Does Grit Matter? A Correlational Study of the Relationship Between Grit-S Assessment Scores and Student Retention in Undergraduate Online Programs

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Does Grit Matter? A Correlational Study of the Relationship Between Grit-S Assessment Scores and Student Retention in Undergraduate Online Programs

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education in Adult and Lifelong Learning

by

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Abstract

Historically, colleges and universities have used intelligence-based admissions tests to select students who demonstrate the intelligence to succeed academically. These institutions also have employed strategies to help students stay in school and graduate. However, despite tests and support strategies, the National Center for Education Statistics in 2018 reported a six-year completion rate of about 60% of first-time, full-time bachelor’s degree-seeking students for the 2010 cohort, including both traditional and online students. One study shows retention in online classes can be 10% to 15% lower than in traditional face-to-face courses (Carr, 2000).

Meanwhile, higher education institutions today face increasing pressure to raise graduation rates, which are sometimes linked with state funding. This has inspired administrators and faculty to search for more ways to help admitted students succeed. Angela Duckworth and other researchers contend that intelligence alone does not mean success in long-term goals, like earning a bachelor’s degree. Duckworth contends people need Grit – a combination of passion and perseverance.

This study set out to determine whether Grit mattered in the academic success of online undergraduate students at the University of Arkansas. It focused on determining whether these students’ Grit scores, collected through a survey, correlated to GPA and persistence (enrolling in spring 2019 or graduating in fall 2018). If Grit mattered, the survey could be used as another tool to identify students who needed extra support, before they dropped out of college. The Grit-S survey was administered to all 998 University of Arkansas students identified as studying in online undergraduate degree programs. About 200 responded, identified themselves as studying in online degree programs, and agreed to provide the researcher access to their 2018 fall semester GPA and/or their enrollment status (enrolled or not) in spring 2019. Contrary to many other Grit-
based studies, this U of A study showed no statistically significant relation between students’ Grit scores and their fall GPA and persistence, when other predictors and covariates were controlled. It appears the Grit survey would not be a useful tool in helping U of A administrators and faculty identify online students who would benefit from additional support.
Acknowledgements

Earning a doctorate is not a solo accomplishment. A student reaches this goal thanks to the knowledge imparted by esteemed faculty; thanks to the long, tedious hours spent by passionate, caring faculty committee members who read countless versions of manuscripts; thanks to the encouragement of student peers and mentors; and thanks to the patience and support of family and friends. May every student be as lucky as I have been to feel the warm embrace of a learning community, a tribe of scholars, who inspire and amaze.
Dedication

To my parents, Gary and Sue Best, who have supported me in every goal I ever set, forever and always.
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CHAPTER ONE

Introduction

The higher education institutions are seeking means to increase retention and graduation rates (Cochran, Campbell, Baker, & Leeds, 2014; Hachey, Wladis & Conway, 2013; Simpson, 2013). The National Center for Education Statistics (2018) measured the number of all students, both traditional and online, who return to the same institution the following fall and reported the six-year completion rate for first-time, full-time bachelor’s degree-seeking students at public, private nonprofit, and private-for-profit institutions was 60% for the 2010 cohort. Retention in online classes is lower than in traditional face-to-face courses, by about 10% to 15% in some cases (Carr, 2000; Frydenberg, 2007; Ormond, 2013; Opp-Beckman, 2009). Failure to graduate hurts the students because they lose the money invested in education and future income they could gain as college graduates in the workforce (Jones-Schenk, Leafman, Wallace & Allen, 2017; Bureau of Labor Statistics, 2017). Failure to graduate hurts institutions that depend on performance-based funding models that reward higher retention and graduation rates (Hardy, 2016; Kerby, 2015). Therefore, institutions are looking for ways to increase graduation rates (Cochran et al., 2014; Hachey et al., 2013; Simpson, 2013). Graduation rates are dependent on students maintaining grades required by their academic programs and students enrolling in courses from one semester to the next.

Traditionally, higher education institutions have relied on cognitive assessments, which focus on intelligence, to help them predict which students are more likely to be successful academically (Burks et al., 2015; Duckworth, Peterson, Matthews, & Kelly, 2007; Chamorro-Premuzic & Furnham, 2003; Gottfredson, 2002; West, et al, 2016). Higher education institutions in the United States have relied heavily on the predictive validity of cognitive assessments to
determine whether students’ college applications are accepted (West, et al, 2016; Burks, Lewis, Kivi, et al., 2015). The use of these cognitive assessments increased over the past 80 years. The metrics used by colleges and universities to predict academic success – high school grades, strength of high school curriculum, and admission test scores – have remained the same over the past 20 years (Clinedinst, M. & Patel, 2018). Belasco, Rosinger and Hearn (2015) contend that most four-year higher education institutions rely on standardized test scores in the admissions process, using scores as predictors of future academic success. Alon and Tienda (2007) state that 94% of four-year higher education institutions used standardized tests as part of the admissions process. The number of people taking traditional cognitive assessments – including the Scholastic Aptitude Test (SAT) and the American College Testing (ACT) – tripled from the 1950s to the 2010s (Belasco, Rosinger, & Hearn, 2015). Much scholarly research affirms the validity of such assessments in predicting student achievement. After World War II, the number of people seeking entry to higher education grew, and institutions increased the use of cognitive assessments to be more selective of applicants (Alon & Tienda, 2007; Lemann, 1999; Posselt, Jaquette, Bielby, & Bastedo, 2012; Gumport, Iannozzi, Shaman, & Zemsky, 1997). Research has also found a positive correlation between high school grade point averages and university grade point averages (Richardson, Abraham, and Bond, 2012). Some critics argue that standardized cognitive tests do not measure traits and abilities that are also important to academic achievement (Alon and Tienda, 2007; Duckworth, Peterson, Matthews, & Kelly, 2007). Alon and Tienda (2007) and other critics of standardized tests argue that standardized tests do not consider students’ motivation and intellectual curiosity, which are important for learning and academic achievement. They also contend that standardized tests have “low predictive validity for future academic success” (Alon and Tienda, p. 490).
More recently, some institutions in the United States and the United Kingdom have expanded assessment tools used to predict academic success to include non-cognitive assessments that focus on personality traits (Chamorro-Premuzic & Furnham, 2003). These assessments that focus on personality traits have arisen from research regarding the Big Five Personality Traits (Big Five), which are inherent traits, of extroversion, agreeableness, conscientiousness, neuroticism and openness to experience (Stajkovic, et al., 2018; Satchell, Hoskins, Corr, & Moore, 2017; Soric, Penezic & Buric, 2017; Zhang & Ziegler, 2016; Burks, et al., 2015). Stajkovic and five other researchers (2018) conducted assessments of the Big Five traits, GMA and experience around the middle of the semester, conducted self-efficacy assessments about two weeks before final exams, and measured performance at the end of the semester. They found that conscientiousness, which is one of the Big Five, and emotional stability were predictive of self-efficacy and academic performance (Stajkovic, et al., 2018). Self-efficacy is not an inherent trait, like the Big Five, but rather a personality trait that, according to Social Cognitive Theory, adapts and changes based on a person’s individual experiences and decisions (Stajkovic, et al., 2018). In another study, British researchers found a significant correlation between the Big Five trait conscientiousness and academic performance (Chamorro-Premuzic & Furnham, 2003). Chamorro-Premuzic and Furnham (2003) found correlations between the scores from two personality measures – the NEO-FFI and the EPQ-R – and academic performance. “Conscientiousness was found to be the most important correlate and predictor of academic performance” (Chamorro-Premuzic & Furnham, 2003, p. 333).

The Grit-S assessment survey falls into the non-cognitive field of research (Duckworth & Quinn, 2009). Grit is related to conscientiousness, one of the Big Five traits (Duckworth & Quinn, 2009). Duckworth and Quinn (2009) posit that the Grit-S assessment tool is a valid
predictor of achievement in long-term goals, like attaining a college degree. Duckworth (2009) defines Grit as a “trait-level perseverance and passion for long-term goals” (p. 166). Duckworth posits that both perseverance of effort and consistency of interest are needed to meet in long-term, demanding goals, including academic and professional success. Many researchers in the last decade have used some form of the Grit assessment tool and found it to predict achievement in long-term goals (Aparicio, Bacao, & Oliveira, 2017; Hodge, Wright & Bennet, 2017; Eskreis-Winkler, Schulman, Beal, & Duckworth, 2014). Chinese researchers added validation data for the Grit Assessment survey by conducting Confirmatory Factor Analysis and test-retest validity in a study of high school subjects whose native language is Mandarin Chinese (Li, Zhao, Kong, et al., 2018). In this study, Chinese researchers concluded that scores on the Grit assessment offered adequate predictive validity for academic performance measured one month after the Grit assessment was administered (Li, Zhao, Kong, et al., 2018). “These findings suggest that the influence of Grit on academic success might be general across diverse cultures,” according to Li, Zhao, Kong and others (2018, p. 295).

**Student retention**

Various studies have explored the steps faculty and institutions have taken to retain students and help them succeed academically (Beckford, 2015; Cochran et al., 2014; Duff & Quinn, 2006; Dray, Lowenthal, Miszkiewicz, Ruiz-Primo, & Marczynski, 2011; Fetzner, 2013; Kerby, 2015; Lorenzetti, 2008; Opp-Beckman, 2009; Russo-Gleicher, 2013; Tobin, 2014; Wladis & Samuels, 2016). Strategies used to increase retention rates include enhancing student support services, building well-designed courses, enhancing orientation processes for first-year students, and identifying and prompting students who fall behind in coursework (Russo-Gleicher, 2013; Opp-Beckman, 2009; Duff & Quinn, 2006; Salaman, 2015).
While much research exists about retention strategies, less research is available about how to identify which higher education students might benefit most from retention strategies. Cochran, Campbell, Baker and Leeds (2014) posit that “perhaps there are certain characteristics or ‘risk factors’ about the student that can help educators predict who is more likely to drop out of an online course. If such factors do exist, intervention strategies could be developed to target students with these characteristics” (p. 28). Therefore, if a correlation were found between Grit-S assessment scores and retention from one semester to the next, Grit scores might be a predictive tool to identify students who could benefit from retention strategies. This study will focus on the relationship between Grit-S score and student retention. It does not address what retention strategies should be employed.

At the University of Arkansas and similar institutions, online student populations are included in overall reporting numbers, including retention and graduation rates, provided to the state and national agencies (University of Arkansas Office of Institutional Research and Assessment, 2017). However, online students in the United States and in the United Kingdom drop out of higher education programs at higher rates than traditional, on-campus students (Ormond, 2013; Opp-Beckman, 2009; Carr, 2000). Much research examines why college students drop out (Cochran et al., 2014; Fetzner, 2013; Lorenzetti, 2008). Online students face greater challenges including information technology support issues, isolation, lack of structure, and time-management issues (Russo-Gleicher, 2013). Time management issues include balancing school, family and work responsibilities.

While national enrollments in traditional, face-to-face higher education institutions is dropping – by more than a million students from 2012 to 2016 – enrollments of students studying exclusively online have increased for 14 years in a row, (Seaman, Allen & Seaman, 2018).
Nationally, 14.9% of higher education students – about 3 million – were studying exclusively online in 2016. The indication is that overall retention rates at higher education institutions are at risk of falling as more exclusively online students become a part of their overall enrollments.

**Statement of the Problem**

Higher education institutions – including the University of Arkansas – are still seeking solutions for increasing graduation rates, which is dependent on students making passing grades and continuing to enroll in courses through graduation (Cochran et al., 2014; Hachey et al., 2013; Simpson, 2013). Attrition before graduation hurts both students financially through loss of education investment and increased future income attributed to higher education (Jones-Schenk et al., 2017; Bureau of Labor Statistics, 2017). Attrition before graduation hurts institutions that receive funding based on performance models (Kerby, 2016; Hardy, 2016). Online students in the United States and in the United Kingdom drop out of higher education programs at higher rates than traditional, on-campus students (Ormond, 2013; Opp-Beckman, 2009; Carr, 2000).

Performance-based funding models for public institutions has become the trend within the past decade (Kerby, 2015). State funding for the University of Arkansas is now performance-based, not enrollment-based, and that performance rating of institutions in Arkansas looks at graduation rates as part of the formula (Hardy, 2016). In a matter related to U of A funding, Governor Asa Hutchinson called on higher education institutions in Arkansas to freeze tuition increases for the 2018-2019 academic year (Ramsey, 2018).

Higher education administrators across the nation are looking for ways to increase student retention, which facilitates student success in achieving long-term academic goals, such as earning degrees (Cochran et al., 2014; Hachey et al., 2013; Simpson, 2013). The National
Center for Education Statistics (2018) reported the six-year degree-completion rate from the first institution attended for first-time, full-time bachelor’s degree-seeking students at all four-year institutions – including public, private nonprofit, and private for-profit – was 60% for the 2010 cohort. The public institution subset of that cohort posted a 59% six-year degree-completion rate (National Center for Education Statistics, 2018). In some cases, retention in online classes is 10% to 15% lower than in traditional face-to-face courses (Carr, 2000). As noted above, the University of Arkansas Office of Institutional Research (OIR) and Assessment (2017) reported “Retention and Graduation 6-Year Graduation Rate” statement that the six-year graduation rate for undergraduate students, both online and on-campus students, for 2011 was 61.5%. Retention rates for online students alone were not available (University of Arkansas Office of Institutional Research and Assessment, 2017; Global Campus staff & Judges, 2017).

The concern of attrition in online learning has garnered increasing attention as the number of students enrolled in online classes in the United States and around the world continues to climb (Hachey et al., 2013; Simpson, 2013; Seaman, Allen & Seaman, 2018). The 2018 Babson Survey Group report states the total number of distance education enrollments – students who took at least one online course – has grown for fourteen years in a row in the United States, reaching 6,359,121 enrollments in fall 2016 (Seaman, Allen & Seaman, 2018). Of that total, more than 3 million were taking all of their courses at a distance and more than 3.35 million were taking a combination of on-campus and distance courses. Public higher education institutions enrolled 68.9% of all distance learners.

At the local level, the University of Arkansas seeks to increase retention efforts at its institution and is experiencing an increasing number of online students. The University of Arkansas (2018), a public, land-grant institution, recently adopted “Guiding Priorities” as part of
its strategic plan for the institution. The first of these “Guiding Priorities” is “Advancing Student Success,” which is the subject of this study. The “Advancing Student Success” priority includes “improving retention and graduation rates” (University of Arkansas, 2018). The U of A Global Campus (Global Campus staff & Judges, 2017) released its annual report that showed in academic year 2017, the total student enrollment at the U of A was 29,224, and more than 10% of that total, or 3,048 students, studied exclusively online. More than 42% of that total enrollment, or about 12,467 students, took at least one online course. According to data released by the University of Arkansas Global Campus, the number of students who took at least one online course at the University of Arkansas increased from 7,161 in academic year 2012-13 to 12,467 in academic year 2016-17). The number of students studying solely online increased from 1,217 in academic year 2012-13 to 3,048 in academic year 2016-17. In the academic year 2016-17 (AY17), the University’s total student population was 29,224. That means that 42.66% of all University of Arkansas students took at least one course online in AY17 and 10.43% of U of A students studied exclusively online. The overall retention and graduation six-year rate was 61.5 for Academic Year 2011, the most recent data posted by the U of A Office of Institutional Research and Assessment (2018). That rate included on-campus and online students, but no separate rate was listed for only online students.

The current study the relationship, if one exists, between Grit scores and two academic success points: (1) fall 2018 GPA and (2) persistence in spring 2019 in University of Arkansas online undergraduate programs. Persistence, in this reference, will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester.
Graduation requires that a student stay in college long enough to fulfill credit hour requirements and maintain grade-point requirements for academic programs. Predicting students who are at risk of leaving college could help institutions take preventive steps to help students. Currently there is a lack of research to determine whether non-cognitive traits like Grit, a combination of passion and perseverance, correlate to retention, meaning students’ persistence in higher education.

**Purpose of the Study**

The purpose of this study is to determine whether a correlational relationship exists between Grit-S assessment scores and (1) student grade point averages for the 2018 fall semester and (2) student persistence in the 2019 spring semester for undergraduate students studying in online degree programs at the University of Arkansas and grade point average. Persistence, in this reference, will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. This study seek to generate research data that would determine whether U of A student traits in perseverance and passion for long-term goals, as determined by Grit-S Scale scores, correlate to students’ likelihood of persisting in online classes, passing classes in the current semester and enrolling in the following semester. Specifically, the study will examine U of A students in online undergraduate degree programs and whether Grit assessment scores correlate to (1) grade point averages, which provide a numerical assessment of student success through a 4-point system at the U of A, and (2) whether students persisted in the 2019 spring semester, meaning they were retained by their academic programs by enrolling in classes or they graduated in fall 2018. The U of A uses a 4-point grading system, where 4.0 is an A (highest
grade), 3.0 to 3.9 is a B, 2.0 to 2.9 is a C, 1.0 to 1.9 is a D, and anything 0.9 and below is an F (lowest grade).

The predictor variable in this study is a student’s score on the Grit survey, a self-reporting instrument developed and refined by Angela Duckworth, a professor of psychology at the University of Pennsylvania who has devoted more than a decade of research to the theory of Grit (Duckworth, 2016). The theory of Grit posits that the higher a person’s Grit score is, the more likely that person is to succeed in long-term goals (Duckworth, 2016). The current study will attempt to expand the scope of Duckworth’s research to a new population by determining whether a correlation exists between U of A online students’ self-reported Grit scores and (a) their grade point average in the semester the Grit survey is offered and b) enrollment matriculation the following semester.

The question is whether the Grit-S assessment tool could help identify U of A students at risk of leaving college without a degree so that the U of A could provide academic support to help them remain in college. This study examines whether a correlation exists between the Grit-S assessment tool scores of U of A undergraduate students studying in five online degree programs and (1) semester grade point averages during the semester the survey was administered and (2) whether students persisted in the semester following the survey. If a correlation exists, Grit scores could be used to identify students at risk of making lower grades and not enrolling in the next semester of classes, U of A faculty could take steps to help students succeed. This study focuses on identifying students who would benefit from enhanced academic support, not the support that should be provided.
Significance of the Study

This study will contribute to the knowledge base regarding non-cognitive assessments as they relate to student retention by exploring whether the Grit assessment tool correlates to (1) semester grade point averages during the semester the survey was administered and (2) whether students persisted in the semester following the survey. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. If students who are at risk of dropping out or failing out of school could be identified through this predictor variable, a Grit score, the study could be significant to higher education officials who want to identify students who could benefit from enhanced academic support efforts. The U of A could use the Grit assessment tool to identify students who need extra support and decide what extra measures should be taken to help those students raise their grade point averages and continue to take courses at the U of A. Depending on whether a correlation is found, this assessment tool could be used by administrators and faculty at the U of A, and possibly other institutions, to identify online students in undergraduate online degree programs who are at-risk of dropping out of school or failing classes and could benefit from enhanced academic support.

Successful interventions could increase retention rates, which facilitate the achievement of long-term academic goals, like earning degrees (Tinto, 2004; Ryan & Glenn, 2002). Institutions nationwide are searching for ways to increase retention in online classes (Hachey et al., 2013; Simpson, 2013). The same is true at the University of Arkansas (U of A). U of A Chancellor Joseph Steinmetz lists “Advancing Student Success,” which includes increasing retention rates, as the first of the institution’s eight “Guiding Priorities” in the institution’s
strategic plan (University of Arkansas Strategic Plan, 2018). The University of Arkansas Guiding Priorities are:

1. Advancing student success
2. Building a collaborative and innovative campus
3. Enhancing our research and discovery mission
4. Enriching campus diversity and inclusion
5. Investing in faculty excellence
6. Promoting innovation in teaching and learning
7. Reaffirming our land-grant and flagship responsibilities
8. Strengthening graduate education

This study is related specifically to Guiding Priority No. 1: Advancing student success (University of Arkansas, 2018). The following is a list of University of Arkansas goals for this priority (1) increase retention and graduation rates, post-graduation employment, and graduation enrollment rates, (2) significantly increase recruitment and graduation rates of Arkansans, first-generation students (students whose parents do not hold higher education degrees), and several dimensions of diversity, (3) increase the number of transfer students and ease their transitions from targeted institutions. The following are University of Arkansas metrics for advancing student success (1) freshman retention rate, (2) four- and six-year graduation rate, both absolute and expected, (3) job and graduate school placement upon graduation, (4) out-of-pocket costs for students.

Collecting data to determine whether a relationship exists between student Grit scores and retention and between Grit scores and student success could offer the U of A a means of identifying students who could benefit from retention strategies. Improved retention rates in
online courses at the University of Arkansas could help the University gain more state funding through the relatively new performance-based funding model if improved retention rates increased the U of A’s graduation rates. Improved graduation rates help students by providing them with better paying jobs, as noted by the U.S. Department of Labor Statistics (2017). This study would also add to the base of research knowledge available regarding the study of online education and the psychology involved in predicting outcomes. Specifically, this study seeks to determine whether a correlational relationship exists between Grit-S assessment scores and (1) student grade point averages for the 2018 fall semester and (2) student persistence in the 2019 spring semester classes for undergraduate students studying in online degree programs at the U of A. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester.

This research is relevant to the field of adult and lifelong learning because most students studying exclusively online at the U of A are adult learners (Merriam & Bierema, 2014; Knowles, Holton & Swanson, 2005). The U of A Global Campus Annual Report (Global Campus staff & Judges, 2017) shows there are twice as many adult learners studying exclusively online in undergraduate online programs at the U of A than there are traditional students in those programs. The annual report (Global Campus staff & Judges, 2017) shows the total number of students studying exclusively online in undergraduate degree programs in academic year 2017 was 1,045, of which 346 students were between the ages of under 18 to 24, and 699 students were ages 25 and older. In online graduate degree programs, including a master’s degree from the School of Law, 85% of students studying exclusively online are adult learners, with 158 aged 20 to 24 and 1,845 ages 25 and older.
Research Questions

This study will address the research questions below.

1. Is there a correlation between the Grit-S assessment scores of undergraduate University of Arkansas students studying in five online degree programs and their 2018 semester grade point averages? The U of A uses a 4-point grading system, where 4.0 is an A (highest grade), 3.0 to 3.9 is a B, 2.0 to 2.9 is a C, 1.0 to 1.9 is a D, and anything 0.9 and below is an F (lowest grade).

2. Is there a correlation between Grit-S assessment scores of undergraduate University of Arkansas students studying in five online degree programs and persistence in the 2019 spring semester? Persistence, in this reference, will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester.

Experimental Hypothesis

This U of A researcher posits that if a relationship is discovered through the collection and analysis of data, that relationship might be predicted based on the theory of Grit, as introduced by Duckworth, Peterson, Matthews, and Kelly (2007). This research suggests that students who score higher on the Grit-S survey can be predicted to continue with classes and achieve academic success (Duckworth, Peterson, Matthews & Kelly, 2007; Duckworth, 2016.; Duckworth & Quinn, 2009). Therefore, alternative hypotheses, are offered.

1. There will be a correlation between the Grit-S assessment scores of undergraduate U of A students studying in five online degree programs and their 2018 semester grade point averages? The U of A uses a 4-point grading system, where 4.0 is an A (highest grade),
3.0 to 3.9 is a B, 2.0 to 2.9 is a C, 1.0 to 1.9 is a D, and anything 0.9 and below is an F (lowest grade).

2. There will be a correlation between Grit-S assessment scores of undergraduate U of A students studying in five online degree programs and whether students persisted in the 2019 spring semester? Persistence, in this reference, will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester.

Research Design

The participants of this study will consist of University of Arkansas undergraduate students studying in five online degree programs in the College of Education and Health Professions, the J. William College of Arts and Sciences, and the Sam M. Walton College of Business. Students will be identified by the Office of the Registrar as students in online degree programs. An internet survey using Qualtrics will collect (1) Grit-S assessment data and (2) demographic information, including age, gender identification, academic program, and student level (e.g. freshman, sophomore, etc.), and (3) consent to access two academic snapshots: students fall 2018 grade point averages and whether students enrolled in courses in spring 2019. The Office of the Registrar will provide grade point averages and spring 2019 enrollment information for students who grant permission through the internet survey.

The survey was offered to all U of A students in undergraduate online degree programs through two means: (1) all students received an email invitation and three follow-up email messages in October and (2) some students accessed the survey through a link posted by faculty in announcements in classes in Blackboard, the University’s platform for online course delivery. The researcher asked faculty and instructors to offer the survey through a class announcement,
but faculty and instructor participation was voluntary, and the researcher does not know how many participated. Survey data was collected using Qualtrics, the University’s preferred survey tool.

Data collected will include (1) Grit assessment scores, (2) grade point averages, and (3) whether students enrolled in spring 2019 courses, as well as self-reported demographic information: academic program, academic level (e.g. Freshman, sophomore, etc.), age, gender identification, and high school grade point average. The predictor variable, Grit scores, and demographic data were collected and stored in Qualtrics. The researcher will import data into IBM SPSS statistics software. SPSS will be used to analyze the data, specifically looking for correlations between the predictor variable, Grit scores, and the dependent variables: (1) 2018 fall semester grade point averages and (2) whether (yes or no) students persisted in 2019 spring semester courses. Persistence, in this reference, will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. Demographic data will be used as constants in multiple regression analysis.

**Theoretical Framework**

The theory of Grit posits that the higher a person’s Grit score is, the more likely that person is to succeed in long-term goals (Duckworth, 2016). Duckworth and Quinn (2009) posit that Grit – a compound trait comprised of stamina in dimensions of interest and effort, which can be measured by a self-reporting scale – is a valid predictor of achievement in long-term goals, like attaining a college degree, in “challenging domains over and beyond” other measures (p. 166). In one Grit study, success meant staying, not dropping out, of an intensive summer training program at the United States Military Academy at West Point, and another study defined success
as becoming a finalist in the National Spelling Bee (Duckworth, 2016). This study looks at passing grades and moving from one semester to the next as steps toward graduation, which is an academic success milestone. The study will attempt to explain whether one independent variable, Grit, correlates with two dependent variables (a) retention in online courses and (b) grade point averages, two steps necessary toward reaching the graduation milestone.

**Limitations**

There are several major limitations to this research study. First, the Grit-S scale assessment and questions related to demographics and past intelligence assessments are based on self-reported data. Duckworth, Peterson, Matthews and Kelly (2007) report that the “limitations of self-report instruments are well-known” (p. 1099), citing Lucas and Baird (2006) and Paulhus (1991).” Second, Duckworth, Peterson, Matthews, and Kelly (2007) stated, “The Grit Scale is relatively transparent and, therefore, particularly vulnerable to social desirability bias” (p. 1099). Third, Duckworth, Peterson, Matthews, and Kelly (2007) note that current research does not explore how Grit “relates to other variables known to predict achievement, such as self-efficacy (Bandura, 1977), optimistic explanatory style (Seligman & Schulman, 1986), and locus of control (Rotter, 1966)” (p. 1100). Fourth, the small population of this study, about 1,000 University of Arkansas students studying in undergraduate online degree programs, limits its ability to be generalizable. The intent of the research is to add to the body of research knowledge by adding another population or sample that examines the predictability of the Grit assessment scale. Generalizable statements should consider the entire body of Grit research, not this study alone.

A delimitation of the current study is the short time range in which it compares the Grit-S scale scores of undergraduate students in online degree programs at the University of Arkansas
during fall 2018 and compares those scores with (1) students’ semester grade point averages for the semester of fall 2018 and (2) whether students persisted in spring 2019. Persistence, in this reference, will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. The time period was set within the graduation expectations of the doctoral researcher, who must complete a dissertation in order to fulfill requirements of the degree program. While the current study is in the spirit of Duckworth’s research with a snapshot of West Point cadets who complete the summer camp, as described in her 2016 book, the short time frame is a limitation. The current study could be enhanced by extending the research period over years. Another delimitation could be the population, which was selected to benefit the University of Arkansas.

Definition of Terms

This definition of terms is written for knowledgeable peers and is intended to provide necessary definitions for terms that may not otherwise be clear or terms that may have more than one meaning.

Grit is defined as a compound character trait consisting of passion and perseverance, as defined by Duckworth et al. (2007).

Distance education includes online delivery of courses and programs (Seaman, Allen, & Seaman, 2018).

Academic success is defined as maintaining passing course grades required by programs and institutions. According to academic regulations at the University of Arkansas, course grades and marks are A, outstanding (4.0); B, good achievement (3.0); C, average achievement (2.0); D, poor, but passing (1.0); F, failure, unsatisfactory work (0.0); XF, failure, academic dishonesty; I,
Incomplete course requirements; AU, audit; CR, credit without grade points; R, registered, no credit; S, satisfactory work without credit; W, withdrawal (University of Arkansas, undergraduate catalog of studies, 2018).

Retention, for the purposes of this study, is defined as continuing in coursework from one semester to another toward the goal of college graduation.

**Summary**

The purpose of this study is to determine whether a correlational relationship exists between Grit-S assessment scores and (1) student grade point averages for the 2018 fall semester and (2) whether student persisted in the 2019 spring semester in undergraduate online degree programs at the University of Arkansas. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. The researcher will use an internet survey to collect Grit-S assessment scores, demographic information, and permission to access two points of academic date from the Office of the Registrar: (1) student grade point averages for the 2018 fall semester and (2) student enrollment in the 2019 spring semester classes for undergraduate students studying in online degree programs at the University of Arkansas. The Office of the Registrar also provided 2018 graduate data. Data will be collected through Qualtrics, the University’s preferred survey tool, and through records maintained by the Office of the Registrar. Data will be analyzed using IBM SPSS statistics software.
CHAPTER TWO

Literature Review

The purpose of this study is to determine whether a correlational relationship exists between Grit-S assessment scores and (1) student grade point averages for the 2018 fall semester and (2) student persistence in the 2019 spring semester classes for undergraduate students studying in online degree programs at the University of Arkansas. The literature review in this chapter will explore retention in higher education, both in traditional and online learning environments; traditional cognitive assessments in higher education; non-cognitive assessment tools, Grit assessments, and retention at the University of Arkansas.

Each year, the National Center for Education Statistics (2018) measures the number of students who return to the same institution the following fall. The center reported in 2018 that the retention rate for first-time, full-time degree-seeking undergraduates at all 4-year degree-granting institutions – including public, private nonprofit and private for-profit – was 81% from 2015 to 2016. That 81% retention rate was the same for public institutions. That represents an increased attrition rate of 19% from 2015 to 2016. The six-year degree-completion rate from the first institution attended for first-time, full-time bachelor’s degree-seeking students at all four-year institutions – including public, private nonprofit, and private for-profit – was 60% for the 2010 cohort (National Center for Education Statistics, 2018). The public institution subset of that total posted a 59% six-year degree-completion rate (National Center for Education Statistics, 2018).

Retention in Online Education

The Higher Education Coordinating Board (2015) within the Arkansas Department of Higher Education, defines “instruction delivered by distance technology” (p. 113), also known as
online learning, as learning in which the majority of instruction, at least 50%, “occurs with a separation of place or time between the instructor and the students and with interaction occurring through electronic media” (p.11). In some cases, retention in online classes is 10% to 15% lower than in traditional face-to-face courses (Carr, 2000). In a United Kingdom study, Ormond (2013) reported that distance institutions had less than one-quarter of the graduation rates of conventional institutions. “Even programs and courses with excellent content and faculty are negatively affected by high attrition rates and are at risk for overall program failure” (Opp-Beckman, 2009, p. 20). This phenomenon is important to note as online enrollments across the nation, and at the University of Arkansas, continue to rise.

An annual national report issued by a group of entities, including the Babson Survey Research Group, shows the number of distance education students across the nation grew to 6,359,121 who are taking at least one online class in 2016, which represented 31.6% of all students (Seaman, Allen, & Seaman, 2018). This percentage, 31.6%, was an increase from 2012, when 25.9% of all higher education students were taking at least one online class. The number of students who studied exclusively online was 3,003,080 in 2016, which represented 16.7% of higher education enrollments (Seaman, Allen, & Seaman, 2018). The 16.7% percentage rate was an increase from 2012, when 13.3% of higher education enrollments were classified as students studying exclusively online. Following the national trend, online enrollments continue to increase at the University of Arkansas (U of A). The Global Campus (Global Campus staff & Judges, 2017) reported that 3,048 U of A students studied exclusively online in 2017, which was 10% of the U of A’s total enrollment of 29,224 students for Academic Year 2017. The number of U of A students who took at least one online class, including exclusively online students, was
12,467, which represents about 43% of the total student population for Academic Year 2017 (Global Campus staff & Judges, 2017).

Much research explores why college students are unsuccessful, including students falling behind on assignments, a lack of student support, poor communication between instructors and students, ineffective teaching methods, and poor course design that outlines objectives and assessments (Cochran et al., 2014; Fetzner, 2013; Lorenzetti, 2008). Researchers also have explored online student retention tools and other efforts employed to retain students (Beckford, 2015; Cochran et al., 2014; Duff & Quinn, 2006; Dray et al., 2011; Fetzner, 2013; Kerby, 2015; Lorenzetti, 2008; Opp-Beckman, 2009; Russo-Gleicher, 2013; Tobin, 2014; Wladis & Samuels, 2016). Rizkallah and Seitz (2017) identified and studied what motivates students as a means to increase retention in higher education, and they contend that students’ needs, problems and aspirations change from year to year. Rizkallah and Seitz (2017) conclude that retention strategies should extend beyond the first two years of college to address those year-to-year changes.

**Traditional Assessments in Higher Education**

Much scholarly research focuses on the importance of cognitive abilities, such as intelligence, in predicting academic achievement and other long-term outcomes (Burks et al., 2015; Duckworth, Peterson, Matthews, & Kelly, 2007; Chamorro-Premuzic & Furnham, 2003; Gottfredson, 2002). There also is vast amount of academic research that explores how, why and whether higher education institutions should use predictive tools, including college entrance exams to predict academic success (West et al., 2016; Burks et al., 2015). Academic research documents the rapid growth in the number of people in the United States who sought higher education following World War II. This growth can be attributed to soldiers returning from
WWII; the unprecedented number of births of baby boomers, born between 1946 and 1964; and
the GI Bill of Rights, which provided financial assistance to American soldiers to seek higher
education following wars, including World War II and the Korean war (Alon & Tienda, 2007;
higher education prior to World War II were male, white and affluent (Gumport, Iannozzi,
Shaman, & Zemsky, 1997). The U.S. Bureau of Census reported that 16% of college-age
population were non-white in 1970 and 35% in 2000 (Alon, S. & Tienda, M, 2007). Belasco,
Rosinger, and Hearn (2015, p. 207) stated:

As college applications surged across the United States, selective colleges, in particular,
were compelled to adopt new screening methods to sort through larger, more competitive,
and increasingly heterogeneous applicant pools (Alon & Tienda, 2007; Lemann, 1999;
Posselt, Jaquette, Bielby, & Bastedo, 2012): and many such institutions began to rely on
standardized testing as one admissions screening mechanism.

Thus, the use of college entrance exams increased.

The number of people who took college entrance exams, such as the Scholastic Aptitude
Test (SAT), launched in the 1920s, and American College Testing (ACT), launched in the 1960s,
grew dramatically from the 1950s to the 2010s (Belasco, Rosinger, & Hearn, 2015). In the
1950s, more than half a million high school students took the SAT exam annually, and, in 2012,
the number of high school students who took the SAT or the ACT exceeded 1.6 million
(Belasco, Rosinger, & Hearn, 2015). A great amount of academic research affirms the validity of
SAT and ACT scores in predicting academic performance in higher education. “Despite
extensive research challenging the predictive validity of standardized tests, there are several
recent studies indicating that the SAT and ACT continue to predict academic performance, even
when background is considered (e.g., Bettinger, Evans, & Pope, 2011; Sackett, Kuncel, Arneson,
& Waters, 2009; Sackett et al., 2012). “While education researchers debate the merits of
standardized testing, the overwhelming majority of selective colleges and universities continue to hold firm to their standardized testing requirements and use standardized test scores, among other academic and extracurricular factors, in making admissions decisions” (Belasco, Rosinger, & Hearn, 2015, p. 208).

Researchers have also examined how colleges use high school grade point averages (GPA) in admissions selections and the correlation between high school GPAs and college academic achievement. Research by Richardson, Abraham, and Bond (2012) found a positive correlation between high school GPA and college GPA, and they suggested that a person’s high school GPA is a stronger predictor of college GPA than standardized college entrance exams, such as the ACT and SAT. Farkas (2003), too, suggested that high school GPAs were better predictors of academic performance in higher education institutions than were standardized college entrance exams. Alon and Tienda (2007, p. 490) said,

Critics argue that standardized tests do not measure abilities that are important for learning, such as motivation, imagination, and intellectual curiosity, and that the tests are biased against women, minorities, and students from low socioeconomic backgrounds (Blau, Moller, and Jones, 2004; Camara and Schmidt, 1999; Crouse and Trusheim, 1988; Fischer et al., 1996; Freedle, 2003; Sacks, 2000; Wells, 1978).

Non-Cognitive Assessments

There is emerging research on non-cognitive assessments, or non-intelligence-based assessments, and their ability to predict academic achievement in higher education. This includes research about the Big Five Personality Traits – extroversion, agreeableness, conscientiousness, neuroticism, and openness – to experience and how they enable or hinder academic promise (Stajkovic, et al, 2018; Satchell, Hoskins, Corr, & Moore, 2017; Soric, Penezic & Buric, 2017; Zhang & Ziegler, 2016; Burks et al., 2015). Studies have also investigated other non-cognitive predictors of academic success, including student characteristics such as age, gender, and
race/ethnicity (Cochran et al., 2014), and student motivation in online courses, including engaging learning environments (Duff & Quinn, 2006).

Research explores non-cognitive predictors of academic success, many of which explore personality traits (Stajkovic, et al, 2018; Satchell, Hoskins, Corr, & Moore, 2017; Burks et al., 2015; Chamorro-Premuzic. & Furnham, 2003). For example, Tom Reeves proposed at a 2017 Association for Educational Communications and Technology (AECT) conference a graphic, or “mindmap,” that connected multiple non-cognitive concepts, linking Conation (Reeves & Rogers, 2017; Quinn, 2017). Conation, which refers to the learners’ intent to learn, and Authentic Learning, which refers to learning through collaborative problem-solving, with Grit (Quinn, 2017). Grit is defined as a compound trait comprised of stamina in the dimensions of interest and effort (Duckworth & Quinn, 2009).

Researchers in the Netherlands contend that higher education institutions should collect personality data when students enter institutions and then the institutions should use that information to help students (Kappe & Henk, 2012). Those Netherlands researchers issued a survey that measured intelligence, the Big Five personality traits (including conscientiousness), motivation, and four personality traits. Kappe and Henk (2012) concluded that highly conscientious students might benefit from more challenging honors programs, while students with lower scores on conscientiousness might benefit from more structured programs that offered frequent deadlines, shorter assignments and clearly defined goals.

Beatie, Laliberte, and Oreopoulos (2018) studied student outliers, meaning students with extremely low or extremely high grade point averages, on three Toronto, Canada, campuses. The outliers were described as divers, students whose first-year college grade point averages were far below expectations, and thrivers, students whose first year college grade point averages exceeded
expectation. They found that divers, those who underperformed, had the propensity to procrastinate and were less conscientious than their peers and thrivers, those who over performed, expressed that they were more purpose-driven and conscientious.

Grit

Various researchers have explored Grit, a compound trait of passion and perseverance, in recent years, adding to the overall body of knowledge in the fields of psychology and education (Duckworth, Peterson, Matthews, & Kelly, 2007; Duckworth & Quinn, 2009; Duckworth, 2013; Duckworth, 2016; Perkins-Gough & Duckworth, 2013; Von Culin, Tsukayama, & Duckworth, 2014; West et al., 2016). These scholars found Grit to be a predictor of achievement toward long-term goals in a variety of settings and populations. The first Grit scale, Grit-O, meaning original, offered 12 questions and was found to be a valid predictor of long-term goals (Duckworth et al., 2007). The latest Grit survey, to be used in this research, is the Grit-S, meaning short, survey, which offers eight questions, which will be explained below (Duckworth & Quinn, 2009).

Duckworth explored Grit in her 2006 dissertation, and her continuing research on Grit rose to prominence through Duckworth’s 2013 Ted Talk and her 2016 book, *GRIT: The Power of Passion and Perseverance*. Duckworth and Quinn (2009) posit that Grit – a compound trait comprised of stamina in dimensions of interest (passion) and effort (perseverance), which can be measured by a self-reporting scale – is a valid predictor of achievement in long-term goals, like attaining a college degree, in “challenging domains over and beyond” (p. 166) other measures. Duckworth (2009) defines Grit as a “trait-level perseverance and passion for long-term goals” (p. 166), and she contends that both perseverance of effort and consistency of interest are needed to meet in long-term, demanding goals, including academic and professional success. Duckworth
(2016) describes the Grit Scale as “a test that, when taken honestly, measures the extent to which you approach life with Grit” (p. 9). Duckworth (2016) posits that the Grit assessment survey can more accurately predict success in long-term goals than traditional measures, such as standard achievement exams and grade point averages. Duckworth and Quinn (2009) published the article “Development and Validation of the Short Grit Scale (Grit-S),” which included six studies that use the Grit-S scale to determine the differential predictive validity of that scale on long-term goals, including the likelihood of higher educational attainment of adults and the likelihood that cadets at the U.S. Military Academy, West Point, would not drop out during a summer camp. Duckworth used the Grit survey to predict which cadets at the United States Military Academy at West Point would drop out of the academy during their first summer, which is a seven-week training program called the “Beast” (Duckworth, 2016, p. 9). Duckworth’s West Point study focused on the “Beast” milestone as intermediary step in the journey to graduation from West Point, which was the long-term goal.

Duckworth began exploring non-IQ predictors of achievement, including Grit, in her dissertation at the University of Philadelphia in 2006. Since then, scholars have explored Grit’s predictive ability on educational success (Duckworth, Peterson, Matthews, & Kelly, 2007; Duckworth & Quinn, 2009; Duckworth, 2013; Duckworth, 2016; Perkins-Gough & Duckworth, 2013; Stokas, 2015; Von Culin, Tsukayama, & Duckworth, 2014; West et al., 2016). Duckworth, Peterson, Matthews, and Kelly (2007) introduced the concept of Grit and the use of the original Grit Scale (Grit-O). Eskreis-Winkler, Schulman, Beal, and Duckworth (2014) explored the “Grit effect” and the Grit scale’s ability to predict retention in the military, workplace, school, and marriage, calculating Grit scores based on participants responses to eight statements about persistence and passion.
Duckworth, Peterson, Matthews, and Kelly (2007) looked at six studies and found that the Grit was a valid predictor of achievements in different areas, ranging from success in a summer intensive training session for cadets at West Point to National Spelling Bee finalists. The found that Grit did not relate positively to IQ but was highly correlated with one of the Big Five traits: Conscientiousness. They found that “across six studies, individual differences in Grit accounted for significant incremental variance in success outcomes over and beyond that explained by IQ, to which it was not positively related” (p. 1098). The researchers defined success outcomes as “vocational and avocational achievements that are recognized by other people” (p. 1087) rather than achievements that may be valued subjectively by individuals.

Hodge, Wright, and Bennet (2017) found a positive correlation between Grit scores and university students’ academic outcomes. They also found these positive correlations increased with students who were the first in their families to attend higher education institutions (Hodge, Wright, and Bennet, 2017). Aparicio, Bacao, and Oliveira (2017) studied Grit as a determinant of e-learning systems success. Their research studied student’s skills and their online learning systems’ characteristics. Aparicio, Bacao, and Oliveira (2017) found that Grit has a positive effect on satisfaction and in students’ individual performance, and they stated that their study’s results could help improve online learning strategies. Bowman, Hill, Denson, and Bronkema (2015) studied the two dimensions of Grit – passion (effort) and persistence (consistency in interest) – and found that passion is more predictive than perseverance for college education outcomes. Strayhorn (2014) further expanded Grit research by studying Grit’s role in academic success of black, male university students at a predominately white institution. Strayhorn found that the Grit scores of black males were positively related to the college grades of those students.
Grit scores added incremental predictive validity beyond the use of high school grade point averages and scores on the American College Test.

Grit research has attracted global scholars. Researchers in the Philippines posit that Grit scale powers to predict positive student outcomes in a collectivist society can be enhanced by adding a third indicator, adaptability to situations, to the two Grit indicators, passion and perseverance (Datu, Yuen, & Chen, 2015). Suran and Woo (2017) studied the effects of Grit on academic achievement of university students in Korea, and found a positive correlation between Grit scores and higher grades.

Although the U.S. Department of Education did not recommend Grit as an college entrance assessment, the department did recognized a form of Grit in a policy document that encouraged educators to design learning environments that promote Grit, tenacity, and perseverance (Shechtman, DeBarger, Dornsife, Rosier & Yarnall, 2013).

We integrate these big ideas from several related definitions in literature to a broad, multifaceted definition of Grit for the purpose of this report: “Perseverance to accomplish long-term or higher-order goals in the face of challenges and setbacks, engaging the student’s psychological resources, such as their academic mindsets, effortful control, and strategies and tactics.” (p.vii)

The document stated that non-cognitive factors such as Grit, tenacity, and perseverance were essential to an individuals’ ability to succeed in long-term goals while facing challenges and obstacles in the 21st Century.

Stokas (2015) explained that the concept of Grit has evolved over the last century in the United States and has only recently been defined by Duckworth and Quinn (2009) in the Grit assessment scale and researched by scholars. Stokas noted Grit is a part of American cultural history, and she pointed to the 1968 book True Grit by Charles Portis. A character in that book, cowboy Rooster Cogburn, was noted for possessing the desirable character trait of Grit, one who
is relentless and follows through with goals. Stokas stated there is downside to linking Grit with achievement, and noted that “President Theodore Roosevelt transformed Grit into a glamorized trope to legitimate vast suffering” (p. 516) in the early 1900s, indicating that people with Grit could heroically overcome inequities in social, financial and educational resources. Stokas said Grit is not a solution to inequality, and she warned that placing too much emphasis on Grit today poses a risk that that educators and society could attribute an individual’s lack of achievement to a lack of Grit rather than focusing on an individual’s lack of educational and social resources.

I posit that without understanding that Grit has been used as a cultural trope to legitimate individual success while ignoring the systemic reasons for its need, we risk continuing to entrench the systemic inequality that educational researchers, such as Diane Ravitch, have identified as the root of underachievement in schools (p. 515).

**Grit Limitations and Criticism**

The Grit assessment scale has limitations on individual diagnosis for children that should be considered if schools want to use Grit scores for tracking or remediation decisions for children (Duckworth & Yeager, 2015). The Grit scale, a self-reporting instrument, cannot diagnose an individual child’s self-control or Grit without considering situational and group-specific biases (Duckworth & Yeager, 2015).

The Grit assessment can be “particularly vulnerable to social desirability bias” because it is a relatively transparent tool (Duckworth, Peterson, Matthews & Kelly, 2007, p. 1099). Social desirability bias is the tendency for people to deny actions and behaviors that are socially undesirable and to claim desirable ones (Chung & Monroe, 2003). However, in 2009, Duckworth and Quinn contend the majority of outcomes of six of their Grit studies were “objectively measured, which effectively rules out the possibility of social desirability bias as an omitted third variable that accounts for these associations” (p. 173).
Zimmerman and Brogan (2015) tested the Grit assessment by surveying one class of recent law school graduates, and they found that the survey results did not support their hypothesis that high Grit scores would be positively correlated with law school GPA. “We expected that grittier students would be more academically successful in this environment” (Zimmerman & Brogan, 2015, p. 141). However, no significant correlations were found between high Grit scores and higher GPAs. It should be noted participants in this study graduated from law school, then were asked to take the Grit assessment, and their GPAs reported before they took the Grit exam were used in the research.

Research findings by Crede, Tynan and Harms (2016) from a meta-analytic review of Grit literature suggest that the validity of may need to be revisited for Grit assertions: (1) “Grit is a higher order construct composed of a perseverance facet and a consistency facet,” (2) “Grit scores are highly predictive of success,” and (3) “Grit scores provide information about individuals that is meaningfully distinct from conscientiousness” (p. 501). Crede, Tynan and Harms (2016) contend that factor analysis did not show Grit as a higher-order construct based on limitations in the methodology information. Other predictors – such as cognitive ability and study habits – offered stronger correlations with academic performance than did Grit (Crede, Tynan, & Harms, 2016). Finally, “the size of the correlation (p = .84) with overall conscientiousness is so strong as to not only limit the incremental value of Grit scores for the prediction of performance over and above conscientiousness but also suggest that Grit may be redundant with conscientiousness” (Crede, Tynan & Harms, 2016, p. 502). Crede (2018) reiterated these findings (Crede, Tynan & Harms, 2016) in an essay critical of Grit. Crede (2018) suggests that educational institutions direct limited resources to predictive variables, e.g. cognitive ability and study habits, that offer stronger correlations to academic success and
performance than Grit. Crede (2018) contends that Grit is “largely a repackaging of conscientiousness – a widely studied personality trait” and that Grit literature “is currently characterized by a number of serious theoretical and empirical challenges ranging from a lack of construct validity, discriminant validity, and predictive validity” (p. 610).

Scholars will publicly present their criticisms of Grit at a symposium at the American Education Research Association in Toronto on April 8, 2019 (Barshay, 2019). Duckworth, the psychology professor at the University of Pennsylvania, responded to peer criticism in a March 11, 2019, article, saying, “I wish I had gotten everything right. But I am also a scientist, and this is what science is. A field can never be one person’s work, and scientists should disagree” (Barshay, 2019). Duckworth said there are problems with the Grit survey questions, adding that she wished she had used more questions that focused on the long term (Barshay, 2019).

**Retention at the University of Arkansas**

The University of Arkansas Office of Institutional Research (OIR) and Assessment (2018) reported in its 2017 “Retention and Graduation 6-Year Graduation Rate” statement that the six-year graduation rate for undergraduate students for 2011 was 61.5%, which was lower than 2010’s 64.5% rate and higher than 2007’s 60.1% rate. OIR reported a first-year retention rate of 82.2% for 2016. Information about retention and graduation rates for online students at the University of Arkansas is not readily available on official reporting sites. OIR (2018) reports of retention and graduation rates do not separate online from on-campus students. The Global Campus (Global Campus staff & Judges, 2017) did not report retention numbers for online programs overall or individually.
Performance-Based Funding Formulas

Historically, higher education institutions received state funding based on enrollment numbers, but that is changing (Hardy, 2016; Hillman & Corral, 2018). Twenty-one states have adopted or redesigned performance-based funding (PBF) models for higher education institutions over the last 10 years in an effort to hold institutions accountable for productivity (Hillman & Corral, 2018). These PBF models tie state funding for institutions to outcomes, such as the “number of degrees awarded, number of transfer students, retention rates, credit-hour accumulation, course completions, job placements and research funding received” (Hillman & Corral, 2018, p. 1758).

The Arkansas Department of Higher Education Coordinating Board (ADHECB) recently approved Arkansas Governor Asa Hutchinson’s plan to switch the state funding model for higher education institutions from an enrollment-based model to a performance-based model (Hardy, 2016). A June 8, 2017, press release (Lewis) from ADHECB states:

The Arkansas Higher Education Coordinating Board (AHECB) met on Monday, May 22, for a special board meeting to review the metrics associated with the new productivity method of calculating funding recommendations for state-supported institutions of higher education. … Arkansas Act 148 of 2017 instructed the Coordinating Board to adopt policies necessary to implement productivity-based funding model. The meeting was the first step in that process. The new productivity-based funding methodology will be used to determine funding recommendations for state-supported institutions of higher education starting with the 2018-19 academic year.

To date, there has been no additional information about the performance funding formula. But it is reasonable to expect that the University of Arkansas will be under financial pressure to retain students and increase its number of bachelor’s degree graduates.

Efforts to Increase Graduation Rates and Support Student Success

Much research has focused on retention strategies in higher education. Scholars have explored the possibility of increasing retention rates by enhancing student support services,
better online course design, increasing instructor contact with online learners, prompting online learners who fall behind in course assignments, enhancing online learning environments, and enhancing student engagement in online courses (Russo-Gleicher, 2013; Opp-Beckman, 2009; Duff & Quinn, 2006). Other research focuses on the quality of course design, rubrics used by faculty and instructional designers to enhance learning, and the value of faculty and peer-review of online courses (Quality Matters, 2018).

Salaman (2015) posited that online students need better on-boarding programs to help avoid primal human “fight-or flight” reactions to the stress of unfamiliar virtual environments and procedures. Salaman (2015) created a chart to help online educators identify stressors and the student reactions that could follow. That researcher also offers recommended design and communications to reduce student stress.

The University of Arkansas (U of A), too, has developed retention strategies for the overall student population. The U of A Office for Faculty Development and Enhancement (2018) administers a mandatory, one-hour course for traditional, on-campus freshmen called University Perspectives: Destination Graduation. It is designed to increase student retention rates through enhanced engagement, critical thinking, and civic engagement, as well as other topics to strengthen student learning. The University of Arkansas has also developed a network of programs and services to enhance student success, with the ultimate goal of increasing retention and graduation rates. That network is the U of A Center for Learning and Student Success (2018), which offers academic coaching, supplemental instruction, tutoring, and writing support. Many of the services and resources provided to on-campus students are also offered to online students (University of Arkansas ONLINE, 2018). U of A University Libraries (2018) also provides a Distance Learning Library, created specifically for online students.
Institutions nationwide, including the University of Arkansas, search for ways to increase retention in online classes (Hachey et al., 2013; Simpson, 2013). U of A Chancellor Joseph Steinmetz lists “Advancing Student Success,” which includes increasing retention rates, as the first of the institution’s eight “Guiding Priorities” in the institution’s strategic plan (University of Arkansas Strategic Plan, 2018). The University of Arkansas Guiding Priorities are:

1. Advancing student success
2. Building a collaborative and innovative campus
3. Enhancing our research and discovery mission
4. Enriching campus diversity and inclusion
5. Investing in faculty excellence
6. Promoting innovation in teaching and learning
7. Reaffirming our land-grant and flagship responsibilities
8. Strengthening graduate education

This study provides data specific to Guiding Priority No. 1: Advancing student success (University of Arkansas, 2018). The following is a list of University of Arkansas goals for this priority (1) increase retention and graduation rates, post-graduation employment, and graduation enrollment rates, (2) significantly increase recruitment and graduation rates of Arkansans, first-generation students (students whose parents do not hold higher education degrees), and several dimensions of diversity, (3) increase the number of transfer students and ease their transitions from targeted institutions. The following are University of Arkansas metrics for advancing student success (1) freshman retention rate, (2) four- and six-year graduation rate, both absolute and expected, (3) job and graduate school placement upon graduation, (4) out-of-pocket costs for students.
Conclusion

The summary of the above literature review indicates there is a gap in the knowledge about whether Grit-S assessment scores correlate with (1) semester grade point averages and (2) semester-to-semester enrollment in courses for undergraduate students studying in online degree programs at public research institutions, such as the University of Arkansas. This study will examine that gap through an Internet survey and qualitative analysis, as will be described in Chapter 3.
CHAPTER THREE

Methodology

The purpose of this study is to determine whether a correlational relationship exists between Grit-S assessment scores and (1) student grade point averages for the 2018 fall semester and (2) student persistence in the 2019 spring semester in undergraduate online degree programs at the University of Arkansas. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. This study examines whether Grit assessment scores show a correlational relationship with whether students make satisfactory grades and enroll in classes from one semester to the next, which are steps toward the long-term goal of graduation, or earning a bachelor’s degree. A correlational relationship could identify online students who are at a higher risk of dropping out of classes or making failing grades, which are indicators of student success. Predictive ability will be measured through correlational statistics.

Research Design

The University of Arkansas Institutional Review Board approved this survey research study on September 24, 2018 (see Appendix A). Duckworth (2018) granted this U of A researcher permission to use the Grit-S survey through (1) an email on June 26, 2018 and (2) written permission on her research website (Duckworth, 2018; see Appendix B). This study examines three variables. The first, the predictor variable, will be students’ scores on the Grit-S Scale Survey, an eight-question survey that measures Grit, a compound trait of passion and perseverance (Duckworth & Quinn, 2009). Grit scores and demographic data will be collected using an internet survey tool, Qualtrics, that will be explained in the data-collection section below. The last two variables, dependent variables, are (1) students’ fall semester 2018 grade
point averages and (2) whether – yes or no – students persisted in spring 2019. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. The dependent variables were collected through student records in the Office of the Registrar for those students who granted permission to access to this information through questions on the survey. These three data points were entered into IBM SPSS 24 statistical software to determine whether a correlation exists between the predictor variable (Grit scores) and the two dependent variables (grade point averages for fall 2018 and student persistence in spring 2019). Details will be explained in the data processing and analysis section below. Statistical analysis will determine whether the null hypothesis can be accepted or rejected. The null hypotheses state:

1. There will be no statistical correlation between Grit scores and grade point averages.
2. There will be no statistical correlation between Grit scores and whether students persist in spring 2019 classes.

Setting and Participants

The population of this study included all students enrolled in fall 2018 in five online undergraduate degree programs at the University of Arkansas: Bachelor of Science in Education in Human Resource and Workforce Development (HRWD), the Registered Nurse to Bachelor of Science in Nursing (RN to BSN), the Bachelor of Arts in Communication, the Bachelor of Arts in Interdisciplinary Studies, and the Bachelor of Science in Business Administration programs. In spring 2018, the estimated enrollments for the programs, according to the University of Arkansas Global Campus, were 94 for the HRWD program, 205 for the RN to BSN program, 87 for the communications program, 67 for the interdisciplinary program, and 179 in the business
program (Murphy, 2018). These programs are offered by the College of Education and Health Professions, the J. William Fulbright College of Arts and Sciences, and the Sam M. Walton College of Business, respectively. Based on the recruiting team’s estimates, the total pool of students, or the population, to be offered the survey will be 632. The Global Campus noted in its 2018 annual report that 1,079 undergraduate online students attended the University of Arkansas in fiscal year 2018, which runs from July 1, 2017, to June 30, 2018 (Global Campus staff & Judges, 2018).

**Sampling Techniques**

The Office of the Registrar at the University of Arkansas, upon written request by the researcher, provided the email addresses of the students in the five online degree programs described above (see Appendix C). Students were identified as being enrolled in an online degree program, which means they are identified in U of A databases as having a “Global” plan stack. The U of A Office of the Registrar determined the population of undergraduate online students at the University was 998 students. That office provided upon the written request 998 student names, their email addresses, their Student ID numbers, and their University email addresses. Of the 998 students, 14 students were removed from the list because of Family Education Rights and Privacy Act of 1974 (FERPA) requests.

**Survey Distribution**

The researcher used the Qualtrics survey tool to distribute the U of A Grit survey (see Appendix D and E). In their textbook *Internet, Phone, Mail, and Mixed-Mode Surveys: A Tailored Design Method*, Dillman, Smyth, and Christian (2014) recommended that survey subjects be invited through more than one means of survey distribution. In this study, the U of A researcher offered the Grit-S assessment instrument to the 984 online students via Qualtrics
survey tool to students in two ways: (1) direct email to students, using the list from the Office of the Registrar, and (2) links to the survey provided by faculty in announcements to students through Blackboard, the University’s learning management system (LMS) for courses (see appendices F and G). The Qualtrics tool used by the researcher sent the first invitation to the survey to 984 students on October 9, 2018; two reminder emails on October 12, 2018, and October 18, 2018; and a final, “last call” email on October 24, 2018. The Qualtrics distributions used official school email addresses provided by the U of A Office of the Registrar.

Additionally, the researcher sent emails on October 10, 2018, to the program coordinators for the five undergraduate online programs offered at the University of Arkansas. According to Dillman, Smyth, and Christian (2014), response rates to surveys can be increased by if subjects feel that the survey is offered by a reliable source, in this case meaning a U of A doctoral student identified by U of A faculty teaching students’ courses. The emails to program coordinators asked coordinators, as well as the faculty working with them, to announce the Grit survey via announcements in their online classes in the Blackboard LMS, with those announcements providing a link to the survey. The researcher, as director of communications for the Global Campus, maintained a list of these program coordinators to collaborate promotional material for U of A online degree programs.

The researcher chose to send direct emails to students four times: one invitation and three follow-up emails, based on recommendations from Dillman, Smyth, and Christian (2014). They referenced a 2005 study by Olsen, Call, and Wygrant of college undergraduates that showed “using four follow-up contacts resulted in a 37 percentage point increase in response rate over sending only survey invitation and no follow-ups” (p. 331).
The researcher in this Grit study asked program coordinators to encourage faculty and instructors to make announcements to students in online courses in an effort to legitimize the survey as a research survey from a University of Arkansas student. Dillman, Smyth, and Christian (2014) state that a sponsor of a survey can make it more rewarding for students to participate “by lending legitimacy to the survey and inducing trust” (p. 29), which is key to getting survey responses. While Dillman, Smith, and Christian (2014) recommended a total of five emails to students, this researcher send only four total emails, based on diminishing returns. Overall, Qualtrics showed 304 participants who completed the survey before the data were cleaned by removing duplicate entries by the same student, underage students, and students who said they were not in an undergraduate online degree program. Of the 304 responses to the survey, 225 were tagged as “email” to identify those who responded to emails sent via Qualtrics and 79 were tagged “anonymous” to identify those who responded via survey links provided in Blackboard class announcements posted by faculty. Three people completed the survey twice, their first responses were kept, and the last three responses were deleted. That meant that meant there were 301 survey responses, which meant a 31% response rate. The initial Qualtrics invitation email yielded 107 completed surveys (0 failed emails, 0 bounced emails), the first reminder provided 68 completed surveys (0 failed emails, 0 bounced emails), the second reminder provided 31 completed surveys (0 failed emails, 36 bounced emails), and the final email provided 19 completed surveys. Qualtrics emails contained student names and ID numbers as imbedded data that was used to automatically avoid sending reminder emails to students who completed the survey, which prohibited duplication. However, this was not true for students who responded via links in Blackboard announcements and entries were tagged “anonymous.” Entries by students tagged as “anonymous” reported student names and ID numbers in a different survey.
field, which made it possible for duplication to occur if students responded to both emails sent directly to students via Qualtrics and survey links imbedded in announcements in Blackboard by faculty. Duplicates were identified using student ID numbers and only the first, time-stamped response was kept.

Dillman, Smyth, and Christian (2014) also stated that prize drawings are not as effective as traditional cash incentives (e.g. placing two dollar bills inside paper surveys), but prize drawings can slightly raise response rates. In one study, participants were offered a chance to win $300 in a lottery drawing, and response rate climbed by 5% (Dillman, Smyth, and Christian, 2014, p. 371). In U of A Grit study, in an effort to boost the number of responses to the survey, this researcher offered a prize drawing of a chance to win one of four $50 Amazon cards. This researcher’s advisor, Kit Kacirek, selected in December 2018 the four winners of the lottery drawing from a bowl of folded-paper strips bearing the names of all who completed the survey. An initial email and a reminder email were sent to the four winners, and the three winners who responded were emailed Amazon gift cards.

Of the 301 remaining responses, 79 were removed because those students answered a question in the survey that indicated they were not enrolled in an online degree program. Of the remaining 222 responses, 18 students declined to grant permission for the researcher to obtain fall GPA data from the Office of the Registrar, which left 204 responses for data analysis regarding Grit and fall 2018 GPA. Thirteen students declined to grant permission for the researcher to obtain information from the Office of the Registrar about whether enrolled in spring 2018 courses. Registration status – along with graduation information – constituted persistence in this study. The Office of the Registrar did not provide enrollment information for six other students. Therefore, 203 responses remained for data analysis of Grit and persistence.
Sample Size

An analysis using G*Power (Faul, Buchner & Lang, 2009) indicated the minimum sample size needed to find an effect, if an effect exists, is 85 for a four-variable multiple regression model and a logistic regression model, with an effect size of 1.5, alpha level of 0.05, and a power of 0.8. A multiple regression model will be used to assess the effect, if an effect exists, of the predictor variable (Grit scores) on the continuous dependent variable, meaning students grade point averages. Grade point averages at the University of Arkansas are based on a four-point scale with 0 being the lowest and 4 being the highest, with various degrees between using decimal points. A logistic regression model will be used to assess the effect, if an effect exists, of the predictor variable, the Grit scores, on whether students (yes or no, a binary variable) persisted in spring 2019 courses. Persistence, in this reference, will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester.

Data Collection

The U of A Grit study will explore three data sets: (1) students’ Grit-S scores, (2) students’ grade point averages for the fall 2018 semester, and (3) whether (yes or no) students persisted in spring 2019 by enrolling in spring 2019 classes or by graduating in fall 2018. This study will also collect self-reported demographic data from students: (1) college academic program, (2) college academic level, (3) high school grade point averages, (4) gender identity, and (5) age. Grit scores and demographic information were collected through an internet survey offered through Qualtrics. The survey also asked permission from students to collect college grade point averages and enrollment and graduation statuses through the Office of the Registrar. The Qualtrics survey sections include (1) information about informed consent for human subject
research, (2) the Grit assessment questions, (3) demographic, permission, and follow-up questions, and (4) a thank-you page that states students who complete the survey will be entered in a prize drawing to win one of four $50 Amazon gift cards. All data will be collected and stored in Qualtrics, the researcher’s computer, and Box, the U of A’s storage system, all of which are protected by the researcher’s passwords to ensure research data remains confidential.

**Instrumentation**

To determine students’ Grit scores, this study will use the Short Grit Scale (Grit-S), an instrument developed and tested by Duckworth and Quinn (2009). The Grit-S is a trait assessment tool with the ability to predict perseverance and passion for long-term goals (Duckworth & Quinn, 2009). The Grit-S assessment uses eight questions and is shorter than its predecessor, Grit-O, the original tool that offered 12 questions (Duckworth & Quinn, 2009). The Grit-S is thought to be superior in its “psychometric properties” and “comparable predictive validity” (Duckworth & Quinn, 2009, p. 174). The Grit-S assessment tool offers eight questions or statements – intended to measure the two components of Grit: (1) perseverance of effort and (2) consistency of interests (Duckworth, 2018). They are:

1. New ideas and projects sometimes distract me from previous ones.
2. Setbacks don’t discourage me.
3. I have been obsessed with a certain idea or project for a short time but later lost interest.
4. I am a hard worker.
5. I often set a goal but later chose to pursue a different one.
6. I have difficulty maintaining my focus on projects that take more than a few months to complete.
7. I finish whatever I begin.

8. I am diligent.

The Grit-S scale asks participants to rate their answers based on a five-point Likert scale, with 5 being “Very much like me” and 1 being “Not like me at all” (Duckworth & Quinn, 2009). Duckworth (2018) provided the Grit-S questionnaire. Grit scores are calculated by assigning points to different questions (Appendix A). For questions 2, 4, 7, and 8, participants are awarded 5 points for “Very much like me,” 4 points for “Mostly like me,” 3 points for “Somewhat like me,” 2 points for “Not much like me,” and 1 point for “Not like me at all.” For questions 1, 3, 5, and 6, participants are awarded 1 point for “Very much like me,” 2 points for “Mostly like me,” 3 points for “Somewhat like me,” 4 points for “Not much like me,” and 5 points for “Not like me at all.” Scores are added and divided by 8. The scores range from a high of 5 (extremely gritty) to a low of 1 (not at all gritty).

The Grit-S assessment was embedded in a Qualtrics survey offered to undergraduate U of A students studying in online degree programs (see Appendix E). Participants were asked demographic questions, in addition to the eight questions on the Grit-S Scale. The demographic questions included the student’s academic program, meaning one of the five degree programs listed above; high school grade point average; academic level, meaning freshman, sophomore, junior, or senior; age; gender; and race. Collection of the Grit survey data relied on self-reported data from online undergraduate students. Duckworth (2006) identified Grit as a compound trait involving stamina in interest, also known as passion, and effort, also known as persistence. The U of A Grit survey consisted of eight questions, or rather statements, about perseverance and passion, using a Likert-type scale, as well as demographic information. Duckworth and Quinn
gave researchers and educators permission to use any form of the Grit assessment scales, including the Grit-S, as noted on Duckworth’s research webpage (Duckworth, 2018).

**Semester Grade Data and Enrollment Status**

This U of A researcher filed an information request with the Office of the Registrar to collect GPA data for the fall 2018 semester (see Appendix H). The student ID numbers of students who granted permission for the researcher to collect GPA data were sent in an Excel file to the Registrar’s Office, which responded within days. The GPA data was added to the researcher’s Excel file containing survey results from Qualtrics. Enrollment status (yes, enrolled, or no, not enrolled) was collected in February, after the 11th day of classes, a point in the semester chosen by the Arkansas Department of Higher Education for institutions to report enrollment numbers. Enrollment status was obtained from the Office of the Registrar after an information request was made (see Appendix I). The Office of the Registrar provided data for students who graduated in fall 2018.

**Grit Internal and External Validity**

Duckworth and Quinn (2009) in the United States, and Li, Zhao, Kong, et al. (2018) found the Grit-S assessment tool to be internally and externally valid. Duckworth and Quinn (2009) used four samples: two samples from the United States Military Academy at West point (N1 = 1,218 and N2 = 1,308), one sample of finalists at the Scripps National Spelling Bee (N = 175), and Ivy League undergraduate students (N = 139). Researchers used factor analysis to show the Grit-S survey has an acceptable internal consistency, with alphas ranging from .73 to .83 for the four samples.

Researchers in China confirmed the validity and reliability of the Grit-S tool (Li, Zhao, Kong, et al., 2018) in their study of Chinese high school students. Li, Zahao, Kong et al. (2018)
studied 607 11th-grade students and reported the reliability of the assessment to be adequate with the total Grit at $r = .78$, consistency of interest (one of two Grit traits) at $r = .63$ and perseverance of effort (one of two Grit traits) at $r = .70$. They reported that Grit-S scores had adequate predictive validity for academic performance, with $r = .21$, $p < .001$.

**Procedure**

This U of A research study was approved September 24, 2018, by the University of Arkansas Institutional Review Board in compliance with the U.S. Department of Health and Human Services (see Appendix B). No risk was anticipated that would be greater than those ordinarily encountered during daily life or during the performance of routine physical or phycological examinations or tests. No precautionary steps were known.

The participants of this study were University of Arkansas undergraduate students studying in five online degree programs in the College of Education and Health Professions, the J. William College of Arts and Sciences, and the Sam M. Walton College of Business. Students were identified by the Office of the Registrar as students studying exclusively online in online degree programs, which means they are identified in University databases as having a “Global” plan stack. An internet survey offered through Qualtrics collected (1) Grit-S assessment data and (2) demographic information, including age, gender identification, academic program, and student level (e.g. freshman, sophomore, etc.), and (3) questions asking students to grant permission to access two academic snapshots: (1) students fall 2018 grade point averages and (2) whether students persisted in courses in spring 2019. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester.
The survey was offered to all U of A students in undergraduate online degree programs through two means: (1) all students received one invitation and three follow-up messages, and (2) students received invitations to the survey through class announcements in Blackboard (see Appendix E). Participants were provided informed consent information in the beginning of the survey, before research survey questions are asked. Those who gave consent were allowed to continue the survey questions, and those who declined consent were sent to a “thank you” page and were not allowed to continue to survey questions. The survey states that submission of the electronic survey will serve as informed consent. Online program coordinator and instructor participation was voluntary, meaning the researcher does not know the number of coordinators and faculty who placed announcements about the Grit survey in courses via Blackboard. Survey data was collected using Qualtrics. As part of the survey, students were asked to consent to a follow-up email questionnaire if they did not enroll in spring 2019 courses (Attachment 8). That follow-up email will ask students to explain why they chose not to enroll in courses in spring 2019. This question was necessary to determine whether factors other than Grit (financial, family emergency, etc.) contributed to their decision not to enroll in spring 2019.

The survey was estimated take 10 to 15 minutes to complete. The follow-up email will take approximately 5 minutes to read and reply. Data collected will include Grit assessment scores, grade point averages for fall 2018, whether students enrolled in spring 2019 courses, and demographic information: academic program, academic level (e.g. freshman, sophomore, etc.), age, gender identification, and high school grade point average. The data was collected through Qualtrics, the U of A’s preferred survey tool. Data were analyzed in IBM SPSS 24 statistics software and stored in Qualtrics, on the researcher’s computer, and in Box, the U of A cloud-based storage service, all of which are password protected. Data analysis was used to determine
whether statistically significant correlations existed between the predictor variable, Grit scores, and the dependent variables: (1) 2018 fall semester grade point averages and (2) whether (yes or no) students persisted in 2019 spring semester courses. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. Demographic data will be used as constants in multiple regression analysis.

**Data Processing and Analysis**

The researcher imported all data – Grit Scores, college grade point averages for fall 2018, whether (yes or no) students persisted in spring 2019 semester courses, and demographic information, which will include self-reported gender, race, and age – into IBM SPSS 24 statistics software. Persistence, in this reference, will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. Demographic characteristics such as gender, race, and age are often included as control variables in research (Cochran, et. Al. 2014). SPSS 24 was used to analyze the data, specifically looking for correlations between the predictor variable, Grit scores, and the dependent variables: (1) fall 2018 semester grade point averages and (2) whether (yes or no) students persisted in spring 2019 semester. Demographic data will be used as constants in a multiple regression analysis model, with an alpha level of .05, for the Grit scores and fall 2018 semester grade point averages, which is a continuous variable. Analysis of Grit scores and whether (yes or no) students persisted in spring 2019 semester courses, which is a binary variable, will use a logistic regression model, with an alpha level of .05. The researcher used “Pearson’s correlation coefficient, r, as a measure of the strength of relationship between two variables” (Fields, 2015, p. 82).
The null hypotheses for this study are (1) there will be no correlation between Grit-S scores and fall 2018 grade point averages and (2) there will be no correlation between Grit-S scores and whether students persisted in spring 2019 courses. Andy Fields (2015) explained, “The reason why we need the null hypothesis is that we cannot prove the experimental hypothesis using statistics, but we can collect evidence to reject the null hypothesis” (p.62). Rejection of the null hypothesis does not prove the research hypothesis; it merely supports it (Fields, 2015).

**Description of Variables**

The independent variable will be students’ scores on the Grit scale. The dependent variables will be the (1) students’ fall 2018 grade point averages and (2) whether (yes or no) students persisted in spring 2019 semester courses. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. According to academic regulations at the University of Arkansas, course grades and marks are A, outstanding (4.0); B, good achievement (3.0); C, average achievement (2.0); D, poor, but passing (1.0); F, failure, unsatisfactory work (0.0); XF, failure, academic dishonesty; I, Incomplete course requirements; AU, audit; CR, credit without grade points; R, registered, no credit; S, satisfactory work without credit; W, withdrawal (University of Arkansas, undergraduate catalog of studies, 2018). This study will include course grades and marks of A, B, C, D and F. Persistence was determined by data collected from the Office of the Registrar in late January, after the U of A identifies 11\textsuperscript{th}-day enrollment numbers that are reported to the Arkansas Department of Higher Education. The first day of class in the spring 2019 semester was January 14, and the 11\textsuperscript{th} day of classes was January 28. Data for students who graduated in fall 2018 were collected in March 2019.
Ethical Considerations

This U of A researcher has studied ethical considerations regarding this research and applied those to each step in the planning of the survey research, data collection, data analysis, and data reporting process. This researcher obtained approval September 24, 2018, from the U of A Institutional Review Board and sought guidance from her dissertation committee (see Appendix B). No risk is anticipated that would be greater than those ordinarily encountered during daily life or during the performance of routine physical or psychological examinations or tests. No deception was used in the survey. Participants in this study will be described as U of A students enrolled in undergraduate online degree programs. Data collected for this study will be kept confidential to the extent allowed by law and U of A policy, as stated in the consent information of the survey. There is no funding source for this study, other than the researcher, who paid for the Amazon gift cards offered for a drawing open to students who completed the survey. Only students who completed the survey were included in the Amazon gift card drawing. This researcher is unaware of any ethical concerns that should be reported.

Summary

This research follows in the footsteps of Angela Duckworth, who has examined the correlation between the self-reported Grit scores of participants and an intermediary step toward a long-term goal. For example, Duckworth (2016) found that students at the Military Academy in West Point who had higher Grit scores were more likely to complete the academy’s first intense summer of training than those who had lower Grit scores. The summer camp is an intermediary step toward graduation from West Point. Other researchers have confirmed Duckworth’s findings and acknowledged the Grit-S as an internally and externally valid instrument (Li, Zhao, Kong et al., 2018). In the U of A study, making passing grades in a semester and enrolling in
courses the following semester are intermediary steps toward earning a degree at the U of A, which is the ultimate, long-term goal. This research intends to add to Duckworth’s work by studying a new population: undergraduate students studying in an online degree programs at the University of Arkansas. The study intends to add to Grit research by studying a new intermediary goals: (1) grade point averages and (2) persistence from one semester to the next. This new population is primarily an adult learner group, commonly referred to on university campuses as non-traditional students. Therefore, this study will add to knowledge in the adult and lifelong learning field. It is possible the outcome of this study could be generalizable to populations that mirror the study sample. The predictive ability of the Grit-S is also generalizable from the standpoint of overall Grit research, including this study and those from around the world, including China (Li et al., 2018).

Participants were offered the Grit-S survey in October 2018. If participants approve, the researcher will collect from the Office of the Registrar (1) students fall 2018 grade point averages in early January 2019 and (2) whether (yes or no) students persisted in spring courses, as collected in late January 2019. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. Data will be stored in Qualtrics, Box and the researcher’s computer, all of which are password protected. Data will be analyzed using IBM SPSS Statistics software using a multiple regression model for Grit-S scores and grade point averages, a continuous variable, and using a logistic regression model for Grit-S scores and whether (yes or no) students persisted in spring 2019, a binary variable. Self-reported demographic information will be used as constants. The results of this analysis will be provided in the next chapter.
CHAPTER FOUR

Results

The purpose of this study was to determine whether a correlational relationship exists between Grit-S assessment scores for undergraduate students studying in online degree programs at the University of Arkansas and (1) student grade point averages for the 2018 fall semester and (2) student persistence in the 2019 spring semester classes and grade point average. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. This study seeks to generate research data that would determine whether U of A student traits in perseverance and passion for long-term goals, as determined by Grit-S Scale scores, correlate to students’ likelihood of persisting in online classes by (1) passing classes in the current semester and (2) enrolling in the following semester.

The Office of the Registrar identified 998 students studying in undergraduate online degree programs and provided email addresses for those students. Participants were recruited to participate in the Grit-S survey through direct email and by faculty announcements about the survey made in classes connected with online undergraduate degree programs, as described in detail in the Methodology chapter. Results were analyzed using two statistical models: (1) multiple regression to explore the relationship between Grit-S and fall 2018 GPA, with a sample of 204 students, and (2) logistic regression to explore the relationship between Grit-S and student persistence, meaning whether or not students enrolled in spring 2019 courses or graduated in fall 2018, with a sample of 203 students.
**Hypothesis**

Statistical analysis will determine whether the null hypothesis can be accepted or rejected. The null hypotheses state:

1. There will be no statistical correlation between Grit scores and grade point averages.
2. There will be no statistical correlation between Grit scores and whether students persisted in spring 2019 classes. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester.

This U of A researcher suggested that if a relationship is discovered, that relationship would be predicted based on the theory of Grit, as introduced by Duckworth, Peterson, Matthews, and Kelly (2007). Therefore the following alternative hypotheses were offered:

1. There will be a positive correlation between the Grit-S assessment scores of undergraduate U of A students studying in five online degree programs and their fall 2018 semester grade point averages. The U of A uses a 4-point grading system, where 4.0 is an A (highest grade), 3.0 to 3.9 is a B, 2.0 to 2.9 is a C, 1.0 to 1.9 is a D, and anything 0.9 and below is an F (lowest grade).
2. There will be a positive correlation between Grit-S assessment scores of undergraduate U of A students studying in five online degree programs and whether students persisted in spring 2019 classes. Persistence will be defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester.
Research Questions

This study addressed the research questions below.

1. Is there a correlation between the Grit-S assessment scores of undergraduate University of Arkansas students studying in five online degree programs and their 2018 semester grade point averages? The U of A uses a 4-point grading system, where 4.0 is an A (highest grade), 3.0 to 3.9 is a B, 2.0 to 2.9 is a C, 1.0 to 1.9 is a D, and anything 0.9 and below is an F (lowest grade).

2. Is there a correlation between Grit-S assessment scores of undergraduate University of Arkansas students studying in five online degree programs and whether (yes or no) students persisted in courses in the semester following the offering of the assessment survey, which is the 2019 spring semester?

Grit-S and GPA

A multiple regression analysis was conducted using IBM SPSS 24 to explore if fall 2018 GPA could be predicted by Grit-S scores. The researcher also looked at age and high school GPA as possible predictors, while holding constant gender, the level of the student (freshman, sophomore, junior or senior), and the online program (five programs from three colleges). The researcher recognizes there may be differences among different genders, programs, and levels, but these are not the focus of the study. Thus, the researcher controlled for these variables. The data for level, program, and age were dummy coded, and the reference group for level was Level 3 (juniors), for program was Program 3 (bachelor’s degree in communication), and for gender was male.

Table 1 shows the descriptive statistics for age, gender identification, program, level, self-reported high school GPA, Grit scores, and fall 2018 GPA at the University of Arkansas.
The researcher will next foreshadow the results of the multiple regression and logistic regression analyses by discussing the bivariate relations among predictors and outcomes. Examination of a scatterplot suggests a weak, positive linear relation between Grit scores and fall GPA, (see Figure 1). However, the correlation was statistically significant, $r = .130, p = .042$, given the sample size. Visualization of the scatterplot suggests this correlation may be attenuated due to restriction of range. Notice that several participants had 4.0 fall GPAs. Fall GPA had a positive linear relation with level 4 (seniors), $r = .140, p = .031$, program 5 (nursing), $r = .301, p < .001$, and age, $r = .242, p = .001$. Note that age had a weak to moderate negative linear relation with self-reported high school GPA, $r = -.276, p < .001$, and positive linear relation with GRIT score, $r = .285, p < .001$. Thus, foreshadowing potential negligible unique relations among the predictors high school GPA, age, and Grit score with the outcome fall GPA. It is important to note that the mean fall GPA is 3.37 and the median is 3.75. For Grit scores the mean is 3.56 and the median is 3.63. For age, the is 32.91 and the median is 31. For self-reported high school GPA, the mean is 3.47 and the median is 3.5 (see Table 1). Contrary to my expectations based on Grit theory and the literature review, Table 2 shows negligible relationships between (1) fall 2018 GPA in college and Grit scores and (2) fall 2018 GPA and self-reported high school GPA. However, there was a weak to moderate relationship between age and high school GPA.

The set of predictors (Grit scores, self-reported high school GPA, age, gender, level, and program) accounted for a statistically significant proportion of the variation in fall 2018 GPA scores of students, $F(11, 167) = 3.716, p < .001, R^2 = .197$. Thus approximately 19.7% of the variability in fall GPA was explained by the set of predictors. The unique relation between Grit scores and fall 2018 college GPA was not statistically significant, $b = 0.064, 95\% CI [-0.131, 0.259], p = .516$, after controlling for the effects of age, high school GPA, gender, program, and
level (see Table 2). The relation between self-reported high school GPA and fall 2018 GPA at the university was not statistically significant, $b = -0.157$, CI [-0.174, 0.487], $p = .351$, after controlling for the effects of age, program, level, gender, and Grit scores (see Table 2). However, the relation between age and fall GPA was statistically significant, $b = 0.015$, 95% CI [0.003, 0.027], $p = .016$, when controlling for high school GPA, Grit scores, gender, program, and level (see Table 2). This significant positive relation indicates that for every year increase in age, the predicted fall GPA increases by 0.015 units, while controlling for other predictors. Although covariant variables were not the focus of this study, the data show is a statistically significant relationship shown between Program 5 (Registered Nurse to Bachelor of Science in Nursing) and fall GPA, $b = 0.697$, CI [0.360, 1.034], $p < .001$. This indicates the predicted fall GPA for students in Program 5 is 0.697 units higher than the predicted fall GPA for students in the reference group, Program 3 (bachelor’s in communication), while controlling for the other predictors.
Figure 1

Scatterplot Graphic for Grit Scores and Fall 2018 GPA

*Figure 1.* Plot of Grit scores by fall 2018 GPA. Notice there seems to be a weak linear relation between Grit scores and fall 2018 GPA. Also, the range of GPA is restricted: a large proportion of GPA fall between 3.00 and 4.00.
Table 1

Descriptive Statistics for Age, Gender, Program Level, High School GPA, Grit Scores, and Fall 2018 GPA at the University of Arkansas

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Median</th>
<th>Standard Deviation</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>203</td>
<td>18</td>
<td>65</td>
<td>32.91</td>
<td>31</td>
<td>11.470</td>
</tr>
<tr>
<td>HSGPA</td>
<td>184</td>
<td>1.70</td>
<td>4.00</td>
<td>3.4701</td>
<td>3.5</td>
<td>.41506</td>
</tr>
<tr>
<td>GRITscore</td>
<td>204</td>
<td>1.875</td>
<td>5.000</td>
<td>3.55907</td>
<td>3.63</td>
<td>.660276</td>
</tr>
<tr>
<td>FallGPA</td>
<td>204</td>
<td>.00</td>
<td>4.00</td>
<td>3.3672</td>
<td>3.7</td>
<td>.88000</td>
</tr>
<tr>
<td>Female/Male</td>
<td>201</td>
<td>.00</td>
<td>1.00</td>
<td>.7264</td>
<td>.000</td>
<td>.44694</td>
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<tr>
<td>Program 1 BSE in HRWD</td>
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<td>1.00</td>
<td>.1343</td>
<td>.000</td>
<td>.34186</td>
<td></td>
</tr>
<tr>
<td>Program 2 BS in Business</td>
<td>.00</td>
<td>1.00</td>
<td>.1642</td>
<td>.000</td>
<td>.37136</td>
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<tr>
<td>Program 4 BA in Interdisciplinary Studies</td>
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<td>.00</td>
<td>1.00</td>
<td>.1294</td>
<td>.000</td>
<td>.33643</td>
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<td>Program 5 RN to BSN</td>
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<td>.2537</td>
<td>.000</td>
<td>.43623</td>
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<td>Level 1 Freshman</td>
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<td>.0545</td>
<td>.000</td>
<td>.22748</td>
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<td>Level 2 Sophomore</td>
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<td>1.00</td>
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<td>.000</td>
<td>.34640</td>
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<tr>
<td>Level 4 Senior</td>
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<td>1.00</td>
<td>.4703</td>
<td>.000</td>
<td>.50036</td>
<td></td>
</tr>
</tbody>
</table>

Note. Students responded to a survey that used the Grit-S scale to measure students’ grittiness, with 0 = not gritty at all and 5 = highest Grit; used self-reported high school and college GPA that ranges from 0 = lowest to 4 = highest; gender identity, where male = 1, female = 2, transgender female = 3, transgender male = 4, other = 5, and prefer not to answer = 6; Program 1 = BSE in Human Resource and Workforce Development, Program 2 = BS in General Business, Program 3 = BA in Communication, Program 4 = BA in Interdisciplinary Studies, Program 5 = Registered Nurse to Bachelor of Science in Nursing; Reference groups (male, Program 3, and Level 3) from the dummy coding are not included.
Table 2

Correlations Among fall 2018 GPA, age, high school GPA, and Grit scores in the Online Undergraduate Sample

<table>
<thead>
<tr>
<th></th>
<th>Fall GPA</th>
<th>Age</th>
<th>HS GPA</th>
<th>GRIT score</th>
<th>Female</th>
<th>Prog 1</th>
<th>Prog 2</th>
<th>Prog 4</th>
<th>Prog 5</th>
<th>Lev 1</th>
<th>Lev 2</th>
<th>Lev 4</th>
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<tr>
<td>FallGPA</td>
<td>--</td>
<td>--</td>
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<td>--</td>
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<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Age</td>
<td>.242**</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
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</tr>
<tr>
<td>HSGPA</td>
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<td>-.276***</td>
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<td>--</td>
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<td>--</td>
<td>--</td>
<td>--</td>
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</tr>
<tr>
<td>GRIT core</td>
<td>.130*</td>
<td>.285***</td>
<td>-.028</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<td>--</td>
<td>--</td>
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</tr>
<tr>
<td>Female</td>
<td>.034</td>
<td>.043</td>
<td>.218**</td>
<td>.033</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<td>--</td>
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</tr>
<tr>
<td>Prog 1</td>
<td>.008</td>
<td>.101</td>
<td>-.032</td>
<td>.070</td>
<td>-.135*</td>
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<td>--</td>
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</tr>
<tr>
<td>Prog 2</td>
<td>.014</td>
<td>.077</td>
<td>.122</td>
<td>.085</td>
<td>-.086</td>
<td>-.165</td>
<td>--</td>
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<tr>
<td>Prog 4</td>
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<td>-.150*</td>
<td>-.140</td>
<td>.090</td>
<td>-.140*</td>
<td>-.165*</td>
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<td>Prog 5</td>
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<td>.060</td>
<td>.131*</td>
<td>.201**</td>
<td>-.217**</td>
<td>-.255***</td>
<td>-.217**</td>
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<tr>
<td>Level 1</td>
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<td>-.083</td>
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<td>.112</td>
<td>.046</td>
<td>.077</td>
<td>-.096</td>
<td>-.041</td>
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<td>.099</td>
<td>-.048</td>
<td>-.046</td>
<td>.029*</td>
<td>.229**</td>
<td>-.025</td>
<td>-.124</td>
<td>-.091</td>
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<td>Level 4</td>
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<td>.068</td>
<td>.138*</td>
<td>-.048</td>
<td>.039</td>
<td>.040*</td>
<td>-.250***</td>
<td>.108</td>
<td>.203**</td>
<td>-.252***</td>
<td>-.349***</td>
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</table>

Note. Age = age of student; HSGPA = self-reported high school GPA; Grit = Grit-S assessment score; Program 1 = Prog 1 = Bachelor of Science in Education in Human Resource and Workforce Development; Program 2 = Prog 2 = Bachelor of Science in Business Administration; Program 4 = Prog 4 = Bachelor of Arts in Interdisciplinary Studies; Program 5 = Prog 5 = Registered Nurse to Bachelor of Science in Nursing; Level 1 = Lev 1 = freshmen; Level 2 = Lev 2 = sophomore; Level 4 = Lev 4 = senior.

*p < .05, ** p < .01, ***p < .001
Table 3

**Coefficients Among Independent and Dependent Variables in the Online Undergraduate Sample**

<table>
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<tr>
<th>Variable</th>
<th>$b$</th>
<th>SE($b$)</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
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<tr>
<td>(Constant)</td>
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<td>.687</td>
<td>.687</td>
<td>2.557</td>
<td>.011*</td>
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<tr>
<td></td>
<td>[0.400, 3.111]</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Age</td>
<td>.015</td>
<td>.006</td>
<td>.195</td>
<td>2.435</td>
<td>.016*</td>
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<tr>
<td></td>
<td>[0.003, 0.027]</td>
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<td>HSGPA</td>
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<td>.167</td>
<td>.074</td>
<td>.936</td>
<td>.351</td>
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<td></td>
<td>[-0.174, 0.487]</td>
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<tr>
<td>GRIT score</td>
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<td>.099</td>
<td>.049</td>
<td>.651</td>
<td>.516</td>
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<tr>
<td></td>
<td>[-0.131, 0.259]</td>
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<td></td>
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<tr>
<td>Female</td>
<td>-.082</td>
<td>.146</td>
<td>-.042</td>
<td>-.558</td>
<td>.577</td>
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<td></td>
<td>[-0.371, 0.207]</td>
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<td>.081</td>
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<td>.304</td>
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<td>.095</td>
<td>1.147</td>
<td>.253</td>
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<td></td>
<td>[-0.164, 0.619]</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>[-0.140, 0.709]</td>
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</tr>
<tr>
<td>Program 5</td>
<td>.697</td>
<td>.171</td>
<td>.344</td>
<td>4.084</td>
<td>&lt; .001***</td>
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<td></td>
<td>[0.360, 1.034]</td>
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<tr>
<td>Level 1</td>
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<td>.274</td>
<td>-.057</td>
<td>-.766</td>
<td>.445</td>
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<tr>
<td></td>
<td>(-0.751, 0.331]</td>
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<td></td>
</tr>
<tr>
<td>Level 2</td>
<td>.403</td>
<td>.218</td>
<td>.144</td>
<td>1.853</td>
<td>.066</td>
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<td></td>
<td>[-0.026, 0.833]</td>
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<tr>
<td>Level 4</td>
<td>.168</td>
<td>.145</td>
<td>.095</td>
<td>1.158</td>
<td>.248</td>
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<tr>
<td></td>
<td>[-0.118, 0.455]</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Note. Confidence intervals are noted in brackets. Age = age of student; HSGPA = self-reported high school GPA; Grit = Grit-S assessment score; Program 1 = Bachelor of Science in Education in Human Resource and Workforce Development; Program 2 = Bachelor of Science in Business Administration; Program 4 = Bachelor of Arts in Interdisciplinary Studies; Program 5 = Registered Nurse to Bachelor of Science in Nursing; Level 1 = freshmen; Level 2 = sophomore; Level 4 = senior.  
*p < .05, **p < .01, ***p < .001
Grit-S and Persistence

A binary logistic regression analysis was performed to determine if Grit scores collected in fall 2018 from students studying in undergraduate online degree programs at the University of Arkansas could predict whether students would persist in spring 2019. Persistence is defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. Analysis was performed using IBM SPSS 24 to determine if relationships existed between persistence status and three main predictors: Grit scores, self-reported high school GPA, and age, and three covariates: gender, level, and program. There were 24 missing values in data collected from 203 students studying in undergraduate online degree programs. The researcher recognizes there may be differences among different genders, programs, and levels, but these are not the focus of the study. Instead, the researcher controlled for these variables by holding them constant. The data for level, program and age were dummy-coded, and the reference group for level was Level 4 (seniors), for program was Program 3 (bachelor’s degree in communication), and for gender was female. Table 4 shows the descriptive statistics for age, self-reported high school GPA, Grit scores, and persistence status of participants for spring 2019. Note that 94.4 percent of the sample persisted in spring 2019 classes. Contrary to expectations based on Grit theory and much of the literature review, Table 5 shows no statistically significant relationships between persistence and Grit scores, age, and high school GPA.

A test of the full model with one dependent variable (persistence status) and predictors (Grit scores, self-reported high school GPA, age, gender, program, and level) resulted in implausible parameter estimates. Close examination of the frequency tables revealed no unenrolled freshmen (Level 1) in the spring semester and no unenrolled students in the Bachelor
of Science in Education in Human Resource and Workforce Development (Program 1), thus no variability in the dummy-coded variable associated with freshmen or students in Program 1. Freshmen and sophomore levels were collapsed and programs 1 and 2 were collapsed to eliminate the implausible parameter estimates. The full model (with levels 1 and 2 and programs 1 and 2 combined) tested against a constant-only model (i.e., no predictors) was not statistically significant, chi-square ($df = 9, N = 179$) = 4.174, $p = .900$, which means the full model did not fit the data better than the constant-only model. The effect size ($pseudo R^2 = .0541$) indicates approximately 5.4% reduction in the error variance over the constant-only model.

Grit scores and spring 2019 persistence status was not statistically significantly related, $Exp(b) = .817$, 95% CI [0.291, 2.291], $p = .700$ (see Table 5). The same table shows no significant statistical relationship between age and spring 2019 persistence, $Exp(b) = 0.989$, 95% CI [0.928, 1.053], $p = .722$ (see Table 5). There is no significant statistical relationship between self-reported high school GPA and 2019 persistence status, $Exp(b) = 0.979$, 95% CI [0.181, 5.288], $p = .980$ (see Table 5). Table 6 shows the full model with predictors and covariates will correctly predict a student’s persistence status for 94.4% of cases, which is exactly the same (94.4%) as the null model.
Table 4

Descriptive Statistics for Age, High School GPA, Grit Scores, and Persistence Status for Spring 2019 At the University of Arkansas

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard Error</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>202</td>
<td>18</td>
<td>65</td>
<td>32.86</td>
<td>.808</td>
<td>11.480</td>
</tr>
<tr>
<td>HSGPA</td>
<td>184</td>
<td>1.70</td>
<td>4.00</td>
<td>3.4701</td>
<td>.03060</td>
<td>.41506</td>
</tr>
<tr>
<td>GRITscore</td>
<td>203</td>
<td>1.88</td>
<td>5.00</td>
<td>3.5597</td>
<td>.04625</td>
<td>.65890</td>
</tr>
<tr>
<td>Persistence</td>
<td>203</td>
<td>0</td>
<td>1</td>
<td>.95</td>
<td>.015</td>
<td>.217</td>
</tr>
</tbody>
</table>

Note. Age = age of student; Grit = Grit-S assessment score; Persistence shows 0 for not enrolled and 1 for enrolled in spring 2019 or graduated in 2018. The number of cases in the descriptive statistics in this table reflects the subset of cases without missing data that were used in the logistic regression analysis.
Table 5

Statistical Analysis of the Relationship Between Spring 2019 Persistence Status and Other Predictors: Age, High School GPA, Grit score, Gender, Program and Level

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$b$</th>
<th>$Exp(b)$</th>
<th>SE($b$)</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
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</thead>
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<tr>
<td>Age</td>
<td>-.011</td>
<td>.989</td>
<td>.032</td>
<td>.127</td>
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<td>.722</td>
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</tr>
<tr>
<td></td>
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<td>[0.928, 1.053]</td>
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<td>HSGPA</td>
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<td>[0.181, 5.288]</td>
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<td>Grit score</td>
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<td>.700</td>
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<td>[0.291, 2.291]</td>
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<td>Male</td>
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<td>.762</td>
<td>.029</td>
<td>1</td>
<td>.864</td>
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<td>[0.256, 5.078]</td>
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<td>.404</td>
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<td></td>
<td></td>
<td>[0.269, 25.925]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program 5</td>
<td>1.782</td>
<td>5.943</td>
<td>1.149</td>
<td>2.406</td>
<td>1</td>
<td>.121</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[0.625, 56.493]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1 &amp; 2</td>
<td>.704</td>
<td>2.022</td>
<td>1.154</td>
<td>.372</td>
<td>1</td>
<td>.542</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[0.211, 19.391]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 3</td>
<td>.050</td>
<td>1.051</td>
<td>.720</td>
<td>.005</td>
<td>1</td>
<td>.945</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[.256, 4.312]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>3.164</td>
<td>23.657</td>
<td>3.883</td>
<td>.664</td>
<td>1</td>
<td>.415</td>
</tr>
</tbody>
</table>

*Note. Confidence intervals are shown in brackets. Age = age of student; HSGPA = self-reported high school GPA; Grit score = Grit-S assessment score; Program 1 = Bachelor of Science in Education in Human Resource and Workforce Development; Program 2 = Bachelor of Science in Business Administration; Program 4 = Bachelor of Arts in Interdisciplinary Studies; Program 5 = Registered Nurse to Bachelor of Science in Nursing; Level 1 = freshmen; Level 2 = sophomore; Level 4 = senior.*

*p < .05, **p < .01, ***p < .001
Table 6

Classification Table Showing the Overall Ability of the Model to Correctly Predict Persistence

<table>
<thead>
<tr>
<th>Observed</th>
<th>Persisted</th>
<th>Persisted 2019</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Did not persist</td>
<td>Persisted</td>
</tr>
<tr>
<td>Persisted 2019</td>
<td>Did not persist</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Persisted</td>
<td>0</td>
<td>169</td>
<td>100.0</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
<td></td>
<td>94.4</td>
</tr>
</tbody>
</table>

Additional Findings

The researcher sought to discover why students did not persist, meaning did not enroll in spring 2019, graduate in fall 2018, or accumulate enough credits to graduate in fall 2018. The researcher used follow-up emails to ask students why (see Appendix J). One student indicated that a severe medical illness was the barrier to enrolling in spring. Another student indicated that a full-time job, family, and classes caused too much stress, but that student might re-enroll at a later date. A different student started a full-time job and did not want to take classes during the transition but said that student would resume classes in fall 2019. The reasons the other students did not enroll in spring classes are unknown.
CHAPTER FIVE

Conclusion

The purpose of this study was to determine whether a correlational relationship exists between Grit-S assessment scores and (1) student grade point averages for the 2018 fall semester and (2) student persistence in the 2019 spring semester in online undergraduate degree programs at the University of Arkansas. Collection of data began with an online survey offered to the population (all undergraduate U of A students in online programs) collected Grit scores from participating students in October 2018 and remaining data (GPA and enrollment and graduation status for spring 2019) were collected in the early part of the spring 2019 semester. Multiple and logistic regression analysis took place in February. A mentor in the statistics lab in the College of Education and Health Professions provided guidance and assistance for data analysis and interpretation. Data analysis was used to answer two research questions:

1. Is there a correlation between the Grit-S assessment scores of undergraduate University of Arkansas students studying in five online degree programs and their 2018 semester grade point averages?

2. Is there a correlation between Grit-S assessment scores of undergraduate University of Arkansas students studying in five online degree programs and whether (yes or no) students persisted in the semester following the offering of the assessment survey, which is the 2019 spring semester? Persistence was defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester.
Findings

The results of my study did not support my alternative hypothesis that student Grit scores of students in online degree programs at the University of Arkansas would be positively correlated with and fall 2018 college GPA. This finding contradicts the theory of Grit, which could indicate that the grittier a person is the higher fall GPA scores would be, especially if semester GPA scores are seen as stepping stones to the long-term goal of earning a bachelor’s degree. Duckworth used a seven-week training program called the “Beast” as a measurement step toward graduating from the U.S. Military Academy at West Point (Duckworth & Quinn, 2009). In that study, Grit scores predicted whether cadets would complete that training program. Strayhorn (2014) found in his study that the Grit scores of black males were positively related to the college grades for those students. However, the findings of this 2019 U of A study align more with the critics of Grit. Zimmerman and Brogan (2015) did not find the positive correlation that they expected between the Grit scores and GPA of law school students. Crede, Tynan, and Harms (2016) said predictors other than Grit offer stronger correlations with academic performance.

However, without controlling for the other predictors and covariates, there was a weak positive correlation between Grit scores and college fall GPA. The reason for this positive correlation might be attributed to age because of its relationship with Grit scores. Age and fall college GPA were uniquely, significantly related, meaning age was significant when the effects of other variables were controlled. This was not true for Grit. Note that Duckworth, Peterson, Matthews, and Kelly (2007) listed a limitation of their Grit study as having not yet explored how Grit relates to other predictive variables. Another possible explanation of why Grit scores and fall college GPA were not uniquely, statistically related may have been the relationship was
weakened because of the restricted range in fall GPA. A scatterplot provides a visualization of Grit scores and GPA. There appears to be weak correlation between Grit Scores and GPA, but most GPA markers are close to a 4.0 (see Figure 1). Note that 82 students out of a total of 211 participants (including those with missing cases not included in the regression model), or 38.86% of participants, had 4.0 GPAs. The fall college GPA mean was 3.37, and the median was 3.7 (see Table 1). The U of A results showing no significant relationship between Grit scores and fall college GPA are contrary to earlier Grit studies. Strayhorn (2017) found a positive relationship between Grit scores and college GPA, and Hodge, Wright, and Bennet (2017) found a positive correlation between Grit scores and students’ academic outcomes.

The answer to the second research question indicated no statistically significant correlation between Grit scores and whether students persisted in spring 2019 (see Table 5). Persistence was defined as students who enrolled in courses in the 2019 spring semester, graduated in the 2018 fall semester, or obtained enough credits to graduate by the end of the 2018 fall semester. In fact, none of the predictors, including self-reported high school GPA or age had statistically significant relationships to spring 2019 student persistence (see Table 5). The reason for this was foreshadowed by a covariate, program Level 4, seniors in the study. Although not the focus of this study, Level 4 (senior) was statistically significant (see Table 5). The researcher posited that persisting in spring 2019 would be a positive indicator of academic success because the student would be taking the next step toward graduation by continuing enrolling in classes each semester.

Overall, my study did add to the body of knowledge regarding Grit theory, which falls inside the fields of education and psychology. Very little empirical research in the area of Grit and online students at public research institutions has been done so far. While Duckworth studied
younger participants – entering cadets at West Point, National Spelling Bee contestants, etc. – my study looked at a significantly older population: online undergraduate students with a mean age of 32.91 years and 31 years. Perhaps Grit scores matter more when participants, such as those studied by Duckworth, are younger than the participants in my study, who were in their early thirties. Perhaps my findings call into question the relationship of Grit and (1) grade point averages and (2) persistence when participants are older. Barely 12 years have passed since Duckworth wrote her “Intelligence is not enough” doctoral dissertation about Grit, and less than 10 years have passed since Duckworth and Quinn developed and validated the Grit-S scale. Some studies by other researchers support Duckworth’s theory of Grit, and others contradict it. This is the point of science: to propose a theory, to test it, to encourage other researchers to test it, and to bring the knowledge from all the studies together to form a bigger picture. Future research regarding Grit will be necessary to further the body of knowledge. My research adds to the global conversation about Grit theory and its meaning.

**Additional findings**

There was no statistically significant relationship between self-reported high school GPA and college fall 2018 GPA (see Table 2). This correlation may have been weakened by the restricted range of fall 2018 GPA, where most averages were near or at 4.0. This lack of a relationship runs contrary to the literature. Other studies have found a positive correlation between self-reported high school GPA and college GPA (Clinedinst, M. & Patel, 2018; Richardson, Abraham, & Bond, 2012). Richardson, Abraham, and Bond found a student’s high school GPA to be a stronger predictor of college GPA than standardized college entrance exams. Perhaps the age of the participants in my study – a median age of 31 years – had some effect on the lack of correlation between high school GPA and college GPA. Perhaps other experiences –
jobs, family, community college experience – meant that older U of A online students had outgrown the predictability of their high school GPA scores. Perhaps their ages put them in a different class of students, for which the common college research conclusions do not necessarily apply. Perhaps age is a better substitute than grit to predict academic achievement.

**Conclusion**

The purpose of this study was to determine whether the U of A student traits in Grit (perseverance and passion for long-term goals), as measured by the Grit-S assessment tool, could predict semester GPA and student persistence. The researcher wanted to know whether the Grit-S assessment tool could help U of A administrators and faculty identify which students needed extra help to be academically successful. My study found there was no significant relationship between Grit scores and GPA or persistence. Based on the outcome of my study, perhaps Grit assessments are not the best tool to help identify students who could benefit from academic support. Like the Zimmerman Brogan (2015) study, my study also raises the question of what role Grit assessments have in the higher education landscape, more generally, regarding the prediction of academic performance.

**Limitations**

As noted previously, there are several limitations to this research study. The most obvious limitation is the Grit-S scale assessment relies on self-reported data and is vulnerable to desirability bias, meaning that people may select answers that make them appear to have more Grit. Another limitation is researchers Duckworth, Peterson, Matthews and Kelly (2007) note that research has not yet explored how Grit relates to other predictive variables. A delimitation is the short time range between the administration of the Grit-S assessment in October 2018 and the end of the fall semester in December 2019. Research at the University of Arkansas in the 2018-
19 academic year shows that the restricted range in fall GPA might weaken correlations and including seniors who might graduate could complicate the interpretation of enrollment status. Another limitation is that only 10 of the 203 students did not persist, which might have reduced the ability of the logistic regression model to be a better fit than the null model (with no predictors).

**Suggestions for Future Research**

There are several possible options for future research:

- Other researchers could take a longitudinal approach to studying whether Grit scores have a relationship with student GPA or persistence. One of the delimitations of this study was the short period of time from the Grit Survey (October 2018) and the end of the semester, when fall semester GPA are recorded (December 2018). Perhaps lengthening the time of the study, or taking a longitudinal approach, would provide a different perspective on the predictability of Grit scores. Perhaps other researchers could look at the total GPA of graduating students, rather than looking at the GPA for one semester, which was done in my study.

- Future researchers could look at Grit study through a broader population of online college students. My study looked at an online student population of only about 1,000 students at a public research institution in Arkansas. Future studies could expand Grit research to multiple institutions and collect information that could further the conversation about Grit theory.

- Perhaps other research can shed more light on why online students drop out of college before graduation and what measures can be taken to encourage them to
remains in school and graduate. Qualitative studies might be more powerful in understanding why. Findings from this study could link with past studies, such as Duff and Quinn’s 2006 study about engaging online learning environments and what motivates online students to stay in school and graduate.

**Suggestions for Practice**

Perhaps Grit assessments are not the best tool for predicting academic success (GPA and persistence) of older student populations. It is possible that older student populations have outgrown the predictability of Grit because older people tend to be more mature and carry more life experiences than many of the participants (West Point cadets and National Spelling Bee contestants) in Duckworth’s studies.
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Appendix A

Expedited Approval from the Institutional Review Board at the University of Arkansas

To: Kay Best Murphy
   GILBL 0507A
From: Douglas James Adams, Chair
       IRB Committee
Date: 09/24/2018
Action: Expedited Approval
Action Date: 09/24/2018
Protocol #: 1808140513
Study Title: Grit Survey for Online U of A Undergraduate Students
Expiration Date: 09/05/2019
Last Approval Date:

The above referenced protocol has been approved following expedited review by the IRB Committee that oversees research with human subjects.

If the research involves collaboration with another institution then the research cannot commence until the Committee receives written notification of approval from the collaborating institution’s IRB.

It is the Principal Investigator’s responsibility to obtain review and continued approval before the expiration date.

Protocols are approved for a maximum period of one year. You may not continue any research activity beyond the expiration date without Committee approval. Please submit continuation requests early enough to allow sufficient time for review. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study closure.

Adverse Events: Any serious or unexpected adverse event must be reported to the IRB Committee within 48 hours. All other adverse events should be reported within 10 working days.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, study personnel, or number of participants, please submit an amendment to the IRB. All changes must be approved by the IRB Committee before they can be initiated.

You must maintain a research file for at least 3 years after completion of the study. This file should include all correspondence with the IRB Committee, original signed consent forms, and study data.

cc: Kit Kacirek, Investigator
Appendix B

Permission to Use the Grit-S Survey

From: Angela Duckworth <aduckworth@characterlab.org>
Sent: Tuesday, June 26, 2018 8:17 PM
To: Kay Best Murphy
Subject: Re: Doctoral candidate seeking permission to use Grit survey instrument

Yes, that is correct.
Good luck!!

On Tue, Jun 26, 2018 at 3:07 PM Kay Best Murphy <ksmurphy@uark.edu> wrote:

Hello, Dr. Duckworth,

Thank you for sharing your Grit Scale instrument with researchers and educators for non-commercial purposes, as is stated on your research website. I believe I will fall into the “researchers” category because I am a doctoral candidate at the University of Arkansas. I will use your Grit Scale instrument in my dissertation research, a non-commercial project. If I misunderstood your website, please let me know. I will cite you and your research. Again, thank you.

Best regards,
Kay

Kay Murphy
Director of Communications
Global Campus
University of Arkansas
2 E. Center St., Room 306
Fayetteville, Arkansas 72701
479-575-6489 – Work
479-575-7232 – Cell
479-575-7232 – Fax
855-402-3300 – Rogers
http://globalcampus.uark.edu
http://online.uark.edu
http://training.uark.edu
Appendix C

Request for Student Email Addresses from the Office of the Register

UNIVERSITY OF ARKANSAS

Information Request Form
Office of the Registrar

Faculty and staff within college units on campus must first make the information request to their Dean’s office. If the request cannot be fulfilled by the Dean’s office, then this form may be submitted for consideration.

Complete this form and return with the signature of full time appointed faculty/staff member making the request to the Office of the Registrar by:

E-mail - registra@uark.edu
Campus Mail -141 UPTE
Mail - Office of the Registrar, 141 Uptown East, 1083 E. Sain St.,
University of Arkansas, Fayetteville, AR 72701

1. Purpose for requested data:
Overall - dissertation research for the Adult and Lifelong Learning program
(First request) ASAP - Email addresses, college and student ID numbers of the students in my research population listed below, allowing me to send my survey link to them. This first request will be followed by two other requests. (Second request) In early January - Fall 2018 grade point averages for students who have given permission via the survey. (Third request) After spring 2019

2. Population and fields requested (i.e. name, e-mail), and classification of all undergraduate students who were enrolled for Fall 2017 on the 11th class day, their name, permanent address, etc.:
The population is current students enrolled in undergraduate online degree programs in Fall 2018 on or following the 11th day of classes. I would like their names, email addresses, and, if possible, their student ID numbers.

3. Format for data (i.e. sorted by last name, college, etc.):
First request - Sort by last name also providing first name, student ID number, email address.
Second request - Sort by student ID number also providing each students’ fall 2018 semester GPA
Third request - Sort by student ID number followed by "yes" or "no" that each student "yes," is enrolled in spring 2019 courses or "no, is not enrolled in spring 2019 courses"

4. Requested delivery date (allow a minimum of 5 business days): August 29, 2018 (first request only)

5. These requests are worked into the normal production schedule and everything possible is done to deliver them by the date requested. All files will be delivered electronically through a digital drop box.

The following acknowledgment is required from a full time appointed faculty/staff member:
I understand that this file is NOT directory information. I will supervise use of the data and ensure that it is not used for any purpose other than what is specified here and that it will not be released to a third party or an off-campus agency, except as indicated on this form. I agree to destroy the file once the project is finished and the data is no longer needed.

Signature of appointed faculty/staff member: Kay Murphy

Printed Name: Kay Murphy Title: Director of Communications
UARK E-mail Address: ksmurphy@uark.edu Date: 8-18-18

Last modified: June 28, 2018
Appendix D

Grit Survey for Online U of A Undergraduate Students

Thank you
Thank you for clicking on this survey link and helping me, Kay Murphy, by completing this survey and allowing me to move forward with the research I need to obtain my doctorate at the University of Arkansas (U of A).

Informed Consent to Participate in a Research Study
Principal Researcher: Kay Murphy
Faculty Advisor: Dr. Kit Kacirek

Invitation to participate
You are invited to participate in a research study about Grit, a combination of passion and perseverance. You are being asked to participate in this study because you are one of about 1,000 students studying in an online undergraduate degree program at the University of Arkansas.

Principal researcher and faculty advisor
This survey will be used in a research study by Kay Murphy, a doctoral candidate in College of Education and Health Professions at the U of A and an employee of the U of A Global Campus, a unit that supports online degree programs. This research is under the supervision of faculty member Kit Kacirek, Ed.D., Associate Professor of Adult and Lifelong Learning in the College of Education and Health Professions. You can contact me, Kay Murphy, or my academic faculty supervisor for answers to pertinent questions about the research and research subjects rights:

Kay Murphy
Doctoral candidate
2 E. Center St.
Fayetteville, AR 72701
ksmurphy@uark.edu

Kit Kacirek
Associate Professor
GRAD 12,
COEHP
University of Arkansas
Fayetteville, AR 72701
479-575-4875
kitk@uark.edu
University of Arkansas
1 University of Arkansas
Fayetteville, AR 72701
479-575-2000
The purpose of the survey
The purpose of this research is (1) the partial fulfillment of the U of A’s requirements for the doctoral program, and (2) to contribute to the field of Adult and Lifelong Learning by adding to the body of research available about the Grit Scale Survey, which measures passion and perseverance.

Participants in the study
About 1,000 students who are studying in online undergraduate degree programs will be invited to participate.

What you will be asked to do
Participants are asked to complete a 10 to 15 minute online survey, managed through Qualtrics, the U of A’s preferred survey tool. You will be asked 18 questions regarding demographic information, Grit Survey questions, and permission to collect student data snapshots from U of A data bases. The Grit Scale Survey is intended to measure your passion and perseverance. Some participants will be asked to participate in a follow-up email, which could take another 10 minutes to read and respond.

Voluntary Participation
A little more than 1,000 U of A students studying in undergraduate online degree programs have been invited to participate in this survey and research study. Participation is voluntary. You may refuse to participate, or you can discontinue participation at any time without penalty or loss of benefits. Refusal to participate will involve no penalty or loss of benefits. However, only participants who complete the survey will be entered in a prize drawing for one of four $50 Amazon gift cards. To complete the survey, you must answer at least nine of the 18 questions. Participants are free to withdraw at any time. If significant new findings develop during the course of research that may relate to participants’ willingness to continue participation, participants will be provided notified via email.

Exclusion of participation
Any person under the age of 18 will be excluded/removed from this survey and research. Information provided by anyone under the age of 18 will be removed. Any person who identifies as NOT being in an undergraduate online degree program will be excluded/removed.

Risks
This researcher does not foresee any potential risks, discomforts, or adverse effects to participants; however, there could be risks that are currently unforeseeable.

Costs
There will be no cost associated with your participation.

Benefits
The main benefit to participating in this survey research will be knowing you helped a fellow U of A student complete a research project needed attain her degree. A minor benefit – for those who complete the survey – is the opportunity to enter a prize drawing for one of four $50 Amazon gift cards. The benefit of the research to society will be expanding the body of
knowledge that exists about the Grit Survey, which measures passion and perseverance. There will be no compensation for your time and inconvenience.

Confidentiality
Participants will be identified as U of A undergraduate students studying in online degree programs in fall 2018 and spring 2019. All other information will be kept confidential to the extent allowed by law and University policy. The researcher is a doctoral student and a full-time appointed U of A staff member. Your name or identity will NOT be part of my dissertation or other published research writing. The researcher needs to identify you for the sole purpose of matching your Grit survey score to two snapshots of your academic data, if permission is granted. Your name or identity will not be linked to Grit scores or academic data in my dissertation or other published research writing and will be kept confidential to the extent allowed by law and University policy. All files will be stored in a password protected computer and U of A Box file. Identifiable data (names and student ID numbers) will be destroyed once my dissertation is complete.

Institutional Review Board
The U of A Institutional Review Board has reviewed this survey research proposal and given approval to proceed. IRB Number: ###

Evidence of Informed Consent
The return (submission) of this survey will serve as your informed consent to participate. Below are U of A Institutional Review Board guidelines:

“Survey or questionnaire research satisfying the requirements for Human Subjects Committee Review under Article 9.02 may rely on the return of the completed instrument as evidence of informed consent so long as the instrument itself or a cover letter: i) informs subjects that they are being asked to participate in research; ii) provides a description of the extent and expected duration of their participation; iii) includes a statement that their participation is voluntary; and iv) assures confidentiality or anonymity of responses.”

Incentive
The names of U of A undergraduate students studying in online degree programs who complete the survey will be entered in a prize drawing for a $50 Amazon gift card. There will be four (4) $50 gift cards given as an incentive to gain the necessary number of participants (sample) to complete the survey research and allow me to complete the research requirements of my doctoral program. You will be required to answer at least nine of the 18 questions to move through and complete the survey: (1) one question regarding whether you consent to participate and (2) eight questions related to Grit, which this study defines as passion and perseverance. Answers for all eight questions are needed to calculate your Grit score.

Questions
You can contact me, Kay Murphy, or my academic faculty supervisor, Dr. Kit Kacirek, for answers to pertinent questions about the research and research subjects rights:

Kay Murphy
Consent to voluntary participate

By clicking the “Take the Survey” button below, you are agreeing that:

I have read the above statement and have been able to ask questions and express concerns, which have been satisfactorily responded to by the investigator. I understand the purpose of the study, as well as the potential benefits and risks that are involved. I understand that participation is voluntary. I understand that significant new findings developed during this research will be shared with the participant. I understand that no rights have been waived by signing the consent form.

You have the option of discontinuing your participation by clicking the “Leave Survey” button below.
Grit Survey for Online U of A Undergraduate Students

*Mandatory questions

**Demographic information**
Please tell me a little bit about you.

1. *What is your name or student ID number?*  
   A. First name (box)  
   B. Last name (box)  
   a. OR  
   C. Student ID number (box)

2. What is your age?  
   A. (box)

3. To which gender identity do you most identify? (radio buttons)  
   Male  
   Female  
   Transgender Female  
   Transgender Male  
   Other  
   Prefer not to answer

4. Which is your U of A online degree program? (radio buttons)  
   BSE in Human Resource and Workforce Development  
   BS in Business Administration  
   BA in Communication  
   BA in Interdisciplinary Studies  
   RN to BS in Nursing  
   I am not in an online degree program at the U of A.

5. In what level are you in your degree program? (radio buttons)  
   Freshman (Less than 30 course hours passed)  
   Sophomore (30 or more course hours passed, but less than 60)  
   Junior (60 or more course hours passed, but less than 90)  
   Senior (90 or more course hours passed)

6. What was your high school GPA?  
   A. (box)
Short Grit Scale Survey

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

**How Gritty are you? Get your Grit Score**

1. Would you like to know how Gritty you are? Mark “Yes” below, and I will send your Grit score to you via email. I will also send a link to professor Angela Duckworth’s research on the Grit Scale, indicate below.

   Yes, I want to know my Grit score. Please send my score and a link to Angela Duckworth’s research website.

   No, do not send an email to me.

**Grit-S Scale citation**

The Grit Scale survey was created by Angela Duckworth, now a professor of psychology at the University of Pennsylvania.


**Snapshot of Academic Progress to Test Grit Correlation**

The heart of my research is discovering whether the Grit Scale has correlation abilities. For this purpose only, I ask for your permission to access two data points (snapshots) in your academic records. You do not have to participate, but **I cannot run a statistical analysis without these data points**. Your name and your personal identity will remain confidential to the extent allowed by law and University policy and will NOT be printed in my dissertation or through any other public means. The data points are:

- Your semester GPA for fall 2018
- Whether or not (yes or no) you enroll in spring 2019 Classes

1. The researcher seeks permission to collect your GPA data for fall 2018 only. No other GPA data information can be used.
   I grant the researcher permission to collect my GPA data for fall 2018 only.
   I do not grant the researcher permission.
2. The researcher seeks permission to collect data about whether you enroll in U of A courses in spring 2019. No other enrollment data can be used. No other enrollment data can be used.
   I grant the researcher permission to collect data about whether or not I enroll in U of A courses in spring 2019 only.
   I do not grant the researcher permission.

**Follow-up contact**

1. The researcher would like to contact students who do not enroll in spring 2019 classes. If you are willing to receive an email from me, grant permission below and share your name and email address.
   
   A. I grant the researcher permission to contact me via email if I do not enroll in spring 2019 classes.
   B. I do not grant the researcher permission to contact me.

**Thank You**
Thank you for completing the Grit Survey for Online U of A Undergraduate Students. You have helped a doctoral student at the U of A conduct the research needed for graduation requirements. Your name will be entered into a drawing for one of four $50 Amazon gift cards.
Appendix E

Scoring for the Grit Scale survey, as created by Dr. Angela Duckworth

Scoring:

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

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).

Grit-S Scale citation

Appendix F

Grit Survey Email Messages to Students via Qualtrics

Invitation (October 9, 2018)

From: Kay Murphy (ksmurphy@uark.edu)
Sent: September 10, 2018
To: (Name of potential participant)
Subject: University of Arkansas Online Student Grit Survey Invitation

Dear (Name),

I am writing to ask for your help with the Grit Survey for Online U of A Undergraduate Students. You are one of more than 1,000 U of A undergraduate students asked to complete a brief survey about your passion and perseverance, otherwise known as Grit. The goal of this survey is to understand if a correlation exists between Grit Scores, semester grade point averages, and enrollment in courses. This research will help me satisfy the requirements of my doctoral program, as well as benefiting the scholarly community by expanding Grit research.

The survey is short, only 18 questions, and should take about 10 to 15 minutes to complete. To begin the survey, simply click on this link:

LINK

This survey is confidential to the extent allowed by law and University policy. Your participation is voluntary, and you can discontinue the survey at any time without penalty or loss. However, only those who complete the survey (answer at least 9 of 18 questions) will be entered in a prize drawing for one of four $50 Amazon gift cards. If you have questions or comments, please contact me, Kay Murphy, at ksmurphy@uark.edu or [redacted] or my faculty advisor, Kit Kacirek, Ed.D., at kitk@uark.edu or 479-575-4875.

The greatest benefit to completing this survey is knowing you helped a doctoral candidate complete the research requirement to earn her degree. As a bonus, students who complete the survey will be entered into a prize drawing for one of four $50 Amazon gift cards.

Many thanks,
Kay Murphy
University of Arkansas doctoral candidate
Employee of the U of A Global Campus

First Reminder (October 12, 2018)

From: Kay Murphy (ksmurphy@uark.edu)
Sent: September 13, 2018  
To: (Name of potential participant)  
Subject: How Gritty Are You? University of Arkansas Research Survey

Dear (Name),

Earlier this week, I sent an email to you asking that you participate in the Grit Survey for Online U of A Undergraduate Students.

I hope that providing you with a link to the survey will make it easy for you to respond to this short survey, with only 18 questions. To complete the survey, simply click on the link below:

LINK

Your participation is voluntary, and I thank you for considering my request.

Best regards,
Kay Murphy  
Doctoral candidate  
College of Education and Health Professions  
University of Arkansas

Second reminder (October 18, 2018)

From: Kay Murphy (ksmurphy@uark.edu)  
Sent: September 19, 2018  
To: (Name of potential participant)  
Subject: A U of A Survey: Your Passion and Perseverance

Dear (Name),

I recently sent you an invitation to complete a survey about the passion and perseverance of students studying in online degree programs at the University of Arkansas. If you have already completed the survey, thank you. I appreciate your effort to help me complete my research and earn my doctorate.

If you have not completed the survey yet, I ask you to do so. It should take you 15 minutes or less to complete. Simply click the link below to begin:

LINK

This survey research is important because it expands research that explores whether passion and perseverance (Grit) matters in higher education. Your participation is voluntary, and you can discontinue the survey at any time without penalty or loss. However, only those who complete the survey (answer at least 9 of 18 questions) will be entered in a prize drawing for one of four $50 Amazon gift cards.
If you have questions or comments, please contact me, Kay Murphy, at ksmurphy@uark.edu or 479-856-8102, or my faculty advisor, Kit Kacirek, Ed.D., at kitk@uark.edu or 479-575-4875.

Sincerely,
Kay Murphy
Doctoral candidate
College of Education and Health Professions
University of Arkansas

Final reminder (October 24, 2018)

From: Kay Murphy (ksmurphy@uark.edu)
Sent: October 5, 2018
To: (Name of potential participant)
Subject: Last Chance to Help the U of A Understand Whether Grit Matters

Dear (Name),

I am following up on the message sent to you earlier this week, asking you to participate in the Grit Survey for Online U of A Undergraduate Students. The survey is drawing to a close, and your participation is important. This will be the last invitation to participate in this survey and help me with my dissertation research.

To begin the survey, click the link below:

LINK

Your participation is voluntary, and your name and identity will be confidential to the extent allowed by law and University policy. Thank you for helping me complete this valuable higher education research.

I wish you much success in reaching your educational goals.

Best regards,
Kay Murphy
Doctoral candidate
College of Education and Health Professions
University of Arkansas
Appendix G

Email to Program Coordinators and Faculty

Program coordinators of undergraduate online degree programs at the University of Arkansas received email messages to ask them to share an email with faculty/instructors in their programs. The proposed email from program coordinators to faculty/instructors asked faculty/instructors to post announcements to students in Blackboard Learn that invite students to participate in the research survey.

1. Email to online degree program coordinators

Subject: Request for faculty to assist with U of A dissertation research survey

Hello, Dr. (name),

I am Kay Murphy, a doctoral candidate in the Adult and Lifelong Learning online program and a staff member of the U of A Global Campus. I am conducting survey research, and I will send emails directly to students in online undergraduate degree programs at the University of Arkansas to invite them to participate. In an effort to boost the response rate, I ask you to forward a message below to the faculty/instructors teaching classes in online undergraduate degree programs, asking them to make an announcement in Blackboard Learn that invites students to participate. Measures are in place in the survey to remove on-campus students who are not part of an online degree program.

Announcement – Please send an email to faculty/instructors asking them to make an announcement to students via Blackboard Learn to invite students to participate in my survey research. Please see below an example of the email I ask you to send to faculty/instructors, including a message to students.

Why is the announcement important – According to Dillman, Smyth and Christian (2014), response rates to surveys can be increased by (1) raising the level of trust, meaning, in this case, letting students know from a reliable source that the email they received from Kay Murphy is a legitimate survey request from a U of A doctoral student, (2) using multiple contacts to invite the population to participate, meaning, in this case, sending an invitation by (a) direct email to the students and (b) making the survey available to students through a faculty/instructor announcement in Blackboard, and (3) a prize drawing for people who complete the survey.

IRB Approval: #(number)

Thank you for helping me advance research at the University of Arkansas and helping me complete the dissertation research required in my online doctoral degree program. Please let me know if you have any questions or concerns.

Sincerely,
Kay Murphy
Doctoral candidate in the Adult and Lifelong Learning Program
College of Education and Health Professionals
Director of Communications for the Global Campus
Work 479-575-6489
Cell 479-856-8102

2. Email from program coordinators to faculty/instructors who teach courses in online degree programs from program coordinators

Subject: Please share with students a link to a U of A doctoral research survey

[Personal message from program coordinator to faculty/instructors, asking them to post survey research announcements in their classes in Blackboard Learn. Please include the message below from the researcher.]

Message from researcher:

Hello, I am Kay Murphy, a doctoral candidate in the Adult and Lifelong Learning online program and a staff member of the U of A Global Campus. I am conducting survey research as part of the requirements to complete my degree. I am asking you to send an announcement to your students in Blackboard Learn that invites them to participate in my research survey, if they wish. Research participation is voluntary.

I will send emails directly to students in online undergraduate degree programs at the University of Arkansas to invite them to participate in my survey research. However, an announcement from you will let students know that my invitation to participate in survey research is legitimate, not a scam. In an effort to boost the response rate, I ask you to make an announcement in Blackboard Learn that invites students to volunteer to participate. Measures are in place in the survey to remove on-campus students who are not part of an online degree program.

**Announcement to students:** How gritty are you? Participate in a U of A research study and find out. You should have received an invitation to participate in a research survey from Kay Murphy, a doctoral candidate at the University of Arkansas. The survey questions will measure your Grit, meaning your passion and perseverance, and ask related questions. You can access the survey at (link), and it will take you about 10 to 15 minutes to complete.

I encourage you to participate in academic research at the U of A, but your participation is voluntary. There is no penalty for not participating. By completing the survey, you will...
be helping a fellow student complete graduation requirements, and those who complete the survey will be entered in a prize drawing for one of four $50 Amazon gift cards.

**Why is the announcement important** – According to Dillman, Smyth and Christian (2014), response rates to surveys can be increased by (1) raising the level of trust, meaning, in this case, letting students know from a reliable source that the email they received from Kay Murphy is a legitimate survey request from a U of A doctoral student, (2) using multiple contacts to invite the population to participate, meaning, in this case, sending an invitation by (a) direct email to the students and (b) making the survey available to students through a faculty/instructor announcement in Blackboard, and (3) a prize drawing for people who complete the survey.

**IRB Approval** #(number)


Thank you for helping me advance research at the University of Arkansas and helping me complete the dissertation research required in my online doctoral degree program. Please let me know if you have any questions or concerns.

Sincerely,
Kay Murphy
Doctoral candidate in the Adult and Lifelong Learning Program
College of Education and Health Professionals
Director of Communications for the Global Campus
Work 479-575-6489
Cell 479-856-8102
Appendix H

Request for Student GPA information from the Office of the Register

Information Request Form
Office of the Registrar

Faculty and staff within college units on campus must first make the information request to their Dean’s office. If the request cannot be fulfilled by the Dean’s office, then this form may be submitted for consideration.

Complete this form and return with the signature of full time appointed faculty/staff member making the request to the Office of the Registrar by:

E-mail - registra@uark.edu
Campus Mail -141 UPTE
Mail - Office of the Registrar, 141 Uptown East, 1083 E. Sain St.,
University of Arkansas, Fayetteville, AR 72701

1. Purpose for requested data:
The purpose for the requested data is for doctoral research for a dissertation at the U of A. I am seeking GPA for Fall 2018 data from students who gave consent via a Qualtrics survey in October 2018.

2. Population and fields requested (i.e. name, e-mail, and classification of all undergraduate students who were enrolled for Fall 2017 on the 11th class day, their name, permanent address, etc.):

Attached is an excel file with two columns: (1) Student ID number (green is the ID number provided by the Registrar’s Office, tan is the number reported by the student) and (1) The column from the Qualtrics survey where 1=consent and 2=declined consent. All student data that declined consent were removed from this Excel file. Raw data is available upon request.

3. Format for data (i.e. sorted by last name, college, etc.):
Sorted by Student ID number
Column 1 - Student ID number - as provided by the researcher
Column 2 - Student consent - as provided by the researcher
Column 3 - Student GPA for Fall 2018 with a whole number and two decimal points, example: 3.25 - REQUESTED FROM THE REGISTRAR’S OFFICE

4. Requested delivery date (allow a minimum of 5 business days): January 30, 2019

5. These requests are worked into the normal production schedule and everything possible is done to deliver them by the date requested. All files will be delivered electronically through a digital drop box.

The following acknowledgment is required from a full time appointed faculty/staff member:

I understand that this file is NOT directory information. I will supervise use of the data and ensure that it is not used for any purpose other than what is specified here and that it will not be released to a third party or an off-campus agency, except as indicated on this form. I agree to destroy the file once the project is finished and the data is no longer needed.

Signature of appointed faculty/staff member: Kay Murphy
Printed Name: Kay Murphy Title: Director of Communications
UARK E-mail Address: ksmurphy@uark.edu Date: 1-22-19

Digitally signed by Kay Murphy Date: 2019.01.19 15:39:54 -06'00'
Appendix I

Request for Student Enrollment Status from the Office of the Registrar

Information Request Form
Office of the Registrar

Faculty and staff within college units on campus must first make the information request to their Dean's office. If the request cannot be fulfilled by the Dean's office, then this form may be submitted for consideration.

Complete this form and return with the signature of full time appointed faculty/staff member making the request to the Office of the Registrar by:

E-mail - registra@uark.edu
Campus Mail - 141 UPTE
Mail - Office of the Registrar, 141 Uptown East, 1083 E. Sain St.,
University of Arkansas, Fayetteville, AR 72701

1. Purpose for requested data:

The purpose for the requested data is for doctoral research for a dissertation at the U of A. I am seeking Enrollment for Spring 2019 data -based on 11th-day data - from students who gave consent via a Qualtrics survey in October 2018.

2. Population and fields requested (i.e. name, e-mail, and classification of all undergraduate students who were enrolled for Fall 2017 on the 11th class day, their name, permanent address, etc.):

Attached is an excel file with two columns: (1) Student ID number (green is the ID number provided by the Registrar’s Office, and tan is the number reported by the student) and (2) The column from the Qualtrics survey where 1 = consent and 2 = declined consent. All student data that declined consent were removed from this Excel file. Raw data is available upon request.

3. Format for data (i.e. sorted by last name, college, etc.):

Sort by Student ID Number
Column 1 - Student ID number - as provided by the researcher
Column 2 - Student consent - as provided by the researcher
Column 3 - Student Enrollment Data - Yes or 1, students are enrolled in spring 2019 classes OR No or 2, students are NOT enrolled in spring 2019 classes - REQUESTED FROM REGISTRAR'S

4. Requested delivery date (allow a minimum of 5 business days): February 8, 2019

5. These requests are worked into the normal production schedule and everything possible is done to deliver them by the date requested. All files will be delivered electronically through a digital drop box.

The following acknowledgment is required from a full time appointed faculty/staff member:

I understand that this file is NOT directory information. I will supervise use of the data and ensure that it is not used for any purpose other than what is specified here and that it will not be released to a third party or an off-campus agency, except as indicated on this form. I agree to destroy the file once the project is finished and the data is no longer needed.

Signature of appointed faculty/staff member: Kay Murphy

Printed Name: Kay Murphy
Title: Director of Communications
UARK E-mail Address: ksmurphy@uark.edu
Date: 1-30-19
Appendix J

Follow-up Email to Students

Below is the follow-up email I will send to students who participate in the Grit survey research and who do not re-enroll in courses in spring 2019.

Email message

Hello, (name),

Thank you for completing the Grit (passion and perseverance) research survey. With your permission, I am following up to ask one final question: What is the reason you did not enroll in courses in spring 2019? I ask this because your reason may or may not have a relationship to Grit.

Your name and identity will remain confidential and will not be linked to your reason. Your response is voluntary. However, your response will help my research be as accurate as possible.

If you are willing, please hit reply and share your reason for not enrolling in courses in spring 2019.

Thank you,
Kay Murphy
U of A doctoral candidate
Appendix K

Request for Student Enrollment Status from the Office of the Registrar

Information Request Form
Office of the Registrar

Faculty and staff within college units on campus must first make the information request to their Dean’s office. If the request cannot be fulfilled by the Dean’s office, then this form may be submitted for consideration.

Complete this form and return with the signature of full time appointed faculty/staff member making the request to the Office of the Registrar by:

E-mail - registra@uark.edu
Campus Mail -141 UPTE
Mail - Office of the Registrar, 141 Uptown East, 1083 E. Sain St.,
University of Arkansas, Fayetteville, AR 72701

1. Purpose for requested data:
The purpose of the request is for doctoral research for a dissertation at the U of A. I want to know yes or no - did 37 students graduate in fall 2018.
This request was not part of the IRB protocol.

2. Population and fields requested (i.e. name, e-mail, and classification of all undergraduate students who were enrolled for Fall 2017 on the 11th class day, their name, permanent address, etc.):
Attached is an Excel file with 37 student ID numbers and names.

3. Format for data (i.e. sorted by last name, college, etc.):
Sort by student ID number

4. Requested delivery date (allow a minimum of 5 business days): March 11, 2019

5. These requests are worked into the normal production schedule and everything possible is done to deliver them by the date requested. All files will be delivered electronically through a digital drop box.

The following acknowledgment is required from a full time appointed faculty/staff member:
I understand that this file is NOT directory information. I will supervise use of the data and ensure that it is not used for any purpose other than what is specified here and that it will not be released to a third party or an off-campus agency, except as indicated on this form. I agree to destroy the file once the project is finished and the data is no longer needed.

Signature of appointed faculty/staff member: Kay Murphy
Printed Name: Kay Murphy  Title: Director of Communications
UARK E-mail Address: ksmurphy@uark.edu  Date: 3-5-19