. The USF System includes three separately accredited institutions by the Commission on Colleges of the Southern Association of Colleges and Schools: USF, USF St. Petersburg, and USF Sarasota-Manatee. In 2016-2017, the USF System's student enrollment numbered 49,591 (System Facts, 2016-2017). The College of Education is one of 14 colleges under the Office of the Provost and Executive Vice President for Academic Affairs at USF. A variety of interdisciplinary programs at the undergraduate, master's, doctoral, and certificate level are offered in the College of Education. As of spring 2017, there were 2914 students in the College of Education; 1438 were undergraduates and the remaining 1476 were at the graduate level (USF WRS, 2017).

Undergraduate teacher preparation programs at the institution are structured in a limited access fashion; that is, students must complete a series of prerequisites in order to gain official admission into the College of Education and transition from being classified as pre-education to fully admitted. Of the 1438 undergraduate students, 592 are classified as pre-education, and 846 are admitted to their upper-level programs (USF WRS, 2017). Of the 592, 282 are native first- or second-year students (USF WRS, 2017). In order to be included in the current study, individuals must be native first- or second-year students majoring in education who completed the Grit-S survey in its entirety.

Variables

The following variables used for this study have been defined:

Academic performance: this dependent variable is a measure of student first-year cumulative institutional GPA.

Consistency of Interest: this dependent variable is based on student scores on this subscale of the Grit-S Scale, one with a focus on an individual's tendency to remain committed to goals over a length of time. This is a continuous variable.

Grit score: this independent variable is based on student total scores on the Grit-S Scale. This is a continuous variable.

HSGPA: this independent variable is based on institutional data collected by the Office of Continuous Improvement. It is comprised of a recalculated, weighted GPA based on grades earned in high school only in core academic subject areas, as well as in specified Advanced Placement and International Baccalaureate courses. Quality points are added for approved accelerated options, including Advanced Placement, International Baccalaureate, AICE, honors, and dual enrollment coursework. This is a continuous variable.

Perseverance of Effort: this dependent variable is based on student scores on this subscale of the Grit-S Scale, one with a focus on an individual's tendency to persist toward the accomplishment of long-term tasks, regardless of distractions. This is a continuous variable.

SAT score: this independent variable is based on institutional data collected by the Office of Admissions. It uses the University's reported SAT or ACT, which is treated as a continuous variable. All SAT and ACT scores were converted to SAT scores using the concordance table provided by The College Board (2009).

Yearly institutional GPA: this dependent variable is a measure of all grades earned by a student during the combination of the following three terms for which the student was enrolled: summer

2016, fall 2016, and spring 2017. This GPA is based on institutional data and was calculated using a 4.0 scale. This is a continuous variable.

Instrument

The original instrument designed for measuring grit, the Grit-Original (Grit-O) consisted of 27 items, with questions including “I have achieved a goal that took years of work,” “I finish whatever I begin,” and “I have overcome setbacks to conquer an important challenge” (Duckworth et al., 2007). Duckworth et al. (2007) suggested that the achievement of difficult goals entails not only talent but also a sustained focus over time; as such, the instrument is intended to measure the two first-order factors of grit: Consistency of Interest and Perseverance of Effort. One factor, Consistency of Interest, reflects participants’ reported tendency to remain committed to particular goals over longer periods of time. The second factor, Perseverance of Effort, represents participants’ reported tendency to sustain the time and energy necessary for accomplishing long-term tasks even in the face of distractions. Accepting that there are some who maintain effort not because of interest but instead because of a fear of change, a desire to be complacent, or an unfamiliarity with other options, the Grit-O included several items that specifically addressed the perseverance of interests over time (Duckworth et al., 2007). Two of these reverse-scored items include “I have been obsessed with a certain idea of project for a short time but later lost interest” and “I have difficulty maintaining my focus on projects that take more than a few months to complete” (Duckworth et al., 2007, p. 1090). All items are measured on a Likert scale, with scores ranging from 1 (not at all like me) to 5 (very much like me); higher scores are associated with higher levels of grit (Duckworth et al., 2007). Individuals with scores of 4.0 or greater are classified as “very gritty,” those with scores between 3.0-2.9 are “moderately gritty,” those with scores between 2.0-2.9 are “fairly gritty,” and those with scores

of 1.9 or lower are “not gritty” (Duckworth & Quinn, 2009). Those with high levels of grit display continuous effort toward achievement of goals, despite challenge or criticism (Duckworth et al., 2007). In studies of diverse populations across varying stages of development, grit has been measured using the eight-item Grit-S, a shortened instrument that more efficiently measures grit while retaining the two-factor structure of the original scale (Duckworth & Quinn, 2009). The Grit-S demonstrated high internal consistency for the overall scale ($\alpha = 0.85$) and individual subscales (Consistency of Interest, $\alpha = 0.84$; Perseverance of Effort, $\alpha = 0.78$) (Duckworth et al., 2007; Duckworth & Quinn, 2009). Angela Duckworth, scale creator, grants permission to both researchers and educators to use the Grit-S scale for non-commercial purposes via a statement on her website. A copy of the email granting permission to utilize the Grit-S in an online format is available in Appendix A. A copy of the Grit-S is found in Appendix B.

Instrument Administration

The Grit-S was converted to an online format utilizing Qualtrics with an added field asking for the student’s university identification number. An email notification inviting students to participate in the study was sent in the summer 2017 semester to all native first- and second-year education majors, a list of students identified using the institution’s web reporting system. The email included a hyperlink to the URL of the Qualtrics website where the survey was located as well as a consent form, requesting the students to grant permission for the researcher to access institutional data on demographic data, HSGPA, SAT score, and yearly institutional GPA. Further, the email instructed students to respond to the Grit-S as it relates to their academic pursuits in their most recent year of study.

Data Collection

In order to get the most accurate information, the researcher obtained demographic and institutional data from official student records once participants granted the researcher permission via a consent form.

Data Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS). This program allowed the researcher to employ a variety of descriptive and inferential statistical procedures. To assess statistical significance, data were analyzed using an $\alpha = 0.05$. Descriptive statistics were used to describe the size and profile characteristics of the sample and population as well as the following independent and dependent variables: HSGPA, SAT scores, student yearly institutional GPA, Grit-S scores, and Grit-S subscores.

The first research question inquired about the relationship between grit and student yearly institutional GPA. The independent variable was measured by scores on the Grit-S, a continuous variable. The dependent variable was measured by student yearly institutional GPA, a continuous variable. A Pearson product-moment correlation coefficient was conducted to measure the strength and direction of the relationship between grit and student yearly institutional GPA. The Pearson product-moment correlation coefficient, or Pearson r , is the appropriate measurement of correlation for quantifying the “magnitude and direction of the linear relationship between two variables” (Glass & Hopkins, 1996, p. 106).

The second research question explored the relationship between student yearly institutional GPA and two separate independent variables. The dependent variable was measured by student yearly institutional GPA, a continuous variable. In a series of two tests, the independent variables were separately measured by scores on the two subscales of the Grit-S.

First, a simple linear regression was conducted to investigate whether Consistency of Interest scores predict student yearly institutional GPA. Second, a simple linear regression was used to explore whether Perseverance of Effort scores predict student yearly institutional GPA. The two pairings and resulting statistics were compared to determine the best-fitting regression line. Then, a multiple regression model was employed using both independent variables to simultaneously predict student yearly institutional GPA.

The third research question inquired about the relationship between student yearly institutional GPA and three separate independent variables. In all tests, the dependent variable was measured by student yearly institutional GPA, a continuous variable. In three separate tests, the independent variable was measured by HSGPA, SAT scores, and grit, respectively. First, a simple linear regression was conducted to investigate whether HSGPA predicts student yearly institutional GPA. Second, a simple linear regression was utilized to explore whether SAT scores predict student yearly institutional GPA. Third, a simple linear regression was used to determine whether grit predicts student yearly institutional GPA. The three pairings and resulting statistics were compared to determine the best-fitting regression line. A regression is an appropriate analysis when the goal of research is to assess the accuracy of a prediction of a dependent variable (a criterion or outcome variable) from one or more independent predictor variables (Glass & Hopkins, 1996, p. 153). In addition to the separate simple linear regression models, a multiple regression model was employed using all independent variables to simultaneously predict student yearly institutional GPA. A multiple regression analysis is appropriate when the prediction is based on two or more independent variables (Glass & Hopkins, 1996, p. 173).

The fourth research question explored the relationship between student yearly institutional GPA and four separate independent variables. In all tests, the dependent variable was measured by student yearly institutional GPA, a continuous variable. In a series of four tests, the independent variables were separately measured by HSGPA, SAT scores, and scores on the two subscales of the Grit-S. First, a simple linear regression was conducted to investigate whether HSGPA predicts student yearly institutional GPA. Second, a simple linear regression was used to learn whether SAT scores predict student yearly institutional GPA. Third, a simple linear regression was employed to investigate whether Consistency of Interest scores predict student yearly institutional GPA. Fourth, a simple linear regression was conducted to explore whether Perseverance of Effort scores predict student yearly institutional GPA. The four pairings and resulting statistics were compared to determine the best-fitting regression line. Then, a multiple regression model was employed using all independent variables to simultaneously predict student yearly institutional GPA.

Researcher Bias

Throughout her time in the College of Education, the researcher has worked as an academic advisor, coordinator for the College's living learning community, instructor for a first-year experience course, assistant director for recruitment and retention efforts, and director for student engagement initiatives. She developed interest on this topic based on her interactions with education majors. Through these interactions, she witnessed the performance and dispositions of both the successful students and those who failed to persist, either in their pursuit toward admission into a teacher preparation program or pursuit of an undergraduate degree in any academic discipline. She grew increasingly interested in exploring the variables that may contribute to the students' academic outcomes. Because of her exposure to the research

population, the researcher will possess an inherent population bias. However, the quantitative design of the study allowed the researcher to maintain objectivity when analyzing the data.

Table 2

Variables and Research Questions

Research questions	Independent variable	Dependent variable	Data analysis
1. What is the relationship between grit, as measured by scores on the Grit-S of first- and second-year students majoring in education, and student academic performance, as measured by student yearly institutional GPA for most recent academic year?	Grit-S scores	Student yearly institutional GPA	Pearson product-moment correlation coefficient
2. To what extent do scores on the Consistency of Interest subscale of the Grit-S and scores on the Perseverance of Effort subscale of the Grit-S predict student academic performance, as measured by student yearly institutional GPA for most recent academic year?	Consistency of Interest scores and Perseverance of Effort scores	Student yearly institutional GPA	Simple linear regression and multiple regression
3. To what extent do HSGPA, SAT scores, and grit, as measured by scores on the Grit-S of first- and second-year students majoring in education, predict academic performance, as measured by student yearly institutional GPA for most recent academic year?	Grit-S scores, HSGPA, and SAT scores	Student yearly institutional GPA	Simple linear regression and multiple regression
4. To what extent do HSGPA, SAT scores, scores on the Consistency of Interest subscale of the Grit-S, and scores on the Perseverance of Effort subscale of the Grit-S predict student academic performance, as measured by student yearly institutional GPA for most recent academic year?	HSGPA, SAT scores, Consistency of Interest scores, and Perseverance of Effort scores	Student yearly institutional GPA	Simple linear regression and multiple regression

CHAPTER FOUR: ANALYSIS OF THE DATA

The purpose of this study was to examine the relationship between grit and academic performance of first- and second-year students majoring in education in order to more accurately identify what may play a role in their academic performance. The Statistical Package for the Social Sciences (SPSS) was used to analyze the data. The text in this section presents demographic characteristics of the sample and population, descriptive statistics of the variables, research question findings, and observations.

Demographic Profile of the Sample and Population

The data for the demographic profile of the sample and population are presented in Table 3. The information is summarized here. As indicated in Chapter Three, the population was comprised of 282 native first- or second-year students majoring in education. Of those 282, 46.10% ($n = 130$) participated in the study. The gender ratio of the sample was 90% ($n = 117$) female to 10% ($n = 13$) male. When categorized by ethnicity, the largest proportion of participants, 66.92% ($n = 87$), was identified as White, followed by 20.77% ($n = 27$) identified as Hispanic or Latino. The remaining 12.31% ($n = 16$) of the sample was classified as Asian, Black or African American, American Indian or Alaska Native, Non-Resident Alien, or Unknown. Students with fall semester matriculation dates made up the largest proportion of both the sample and population, with the majority of participants, 30.0% ($n = 39$), having a matriculation date of fall 2016. Elementary education majors comprised the majority of the sample at 50.77% ($n = 66$); all remaining undergraduate majors in the College of Education were represented with the exception of physical education.

Table 3

Demographic Profile of the Sample and Population

Demographic	Category	Sample <i>n</i> = 130		Population <i>N</i> = 282	
		<i>n</i>	Percentage	<i>N</i>	Percentage
Gender	Female	117	90.0%	229	81.21%
	Male	13	10.0%	53	18.79%
Ethnicity	White	87	66.92%	187	66.31%
	Hispanic or Latino	27	20.77%	49	17.38%
	Unknown	7	5.38%	8	2.84%
	Asian	3	2.31%	13	4.61%
	Black or African American	3	2.31%	16	5.67%
	American Indian or Alaska Native	2	1.54%	5	1.77%
	Non-Resident Alien	1	0.77%	4	1.42%
Matriculation Date	Summer 2015	23	17.69%	37	13.12%
	Fall 2015	36	27.69%	100	35.46%
	Spring 2016	6	4.62%	20	7.09%
	Summer 2016	26	20.0%	55	19.50%
	Fall 2016	39	30.0%	70	24.82%
Academic Major	Elementary Education	66	50.77%	124	43.97%
	Early Childhood Education	14	10.77%	25	8.87%
	Secondary English Education	13	10.0%	28	9.93%
	Secondary Social Science Education	10	7.69%	33	11.70%
	Secondary Mathematics Education	8	6.15%	16	5.67%
	Exceptional Student Education	7	5.38%	13	4.61%
	Exercise Science	7	5.38%	26	9.22%
	Middle Grades Mathematics Education	2	1.54%	6	2.13%
	Secondary Science Education	2	1.54%	7	2.48%
	Foreign Language Education	1	0.77%	1	0.35%
	Physical Education	0	0.0%	3	1.06%

In addition to gender, ethnicity, matriculation date, and academic major, information on academic performance was gathered. Previous academic performance is indicated by high school GPA (HSGPA) and SAT scores, while postsecondary academic performance, or student yearly institutional GPA, is a measure of all grades earned by a student during the combination of the following three terms for which the student was enrolled: summer 2016, fall 2016, and

spring 2017. Table 4 summarizes academic performance information for the study sample.

There were three students with a student yearly institutional GPA below 2.0; the analyses were run both with and without these extreme values, but the results were similar. As such, all values remained as part of the analyses.

In recognition of the previously demonstrated correlation between age and grit such that as one ages, grit increases, in addition to the analyses outlined in Chapter Three, the sample was divided into two groups and the analyses were repeated separately for each group. The first group was comprised of first-year students who had completed one year of undergraduate study (matriculation dates of either summer 2016 or fall 2016); the second group was made up of second-year students who had completed two years of undergraduate study (matriculation dates of either summer 2015, fall 2015, or spring 2016). Results for the subsamples are presented alongside results for the full sample.

Table 4

Academic Performance of the Sample

Academic Performance Measure	<i>n</i>	<i>M</i>	<i>SD</i>	Range	Skewness	Kurtosis
Model	130					
HSGPA		3.96	0.39	3.01 – 4.74	-.220	-.739
SAT Scores		1663.92	136.94	1420 – 2080	.554	-.138
Student Yearly Institutional GPA		3.46	0.54	1.14 – 4.0		
First-Year Students Model	65					
HSGPA		3.95	0.40	3.11 – 4.59	-.114	-.980
SAT Scores		1691.85	130.48	1490 – 2040	.437	-.580
Student Yearly Institutional GPA		3.40	0.564	1.17 – 4.0	-1.666	3.778
Second-Year Students Model	65					
HSGPA		3.96	0.38	3.01 – 4.74	-.341	-.403
SAT Scores		1636.0	139.57	1420 – 2080	.805	.611
Student Yearly Institutional GPA		3.51	0.53	1.14 – 4.0	-1.805	5.127

As shown in Table 5, scores on the Grit-S ranged from 2.25-4.88, with an average of 3.58 ($SD = 0.53$), or within the 3.0-3.9 range considered “moderately gritty.” On the individual subscales, students averaged 3.15 ($SD = 0.71$) on the Consistency of Interest subscale and 4.0 ($SD = 0.56$) on the Perseverance of Effort subscale. Item four (“I am a hard worker”) had the greatest mean ($M = 4.52$) and smallest range (3.0 – 5.0) when compared to all other individual items. Results are similar when broken down by either first- or second-year students.

Table 5

Grit Scores of the Sample

Instrument	<i>n</i>	<i>M</i>	<i>SD</i>	Range	Skewness	Kurtosis
Model	130					
Grit-S Scores		3.58	0.53	2.25 – 4.88	-.133	-.177
Consistency of Interest Subscale Scores		3.15	0.71	1.0 – 4.75	-.290	.323
Perseverance of Effort Subscale Scores		4.0	0.56	2.50 – 5.0	-.308	-.674
First-Year Students Model	65					
Grit-S Scores		3.55	0.54	2.25 – 4.75	-.155	-.075
Consistency of Interest Subscale Scores		3.12	0.73	1.0 – 4.75	-.445	.911
Perseverance of Effort Subscale Scores		3.98	0.58	2.50 – 5.0	-.454	-.537
Second-Year Students Model	65					
Grit-S Scores		3.60	0.52	2.38 – 4.88	-.102	-.229
Consistency of Interest Subscale Scores		3.17	0.70	1.50 – 4.75	-.117	-.286
Perseverance of Effort Subscale Scores		4.02	0.54	3.0 – 5.0	-.104	-.949

Table 6

Item-Level Descriptive Statistics (n = 130)

Instrument	<i>M</i>	<i>SD</i>	Range
Consistency of Interest Subscale			
1. New ideas and projects sometimes distract me from previous ones.	3.09	0.89	1.0 – 5.0
3. I have been obsessed with a certain idea or project for a short time but later lost interest.	2.98	1.05	1.0 – 5.0
5. I often set a goal but later choose to pursue a different one.	3.47	0.91	1.0 – 5.0
6. I have difficulty maintaining my focus on projects that take more than a few months to complete.	3.04	1.11	1.0 – 5.0
Perseverance of Effort Subscale			
2. Setbacks don't discourage me.	3.22	1.00	1.0 – 5.0
4. I am a hard worker.	4.52	0.63	3.0 – 5.0
7. I finish whatever I begin.	4.03	0.80	2.0 – 5.0
8. I am diligent.	4.24	0.78	2.0 – 5.0

Establishing Reliability of the Instrument

An important step in the data analysis process was to re-establish the reliability of the Grit-S. Reliability, measured by Cronbach's alpha, establishes the repeatability and internal consistency of the instrument such that regardless of how many times the instrument is taken, it will measure the same information each time. In previous studies, Duckworth and Quinn (2009) tested the reliability of the Grit-S, concluding that the instrument demonstrated high internal consistency overall ($\alpha = 0.85$). As shown in Table 7, when evaluated for the present study, the eight-item Grit-S showed adequate internal consistency, with $\alpha = .726$, although alpha levels for the individual subscales were somewhat lower.

Table 7

Internal Consistencies for the Grit-S, Consistency of Interest Subscale, and Perseverance of Effort Subscale (n = 130)

Instrument	Cronbach's Alpha
Grit-S	.726
Consistency of Interest Subscale	.684
Perseverance of Effort Subscale	.636

Item-total correlation is a measure of the correlation between each item in the instrument and the total score or related subscale score. Alpha levels decreased slightly to as low as .661, but they did not significantly change with the removal of any individual question.

Table 8

Item-Level Descriptive Statistics for the Consistency of Interest Subscale and Perseverance of Effort Subscale (n = 130)

Instrument	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Consistency of Interest Subscale		
1. New ideas and projects sometimes distract me from previous ones.	.551	.671
3. I have been obsessed with a certain idea or project for a short time but later lost interest.	.310	.725
5. I often set a goal but later choose to pursue a different one.	.385	.705
6. I have difficulty maintaining my focus on projects that take more than a few months to complete.	.572	.661
Perseverance of Effort Subscale		
2. Setbacks don't discourage me.	.216	.742
4. I am a hard worker.	.422	.702
7. I finish whatever I begin.	.549	.675
8. I am diligent.	.437	.696

Assumption Checking

Correlation assumptions. The data were screened for the following violations of correlation assumptions: level of measurement, related pairs, absence of outliers, normality, and homoscedascity.

Level of measurement. This assumption verifies that both the independent variable, Grit-S scores, and the dependent variable, student yearly institutional GPA, are continuous variables.

Related pairs. This assumption confirms that each observation is comprised of a pair of values.

Absence of outliers. As outliers can skew the results, it is important to note if they are included in the data. In this data set, three students earned a student yearly institutional GPA below 2.0. The analyses were run both with and without these three extreme values with similar results. As such, all values remained as part of the analyses.

Normality. This assumption validates that the data set is normally distributed. Two numerical measures of shape, skewness and kurtosis, were used to test for normality. The values of skewness and kurtosis were close to zero, suggesting the assumption of normality has been adequately met. These values are presented in Table 9.

Table 9

Normality of the Sample for the Pearson Product-Moment Correlation Coefficient (n = 130)

Academic Performance Measure	Skewness	Kurtosis
HSGPA	-.220	-.739
SAT Scores	.554	-.138

Homoscedascity. This assumption refers to the shape of the values formed by the scatterplot, presented in Figure 1. As shown in this figure, there were no systematic patterns or clustering of the residuals, suggesting that the assumption of homoscedascity has been met.

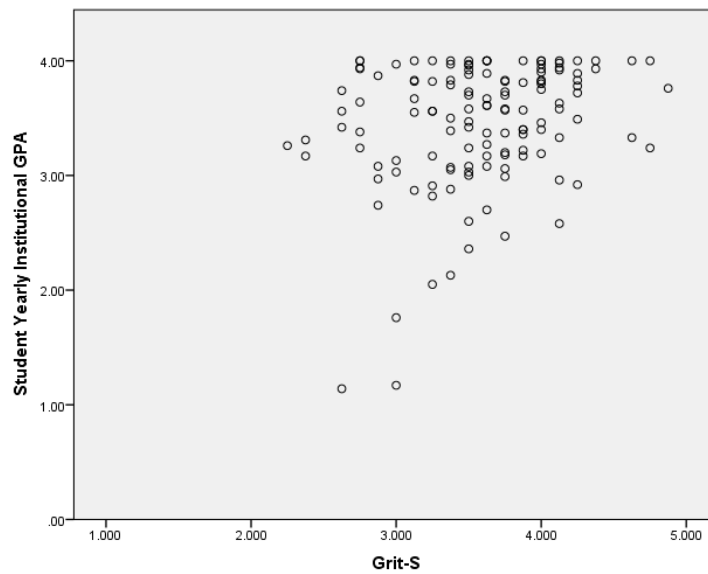


Figure 1. Student Yearly Institutional GPA and Grit-S Scores Scatterplot.

Regression assumptions. Prior to analysis, the data were screened for the following violations of regression assumptions: independence, normality, homoscedasticity, and multicollinearity.

Independence. Independence refers to residuals that are not correlated from one case to the next. The size of the residual is independent for one case because it has no impact on the size of the residual for the next case. A preliminary review of the sample data suggests that the assumption of independent errors has been sufficiently met.

Normality. This assumption validates that the data set is normally distributed. As with the correlation model, two numerical measures of shape, skewness and kurtosis, were used to test

for normality. A review of the skewness and kurtosis measures suggested that the assumption of normality was adequately met for all dependent variables. These values are presented in Table 10.

Table 10

Normality of the Sample for the Regression Models (n = 130)

Academic Performance Measure	Skewness	Kurtosis
HSGPA	-.220	-.739
SAT Scores	.554	-.138
Grit-S Scores	-.133	-.177
Consistency of Interest Subscale Scores	-.290	.323
Perseverance of Effort Subscale Scores	-.308	-.674

Homoscedasticity. This assumption refers to the shape of the values formed by the scatterplot, presented in Figures 1-5. As shown in these figures, there were no systematic patterns or clustering of the residuals, suggesting the assumption has been met.

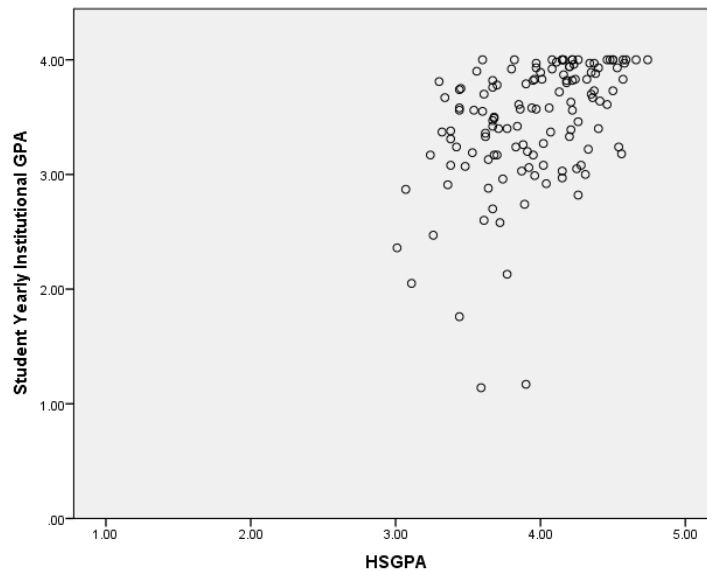


Figure 2. Student Yearly Institutional GPA and HSGPA Scatterplot.

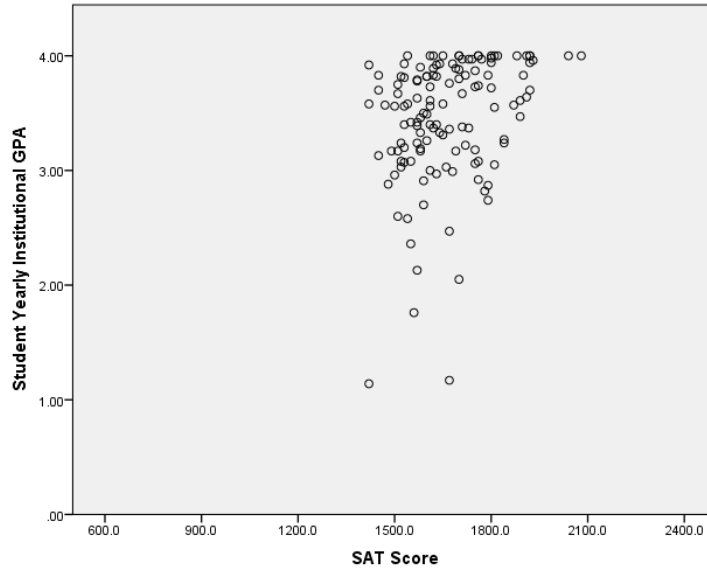


Figure 3. Student Yearly Institutional GPA and SAT Scores Scatterplot.

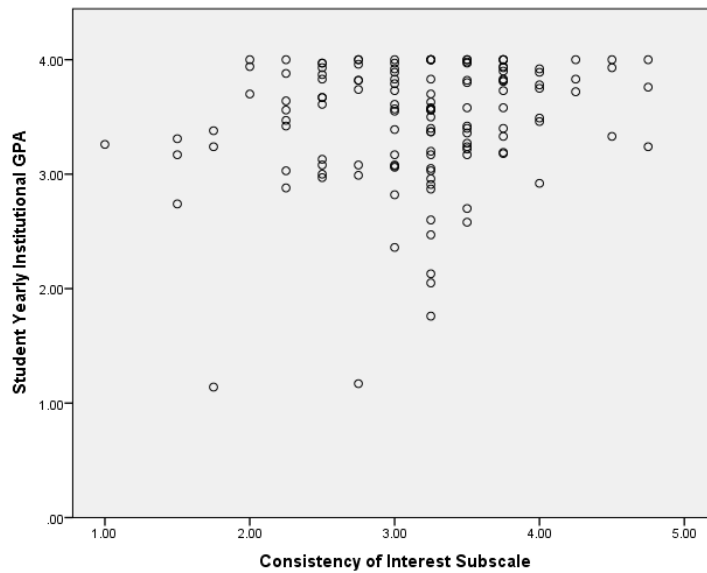


Figure 4. Student Yearly Institutional GPA and Consistency of Interest Subscale Scores Scatterplot.

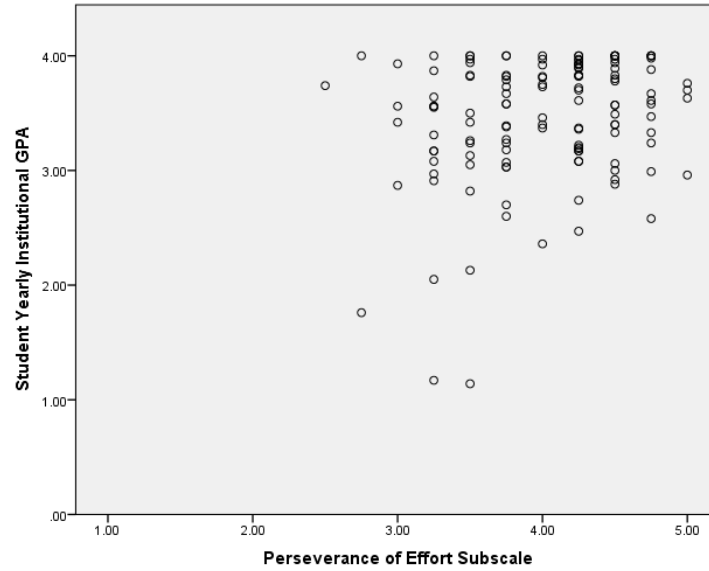


Figure 5. Student Yearly Institutional GPA and Perseverance of Effort Subscale Scores Scatterplot.

Multicollinearity. This assumption refers to the correlation between each pair of independent variables in each regression model. Because the VIF values obtained for each of the three multiple regression models were all less than 1.3 (see Table 11), there is no concern about violating this assumption for each regression model.

Table 11

Multiple Regression Model Multicollinearity (n = 130)

Predictor Variable	VIF
Research Question Two	
Consistency of Interest Subscale Scores	1.172
Perseverance of Effort Subscale Scores	1.172
Research Question Three	
HSGPA	1.250
SAT Scores	1.239
Grit-S Scores	1.028
Research Question Four	
HSGPA	1.257
SAT Scores	1.241
Consistency of Interest Subscale Scores	1.187
Perseverance of Effort Subscale Scores	1.197

Analysis of the Research Questions

This section includes inferential statistics based on the results of the the Statistical Package for the Social Sciences (SPSS) program used to analyze the data to answer the questions in this research study.

Research Question One. The following section presents a discussion on the data analysis of the first research question: “What is the relationship between grit, as measured by scores on the Grit-S of first- and second-year students majoring in education, and student academic performance, as measured by student yearly institutional GPA for most recent academic year?” The two variables were measured by scores on the Grit-S and student yearly institutional GPA, both continuous variables. A Pearson product-moment correlation coefficient was conducted to measure the strength and direction of the relationship between the two variables. The analysis revealed a positive significant correlation at the 0.05 level between the scores on the Grit-S and student yearly institutional GPA, suggesting that, for this sample, as

Grit-S scores increase, an increase in student yearly institutional GPA is observed ($r = .256, n = 130, p = .003$). The results of the Pearson product-moment correlation coefficient are summarized in Table 12 and coordinating scatterplot (Figure 1).

The resulting statistics for the two subgroups of the sample were compared and are presented in Table 13 and Table 14, respectively. When separated into the two groups, the analysis revealed a positive significant correlation at the 0.05 level between Grit-S scores and student yearly institutional GPA for second-year students; however, no significant correlation between the variables was revealed for the first-year student group.

Table 12

Pearson Product-Moment Correlation Coefficient Results for Grit-S Scores and Student Yearly Institutional GPA

		Student Yearly Institutional GPA	Grit-S Scores
Student Yearly Institutional GPA	Pearson Correlation	1	.256*
	Sig. (2-tailed)		.003
	<i>N</i>	130	130
Grit-S Scores	Pearson Correlation	.256*	1
	Sig. (2-tailed)	.003	
	<i>N</i>	130	130

*Correlation is significant at the 0.05 level (2-tailed).

Table 13

Pearson Product-Moment Correlation Coefficient Results for Grit-S Scores and Student Yearly Institutional GPA for First-Year Students

		Student Yearly Institutional GPA	Grit-S Scores
Student Yearly Institutional GPA	Pearson Correlation	1	.244
	Sig. (2-tailed)		.050
	<i>N</i>	65	65
Grit-S Scores	Pearson Correlation	.244	1
	Sig. (2-tailed)	.050	
	<i>N</i>	65	65

Table 14

Pearson Product-Moment Correlation Coefficient Results for Grit-S Scores and Student Yearly Institutional GPA for Second-Year Students

		Student Yearly Institutional GPA	Grit-S Scores
Student Yearly Institutional GPA	Pearson Correlation	1	.263*
	Sig. (2-tailed)		.035
	<i>N</i>	65	65
Grit-S Scores	Pearson Correlation	.263*	1
	Sig. (2-tailed)	.035	
	<i>N</i>	65	65

*Correlation is significant at the 0.05 level (2-tailed).

Research Question Two. The following section presents a discussion on the data analysis of the second research question: “To what extent do scores on the Consistency of Interest subscale of the Grit-S and scores on the Perseverance of Effort subscale of the Grit-S predict student academic performance, as measured by student yearly institutional GPA for most recent academic year?” First, a simple linear regression was calculated to examine the relationship between student yearly institutional GPA, the dependent variable, and scores on the

Consistency of Interest subscale of the Grit-S, the independent variable. A significant regression result was found, $F(1, 128) = 5.098, p = .026$, with an adjusted R^2 of .031, suggesting that 3.1% of the variance in student yearly institutional GPA is explained by the model. Results demonstrate a standardized beta of .196, indicating that a one-unit increase in the Consistency of Interest subscale would result in a .196-unit increase in student yearly institutional GPA.

Next, a second simple linear regression model was examined, with the dependent variable again measured by student yearly institutional GPA, but the independent variable now measured by scores on the Perseverance of Effort subscale of the Grit-S. The analysis revealed a significant regression equation between the student yearly institutional GPA and Perseverance of Effort subscale scores, $F(1, 128) = 7.506, p = .007$, with an adjusted R^2 of .048, suggesting that 4.8% of the variance in yearly institutional GPA is explained by the model. Results demonstrate a standardized beta of .235, indicating that a one-unit increase in the Perseverance of Effort subscale would result in a .235-unit increase in student yearly institutional GPA. The results of both simple linear regression models are presented in Table 15.

Finally, a multiple regression model was used to estimate the relationship between each independent variable and student yearly institutional GPA, holding the other independent variable constant. The analysis revealed a significant regression equation, $F(2, 127) = 4.667, p = .011$, with an adjusted R^2 of .054, indicating 5.4% of the variability in student yearly institutional GPA is accounted for by the model. Results of the multiple regression models are presented in Table 16.

In addition to these analyses, the sample again was divided into two groups and the analyses were run separately for both the first- and second-year student subgroups, both with

statistically insignificant results. The resulting statistics for the two groups were compared and are presented in Table 16 alongside the model containing all participants.

Table 15

Simple Linear Regression Models of HSGPA, SAT Scores, Grit-S Scores, Consistency of Interest Subscale Scores, and Perseverance of Effort Subscale Scores Predicting Student Yearly Institutional GPA (n = 130)

Predictor Variable	<i>t</i>	β	<i>F</i>	<i>df</i>	<i>p</i>	adj. <i>R</i> ²
HSGPA	5.736	.452	32.899	1, 128	< .001	.198
SAT Scores	3.577	.301	12.796	1, 128	< .001	.084
Grit-S Scores	2.990	.256	8.941	1, 128	.003	.058
Consistency of Interest Subscale	2.258	.196	5.098	1, 128	.026	.031
Perseverance of Effort Subscale	2.740	.235	7.506	1, 128	.007	.048

Table 16

Multiple Regression Models of Consistency of Interest Subscale Scores and Perseverance of Effort Subscale Scores Predicting Student Yearly Institutional GPA

Model and Predictor Variable	<i>n</i>	<i>t</i>	<i>p</i>	β	<i>F</i>	<i>df</i>	<i>p</i>	adj. <i>R</i> ²
Model	130				4.667	2, 127	.011	.054
Consistency of Interest Subscale		1.335	.184	.124				
Perseverance of Effort Subscale		2.028	.045	.188				
First-Year Students Model	65				2.530	2, 62	.088	.046
Consistency of Interest Subscale		.445	.658	.058				
Perseverance of Effort Subscale		1.899	.062	.248				
Second-Year Students Model	65				2.324	2, 62	.106	.040
Consistency of Interest Subscale		1.497	.140	.201				
Perseverance of Effort Subscale		.803	.425	.108				

Research Question Three. The following section presents a discussion on the data analysis of the third research question: “To what extent do HSGPA, SAT scores, and grit, as measured by scores on the Grit-S of first- and second-year students majoring in education,

predict academic performance, as measured by student yearly institutional GPA for most recent academic year?” First, a simple linear regression was calculated to examine the relationship between student yearly institutional GPA, the dependent variable, and HSGPA, the independent variable. A significant regression equation was found, $F(1, 128) = 32.899, p < .001$, with an adjusted R^2 of .198, suggesting that 19.8% of the variance in student yearly institutional GPA is explained by the model. Results demonstrate a standardized beta of .452, indicating that a one-unit increase in HSGPA would result in a .452-unit increase in student yearly institutional GPA.

Next, a second simple linear regression was calculated to examine the relationship between student yearly institutional GPA and SAT scores. A significant regression equation was found, $F(1, 128) = 12.796, p < .001$, with an adjusted R^2 of .084, suggesting that 8.4% of the variance in student yearly institutional GPA is explained by the model. Results demonstrate a standardized beta of .301, signifying that a one-unit increase in SAT scores would result in a .301-unit increase in student yearly institutional GPA.

From there, a third simple linear regression was calculated to examine the relationship between student yearly institutional GPA and Grit-S scores. A significant regression equation indicated, $F(1, 128) = 8.941, p = .003$, with an adjusted R^2 of .058, suggesting that 5.8% of the variance in yearly institutional GPA is explained by the model. Results demonstrate a standardized beta of .256, which denotes that a one-unit increase in Grit-S scores would result in a .256-unit increase in yearly institutional GPA. The results of the simple linear regression models are presented in Table 15.

Finally, a multiple regression model was used to estimate the relationship between each independent variable and yearly institutional GPA, holding the other independent variables constant. A significant regression equation revealed, $F(3, 126) = 15.379, p < .001$, with an

adjusted R^2 of .251, indicating 25.1% of the variability in yearly institutional GPA is accounted for by the model. The results of the multiple regression model are presented in Table 17 alongside the results from the analyses for the first- and second-year student groups.

Table 17

Multiple Regression Model of HSGPA, SAT Scores, and Grit-S Scores Predicting Student Yearly Institutional GPA

Model and Predictor Variable	<i>n</i>	<i>t</i>	<i>p</i>	β	<i>F</i>	<i>df</i>	<i>p</i>	adj. R^2
Model	130				15.379	3, 126	< .001	.251
HSGPA		4.195	< .001	.358				
SAT Scores		1.917	.058	.163				
Grit-S Scores		2.905	.004	.224				
First-Year Students Model	65				5.173	3, 61	.003	.164
HSGPA		1.763	.083	.230				
SAT Scores		1.660	.102	.215				
Grit-S Scores		1.962	.054	.229				
Second-Year Students Model	65				12.469	3, 61	< .001	.350
HSGPA		4.166	< .001	.468				
SAT Scores		1.477	.145	.165				
Grit-S Scores		2.218	.030	.225				

Research Question Four. The following section presents a discussion on the data analysis of the fourth research question: “To what extent do HSGPA, SAT scores, scores on the Consistency of Interest subscale of the Grit-S, and scores on the Perseverance of Effort subscale of the Grit-S predict student academic performance, as measured by student yearly institutional GPA for most recent academic year?” First, a simple linear regression was calculated to examine the relationship between student yearly institutional GPA, the dependent variable, and HSGPA, the independent variable. A significant regression equation was found, $F(1, 128) = 32.899$, $p < .001$, with adjusted $R^2 = .198$ and $\beta = .452$.

Second, a simple linear regression was calculated to examine the relationship between student yearly institutional GPA and SAT scores. A significant regression equation was found, $F(1, 128) = 12.796, p < .001$, with adjusted $R^2 = .084$ and $\beta = .301$.

Third, a simple linear regression was calculated to examine the relationship between student yearly institutional GPA and scores on the Consistency of Interest subscale of the Grit-S. A significant regression equation was found, $F(1, 128) = 5.098, p = .026$, with adjusted $R^2 = .031$ and $\beta = .196$.

Fourth, another simple linear regression was computed to examine the relationship between student yearly institutional GPA and scores on the Perseverance of Effort subscale of the Grit-S. The analysis revealed a significant regression equation, $F(1, 128) = 7.506, p = .007$, with adjusted $R^2 = .048$ and $\beta = .235$. The results from the simple linear regression models are presented in Table 15.

Finally, a multiple regression model was used to examine the relationship between each independent variable (HSGPA, SAT scores, scores on the Consistency of Interest subscale of the Grit-S, and scores on the Perseverance of Effort subscale of the Grit-S) and yearly institutional GPA, holding the other independent variable constant. A significant regression equation revealed, $F(4, 125) = 11.445, p < .001$, with an adjusted R^2 of .245, suggesting that 24.5% of the variability in yearly institutional GPA is accounted for by the model. The results of the multiple regression model are presented in Table 18 alongside results from the analyses for the separated first- and second-year student groups.

Table 18

Multiple Regression Model of HSGPA, SAT Scores, Consistency of Interest Subscale Scores, and Perseverance of Effort Subscale Scores Predicting Student Yearly Institutional GPA

Model and Predictor Variable	<i>n</i>	<i>t</i>	<i>p</i>	β	<i>F</i>	<i>df</i>	<i>p</i>	adj. <i>R</i> ²
Model	130				11.445	4, 125	< .001	.245
HSGPA		4.162	< .001	.357				
SAT Scores		1.903	.059	.162				
Consistency of Interest Subscale		1.745	.083	.145				
Perseverance of Effort Subscale		1.484	.140	.124				
First-Year Students Model	65				3.845	4, 60	.008	.151
HSGPA		1.692	.096	.224				
SAT Scores		1.599	.115	.210				
Consistency of Interest Subscale		.984	.329	.124				
Perseverance of Effort Subscale		1.229	.224	.157				
Second-Year Students Model	65				9.203	4, 60	< .001	.339
HSGPA		4.129	< .001	.468				
SAT Scores		1.463	.149	.165				
Consistency of Interest Subscale		.952	.345	.106				
Perseverance of Effort Subscale		1.431	.158	.160				

CHAPTER FIVE: DISCUSSION

Included in this chapter is a review and summary of the study, a description of the major findings drawn from the data analysis from Chapter Four, a discussion on the implications for practice, recommendations for future research, and concluding remarks.

Summary of the Study

Researchers have studied the complexities of postsecondary student performance in great detail in an attempt to identify what may contribute to increased levels of student success. Much of the research centers on the relationship between performance and traditional cognitive measures, such as high school grades and scores on standardized tests. However, a growing body of literature is devoted to exploring other factors that may contribute to academic performance, including that of grit, a non-cognitive trait described as a disposition toward perseverance and passion for long-term goals (Duckworth, 2007). The present study addressed the relationship between grit and academic performance of undergraduate students in the USF College of Education in order to identify what may play a role in their postsecondary academic performance.

Native first- and second-year students pursuing an undergraduate degree in the USF College of Education were asked to complete the Grit-S survey in the summer of 2017. Results from the survey were analyzed to identify the relationship between grit and academic performance of student participants, as measured by students' GPA in their most recent year of postsecondary coursework. A Pearson product-moment correlation coefficient was conducted, measuring the strength and direction of the relationship between grit and GPA. Simple linear

and multiple regression analyses were used to investigate the relationship between GPA and a series of independent variables, including HSGPA, SAT scores, Grit-S scores, scores on the Consistency of Interest subscale of the Grit-S, and scores on the Perseverance of Effort subscale of the Grit-S. Further investigation occurred as the correlation and regression models were repeated separately for each of the two subgroups of the sample: first- and second-year students.

Findings

The findings from this study suggested that the non-cognitive trait, grit, had a statistically significant positive relationship to the academic performance of first- and second-year students majoring in education. It also affirmed previous research citing HSGPA as a significant predictor of student performance at the postsecondary level, over and above that of scores on standardized tests. Additional key findings and discussion follow.

Research Question One. The first research question focused on the relationship between student yearly institutional GPA and scores on the Grit-S. A Pearson product-moment correlation coefficient showed a statistically significant correlation between the two variables, suggesting a moderately positive relationship between student yearly institutional GPA and Grit-S scores such that as one variable increases, as does the other. When the analyses were run separately for both first- and second-year student groups, no significant correlation was shown between the two variables for first-year students. However, the correlation between student yearly institutional GPA and Grit-S scores was significant for second-year students.

For many, the academic rigor at the collegiate level far surpasses what they were accustomed to in high school. Because of this, undergraduates may encounter significant academic challenges for the first time once they enter the college environment. Couple that with the myriad of new challenges and demands that accompany the transition from high school to

college, and one may deduce that the impetus to develop grit as a result of overcoming challenge may not come into play until after students have an opportunity to familiarize themselves with the college environment, perhaps accounting for differences between the first- and second-year student groups.

Research Question Two. The second research question focused on the relationship between student yearly institutional GPA and two independent variables: scores on the Consistency of Interest subscale of the Grit-S and scores on the Perseverance of Effort subscale of the Grit-S. A multiple regression model showed a statistically significant yet weak positive relationship, indicating 5.4% of the variability in student yearly institutional GPA is accounted for by the model. When the models were calculated for the separated first- and second-year student groups, the p values did not demonstrate a statistically significant relationship for either subgroup. It may be such that the similarities between the two subscale scores are indicative of the fact that the qualities necessary to be successful at the postsecondary level require components from each subscale.

Research Question Three. The third research question focused on the relationship between student yearly institutional GPA and three independent variables: HSGPA, SAT scores, and Grit-S scores. A multiple regression analysis showed a statistically significant weak positive relationship, with an adjusted R^2 value indicating 25.1% of the variability in student yearly institutional GPA is accounted for by the model. When comparing adjusted R^2 values for the first- and second-year student subgroups, results suggest statistically significant weak positive relationships for each, with 16.4% of the variability in student yearly institutional GPA accounted for by the model for the first-year student subgroup, compared to 35.0% for the second-year students. Again, the differences between the first- and second-year student groups

may be a consequence of the extended amount of time second-year students have spent in the postsecondary environment, one often permeated with trials and tribulations, when compared to their first-year counterparts.

Further, it is important to note the possibility that grit may be a factor in both high school grades in standardized test scores, as grit-like tendencies may play a role in the actions and behavior students must put forth in order to earn a certain grade point average or scores on standardized tests. This phenomenon prohibits the researcher from pulling out what power grit may have by itself, based upon the design of the instrument used.

Research Question Four. The fourth research question examined the relationship between student yearly institutional GPA and four independent variables: HSGPA, SAT scores, scores on the Consistency of Interest subscale of the Grit-S, and scores on the Perseverance of Effort subscale of the Grit-S. A multiple regression analysis showed a statistically significant weak positive relationship, with an adjusted R^2 value suggesting 24.5% of the variability in student yearly institutional GPA is accounted for by the model. When comparing adjusted R^2 values for the student subgroups, results indicate statistically significant weak positive relationships, with 15.1% of the variability in student yearly institutional GPA accounted for by the model for the first-year student subgroup and 33.9% for the second-year students. Again, students may not be prompted to develop grit-like tendencies immediately upon their transition from high school to college; rather, this phenomenon may not take place until students have spent an extended period of time facing the challenges that often accompany postsecondary study.

Again, it is important to note that grit may play a role in high school grades and standardized test scores. Grit-like affinities may contribute to the behavior students put forth in

order to earn certain grades or standardized test scores, prohibiting the researcher from extracting what power grit may have by itself, based upon the design of the instrument used.

Implications for Practice

The findings from this study suggest a positive, statistically significant relationship exists between grit and academic performance of first- and second-year education majors. Previous research cites HSGPA as a significant predictor of postsecondary success, and findings from this study support those conclusions. Further, this research adds to the existing literature suggesting that non-cognitive factors may serve as additional predictors of academic performance.

As grit and postsecondary academic performance demonstrate a positive linear relationship, such that as grit increases, so does student yearly institutional GPA, combined with the pre-determined findings that demonstrate that grit can be taught, postsecondary administrators may consider implementing mechanisms shown to foster grit in students. Administrators may employ an across-the-board implementation of such mechanisms so that all students, regardless of their assessed grit levels, can benefit. If the identification of an additional subpopulation of at-risk students is limited, for example, to students with scores in the “not gritty” range of the Grit-S, caution should be employed. The limitations of self-reported questionnaires might lead administrators to identify only those individuals with accurate and honest self-awareness and responses for their interventions, omitting a cadre of students who may have inaccurately replied to the survey by answering in a manner to depict themselves in the best way possible, resulting in erroneously elevated final scores.

Additionally, support mechanisms should be rich not only in the formation of grit but also in related non-cognitive traits that have been demonstrated to promote grit, including that of growth mindset. Those with a growth mindset, the psychological trait conceptualized by

Stanford University psychologist Carol Dweck, value effort and perceive ability and intelligence as flexible, not fixed (Dweck, 2006). Likewise, they often respond to academic challenge with perseverance and dedication. Gritty individuals persist through the attainment of long-term goals and see academic setbacks as opportunities for growth; therefore, added levels of support to help foster these traits at the postsecondary level may contribute to increased rates of student persistence and completion. This support could come through academic advising practices, student engagement opportunities, and curricular enhancements. Duckworth suggests “the culture in which we live, and with which we identify, powerfully shapes just about every aspect of our being” (2016, p. 244). By culture, Duckworth refers to shared norms and values of a group of people, whether it be teammates, colleagues, or, in the case of the participants in the present study, academic peers. A gritty culture breeds gritty individuals, a concept in line with the corresponsive principle of personality development (Duckworth, 2016; Roberts, Caspi, & Moffitt, 2003). Higher education environments have plentiful opportunities for promoting a gritty culture within communities of students, including student class cohorts, living learning communities, and student organizations. Workshops, seminars, and class assignments all serve as vehicles for sharing strategies and skills for fostering grit among groups of students.

Recommendations for Future Research

The results suggested a positive statistically significant relationship between grit and academic performance of first- and second-year education majors. However, to gain a greater understanding of the intricacies of that relationship and address the boundaries of this research, future inquiry is necessary. To delve further, the study could be replicated using a larger sample size, increasing the potential for obtaining stronger relationship and prediction results. Beyond that, future studies could be designed such that the Grit-S is administered at the start of students’

postsecondary study and again at various points throughout their collegiate journeys. This longitudinal approach could serve the purpose of improving the study twofold. First, chronicling students' grit levels over time could allow the researcher to examine such questions as how grit may grow throughout students' undergraduate years. Second, although one academic year provided a glimpse into student academic performance, the implementation of a longitudinal design would lead to richer results in regard to the academic performance of students who persist, including greater information on their time to degree, grades, and retention in major. Grit-related tendencies may influence student persistence; as such, an important subset of participants who left the university prior to degree completion was absent from the population and subsequent analysis.

Further, an experimental design study in which a comparison is made between an experimental group and a control group could be conducted. In a study of this design, groups of students from two schools, one in which an intervention is made such that the students are the recipients of activities and services intended to foster their grit levels and another where an intervention is absent, would be compared. Results from the comparisons of the two groups could assist the researcher in determining what resulting factors, if any, are present in those students who experienced the grit-focused interventions. Additional interventions could be conducted based on the results of the experimental design study.

Embracing a mixed-methods design could allow the researcher to incorporate non-quantifiable variables into the data analysis, thereby providing a platform for gaining a fuller understanding about the participants' perspectives of the intricacies of the study. As noted in Chapter Four, participant responses to question four, "I am a hard worker," ranged from 3.0 – 5.0, with an average score of 4.52, the narrowest range and greatest mean among all eight items

on the Grit-S. Follow-up interviews would provide an opportunity for the researcher to learn more about participants' personal definitions of "hard worker" as well as to solicit examples of how participants believe that characteristic has been exemplified in their actions. Further, replies to question three, "I have been obsessed with a certain idea or project for a short time but later lost interest," resulted in the lowest mean (2.98), and follow-up qualitative analysis may lend to richer information regarding their responses to this and other related items, findings not surprising when considering the frequency with which students change majors and other non-committal behaviors consistent with characteristics of the current generation of traditional age college students.

This may be especially key for those working with students pursuing degrees in education, an academic discipline and corresponding profession facing nationwide declines. From 2014-2024, nearly 1.9 million job openings will be available for teachers at the pre-kindergarten through secondary levels, yet there is not a supply of prepared, credentialed individuals available to meet the demands of the market (Vilorio, 2016). Challenges facing declining numbers in the academic discipline have prompted the need to implement additional mechanisms for recruiting and retaining students studying education at the postsecondary level and ensuring that have not only the academic preparedness but also the dispositions demonstrated necessary for success in the field.

Conclusion

This quantitative study was an exploration of the relationship between grit and academic performance of first- and second-year students studying education, an academic discipline facing historic declines. The theoretical framework, based on Alexander W. Astin's Theory of Student Involvement and expanded Input-Environment-Output (I-E-O) data analysis model and

Terenzini and Reason's subsequent model of student persistence, served as a guide for the literature review and created a foundation for a multifaceted approach to student performance, as both emphasize how the institutional environment and student background characteristics work in conjunction to shape student academic performance. A review of the literature implied that, although cognitive measures are often considered when making college admission decisions, certain non-cognitive variables have proven successful in identifying and supporting individuals most likely to achieve a long-term goal, such as college degree completion. Moreover, for graduates who enter the workforce in a profession as demanding as teaching, some characteristics, such as grit, have proven significant in terms of their linkage with success in the profession.

The overall findings of this study contribute to the increased understanding of the complexities related to predictors of postsecondary student performance, specifically in regard to undergraduate students pursuing degrees in education. As with other fundamental principles, models, and theories, higher education administrators should allow these findings to inform their practice while employing caution and vigilance, as conclusions from this and other studies may not be effective in supporting decisions or policies for different groups of students at different times.

The type of atmosphere and conditions that breed challenge often accompany postsecondary study. To support students in their pursuit of academic success, the aim of university administrators should not be to eliminate these challenges; rather, focus should be placed on how to educate students on approaches for persevering through hardship. In working toward providing students with the skills and strategies beneficial for persisting through the challenges of the academic environment, administrators' efforts may serve a secondary purpose

as it relates to helping individuals improve their overall grit, a trait found to be beneficial in a multitude of settings, academic and otherwise.

References

- Almlund, M., Duckworth, A. L., Heckman, J. J., & Kautz, T. D. (2011, February). *Personality psychology and economics* (National Bureau of Economic Research Working Paper No. 16822). Retrieved from <http://www.nber.org/papers/w16822.pdf>
- Atkinson, R. C., & Geiser, S. (2009). Reflections on a century of college admissions tests. *Educational Researcher*, 38(9): 655- 686. Retrieved from <http://www.cshe.berkeley.edu/sites/default/files/shared/publications/docs/ROPS-AtkinsonGeiser-Tests-04-15-09.pdf>
- Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel*, 25(4), 297-308. Retrieved from https://www.researchgate.net/profile/Alexander_Astin/publication/220017441_Student_Involvement_A_Development_Theory_for_Higher_Education/links/00b7d52d094bf5957e000000.pdf
- Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco: Jossey-Bass.
- Barnes, J. E. (2002). The SAT revolution: The new test spells the end of IQ—and big changes for American education. *U.S. News & World Report*, 133(18), 50-59. Retrieved from <http://connection.ebscohost.com/c/articles/7732010/sat-revolution>
- Baum, S., Ma, J., & Payea, K. (2010). *Education pays 2010: The benefits of higher education for individuals and society*. Retrieved from <https://trends.collegeboard.org/sites/default/files/education-pays-2010-full-report.pdf>

- Berger, J. B., & Milem, J. (1999, December). The role of student involvement and perceptions of integration in a causal model of student persistence. *Research in Higher Education*, 40(6), 641-664. Retrieved from <http://www.jstor.org/stable/40196897>
- Bill & Melinda Gates Foundation. (2008). *New initiative to double the number of low-income students in the U.S. who earn a postsecondary degree*. Retrieved from <http://www.gatesfoundation.org/Media-Center/Press-Releases/2008/12/New-Initiative-to-Double-the-Number-of-LowIncome-Students-in-the-US-Who-Earn-a-Postsecondary-Degree>
- Beggs, J. M., Banthan, J. H., & Taylor, S. (2008). Distinguishing the factors influencing college students' choice of major. *College Student Journal* (42)2, 381-394. Retrieved from <http://eds.a.ebscohost.com/ehost/detail/detail?sid=b1c7d48a-d952-4025-8c36-88bb8fb43998%40sessionmgr4009&vid=13&hid=4102&bdata=JnNpdGU9ZWwhvc3QtbGl2ZQ%3d%3d#AN=32544871&db=aph>
- Borghans, L., Duckworth, A. L., Heckman, J. J., & ter Weel, B. (2008). The economics and psychology of personality traits. *Journal of Human Resources*, 43(4), 972-1059. Retrieved from <http://www.jstor.org.ezproxy.lib.usf.edu/stable/40057376>
- Buchanan, J., Prescott, A., Schuck, S., Aubusson, P., Burke, P., & Louviere, J. (2013, March). Teacher retention and attrition: Views of early career teachers. *Australian Journal of Teacher Education*, 38(3), 112-129. <http://dx.doi.org/10.14221/ajte.2013v38n3.9>
- Bulger, S., & Watson, D. (2006). Broadening the definition of at-risk students. *The Community College Enterprise*, 12(2), 24-32. Retrieved from www.schoolcraft.edu/pdfs/cce/12.2.23-32.pdf

- Carnevale, A. P., Smith, N., & Strohl, M. (2010). *Help wanted: Projections of jobs and education requirements through 2018*. Retrieved from <https://cew.georgetown.edu/wp-content/uploads/2014/12/fullreport.pdf>
- Clinedinst, M. E., Hurley, S. F., & Hawkins, D. A. (2011). *2011 state of college admission*. Retrieved from <http://www.thecollegesolution.com/wp-content/uploads/2011/10/NACAC-report.pdf>
- Duckworth, A. L. (2017). *Angela Duckworth*. Retrieved from <https://angeladuckworth.com/qa/#faq-380>
- Duckworth, A. L. (2016). *Grit: The power of passion and perseverance*. New York, NY: Simon & Schuster, Inc.
- Duckworth, A. L., & Gross, J. J. (2014). Self-control and grit: Related but separable determinants of success. *Current Directions in Psychological Science*, 23(5), 319-325. doi: 10.1177/0963721414541462
- 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, 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
- Duckworth, A. L., Quinn, P. D., & Seligman, M. E. P. (2009). Positive predictors of teacher effectiveness. *The Journal of Positive Psychology* 4(6), 540-547. doi: 10.1080/17439760903157232

- Duckworth, A. L., & Yeager, D. S. (2015, May). Measurement matters: Assessing personal qualities other than cognitive ability for educational purposes. *Educational Researcher*, 44(4), 237-251. doi: 10.3102/0013189X15584327
- Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York: Ballantine Books.
- Eagan, K., Stolzenberg, E. B., Bates, A. K., Aragon, M. C., Suchard, M. R., & Rios-Aguilar, C. (2016). *The American freshman: National norms fall 2015*. Los Angeles: University of California-Los Angeles, Higher Education Research Institute. Retrieved from <http://www.heri.ucla.edu/tfsPublications.php>
- Engle, C. C., Reilly, N. P., & Levine, H. B. (2004). A case study of an academic retention program. *Journal of College Student Retention: Research, Theory & Practice*, 5(4), 365-383. <http://dx.doi.org.ezproxy.lib.usf.edu/10.2190/JP0W-5358-Y7DJ-14B2>
- Ericsson, K. A. (2014). Why expert performance is special and cannot be extrapolated from studies of performance in the general population: A response to criticisms. *Intelligence*, 45, 81-103. doi: 10.1016/j.intell.2013.12.001
- Farkas, S., Johnson, J., & Foleno, T. (2000). *A sense of calling: Who teaches and why*. Retrieved from https://www.publicagenda.org/files/sense_of_calling.pdf
- Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Seneca Keyes, T., Johnson, D. W., & Beechum N. O. (2012, June). *Teaching adolescents to become learners. The role of noncognitive factors in shaping school performance: A critical literature review*. Retrieved from <https://consortium.uchicago.edu/sites/default/files/publications/Noncognitive%20Report.pdf>

- Fisher, R. J. (1993). Social desirability bias and the validity of indirect questioning. *Journal of Consumer Research* 20(2), 303-315. <https://doi.org/10.1086/209351>
- Geiser, S., & Santelices, M. V. (2007). Validity of high-school grades in predicting student success beyond the freshman year: High-school record vs. standardized tests as indicators of four-year college outcomes. Retrieved from <http://files.eric.ed.gov/fulltext/ED502858.pdf>
- Glass, G. V., & Hopkins, K. D. (1996). *Statistical methods in education and psychology* (3rd ed.). Needham Heights, MA: Pearson.
- Glynn, J. G., Sauer, P. L., & Miller, T. E. (2002). A logistic regression model for the enhancement of student retention: The identification of at-risk freshmen. *International Business & Economics Research Journal*, 1(8), 79-86. <http://dx.doi.org/10.19030/iber.v1i8.3970>
- Godfrey, K. E. (2011). *Investigating grade inflation and non-equivalence* (College Board Research Report No. 2011-2.) Retrieved from <https://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2011-2-investigating-grade-inflation-non-equivalence.pdf>
- Goldberg, L. R. (1990). An alternative “description of personality”: The big-five factor structure. *Journal of Personality and Social Psychology*, 59(6), 1216-1229. Retrieved from http://projects.ori.org/lrg/PDFs_papers/Goldberg.Big-Five-FactorsStructure.JPSP.1990.pdf
- Goldberg, L. R. (1993, January). The structure of phenotypic personality traits. *American Psychologist*, 48(1), 26-34. Retrieved from

<http://eds.a.ebscohost.com.ezproxy.lib.usf.edu/eds/pdfviewer/pdfviewer?sid=5fad3734-e4e3-49ab-a2e8-f9a899f3c8ce%40sessionmgr4007&vid=5&hid=4110>

Goleman, D. (2011). *Leadership: The power of emotional intelligence*. North Hampton, MA: More than Sound.

Gottfredson, L. S. (1997). Why g matters: The complexity of everyday life. *Intelligence*, 24(1), 79-132. [http://dx.doi.org/10.1016/S0160-2896\(97\)90014-3](http://dx.doi.org/10.1016/S0160-2896(97)90014-3)

Greenberg, J., Walsh, K., & McKee, A. (2014). *Teacher prep review: A review of the nation's teacher preparation programs*. Retrieved from http://www.nctq.org/dmsView/Teacher_Prep_Review_2014_Report

Hagedorn, L. S. (2006). *How to define retention: A new look at an old problem*. Retrieved from <files.eric.ed.gov/fulltext/ED493674.pdf>

Hiss, W.C., & Franks, V. W. (2014, February 5). *Defining promise: Optional standardized testing policies in American college and university admissions*. Retrieved from <https://offices.depaul.edu/enrollment-management-marketing/test-optional/Documents/HISSDefiningPromise.pdf>

Hochanadel, A., & Finamore, D. (2015). Fixed and growth mindset in education and how grit helps students persist in the face of adversity. *Journal of Educational Research*, 11(1), 47-50. <http://dx.doi.org/10.19030/jier.v11i1.9099>

Hughes, K. (2012). *The college completion agenda 2012 progress report*. Retrieved from <http://media.collegeboard.com/digitalServices/pdf/advocacy/policycenter/college-completion-agenda-2012-progress-report.pdf>

Hussar, W. J., & Bailey, T. M. (2016). *Projections of education statistics to 2024* (NCES 2016-013). Retrieved from <https://nces.ed.gov/pubs2016/2016013.pdf>

- Jackson, J. J., Connolly, J. J., Garrison, S. M., Leveille, M. M., & Connolly, S. L. (2015). Your friends know how long you will live: A 75-year study of peer-rated personality traits. *Psychological Science, 26*(3), 335-340. doi: 10.1177/0956797614561800
- James, W. (1907, March 1). The energies of men. *Science, 25*, 321-332. Retrieved from <http://www.archive.org/details/energiesofmenOOjameuoft>
- Jayaprakash, S. M., Moody, E. W., Lauría, E. J. M., Regan, J. R., & Baron, J. D. (2014). Early alert of academically at-risk students: An open source analytics initiative. *Journal of Learning Analytics, 1*(1), 6-47. Retrieved from <http://www.learning-analytics.info/journals/index.php/JLA/article/viewFile/3249/4011>
- Johnson, S. M., & Birkeland, S. E. (2003). Pursuing a “sense of success”: New teachers explain their career decisions. *American Educational Research Journal, 40*(3), 581-617. Retrieved from <http://www.jstor.org/stable/3699446>
- Johnson, V. E. (1997). An alternative to traditional GPA for evaluating student performance. *Statistical Science, 12*(4), 251-278. Retrieved from https://projecteuclid.org/download/pdf_1/euclid.ss/1030037959
- Jones, D. P. (2013, October). Outcomes-based funding: The wave of implementation. Retrieved from <http://completecollege.org/pdfs/Outcomes-Based-Funding-Report-Final.pdf>
- Judge, T. A., & Bono, J. E. (2000). Five-factor model of personality and transformational leadership. *Journal of Applied Psychology, 85*(5), 751-765. doi: 0.1037//0021-9010.85.5.751
- Kane, T. J., Rockoff, J. E., & Staiger, D. O. (2008). What does certification tell us about teacher effectiveness? Evidence from New York City. *Economics of Education Review, 27*(6), 615-631. doi: 10.1016/j.econedurev.2007.05.005

- Kappes, H. B., & Oettingen, G. (2011). Positive fantasies about idealized futures sap energy. *Journal of Experimental Psychology*, 47, 719-729. doi: 10.1016/j.jesp.2011.02.003
- Karp, M. M., & Bork, R. H. (2012). "They never told me what to expect, so I didn't know what to do": Defining and clarifying the role of a community college student (CCRC Working Paper No. 47). Retrieved from <https://ccrc.tc.columbia.edu/media/k2/attachments/defining-clarifying-role-college-student.pdf>
- Kobrin, J. L., Patterson, B. F., Shaw, E. J., Mattern, K. D., & Barbuti, S. M. (2008). *Validity of the SAT for predicting first-year college grade point average* (College Board Research Report No. 2008-5). Retrieved from <https://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2008-5-validity-sat-predicting-first-year-college-grade-point-average.pdf>
- Kobrin, J. L., & Schmidt, A. E. (2005). *The research behind the new SAT*. (College Board Research Summary RS-11). Retrieved from <http://files.eric.ed.gov/fulltext/ED563076.pdf>
- Kopkowski, C. (2008, April). *Why they leave*. Retrieved from <http://www.nea.org/home/12630.htm>
- Kuncel, N. R., Credé, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Review of Educational Research*, 75(1), 63-82. Retrieved from <http://www.jstor.org.ezproxy.lib.usf.edu/stable/3516080>
- Labaree, D. F. (2000). On the nature of teaching and teacher education: difficult practices that look easy. *Journal of Teacher Education*, 51(3), 228-233. Retrieved from https://web.stanford.edu/~dlabaree/publications/Nature_of_Teaching_and_TE.pdf

- Lee, J. M., Jr., Edwards, K., Menson, R., & Rawls, A. (2011). *The college completion agenda 2011 progress report*. Retrieved from http://completionagenda.collegeboard.org/sites/default/files/reports_pdf/Progress_report_2011.pdf
- Lumina Foundation for Education. (2009). *Lumina foundation's strategic plan*. Retrieved from https://www.luminafoundation.org/files/wp-content/uploads/2011/02/Lumina_Strategic_Plan.pdf
- Lumina Foundation for Education. (2017). *Lumina foundation strategic plan for 2017 to 2020*. Retrieved from <https://www.luminafoundation.org/files/resources/lumina-strategic-plan-2017-to-2020.pdf>
- McCrae, R. R., & Costa, P. T. (1987, January). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, 52(1), 81-90. <http://dx.doi.org/10.1037/0022-3514.52.1.81>
- Miller, T. E., & Murphy, C. (2011, March). Predicting student risk of attrition. *Campus Activities Programming*, 43(7), 40-44. Retrieved from eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?sid=eb73fdbd-6cff-4375-b0cc-819f587cde48%40sessionmgr120&vid=8&hid=114
- Moutafi, J., Furnham, A., and Paltiel, L. (2005). Why is conscientiousness negatively correlated with intelligence? *Personality and Individual Differences*, 37(5), 1013-1022. doi: 10.1016/j.paid.2003.11.010
- National Conference of State Legislators. (2015, July 31). *Performance-based funding for higher education*. Retrieved from <http://www.ncsl.org/research/education/performance-funding.aspx>

- Nederhof, A. J. (1985). Methods of coping with social desirability bias: A review. *European Journal of Social Psychology* 15(3), 263-280. doi: 10.1002/ejsp.2420150303
- Neisser, U., Boodoo, G., Bouchard, T. J., Jr., Boykin, A. W., Brody, N., Ceci, ... Urbina, S. (1996). Intelligence: Knowns and unknowns. *American Psychologist*, 51(2), 77-101.
Retrieved from http://psych.colorado.edu/~carey/pdfFiles/IQ_Neisser2.pdf
- Norman, W. T. (1963, June). Toward an adequate taxonomy of personality attributes: Replicated factor structure in peer nomination personality ratings. *The Journal of Abnormal and Social Psychology*, 66(6), 574-583. <http://dx.doi.org/10.1037/h0040291>
- Oettingen, G., & Mayer, D. (2002). The motivating function of thinking about the future: Expectations versus fantasies. *Journal of Personality and Social Psychology*, 83(5), 1198-1212. doi: 10.1037//0022-3514.83.5.1198
- Pascarella, E. T. (1985). College environmental influences on learning and cognitive development: A critical review and synthesis. In J. Smart (Ed.), *Higher education: Handbook of theory and research*, 1. New York: Agathon.
- Pascarella, E. T., & Terenzini, P. T. (1978). The relation of students' precollege characteristics and freshman year experience to voluntary attrition. *Research in Higher Education*, 9(4), 347-366. Retrieved from <http://www.jstor.org/stable/40195235>
- Pascarella, E. T., & Terenzini, P. T. (1980). Predicting freshman persistence and voluntary dropout decisions from a theoretical model. *Journal of Higher Education*, 51(1), 60-75.
doi: 10.2307/1981125
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* (2nd ed.). San Francisco, CA: Jossey-Bass.

- Pomerance, L., Greenberg, J., & Walsh, K. (2016, January). *Learning about learning: What every teacher needs to know*. Retrieved from http://www.nctq.org/dmsView/Learning_About_Learning_Report
- Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin, 135*(2), 322-338. doi: 10.1037/a0014996
- Richardson, M., Abraham, C., & Bond, R. (2012, March). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin, 138*(2), 353-387. doi: 10.1037/a0026838
- Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement. *Econometrica, 73*(2), 417-458. Retrieved from <https://econ.ucsb.edu/~jon/Econ230C/HanushekRivkin.pdf>
- Roberts, B. W., Caspi, A., & Moffitt, T. E. (2003). Work Experiences and Personality Development in Young Adulthood. *Journal of Personality & Social Psychology, 84*(3), 582-593. doi: 10.1037/0022-3514.84.3.582
- Robertson-Kraft, C. & Duckworth, A. L. (2014). True grit: Trait-level perseverance and passion for long-term goals predicts effectiveness among teachers. *Teachers College Record, 116*(3), 1-27. Retrieved from www.tcrecord.org/library/content.asp?contentid=17352
- Rojas, J. P., Reser, J. A., Usher, E. L., & Toland, M. D. (2012). *Psychometric properties of the academic grit scale*. Retrieved from sites.education.uky.edu/motivation/files/2013/08/PojasPeserTolandUsher.pdf
- Rothstein, J. (2004). College performance predictions and the SAT. *Journal of Econometrics, 121*(1-2), 297-317. <http://dx.doi.org.ezproxy.lib.usf.edu/10.1016/j.jeconom.2003.10.003>

- Russell, A. (2011, October). *A guide to major U.S. college completion initiatives* (Policy Matters: A Higher Education Policy Brief). Retrieved from <http://www.aascu.org/policy/publications/policymatters/2011/collegecompletion.pdf>
- Sawyer, R. (2010). *Usefulness of high school average and ACT scores in making college admission decisions*. (ACT Research Report No. 2010-2). Retrieved from <http://files.eric.ed.gov/fulltext/ED527216.pdf>
- Shechtman, N., DeBarger, A. H., Dornsife, C., Rosier, S., & Yarnall, L. (2013, February). *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>
- Shapiro, D., Dundar, A., Wakhungu, P. K., Yuan, X., Nathan, A., & Hwang, Y. (2016, November). *Completing college: A national view of student attainment rates – Fall 2010 cohort* (Signature Report No. 12). Retrieved from: <https://nscresearchcenter.org/wp-content/uploads/SignatureReport12.pdf>
- Snyder, T. D., de Brey, C., & Dillow, S. A. (2016). *Digest of Education Statistics 2015* (NCES 2016-014). Retrieved from <https://nces.ed.gov/pubs2016/201604.pdf>
- Spady, W. G. (1971). Dropouts from higher education: Toward an empirical model. *Interchange*, 2(3), 38-62. doi: 10.1007/BF02282469
- Stemler, S. E. (2012). What should university admissions tests predict? *Educational Psychologist*, 47(1), 5-17. <http://dx.doi.org/10.1080/00461520.2011.611444>
- St. John, E. (2000). Do majors matter? *Black Issues in Higher Education*, 17(4), 21-27. Retrieved from <http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?sid=000b452b-5f7e-4b75-be57-9cf6c5517bb2%40sessionmgr104&vid=8&hid=127>

- Sutcher, L., Darling-Hammond, L., & Carver-Thomas, D. (2016). *A coming crisis in teaching? Teacher supply, demand, and shortages in the U.S.* Retrieved from https://learningpolicyinstitute.org/sites/default/files/product-files/A_Coming_Crisis_in_Teaching_REPORT.pdf
- Terenzini, P. T., & Reason, R. D. (2005). *Parsing the first year of college: Rethinking the effects of college on students.* Paper presented at the meeting of the Association for the Study of Higher Education. Retrieved from <http://docplayer.net/15292255-Parsing-the-first-year-of-college-a-conceptual-framework-for-studying-college-impacts.html>
- Terman, L. M., & Oden, M. H. (1947). *The gifted child grows up: Twenty-five years' follow-up of a superior group.* Stanford, CA: Stanford University Press.
- The College Board. (2002). *Best practices in admissions decisions: A report on the third college board conference on admission models.* Retrieved from <https://research.collegeboard.org/sites/default/files/publications/2012/7/misc2002-1-best-practices-admissions-decisions.pdf>
- The College Board. (2009, October). *ACT and SAT concordance tables (RN-40).* Retrieved from <https://research.collegeboard.org/sites/default/files/publications/2012/7/researchnote-2009-40-act-sat-concordance-tables.pdf>
- Therriault, S. B., & Krivoshey, A. (2014, August). College persistence indicators research review. Retrieved from http://www.earlywarningsystems.org/wp-content/uploads/2014/08/14-3028_College-Persistence_Indicators_Aug_2014.pdf
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45(1), 89-125. doi: 10.3102/00346543045001089

- Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: University of Chicago Press.
- Tough, P. (2012). *How children succeed: grit, curiosity, and the hidden power of character*. New York, NY: Mariner Books.
- Trolian, T. L. (2014). What the Wabash national study can teach us about at-risk student populations. *New Directions for Student Services*, 2014(147), 77-87. doi: 10.1002/ss.20102
- Tupes, E. C., & Christal, R. E. (1992, June). Recurrent personality factors based on trait ratings. *Journal of Personality*, 60(2), 225-251. doi: 10.1111/j.1467-6494.1992.tb00973.x
- University of South Florida. (2016-2017). USF System Facts 2016-2017. Retrieved from <http://www.usf.edu/pdfs/usf-facts-2016-17.pdf>
- USF WRS Report. (2016, February 7). College: Student Listing All by Level, Student Status and College.
- U.S. Department of Education (2004). *New no child left behind flexibility: Highly qualified teachers*. Retrieved from <https://www2.ed.gov/nclb/methods/teachers/hqtflexibility.pdf>
- U.S. Department of Education. (2016). *Preparing and credentialing the nation's teachers: The secretary's 10th report on teacher quality*. Retrieved from <https://title2.ed.gov/Public/TitleIIReport16.pdf>
- Vilorio, D. (2016, June). Teaching for a living. *U.S. Bureau of Labor Statistics: Career Outlook*. Retrieved from www.bls.gov/careeroutlook/2016/article/education-jobs-teaching-for-a-living.htm

- Von Culin, K. R., Tsukayama, E., & Duckworth, A. L. (2013). Unpacking grit: Motivational correlates of perseverance and passion for long-term goals. *The Journal of Positive Psychology, 9*(4), 306-312. <http://dx.doi.org/10.1080/17439760.2014.898320>
- West, M. R., Kraft, M. A., Finn, A. S., Martin, R. E., Duckworth, A. L., Gabrieli, C. F. O., & Gabrieli, J. D. E. (2016). Promise and paradox: Measuring students' non-cognitive skills and the impact of schooling. *Educational Evaluation and Policy Analysis, 38*(1), 148-170. doi: 10.3102/0162373715597298
- Yeager, D. S., & Walton, G. M. (2011, June 1). Social-psychological interventions in education: They're not magic. *Review of Educational Research, 81*(2), 267-301. doi: 10.3102/0034654311405999
- Yeh, T. L. (2002). Asian American college students who are educationally at risk. *New Directions for Student Services, 2002*(97), 61-62. doi: 10.1002/ss.39

Appendix A

From: Duckworth Team <info@angeladuckworth.com>
Subject: Request Permission to Use Short Grit Scale in Electronic Format
Date: March 16, 2017 at 9:35:31 AM EDT
To: <lnwilliams@usf.edu>

Hi Lindsey,

As detailed here, <http://angeladuckworth.com/research/>, the Grit Scale can be used for educational or research purposes. However, it cannot be used for any commercial purpose, nor can it be reproduced in any publication. You are free to use it in your research as long as you follow these guidelines.

Note that we discourage using the scale to evaluate students or employees. As Angela discusses in this [paper](#) and this [Q&A](#) and this [op-ed](#), the scale is not ready for high-stakes assessment; it is ready for research and internal use.

Thanks for all the work you do!

Best,
Duckworth Team
<https://characterlab.org/>

Appendix B

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

Scoring:

1. For questions 2, 4, 7 and 8 assign the following points:

5 = Very much like me

4 = Mostly like me

3 = Somewhat like me

2 = Not much like me

1 = Not like me at all

2. For questions 1, 3, 5 and 6 assign the following points:

1 = Very much like me

2 = Mostly like me

3 = Somewhat like me

4 = Not much like me

5 = Not like me at all

Add up all the points and divide by 8. The maximum score on this scale is 5 (extremely gritty), and the lowest score on this scale is 1 (not at all gritty).