Grit and Academic Performance: Is Being Grittier Better?

Winnie Chang  
*University of Miami, w.chang@miami.edu*

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GRIT AND ACADEMIC PERFORMANCE: IS BEING GRITTIER BETTER?

By

Winnie Chang

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GRIT AND ACADEMIC PERFORMANCE: IS BEING GRITTIER BETTER?

Winnie Chang

Approved:

_________________________  ________________________
Soyeon Ahn, Ph.D.  Tywan G. Martin, Ph.D.
Associate Professor of Educational  Assistant Professor of
and Psychological Studies  Kinesiology and Sports
Sciences

_________________________  ________________________
Nicholas Myers, Ph.D.  M. Brian Blake, Ph.D.
Associate Professor of Educational  Dean of the Graduate School
and Psychological Studies

_________________________
Brian Orefice, Ph. D.
Lecturer of Educational and
Psychological Studies
Abstract of a dissertation at the University of Miami.

Dissertation supervised by Dr. Soyeon Ahn.

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Completing a college degree benefits both the individual and society and as data show, students are starting college, but not persisting through graduation. The purpose of this study was to examine the importance of a non-cognitive trait, grit, in predicting first year academic performance, as academic performance has been found to be the best indicator of students persisting through graduation. The secondary data obtained from the first year students at a private highly selective institution was analyzed using Hierarchical Multiple Regression analysis. The results of the study showed that gender, SAT scores, race, and the perseverance subscale score of grit measured by the Grit-S were found to be significant in predicting first year GPA. The results suggest that higher education administrators and faculty should foster perseverance in students in an effort to increase academic performance. Perseverance in students can be developed through learning strategies interventions, academic support, classroom/learning experiences and faculty contact. Future research on grit includes gathering data from a national sample in order to increase the generalizability of the findings, as well as validating the factor structure of grit and empirically testing its effect in relation to student academic performance.
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Chapter 1: Introduction

Access to higher education has been rising, as data show a 37% increase in enrollments in degree-granting postsecondary institutions (i.e., academic, career and technical, and continuing professional education programs after high school) in the past decade (U.S. Department of Education, National Center for Education Statistics, 2012). However, graduation rates have not been increasing at the same rate as student enrollment. The U.S. Department of Education, National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS) (2013) reports the degree completion rate within six years after starting at four-year institutions was approximately 55% for students entering college in 1996, but was almost 59% for students who began pursing a bachelor’s degree in 2005. Moreover, roughly 69% of Asian students, 62% of White students, and 64% of students identifying as two or more races graduate in six years, while approximately 40% of Black students and 51% of Hispanic students graduate within six years (U.S. Department of Education, NCES, IPEDS, 2013). The six-year graduation rate for female students is almost 61%, with male students graduating at 56% (U.S. Department of Education, NCES, IPEDS, 2013). As the data show, students are starting college, but not persisting through graduation, which varies by student demographics such as race/ethnicity and gender.

Completing a college degree benefits both the individual and society. People with at least a bachelor’s degree have lower rates of unemployment, poverty, smoking, and obesity, as compared to those who have only earned a high school diploma. Furthermore, people earning at least a bachelor’s degree show higher rates of civic involvement, voting, and being covered by employer-provided health insurance (Baum, Ma, & Payea,
Likewise, a college education “provides tools that help people to live healthier and more satisfying lives, to participate actively in civil society, and to create opportunities for their children” (Baum et al., 2013, p.7). Therefore, it is important for higher education institutions to find strategies to increase the retention of their students, so they ultimately graduate with a degree.

Because academic performance or grades in college has been found to be the single best proxy variable of students persisting through graduation (Pascarella & Terenzini, 2005), a central focus has been on various factors affecting student’s academic performance in an effort to better understand and increase student persistence. Traditionally, cognitive ability measures such as scores on the American College Test (ACT), Scholastic Aptitude Test (SAT), and high school grade point averages (HSGPA) have been widely used in predicting academic performance in college (Komarraju, Ramsey, & Rinella, 2013).

More recently, research has begun to consider personality traits, such as grit, as a predictor of student academic performance in college (Duckworth, Peterson, Matthews, & Kelly, 2007; Strayhorn, 2014). Grit is defined as trait-level perseverance and passion for long-term goals (Duckworth et al., 2007). Some statements that describe grittier students include behaviors such as not being discouraged by setbacks, maintaining focus on a project, being a hard worker, completing tasks, and being diligent. To the contrary, statements that describe less gritty students include behaviors such as being distracted by new ideas and projects, setting a goal but later choosing a different goal, and having difficulty maintaining focus on long-term projects.
In spite of its role in predicting student’s academic performance in college, grit has not been sufficiently studied in college students. Therefore, understanding the role of grit will offer a new lens for higher education administrators when looking at student academic performance, and ultimately their persistence through graduation. In particular, this study examined whether grit predicts academic performance over that of other predictors that have been traditionally examined (gender, race, HSGPA, ACT/SAT scores). This study also examined if grit moderates the effect of student background characteristics and/or previous academic achievement on academic performance in college.

**Theoretical Basis of the Study**

Many theories and models have been developed to explain student persistence and retention. Student retention is defined as the ability of an institution to retain a student from admission through graduation (Renn & Reason, 2013; Seidman, 2005). Student persistence is defined as the desire and action of a student to stay within the system of higher education from beginning through degree completion (Renn & Reason, 2013; Seidman, 2005). Student persistence is used when describing the students’ perspective and student retention is used when describing the institution’s perspective. In other words, students persist at an institution (or may transfer between institutions), whereas institutions retain students between academic terms. Below, the most relevant theories for retention and student persistence, as it relates to academic performance in college, are briefly introduced.

Tinto’s Model of Student Departure (1975, 1988, 1993) states that students enter college with individual characteristics including demographic characteristics, and their
goals and aspirations for their college experience. It is how students feel about their experiences at the institution, in addition to how well they academically and socially integrate into the college culture, which affects their decisions to persist or depart from an institution. Tinto (1975) asserted that academic integration can be measured by grade performance in college. Braxton, Sullivan, and Johnson (1997) proposed modifications to Tinto’s Model of Student Departure. Braxton and colleagues argued that there is overwhelming empirical evidence that only certain aspects of Tinto’s theory should form the foundation for the Model on Student Departure.

Astin (1984) proposed a Theory of Student Involvement. Astin stated that students learn by becoming involved; his theory is psychological and behavioral in nature. Two of the five most relevant components of Astin’s Theory of Student Involvement to this study are 1) what students gain from being involved is proportional to the quality, and 2) the quantity of their involvement and academic performance in college is correlated with how involved a student is while in college. Astin (1993) expanded upon his Theory of Student Involvement to develop the Input-Environment-Output (I-E-O) model as a framework to understand how college affects students. College outcomes are a function of three components: inputs, environments, and outcomes of attending college. Simply put, students enter college with their individual background characteristics and it is the interaction students have with their college environment that ultimately affects their outcomes from attending college. Kuh, Kinzie, Schuh, and Whitt (2010) further expanded upon Astin’s Theory of Student Involvement and described how institutions can create conditions that foster student success in college and emphasized that student engagement is a key to student success.
The theories introduced above focus on student persistence and retention at an institution, which has shown to be strongly related to the academic performance of students. For instance, research has found that first-year grades are a significant predictor of degree completion (Adelman, 1999, 2006; Ishitani & DesJardins, 2002; Pascarella & Terenzini, 2005). Additionally, research has shown that the probability of degree completion varies based on student race (DesJardins, Ahlburg, & McCall, 1999, 2002) and previous academic achievement (Cabrera, Nora, Terenzini, Pascarella, & Hagedorn, 1999; Ishitani & DesJardins, 2002). Ishitani and DesJardins (2002) also concluded that students with lower SAT scores had increased risk of dropping out of college. Therefore, it is essential to understand how the academic performance of college students can be improved, which further contributes to student persistence and retention at an institution.

**Empirical Research on Factors Affecting Academic Performance**

Studies have found that HSGPA (Astin, 2005; Cornwell, Mustard, & Van Parys, 2009; Komarraju et al., 2013; Zwick & Sklar, 2005) and ACT/SAT scores (Brown, Tramayne, Hoxha, Telander, Fan, & Lent, 2008; Noble & Sawyer, 2002; Rothstein, 2004) are significant predictors of college performance. However, the effect of ACT/SAT scores and HSPGA on predicting academic performance varies based on gender (Chee, Pino, & Smith, 2005) and race (Culpepper & Davenport, 2009; Noble, 2003; Steele-Johnson & Leas, 2013).

In an effort to identify better predictors of academic performance in college over that of gender, race, and previous academic achievement, researchers have explored the effects of personality factors on academic performance. Many researchers (Conard, 2006; Komarraju, Karau, & Schmeck, 2009; Noftle & Robins, 2007; O’Connor & Paunonen,
2007; Poropat, 2009; Tross, Harper, Osher & Kneidinger, 2000) have concluded that specific personality factors explain additional variance in college GPA, when controlling for student background characteristics and previous academic achievement.

Of the personality factors, Duckworth et al. (2007) studied grit in a population of Ivy League psychology undergraduates. Duckworkth et al. found that students with higher grit had higher GPAs in college; yet those same students entered college with lower SAT scores. Research conducted by Strayhorn (2014) was centered on Black males attending a Predominately White Institution (PWI), and his results showed that grittier Black males had higher GPAs in college, higher HSGPAs, and higher ACT scores compared to less gritty Black males. To that end, although it is limited, the existing literature supports the relationship between grit and academic performance, which is further moderated by other factors such as student background and previous academic achievement. Therefore, a closer examination of the effect of grit and its moderating effect on student academic performance in college is warranted.

**Purpose of the Study**

The purpose of this study was to examine whether grit explains significantly more variation in student academic performance in college, over that of student background characteristics and previous academic achievement. Therefore, the focal variable of interest in this study was grit score, as measured by the short grit scale (Grit-S) survey (Duckworth & Quinn, 2009), after controlling for student background characteristics and previous academic achievement. In addition, the moderating effect of grit was explored in the relationship between student background characteristics and/or previous academic achievement and academic performance, defined by their first year college GPA.
Research Questions

As shown in Figure 1, the following research questions were examined using secondary data obtained from the university.

1. Of student background characteristics and previous academic achievement, what were the significant predictors of academic performance after the first year in college?
2. After controlling for student background characteristics and previous academic achievement, did grit significantly explain academic performance after the first year in college?
3. Did grit significantly moderate the relation of student background characteristics and previous academic achievement to academic performance after the first year in college?

Significance of the Study

If grit is found to play a significant role in predicting student academic performance, the study will provide new insights to higher education institutions on different methods of enhancing student academic performance, which in turn will help increase student persistence and retention. Higher education practitioners can use grit to predict which students are more likely to struggle in college, thus identifying at-risk students and provide support to increase their academic performance, which is directly related to student persistence and retention.

Many of the existing retention strategies can continue to be used to create support programs for students; however, the ways in which students participate in those programs will change. Research suggests that grit increases with age (Duckworth et al., 2007). As a
result, it is possible that grit is a personality trait that can be nurtured and taught to students. For instance, cooperative or collaborative learning can be used with students of similar grit levels. Collaboration among students can be a successful way for students to learn from each other to increase their levels of grit, and in turn their academic performance and persistence.

Learning communities, where students take multiple courses together or residential learning communities, where students live together and take courses together, can be more thoughtfully executed to include students of related backgrounds and interest, but of varied levels of grit. This would allow students to experience similar situations, share their successful strategies, and learn from one another. Service learning courses where students engage in community service while concurrently taking a course can be used to help nurture grit in students based on their areas of interest. Mentoring programs may also be a successful intervention for students identified as being less gritty. Explicit instruction on goal-setting strategies with sustained practice of skills and effort toward goals can increase grit levels, which would affect their academic performance and ultimately, their persistence.
Chapter 2: Literature Review

The overarching framework of this study was student persistence and retention; therefore, the seminal models of student retention and persistence are first described in this literature review. Next, academic performance in college, as it relates to student persistence as a proxy variable, is discussed. Third, the effect of student background characteristics, previous academic achievement, and personality factors on academic performance in college is explored. The personality construct, grit, is discussed next and framed within the context of academic performance in college. Lastly, recent research on the effect of grit and college academic performance is reviewed, as well as its moderating role on academic performance.

Retention and Persistence in Higher Education

Student retention has long been a concern for higher education institutions and administrators. The 1970’s marked an end of sustained growth in higher education (Hossler & Bean, 1990). Higher education institutions shifted their focus from the recruitment of students to include efforts in retaining students. During this time of fluctuating goals, Tinto (1975, 1988, 1993) and Astin (1984, 1993) developed their models and theories on student departure and involvement. Tinto (1975) posited that student academic integration can be measured by both grade performance and intellectual development during college. When considering dropout in terms of academic integration, college dropout is more related to academic grade performance than intellectual development. This study focused on academic performance in college, a proxy for academic integration and student persistence. Tinto (1993) stated that the transition to college occurs mostly during the first year and that student experiences during the first
year greatly shape their subsequent persistence. He also emphasized that the first year is when dropouts are the highest and institutional interventions are most effective. Therefore, academic performance during the first year of college is the outcome of interest in the current study.

**Tinto’s model of student departure.** Tinto’s Model of Student Departure (1975, 1988, 1993) is a theoretical framework widely used when studying retention. Tinto based his initial model on Durkheim’s (1961, as cited by Tinto, 1975) sociological concept of suicide, where suicide is more likely to occur when individuals are inadequately integrated into society. Tinto asserted that students who are not sufficiently integrated into the social (peer-group interactions, faculty interactions) and academic (grade performance, intellectual development) structures of higher education can lead to dropout behavior. Tinto’s theoretical model emphasized dropout as a longitudinal process of interactions between the individual and the institution. The students’ experiences with the institution affect their goals and institutional commitment, which lead to persistence or dropout. Students enter higher education institutions with individual characteristics (gender, race/ethnicity), precollege schooling (HSGPA), and family backgrounds (socioeconomic status, values, expectations). These background characteristics and individual attributes affect their development of educational expectations, goals and commitment to the institution. Educational expectation is an important input variable because it identifies the psychological orientation the student brings to college and the level and intensity the educational expectation is held. “Given individual characteristics, prior experiences, and commitments, the model argues that it is the individual’s
integration into the academic and social systems of the college that most directly relates to his continuance in that college” (Tinto, 1975, p. 96).

It is the levels of academic and social integration that modify a student’s commitments, which ultimately determine whether or not the student decides to leave the institution. With a strong commitment to the goal of persisting through graduation and low commitment to the institution can lead to dropout. Comparably, a strong institutional commitment but lower individual commitment to college completion can lead to dropout. Tinto also addresses the effects of external impacts on dropout decisions and the decision to leave a higher education institution is not unaffected by external events. These external impacts may not directly impact the interaction between the student and college environment, but does impact the student’s commitment to their educational goals, which influences dropout decisions.

Continuing his research on student retention, Tinto (1988) delineated the stages of student departure. The stages of student departure are framed using Van Gennep’s (1960, as cited by Tinto, 1988) concept of rites of passage. The process of student persistence consists of three stages: separation, transition, and incorporation. The stage of separation requires students to detach themselves from their past communities, such as those associated with the local high school and hometown. The process of separation from the past is somewhat stressful and for some students, can be so severe that it hinders persistence in college.

The second stage of departure is transition, the passage between the past and the present. As students have separated themselves from the past, students have to learn “the norms and patterns of behavior appropriate to integration in the new communities of the
college” (Tinto, 1988, p. 444). This stage results in students who are not strongly tied to the past or future, which creates much stress and possible isolation for students. Tinto explained that most students are able to handle the transition to college; however, students who drop out from college this early perhaps is not due to inadequate academic and social integration, but from the failure of coping with the stresses of transition to college. Tinto highlights that “some students will ‘stick it out’ even under the most severe conditions whereas others will withdraw even under minimal stress” (1988, p. 444). It is not the separation and transition that directly affect the departure from the institution, but the student’s response to those stressors brought on by the first two stages that affect the dropout decision. Tinto’s transition stage most closely reflects the constructs of grit. Some students have the skills necessary to work hard and figure out the transition to college, whereas other students do not put forth the effort necessary to adjust to college.

It is in the third and final stage, incorporation that a student works to become integrated into college life. Students have to connect with peers, faculty and administrators of the institution to learn behavior appropriate for the college setting. Participating in Greek life, student groups, residence halls and meeting with faculty are opportunities for students to establish relationships on campus. Failure to integrate academically and socially to college life can lead to departure from the institution.

Although much of Tinto’s research centered on how individual student characteristics and the integration of students affect student retention, he also emphasized the institutional role in student retention. Most recently, Tinto (2012a) offered a framework for institutional action with four conditions for student success. The first condition for student success is expectations. High expectations are necessary for student
success. Expectations are in part what students expect of themselves, but also shaped by institutional actions. The institution and faculty must establish high expectations of student performance. It is the clarity and consistency of these expectations that contribute to student success. The second condition for student success is support. Institutions and faculty need to have high expectations for students, however, they must also provide the necessary support for students to meet the high expectations and be successful. Support to students can come in the form of academic, social and financial support. Tinto (2012a) stated that “at no time is support, especially academic support, more important than during the critical first year of college, when student success is still so much in question and still very responsive to institutional intervention” (p. 7). The third condition is assessment and feedback. Institutions can enable faculty and staff to modify their interactions with students to better promote student success by frequently assessing student performance, and providing timely feedback. Here, Tinto stressed the importance of assessment and feedback in the first year “when students are adjusting their behaviors to the new academic and social demands of college” (2012a, p. 7). The last and perhaps most important condition of student success is involvement. “The more students are academically and socially engaged with faculty, staff, and peers, the more likely they are to succeed in college” (Tinto, 2012a, p. 7). Students are most likely to succeed and remain in college when all four conditions are met. Tinto (2012a) strongly advocated that these four conditions are most important in the classroom and during the first year of college.

**Braxton et al.’s theory.** Braxton et al. (1997) suggested modifications be made to Tinto’s Model of Student Departure. The researchers stated that it is widely accepted that
Tinto’s theory possess internal consistency when accounting for individual student persistence, however they questioned the empirical internal consistency of Tinto’s theory. Braxton et al. (1997) used Tinto’s Model of Student Departure (1975) and developed 13 propositions and tested them for empirical soundness using peer-reviewed articles with samples from single and multi-institutional studies. Braxton et al. (1997) asserted that the validity of Tinto’s theory rests on strong empirical support for proposition eight, the greater the degree of academic integration, the greater the level of commitment to the goal of graduating college, and proposition nine, the greater degree of social integration, the greater the level of commitment to the institution.

Although proposition eight is a foundation of Tinto’s theory, it received only moderate empirical support (Braxton et al., 1997). It is argued that the continued focus on proposition eight, the effect of academic integration on student persistence, only challenges the validity of Tinto’s theory (Braxton et al, 1997; Braxton, Hirschy, & McClendon, 2004). It is only the empirically supported propositions that should be used when understanding the process of student departure (Braxton, 2000; Braxton, Doyle, Hartley, Hirschy, Jones, & McLendon, 2014; Braxton et al., 1997; Braxton et al., 2004).

The extent of empirical support for the 13 propositions was also disaggregated by institutional type (residential universities, commuter universities, two-year colleges, and liberal arts colleges) and academic integration was not strongly supported by any institution type. The lack of support for proposition eight leads some researchers to believe that perhaps academic integration, as a core construct of Tinto’s theory, requires further investigation. Braxton (2000) suggested two paths, a serious revision of the existing theory or the development of new theories based on institution type. Since
researchers, like Braxton, challenge the empirical soundness of including academic integration in the model of student departure, this study hoped to expand on the understanding of the role of academic integration in the process of student departure through examining academic performance.

**Astin’s theory of student involvement.** Astin (1984) developed the Theory of Student Involvement. “Student involvement refers to the amount of physical and psychological energy that the student devotes to the academic experience” (Astin, 1984, p. 297). Astin emphasized a behavior component in his Theory of Student Involvement that was lacking in traditional pedagogical theories (Subject-Matter Theory, Resource Theory, Individualized [Eclectic] Theory). The involvement theory suggests the following five assumptions: 1) involvement is the investment of energy, 2) involvement occurs along a continuum, different students different degrees of involvement at different times, 3) involvement has quantitative and qualitative aspects, 4) the amount of student learning is directly proportional to the quality and quantity of involvement, and 5) the effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement. Astin highlighted that the more time a student spends on activities that increase involvement, the more the student will learn in college. However, he recognized that student time is a finite resource and the more time a student spends on outside activities (family, friends, job) is decreasing the amount of time available to the student for involvement activities. Astin (1984) emphasized that both the student and the institution are accountable for successful student involvement.
Later, Astin (1993) developed the Input-Environment-Output (I-E-O) model as an extension to his Theory of Student Involvement. College outcomes are a function of three components: Inputs, Environments, and Outcomes of attending college. Inputs include demographic characteristics, family backgrounds, and academic and social experiences students bring to college. Environments include the people, academic programs, policies, campus culture and experiences that students have while in college. Student characteristics, knowledge, skills, attitudes and beliefs as they exist after attending college make up the outcomes of attending college. Student background characteristics and the institutional environment affect student outcomes. Moreover, it is the interactions students have with their college environment that ultimately affects their outcomes from attending college. Therefore, variables such as gender, race/ethnicity, and previous academic achievement should be examined when understanding student’s academic performance in college.

**Kuh et al.’s theory.** Kuh et al. (2010) delineated the conditions necessary for student success in college with a focus on student engagement, as an extension of Astin’s Theory of Student Involvement. Similar to Tinto’s (2012a) framework for institutional action that outline four conditions for student success, Kuh et al. (2010) focused on five different educational practices that facilitate student success and higher retention rates: 1) academic challenge, 2) active and collaborative learning, 3) student-faculty interactions, 4) enriching educational experiences, and 5) supportive campus environments. Kuh, Cruce, Shoup, Kinzie, & Gonyear (2008) and Kuh et al. (2010) identified that student engagement has two fundamental components that contribute to student success. The first is student-focused and is the amount of time and effort students put into their studies and
other academically purposeful activities. The second component is institution-centered and emphasizes the ways an institution allocates resources and organizes learning opportunities and services to encourage students to participate in and benefit from these activities. For as many students that participate and benefit from being engaged on a college campus, there are just as many that do not connect in meaningful ways and fail to reach their full potential (Kuh et al., 2010). Grit, a student’s ability to pursue challenging goals with perseverance and passion, dictates the quality and quantity of a student’s academic involvement and can positively affect his or her academic performance in college. Assuming that grittier students are more integrated into college life, students with higher grit would also have higher levels of persistence since they are more engaged. It is this understanding of a mutual student and institutional accountability for student success, through engagement, that can offer effective strategies in increasing student performance and retention in college.

**Persistence and Academic Performance**

Pascarella and Terenzini (2005) stated that grades are one of the most consistent predictors of student persistence in college. There is much research to support the use of college grades as a predictor of student persistence in college. Adelman (1999) used data from a longitudinal study following a national sample of students from the time they were in tenth grade in 1980 through age 30 in 1993 to study bachelor’s degree attainment. He found first-year grades to be a statistically significant predictor of degree completion beyond the effects of other variables, such as student background and precollege characteristics. In 2006, Adelman replicated his study conducted in 1999 to validate his model using another cohort of students. This cohort of students was followed from 1992
Adelman (2006) confirmed his original conclusion of first-year college grades predicting degree completion. He found that a student’s probability of degree completion increased by almost 22% if the student’s first-year GPA was in the top two quintiles. In other study using a sample of first-year students from 18 four-year universities that participated in the National Study of Student Learning with a special focus on White and Black students, Caberera et al. (1999) concluded that academic performance was a factor that directly influenced persistence in college for both groups of students.

DesJardins et al. (1999) used event history modeling to study student departure from a large research university. Findings consistent with other research (DesJardins et al., 2002; Ishitani & DesJardins, 2002) showed that Asian students were less likely to drop out in the first year of college compared to White students. DesJardins et al. (2002) found that there was no difference in the probability of White, Black, or Hispanic students leaving an institution in the first year, in line with DesJardins et al.’s (1999) conclusion. Risk of leaving the institution in the first year was no different for female students compared to male students (DesJardins, et al., 1999; Ishitani & DesJardins, 2002).

Ishitani and DesJardins (2002) also used event history modeling to examine student dropout with a sample of students obtained from the NCES, consisting of students enrolled in public and private four-year universities. The researchers found that students with SAT scores in the lowest quartile had an increase in the risk of dropping out by 35% during the first year compared to students with scores in the highest quartile. Students with higher first-year GPAs were also less likely to drop out of college, in agreement with DesJardins et al. (1999). This contributes to the rationale of this study examining
academic performance during the first year of college as a proxy of student persistence in college.

**Student Background, Previous Achievement and Academic Performance**

Previous research has described the effects of race, gender, and standardized test scores on academic performance, which is a proxy of student persistence in college. Steele-Johnson and Leas (2013) examined the importance of race and gender in predicting academic performance at a Midwestern university. The researchers concluded that gender was not a predictor of college GPA, but race was a significant predictor of GPA in college.

Gender and racial differences in the academic achievement of undergraduate students at a state university in the Southeast were examined by Chee et al. (2005). Their results indicated that race was a predictor of GPA for female students but not male students, contrary to the findings of Steele and Leas (2013). Chee et al. found that male students were more likely to have a higher college GPA if they had higher SAT scores, but White female students with higher SAT scores were more likely to have a higher GPA in college. Chee and colleagues also concluded that White female students had higher GPAs than Black females. Contrary to Chee et al.’s (2005) conclusions that race was not a predictor of GPA for male students, Strayhorn (2010) found that Black males earned lower grades in college compared to Hispanic males. His study examined the influence of background traits and academic preparation on academic achievement in college for Black and Hispanic males. Data for his study was drawn from the NCES National Education Longitudinal Study comprised of a nationally representative sample.
of students. His findings also showed that Black males had lower HSGPAs compared to Hispanic males.

Noble (2003) analyzed data from the ACT Prediction Research file to examine the effects on Black, Hispanic and White students of using ACT scores and HSGPA for making admissions decisions and predicting academic performance in college. Noble found that Black students had lower ACT scores, lower HSGPA, and lower college grades compared to White students. Hispanic students also had lower ACT scores, lower HSGPA and lower college grades compared to White students. The ACT and HSGPA together were somewhat more reliable predictors of first year GPA for Black students than White students than using either predictor alone. Conversely, the likelihood of predicting first year GPA was lower using the ACT and HSGPA together for Hispanic students than White students than using each predictor alone. However, Culpepper and Davenport (2009) assessed the prediction of college grades by race/ethnicity using multilevel models and found that HSGPA was less likely to accurately predict college GPA for Black students when compared to White students. The researchers concluded that Black students were predicted to earn a lower college GPA when compared to White students with similar standardized test scores and HSGPA.

The above review of recent research shows that student background characteristics and previous academic achievement were found to be significant predictors of college academic performance. In an effort to explain additional variance in academic performance in college, this study considered how personality factors contributed to predicting academic performance in college.
Personality Factors and Academic Performance

Recent research has established a positive association of personality factors to academic performance in college (Bauer & Liang, 2003; Conard, 2006; Duckworth & Seligman, 2005; Komarraju et al., 2009; Noftle & Robins, 2007; Poropat, 2009; Tross et al., 2000). The Big Five personality traits are the most commonly used framework of personality, which consist of five dimensions: agreeableness (likability and friendliness), conscientiousness (dependability and will to achieve), neuroticism (adjustment and emotional stability), extraversion (activity and sociability), and openness (imaginativeness and artistic sensibility).

To reduce subgroup differences when considering gender, race, and personality on academic performance, Steele-Johnson and Leas (2013) examined whether race and gender jointly affect the influence of personality on college GPA. Their results showed that for female students, agreeableness, conscientiousness and neuroticism accounted for unique variance in college GPA. More specifically, they found agreeableness to be more strongly related to GPA for Black female students than White female students. Extraversion and openness accounted for unique variance in GPA for male students. Extraversion and openness interacted with race in their effects on GPA. Furthermore, Extraversion and openness were more strongly related to GPA for Black male students than for White male students.

Conard (2006) examined the incremental predictive validity of Big Five personality traits for affecting college GPA while controlling for SAT scores and found that conscientiousness and SAT scores had a direct effect in predicting college GPA, but the other traits were not predictive. Similarly, Noftle and Robins (2007) concluded that
conscientiousness was a slightly stronger predictor of college GPA than SAT scores. However, Noftle and Robins (2007) observed that openness and extraversion were weakly related to college GPA. Tross et al. (2000) studied conscientiousness as a means to predict college performance and found that conscientiousness was a stronger predictor of college GPA than HSGPA. Consistent with this result, Noftle and Robins (2007) observed that conscientiousness was a significant and positive predictor of college GPA, even when controlling for gender, SAT scores, HSGPA, and the other four Big Five factors.

Grit

Duckworth et al. (2007) established the term grit, as it is used in this study and defines it as perseverance and passion for long-term goals. The researchers suggest that grit may be as important as other measures of intelligence to high achievement and success in life. Duckworth et al. (2007) explains that grit emphasizes stamina, which distinguishes it from other related personality factors, such as the Big Five dimension conscientiousness. Grit shares the achievement aspect of conscientiousness, but grit requires sustained effort and interest in goals, notwithstanding failure, lack of progress and feedback, and difficulty. “The gritty individual approaches achievement as a marathon; his or her advantage is stamina” (Duckworth et al., 2007, p. 1088). Some statements that describe grittier individuals include behaviors such as being obsessed with an idea or project, maintaining focus on a project over a period of time, completing tasks, and being diligent. On the other hand, some statements that describe less gritty individuals include behaviors such as being distracted by new ideas and projects, being
discouraged by setbacks, setting a goal but later choosing a different one, and having difficulty maintain focus on long-term projects.

**Measuring grit.** Student grit level has been measured by the short grit survey (Grit-S), which was developed by Duckworth et al. (2007) and further validated by Duckworth and Quinn (2009) using various samples. Duckworth et al. (2007) initially created a stand-alone survey measuring student level of grit, Grit-Original (Grit-O). Duckworth et al. (2007) started with 27 items they thought captured the construct of grit. Item examples include “I have overcome setbacks to conquer an important challenge,” “I finish whatever I begin,” “My interests change from year to year,” and “I have difficulty maintaining my focus on projects that take more than a few months to complete.” Items were rated on a 5-point Likert scale from 1 (not at all like me) to 5 (very much like me). Higher scores are associated with higher levels of grit. Based on item-total correlations, internal consistency (reliability coefficient), redundancy, and simplicity of vocabulary, the researchers first dropped 10 items. Then, an exploratory factor analysis (EFA) was conducted on the remaining 17 items, demonstrating a second-order factor structure of Grit-O, which was composed of two-factors, *consistency of interest* and *perseverance of effort*.

*Consistency of interest* can be described as holding interest in the same things over time and *perseverance of effort* can be described as continuing to put forth effort. Based on the results from EFA, a total five items with factor loadings below 0.40 were dropped, and only 12 items remained. Using a sample of 1,545 people, the remaining 12 items of Grit-O held an acceptable internal consistency (\( \alpha = .85 \)). Likewise, Grit-O showed some evidence of psychometric soundness, face validity for adolescence and
adults pursuing goals, low likelihood of ceiling effects in high-achieving populations, and construct validity representing grit as a factor.

Duckworth and Quinn (2009) further conducted a validity study of a grit survey using four different samples. The four samples included West Point cadets, class of 2008 \((n = 1,218)\); West point cadets, class of 2010 \((n = 1,308)\); finalists in the 2005 Scripps National Spelling Bee \((n = 175)\); and Ivy League undergraduates \((n = 139)\). Item-level correlations with outcomes (i.e. retention in West Point after rigorous summer training, final rounds reached in Scripps National Spelling Bee, and academic performance) were computed for each sample, which resulted in eliminating four out of twelve items from Grit-O. Then, the resulting eight-item, which is referred to as Grit-S, showed an internal consistency of .73 for West Point 2008 cadets, .76 for West Point 2010 cadets, .80 for 2005 National Spelling Bee finalists, and .83 for Ivy League undergraduates.

The researchers performed a Confirmatory Factor Analysis (CFA) on Grit-S for each sample testing the fit of the second-order factor model of Grit-S. Results from the CFA showed that Grit–S holds an acceptable level of model fit in the West Point Class of 2008 \(\chi^2 (19) = 106.36, p < .001; \text{RMSEA} = .06 (90\% \text{CI} = .05, .07), \text{CFI} = .95 \) ], West Point Class of 2010 \(\chi^2 (19) = 135.51, p < .001; \text{RMSEA} = .07 (90\% \text{CI} = .06, .08), \text{CFI} = .95 \) ], the 2005 Scripps National Spelling Bee finalists \(\chi^2 (19) = 71.57, p < .001; \text{RMSEA} = .10 (90\% \text{CI} = .08, .13), \text{CFI} = .86 \), and Ivy League undergraduates \(\chi^2 (19) = 43.63, p = .001; \text{RMSEA} = .10 (90\% \text{CI} = .06, .14), \text{CFI} = .93 \).

Duckworth and Quinn (2009) validated the Grit-S by conducting a CFA using a large online sample \((n = 1554)\) of adults over 25 years old. Both consistency of interest and perseverance of effort were first-order latent factors that were loaded on a second-
order latent factor, grit. Four items (e.g., “I often set a goal but later choose to pursue a different one,” “New ideas and projects sometimes distract me from previous ones”) made up one of the first-order latent factors, consistency of interest, with factor loadings of 0.67, 0.61, 0.74, and 0.69, respectively. The remaining four items (e.g., “I finish whatever I begin,” “Setbacks don’t discourage me,” “I am a hard worker,” “I am diligent”) made up the perseverance of effort with the associated factor loadings of 0.80, 0.37, 0.56, and 0.74, respectively. Then, each of the two first-order factors was loaded on the higher-order factor of grit, with 0.62 for consistency of interest and 1.30 for perseverance of effort.

Duckworth and Quinn (2009) also examined the predictive validity of grit in different samples. In their study, the researchers used a series of hierarchical regression model to predict each of the following dependent variables: educational attainment in adults, number of career changes in adults, and final round attained by spelling bee participants. Age, gender, and level of education were independent variables for predicting educational attainment and number of career changes. For spelling bee participants, independent variables included, age, gender, cumulative hours of spelling practice, and previous experience in Scripps National Spelling Bee competitions. After controlling for the Big Five Inventory dimensions (BFI), including Conscientiousness, Neuroticism, Agreeableness, Extraversion, and Openness, and age, Grit-S was found to be a significant predictor of educational attainment ($b = 0.27$, OR = 1.31, $p < .001$), fewer career changes ($b = 0.22$, OR = 0.80, $p = .01$), and final round attained in the National Spelling Bee ($b = 0.55$, OR = 1.73, $p = .03$).
Additionally, Duckworth and Quinn (2009) examined the effect of Grit-S in predicting the retention of West Point cadets over the first summer at West Point. Whole Candidate Score, comprised of SAT scores, high school rank (determined by HSGPA), participation in extracurricular activities and a standardized physical exercise evaluation, is used for admission into the United States Military Academy, West Point. The Whole Candidate Score was entered in step 1 and Grit-S in step 2 in a hierarchical regression predicting the retention of cadets at West Point. Grit-S was found to be a significant predictor of retention at West Point when the Whole Candidate Score was controlled ($b = 0.69$, $OR = 1.99$, $p < .001$).

**Grit and Academic Performance**

The construct of grit as a personality factor affecting the academic performance and success of students is a rather new concept. As shown in Table 1, to date, only a handful of studies have explored the relation of grit to academic performance in college (Duckworth et al., 2007; Jaeger et al., 2010; Strayhorn, 2014). Duckworth et al. (2007) established the construct of grit and pioneered the first study of the effect of grit on the academic performance of college students. As part of their broader study of grit in people of all ages, Duckworth et al. (2007) surveyed undergraduate psychology students at the University of Pennsylvania. They used SAT scores as a measure of general intelligence and tested whether grit would explain variance in GPA beyond that of intelligence. The researchers found that gritty students outperformed less gritty students. Grit scores were positively and significantly associated with GPAs ($r = .25$, $p < .01$). The relation of grit to GPA was even stronger when controlling for SAT scores. Grit was also negatively and significantly associated with lower SAT scores ($r = -.20$, $p < .03$), suggesting that
“smarter students may be slightly less gritty than their peers” (Duckworth et al., 2007, p. 1093). The researchers concluded that educators should encourage students to work with intensity and stamina in order to be successful.

Jaeger et al. (2010) studied grit in engineering students at Northeastern University. The researchers asked two main research questions: 1) Is grit correlated to student characteristics, such as gender, academic level and SAT scores? 2) Does grit develop in students over time when grit scores of freshmen are compared to upperclassmen? The results of their study showed significant differences in Grit-S score only by gender, with female students possessing more grit than males. There was no significant mean difference in grit score by different academic levels, and SAT scores were not correlated with higher grit levels. Level of grit was also examined by students’ concentration within the engineering field, honor students and student athletes in the engineering program. The results showed that Chemical Engineering and Mechanical Engineering students had the highest grit scores, while Computer Engineering students possessed the lowest grit scores. No significant difference in grit was observed among honors and non- honors engineering students and athlete and non-athlete engineering students. However, non- honors and student athlete engineering students exhibited more grit than honors and non-athlete engineering students. The researchers planned to track this cohort of students to study the relationship between grit and academic success as these students progress through the engineering program. Based on their findings, Jaeger et al. (2010) concluded that additional research on grit and student success can inform educators of strategies that foster and increase grittiness in students to contribute to their overall success.
Lastly, Strayhorn (2014) tested the effect of grit on the academic success of Black male students at predominately white institutions. Two research questions guided his research: 1) What is the relationship between grit and the grades of Black male college students? and 2) Does grit add incremental predictive validity for explaining college grades beyond traditional measures, after controlling for age and other confounding variables? After examining bivariate correlation coefficients, the researcher concluded that grittier Black males earned higher grades in college than their less gritty peers and also tended to have higher HSGPAs and higher ACT scores. College grades were moderately and significantly related to grit scores in a positive direction ($r = .38, p < .01$). College grades were also positively and significantly related to HSGPAs ($r = .35, p < .01$) and ACT scores ($r = .23, p < .01$). Strayhorn (2014) then conducted a hierarchical regression analysis in an effort to test the predictive validity of grit for explaining college grades. The results showed that “grittier Black males earned higher grades in college than their less gritty same-race male peers, even after controlling for differences in age, year in school, transfer status, engagement activities, degree aspirations, and prior achievement” (Strayhorn, 2014, p.6). The final model of the multiple regression analysis including Grit-S scores in predicting grades was found to be significant, $F(9, 129) = 4.42, p < .01$. Approximately 24% ($R = .49$) of the total variance in grades were explained by all factors in the model, which included age, HSGPA, college GPA, grit, ACT, international student status, transfer student status, student athlete status, affiliation with fraternity and year in college. “Grit ($b = 0.04$) was a positive predictor of grades in college, affecting grades almost as equally as HSGPA ($\beta = .31$) and ACT scores ($\beta = .28$). Grit was moderately correlated with Black males’ grades in college (partial $r = .25, p < .01$)” (Strayhorn,
2014, p.6). Strayhorn (2014) concluded that higher education administrators can use the results of this study to modify the way in which they interact with Black male college students by teaching students how to regulate effort over longer periods of time in effort to increase their academic success. Strayhorn stated that more research on grit in college student samples is needed in order to identify strategies that nurture grit in college students and positively affect their overall academic success.

What informed the research questions of this study are the limited research on the effects of grit on college samples and the varying findings on the significant predictors of academic performance in college. The present study contributes to the insufficient research on the effect of grit on the academic performance of college students.

**Moderating effect of grit.** At the present time, even though no studies have considered the moderating effect of grit in predicting academic performance, research has explored the moderating effects of personality traits, motivational factors, and academic behaviors on academic performance.

Nonis and Wright (2003) examined the moderating effects of achievement striving and situational optimism on the relationship between ability, as measured by the ACT, and the academic performance of college students. The researchers defined achievement striving as the extent to which students take their work seriously and work hard, and situational optimism as expecting positive outcomes based on the situation. Outcomes of interests were cumulative grade point average (CGPA), performance perceptions, and credit hours earned to credit hours attempted ratio (CECA), with gender, age, and marital status as controlled variables (Nonis & Wright, 2003).
Results from the Analysis of Covariance (ANCOVA) showed significant interaction effects between achievement striving and ability on CGPA ($F = 5.38, p < .05$) and performance perceptions ($F = 6.27, p < .05$). Results suggested that student ability on GPA and performance perceptions are higher for students with high achievement striving behavior than students with low achievement striving behavior. In addition, Nonis and Wright (2003) found significant moderating effects of situational optimism on the relationship between ability and CGPA ($F = 4.18, p < .05$) and its relationship between ability and performance perceptions ($F = 3.81, p < .05$). This suggests that students with higher optimism have a larger effect of ability level on CGPA and performance perceptions. Nonis and Wright (2003) concluded that the influence of ability measured by ACT scores on performance outcomes (i.e., CGPA and performance perceptions) is higher for more optimistic students and students with high achievement striving behavior. Their results indicated that personal variables like achievement striving and optimism yield differential effects of ability variables (ACT scores) on academic performance.

Nonis and Hudson (2006) studied the influence of time spent studying and working on student academic performance in college. Academic performance was measured by semester grade point average (SGPA), course load, and ACT scores, while student behavior variables, time spent working (TSW) and time spent on academic activities (TSA) were measured using student journal data. Using Moderated Multiple Regression (MMR), their results indicated that students with high ACT scores and high TSA are more likely to have higher SGPA, compared to students with high ACT and low TSA, and compared to students with low ACT scores and either high TSA or low TSA. TSA was found to explain variance in academic performance that was not explained by
ACT when ACT and TSA were used as predictors. Therefore, TSA was found to be a significant moderator in the relationship between ACT scores and academic performance. Nonis and Hudson (2006) state the importance of considering both ability (ACT scores) and behavior (TSA) measures when predicting academic performance in college.

Chen and Ickes (2009) explored the mutually compensatory effects of conscientiousness and self-motivation on college GPA. Conscientiousness was measured using the conscientiousness subscale of the Big Five Inventory, while the Self-Motivation Inventory measured a student’s level of self-motivation. MMR analyses were performed to determine whether conscientiousness moderated the relationship between self-motivation and GPA and whether self-motivation moderated the relationship between conscientiousness and GPA. The relationship between conscientiousness and GPA on self-motivation was examined at three different levels of self-motivation, low (1 standard deviation below the mean), medium (at the mean), and high (1 standard deviation above the mean). The results showed that conscientiousness significantly predicted GPA when self-motivation was low, $b = 0.02, t(373) = 2.01, p < .05$, the squared of semi-partial correlation ($sr^2$) = .01, but not at medium, $b = 0.01, t(373) = 1.01$, or high, $b = -0.003, t(373) = -0.25$. When examining the relationship of self-motivation and GPA on conscientiousness, the three different levels were also used to define levels of conscientiousness. The results showed that self-motivation significantly predicted GPA when conscientiousness was low, $b = 0.01, t(373) = 2.07, p < .05$, $sr^2 = .011$, but not at medium, $b = 0.003, t(373) = 1.10$, or high, $b = -0.001, t(373) = -0.02$. The researchers’ results indicated that a high level of conscientiousness can compensate for a low level of self-motivation, as a high level of self-motivation can compensate for a low level of
conscientiousness, in affecting student academic performance in college. As high school rank and ACT/SAT scores are commonly used predictors of academic performance, the researchers conducted the same MMR analyses, while controlling for high school rank and ACT/SAT scores to test the interaction between conscientiousness and self-motivation in predicting GPA. When high school rank and ACT/SAT scores were controlled, the results showed that conscientiousness significantly predicted GPA when self-motivation was low, \( b = 0.04, t(336) = 3.06, p < .01, sr^2 = .023 \), but not at medium levels of self-motivation, \( b = -0.02, t(336) = 1.58 \) or high levels of self-motivation, \( b = -0.003, t(336) = -0.28 \). After controlling for high school rank and ACT/SAT scores, self-motivation significantly predicted GPA when conscientiousness was low, \( b = 0.01, t(336) = 1.81, p = .07, sr^2 = .008 \), but did not significantly predict GPA at medium, \( b = 0.00, t(336) = 0.15 \), or high levels of conscientiousness, \( b = -0.005, t(336) = -1.51 \). The researchers concluded that regardless of students’ previous academic performance and ability, either high conscientiousness or high self-motivation could increase college academic performance.

The existing research showed the moderating effects of personality variables when predicting academic performance in college. Since grit has not been adequately studied in college students, examining the moderating effects of grit on student background characteristics, previous academic achievement and college academic performance may provide different implications when predicting academic performance. Therefore, this research will expand the research on what factors affect college student performance by investigating the effect of grit and its moderating effect to contribute to the existing literature of predicting academic performance in college students.
Chapter 3: Method

Target Population

The target population for this study is incoming freshmen with varying racial/ethnic backgrounds at four-year institutions having admissions requirements that meet the most competitive admissions selectivity category using Barron’s Admissions Competitive Index. Institutions that are classified as most competitive have admissions data with minimum HSGPAs of 3.0, minimum median SAT scores of 1310, minimum median ACT scores of 29, and students ranking in the top 10 - 20% of their graduating high school class (Smith, Pender, & Howell, 2013).

Sample

The sample for this study was drawn from a private highly selective four-year institution with varying racial/ethnic backgrounds located in the Southern United States. Students at this institution come from all 50 states of the United States and represent 116 different countries. The approximate size of the incoming class in 2013 was 2035 students. The typical freshmen class consisted of 51% female students. 72% of incoming freshmen are ranked in the top 10% of their high school class, with 51% of freshmen ranked in the top 5% of their high school class. 55% of the incoming freshmen are White, 9% Black, 18% Hispanic, and 14% Asian/Pacific Islander. The mean ACT score of entering freshmen was 30.1, while the median ACT score was 30. The mean SAT score of entering freshmen was 1317, and the median SAT score was 1320 (University of Miami Fall Fact Book, 2013). In order to have been included in the current study, students must be freshmen that completed all 8 items of the Grit-S survey, at least 18 years of age and had a first year GPA. Freshmen were the focus for this study because
research shows that dropout from college is highest and interventions are most effective in the first year (Tinto, 1975, 1988, 1993).

**Research Design**

This study was based on a quantitative analysis of secondary data obtained from the institution. Secondary data are data that were not directly collected by the principle researcher. Even though the use of secondary data might limit the researcher’s ability to directly answer the research questions of the study and control how and what data were collected, it saves time and effort with data collection and is likely to contain more information than what could have been collected by the researcher independently. Other advantages include the breadth of data available, ease of access, and efficiency in handling informed consent from the respondents. Therefore, due to the several aforementioned advantages of second data, this study relied on the secondary data that has already been collected by the institution, so as to predict student academic performance using a number of student background variables.

**Data Collection**

Data for this study was obtained from the Division of Enrollment Management in Spring 2014. The requested variables, which were de-identified, included student background characteristics (gender and race/ethnicity), previous academic achievement (ACT/SAT scores and HSGPA), responses on the Grit-S survey, and student academic performance (first year cumulative GPAs). Student background characteristics were self-reported by students on their admissions applications, while previous academic achievement, responses on the Grit-S survey and first year GPAs were requested from the university.
The University collected the responses on the Grit-S survey through a web-based survey program, Qualtrics. The Division of Enrollment Management at the institution invited all incoming freshmen to take the survey and collected the surveys October 7, 2013 through October 21, 2013. The institution offered an incentive of winning one of five $20 Starbucks gift cards to help increase the response rate for the survey. The survey was open to students for two weeks, with a reminder email being sent after one week.

The wording of the survey questions and directions were taken verbatim from the validated Grit-S survey by Duckworth and Quinn (2009). The Grit-S survey as shown in Appendix consists of 8 items that are measured on a five-point Likert scale from 1 (not at all like me) to 5 (very much like me). Sample items include: “Setbacks don’t discourage me,” or “I finish whatever I begin.” Responses to each question have a corresponding point value, ranging from 1 to 5. The maximum score is 5 (extremely gritty) and the lowest, 1 (not at all gritty) (Duckworth & Quinn, 2009). Point values for each item were added together and divided by 8 to compute the student’s level of grit. Grit-S survey has been found to hold appropriate levels of psychometric properties, and evidence of its construct and predictive validity: internal consistency ranging from .73 to .83 computed across four different samples (Duckworth & Quinn, 2009), medium to strong predictive validity with unstandardized regression coefficients associated with grit scores predicting student performance ranging from 0.22 to 0.55 with an associated odds ratios ranging from 0.80 to 1.73 (Duckworth & Quinn, 2009), and a reasonable model fit from a second-order CFA model with RMSEA index ranging from 0.06 to 0.10 (Duckworth & Quinn, 2009).
Variables

**Dependent variable.** The dependent variable of this study was academic performance. Academic performance is defined by a student’s first semester GPA, a continuous ratio variable ranging from 0 to 4.0. GPA was computed by dividing the total quality points earned by the total credits attempted (University of Miami, 2013).

**Independent variables.** The independent variables being examined were student background characteristics, including gender and race/ethnicity, previous academic achievement, measured by ACT/SAT scores, grit scores measured by the Grit-S survey, and subscale grit scores.

Gender was dummy-coded with male being the reference group (0 = male and 1 = female). Race/ethnicity was also dummy-coded with White being a reference group as follows: Black (0 = not Black and 1 = Black), Hispanic (0 = not Hispanic and 1 = Hispanic), and Asian/Pacific Islander (0 = not Asian/Pacific Islander and 1 = Asian/Pacific Islander). Students identifying as two or more races were not included in the sample as the number of students was very small ($n = 13$).

This study used the University’s reported SAT or ACT, which were treated as a continuous variable. From the data received from the University, some students had only either an ACT or SAT score, while other students had both. As there were more reported SAT scores ($n = 1390$) than ACT scores ($n = 1105$), all scores were converted to SAT scores using a concordance table provided by American College Testing (2008). If a student had reported scores for both ACT and SAT, the higher score of the two was used for the study, which was consistent with the University’s admissions policy.
Individual responses to each of the eight Grit-S survey questions were obtained from the University. Each response was reported on a five-point Likert scale and was recalculated to the appropriate point value, as determined by Duckworth and Quinn (2009). Then, the point value of each Grit-S survey response was totaled and divided by 8 to calculate the grit score for each student in the sample.

Subscale grit scores were also calculated for this study, as grit is a two-factor construct suggested by Duckworth and Quinn (2009), consisting of **consistency of interest** and **perseverance of effort**. Duckworth and Quinn (2009) did not examine whether either factor predicted outcomes better than the other. Therefore, this study also examined the predictive validity of each factor on first year GPA. Questions 1, 3, 5, and 6 comprised the **consistency of interest** subscale grit score, while questions 2, 4, 7, and 8 encompassed the **perseverance of effort** subscale grit score. The Grit-S survey question responses for each factor was assigned the appropriate point value, as determined by Duckworth and Quinn (2009), and the total point values were divided by four to determine the **consistency of interest** subscale score and **perseverance of effort** subscale score.

HSGPAs were included in the data received from the University but not used as a variable in this study. Since HSGPA was not an admissions requirement for the University, not all students had a reported HSGPA. Moreover, the HSGPAs obtained from the University were not recalculated for admissions purposes and were reported on different scales. High school percentile or class rank was considered as another previous achievement variable, but only 28% of high schools reported high school percentile to the institution. Admissions decisions for students without reported HSGPAs were determined after reviewing the students within the context of their high schools and their high school
transcripts. However, student transcripts were not available to the researcher. To that end, the researcher was unable to use HSGPA as a variable in the study.

Power Analysis

A priori power analysis was conducted to determine the required minimum sample size necessary to find the significant effect of grit as a focal variable in the multiple regression analysis. Using $R^2$ of .18 found in the previous multiple regression analysis from Strayhorn (2014), a significance level ($\alpha$) of .05, an acceptable power of .80 (Cohen, 1992), and 10 predictors (race/ethnicity coded with four dummy variables, and one variable for: a dummy-coded gender variable, HSGPA, ACT/SAT scores, interactions between student background and previous achievement, grit scores, and three-way interactions, giving a total of 10 predictors), a priori power analysis using GPOWER (Erdfelder, Faul, & Buchner, 1996) indicated that a sample size of 84 would be needed to find the significance of the overall model predicting academic performance using grit as a focal variable with 10 predictors. For finding the significance of the single regression coefficient associated with grit, using partial $r$ of .25 from Strayhorn (2014), the same $\alpha$, power, and number of predictors as above, the priori power analysis indicated a sample of 94 would be needed. Therefore, the minimum sample size necessary to find the significance of grit on student performance was 94.

Data Analysis

Descriptive statistics were first examined to understand the distribution of students’ grit scores, gender, race/ethnicity, and ACT/SAT scores. The Pearson Product Moment Correlation coefficient ($r$) was used to identify whether there were significant relationships among the variables of interest. Then, a hierarchical multiple regression
with three subsequent blocks was performed to examine the effect on students’ first year GPA using student background variables, previous achievement scores, grit, and the two-way interactions between grit, student background variables and previous achievement scores.

As shown in Figure 2, variables were entered in the subsequent three blocks. The first block included (1) the student background variables (gender and race/ethnicity); (2) the previous academic achievement variable (ACT/SAT scores); and (3) the interaction terms between each of the student background variables and previous achievement variables, keeping only the significant interaction terms. Block two controlled for all the variables in block one and included students’ Grit-S score. Block three included the interaction terms between grit scores and each of the student background variables or previous academic achievement variable, and the interaction terms between grit scores and each of the student background variables and previous achievement variable, keeping only the significant interaction terms. In each block, the importance of the added variable(s) was first examined based on a significance of the $R^2$ change. Then, the overall model fit (i.e., $F$ for overall model, $R^2$, $R$) and the significance of individual slope were examined. Before running the regression model, the underlying assumptions of homoscedasticity, linearity, and normality were tested.
Chapter 4: Results

The Statistical Package for the Social Sciences (SPSS) (IBM Corp., 2013) was used to analyze the data obtained from the division of Enrollment Management. The descriptive statistics of the variables were first summarized, followed by the Pearson Product Moment Correlation coefficients among the variables in the study. Next, a series of hierarchical multiple regression analyses was performed after examining whether the underlying assumptions for the multiple regression model were met.

**Descriptive Statistics**

The institution enrolled 2035 students for the Fall 2013 semester. Of the 2035 students, 454 students attempted the grit survey. However, those that did not complete all eight grit survey questions or who were under the age of 18 at the time of the survey were excluded from the sample, leaving a sample of 342 students for the statistical analysis. A priori power analysis done determined that a minimum sample of 94 students was necessary to the significance of grit; therefore, the current sample of 342 students was adequate in finding the significance of grit on student academic performance.

Table 2 shows the frequency by gender and race for the sample and population. Females represented 66.7% of the students included in the sample; in terms of race, 15.8% reported as Asian, 6.4% Black, 17.8% Hispanic, and 59.9% White. The proportion difference by gender between the sample and population of students showed that there was a significant difference in the proportions between the sample and the population ($z = 5.02, p < .01$), indicating that there were more females in the sample than in the population. However, no frequency differences by race were noted between the sample and the population, $\chi^2(3) = 6.25, p = .10$. 

The mean SAT score for sample was 1351.04 ($SD = 1224.39$) with scores ranging from 920 to 1600. The mean SAT score for the population of incoming freshmen ($n = 1653$) was 1337.70 ($SD = 124.50$), with scores ranging from 740 to 1600. SAT scores for all incoming freshmen were not available, as the institution did not require a SAT score for admission purposes.

As shown in Table 3, the mean grit score for the sample was 3.38 ($SD = 0.35$), with scores ranging from 2.38 to 4.88. As grit is a compound trait comprised of consistency of interest and perseverance of effort, subscale grit scores were also calculated for the sample. The mean interest score was 2.80 ($SD = 0.72$), with scores ranging from 1.00 to 5.00, while the mean perseverance score was 3.96 ($SD = 0.58$), with scores ranging from 1.50 to 5.00.

**Pearson Product Moment Correlations**

Pearson Product Moment Correlation Coefficients were computed among the variables included in the regression model, as shown in Table 4. There was a negative and significant correlation between being a Black student and first year GPA ($r = -.25, p < .01$). Yet SAT showed a significant and positive correlation with first year GPA ($r = .33, p < .01$). In addition, the significant and positive correlations between the first year GPA and each of the following two-way interactions: being female and SAT score ($r = .31, p < .01$), Asian and SAT score ($r = .10, p < .05$), and Black and SAT score ($r = .28, p < .01$). However, the interaction between being Black and grit showed a negative significant correlation to first year GPA ($r = -.24, p < .01$).
Assumption Checking

The underlying assumptions of homoscedasticity, linearity, and normality for the multiple regression analysis were first tested before running the proposed hierarchical regression models. A number of evidence indicated that the model met the three assumptions of regression, homoscedasticity, linearity and normality. A relatively random and fairly equal display of residuals over the range of predicted values in the scatter plot of the residuals against predicted scores indicates the homoscedasticity of errors, for both models. Review of the scatterplots of the standardized residuals on the dependent variable, first year GPA, suggests that linearity is a reasonable assumption for both models. The assumption of normality was tested through examining the distribution of the standardized residuals. The histogram showed a relatively normal distribution of residuals, which suggests that normality is reasonable for both models. When completing the grit survey, students were assumed not to interact with each other while responding, so the assumption of independence of errors was met.

Hierarchical Multiple Regression Analysis

The results of the analysis for the model are shown in Table 5. Gender, race, SAT score, and the two-way interactions between student background and previous academic achievement were entered in the first block. All of the variables included in the first block jointly explained a significant amount of variance in first year GPA, $R^2 = .16$, adjusted $R^2 = .14$, $F(9, 290) = 6.24, p < .01$. All of the variables in block one together accounted for 16% of total variance in first year GPA. More specifically, first year GPA was different by gender ($\beta = .14, p < .05$), indicating that females had higher first year GPA on average. None of the racial groups were found to be significant, demonstrating no
differences in first year GPA by racial groups. SAT scores were a positive predictor of first year GPA \( (\beta = .28, p < .01) \), showing that a one standard deviation increase in SAT scores would result in an increase in the first year GPA by .28 of a standard deviation of the first year GPA.

In block two where grit as a composite score was added, no additional variance in first year GPA was explained, \( \Delta R^2 = .01, F(1, 289) = 1.75, p = .19 \), indicating that grit as a composite score was not found to be a significant predictor of first year GPA, \( \beta = .07, p = .19 \), for the sample of students.

As seen in Table 5, block three included the two-way interactions between grit score and student background variables and SAT scores, and none of the two-way interactions were found to be significant, \( \Delta R^2 = .01, F(5, 284) = 0.39, p = .86 \). This indicated that there was no moderating effect of grit score on the effect of student background variables and previous achievement in predicting the first year GPA.

**Supplementary Analysis**

Whilst grit is a compound trait composed of *consistency of interest* and *perseverance of effort*, an additional hierarchical multiple regression model (supplementary model hereafter, as shown in Figure 3) was performed to test whether any of grit subscales was meaningful in understanding academic performance in the first year of college. In block one of the supplementary model, student background characteristics, previous academic achievement, and the *consistency of interest* subscale score were entered. In block two, the *perseverance of effort* subscale scores was entered, and in block 3, the interaction between the *interest* subscale score and *perseverance* subscale score were entered.
**Pearson product moment correlation coefficients.** Pearson Product Moment Correlation Coefficients were computed among the variables included in the supplementary model, as shown in Table 6. There was a negative and significant correlation between being a Black student and first year GPA ($r = -0.25, p < .01$). Yet SAT showed a significant and positive correlation on first year GPA ($r = 0.33, p < .01$). Also, the interaction between being Asian and SAT score and first year GPA showed a positive and significant correlation ($r = 0.21, p < .01$). Being Black and SAT score on first year GPA also showed a positive and significant correlation ($r = 0.11, p < .01$).

**Hierarchical multiple regression analysis.** The results of the analysis for the supplementary model are shown in Table 7. The *interest* subscale score was entered in block one with student background characteristics, previous academic achievement, and jointly accounted for a significant amount of variation in first year GPA, $R^2 = 0.17$, adjusted $R^2 = 0.15$, $F(6, 293) = 9.62, p < .01$. All of the variables included in block one accounted for 17% of variance in first year GPA. In Block one, being Black was found to be a negative and significant predictor of first year GPA ($\beta = -0.20, p < .01$). This indicated that on average, Black students would have a significantly lower GPA than White students. The *interest* subscale score was found to be a negative and significant predictor of first year GPA ($\beta = -0.11, p < .01$), indicating that a one standard deviation increase of the *interest* subscale score would lead to a significant decrease in the first year GPA by 0.11 of a standard deviation of first year GPA.

The *perseverance* subscale score was entered in block two while controlling for variables included in the previous block and was found to account for a significant amount of variation in first year GPA, $\Delta R^2 = 0.04$, $F(1, 292) = 15.39, p < .01$. The
perseverance subscale score accounted for an additional 4% of variance in first year GPA. That being the case, the perseverance subscale score was a positive and significant predictor of first year GPA ($\beta = .22, p < .01$) after controlling for the interest subscale, student background variable and previous achievement score, meaning a one standard deviation increase in the perseverance subscale score would lead to, on average, an increase in the first year GPA by .22 of one standard deviation of first year GPA. It is intriguing to note that the interest score was found to be insignificant in block two after the perseverance subscale was entered. As shown in Table 7, the interaction between the two grit subscale scores were entered in block three, however it was not significant, indicating no interaction between the two subscales in predicting first year GPA, $\Delta R^2 = .01, F(1, 291) = 2.58, p = .11$. 
Chapter 5: Discussion

As enrollment in postsecondary institutions continues to rise and graduation rates remain stagnant, higher education research remains focused on the retention and academic performance of students. Conventional predictors of academic performance, including gender, race, ACT/SAT scores and HSGPA, have been widely used to predict student academic performance (Komarraju et al., 2013). Yet research has begun to study specific personality traits, like grit, as predictors of academic performance in college in combination with traditional cognitive measures (Duckworth et al., 2007; Strayhorn, 2014). Unlike the extensive empirical research on the use of traditional cognitive ability measures to understand academic performance, personality factors, like grit, have not been empirically studied in the literature.

The primary purpose of this study was to examine whether the personality factor, grit, predicts students’ first year academic performance at a private highly selective four-year institution after controlling for student background characteristics and previous academic achievement. In addition, the moderating effect of grit in the relation of student background and previous achievement to academic performance was examined. These questions were explored using Hierarchical Multiple Regression analysis on the secondary data obtained from the institution. Research question one asked, of the student background characteristics and previous academic achievement variables examined, which were significant predictors of academic performance after the first year of college? The results from the Hierarchical Multiple Regression found that female students earned higher first year GPAs as compared to male students. This study also found that the previous academic achievement as measured by SAT scores was a significant predictor of
first year GPA. Students entering college with higher SAT scores had higher first year GPAs than those students entering with lower SAT scores. Research question two asked, after controlling for student background characteristics and previous academic achievement, did grit significantly explain academic performance in the first year? The results of this study found that grit as a composite score did not significantly explain academic performance in the first year of college. Research question three asked, did grit significantly moderate the relation between student background characteristics and previous academic achievement to academic performance after the first year of college? This study found that the two-way interactions between grit and either student background or previous achievement were not significant. Conversely, the supplementary analysis completed showed that of the two subscales of grit, perseverance was found to be significant in predicting first year GPA. Interestingly, the supplementary analysis also found that black students earned lower first year GPAs as compared to White students. The results of this study suggest four important conclusions.

First, the findings provide empirical evidence supporting the hypothesis that gender is a significant predictor of academic performance. Consistent with previous research (DeBerard et al., 2004; Sheard, 2009. Yu, Lin, Chen, & Kaufman, 2011), this study found that female students had higher first year GPAs on average as compared to male students. Second, the supplementary analysis of this study found that race is a significant predictor of academic performance. Similar to earlier research (Culpepper & Davenport, 2009; Noble, 2003; Zwick & Skylar, 2005), this study found that Black students had lower first year GPAs as compared to White students. Third, this study affirms that student previous achievement as measured by SAT is a significant predictor
of first year academic performance. In line with past research (Brown et al., 2008; Noble & Sawyer, 2002; Rothstein, 2004), this study found that students with higher SAT scores are more likely to earn higher first year GPAs. Lastly, although the findings showed that grit as a composite score was not a significant predictor of first year GPA for this sample, the supplementary analysis showed that the perseverance subscale scores were found to be significant in predicting first year academic performance in college. Students with higher perseverance subscale scores tended to have higher first year GPAs. Consistent with prior research by Lounsbury, Fisher, Levy and Welsh (2009), students who show perseverance in their studies are more likely to attain higher GPAs.

Implications

Tinto’s (2012a) four conditions for student success (expectations, support, assessment and feedback, and involvement), Kuh et al.’s (2010) five educational practices for student success (academic challenge, active and collaborative learning, student-faculty interactions, enriching educational experiences, and supportive campus environments), and the U.S. Department of Education, Office of Technology’s (2013) proposal for fostering grit and perseverance in students are used to frame the implications of this study. Higher education administrators, faculty members and institutions can use the strategies proposed in this section to positively affect all students’ academic performance and their persistence through graduation.

Institutions as a whole play a substantial role in increasing the academic performance of students. Institutions can facilitate academic, social, and financial support for students. Institutions can ensure financial support for students by offering different types of scholarships, grants and loans to meet the financial needs of their students.
Academic and social support for students can be accomplished through providing opportunities for engagement of all students. Diverse student groups and activities, course offerings and academic support programs can all contribute to the academic success of students. Institutions can show that diversity is valued by having the backgrounds of the administrators and faculty members mirror that of the student population. Institutions can also use early warning systems and predictive analytics to flag students who show signs of struggling and refer them to the appropriate support services. Additionally, institutions can consider personality factors, or non-cognitive factors like grit, when determining a student’s risk of struggling in college. Since faculty members have a large effect on the academic engagement of students, institutions can be sure to offer and support the professional development of the faculty to best support students.

An approach to increase student performance that can be employed by institutions, faculty members and higher education administrators alike, is maintaining high expectations. “No one rises to low expectations” (Tinto, 2012a, p 7). Institutions must have high expectations of their faculty, administrators and students. Faculty members and higher education administrators must set and reinforce high expectations for students. Faculty and administrators can reinforce these expectations through grading standards, feedback and modeling exemplary effort. “Colleges with environments of this kind not only will help its existing students to succeed but will attract many others who seek such environments” (Tinto, 2012a, p 23).

The first year of college is an important time to engage students, as Tinto (2012a) stated that interventions are the most effective during the first year when students are
adjusting to the new academic and social demands of college. Studies show that the more students are academically and socially engaged, the more likely they are to succeed in college (Astin, 1984, 1993, 2005; Kuh, Cruce et al., 2008; Kuh, Kinzie et al., 2010; Tinto, 2012a). The two main components of student engagement that contribute to student success is first, the amount of time and effort students put toward their studies and educational activities that lead to experiences that establish student success and second, the ways institutions allocate resources and organize learning opportunities and services to stimulate students to participate and benefit from that engagement (Kuh et al, 2010).

During the first year, higher education administrators can encourage all students to be active in campus activities such as student groups, use academic resource services, and interact with faculty. Higher education administrators can also provide academic support to first year students to increase their academic performance. Academic support can be offered through direct instruction on course content, goal setting, sustaining effort/perseverance on academic tasks and self-efficacy. Administrators can also refer students to outside services, such as mental health services and use of wellness centers that may, in combination, facilitate student success.

Classroom experiences and student-faculty contact are the foundation for student academic engagement. Faculty members play a large part in how students interpret classroom experiences and faculty contact. Faculty can use teaching methods in their classrooms to promote academic engagement to increase student academic performance. Faculty members can also be available to students through office hours, advising student groups, and mentoring relationships as a way to connect academically with students.
outside of the classroom. Faculty can use those opportunities to foster academic relationships with students in an effort to increase the academic performance of students.

To address the gender gap in first year GPA between female and male students, mentoring programs can be offered as a technique to the increase academic performance of males in college. Higher education administrators can facilitate mentor relationships between students and faculty, which can provide the social and emotional support necessary for students to be successful in college (Tinto, 2012a). Peer mentoring relationships can also be matched and fostered by higher education administrators in an effort to increase male student academic performance. Service learning courses where service is linked to educational outcomes and students are encouraged to reflect on how the service they are providing to the community relates to the coursework and impacts their learning can also be implemented to academically engage students. Male students can be encouraged to participate in service learning courses as a method to increase their academic engagement and academic performance. The approaches described above that can be used to facilitate positive changes in academic performance for males can be applied to all students, including Black students, which this study showed were more likely to earn lower first year GPAs.

Kuh et al. (2008) suggested that involvement affects first year grades more for students of color. In an effort to alleviate the disparity in first year GPA of Black students, higher education administrators can emphasize the importance of becoming involved in campus activities for Black students. Strayhorn (2010) provided evidence that involvement in student government positively affected Black males’ academic achievement in college. In the classroom, collaborative and cooperative learning
strategies can be an approach to engage Black students. Collaborative and cooperative learning strategies have been shown to positively impact student success by nurturing social interactions among students and increasing academic engagement (Pascarella & Terenzini, 2005). Collaborative/cooperative learning requires students to be active in learning groups where the work of the group cannot be completed without contribution from each member. On top of the increased academic engagement, collaborative and cooperative learning can facilitate social relationships between Black students and increase their academic performance in college. Learning communities built around a central theme and a learning environment where students connect learning from one course to another can also be a successful strategy to involve Black students in the classroom and positively affect their academic performance. All college students, including males, which this study found earned lower first year GPAs compared to female students, can benefit from these strategies to increase their academic performance in college.

When considering the implications of SAT scores as a predictor of GPA, it is important to note that the debate over the use of standardized test scores as an indicator of future academic success is on going. Cornwell et al. (2009) found that SAT scores only marginally contributed in predicting college GPA when compared to other previous academic achievement measures. Moreover, Cornwell et al. established that SAT scores, AP credits, and other measures of previous achievement were not significant in predicting the academic performance of Black students. The present study concluded that the sample of students entering this particular institution with higher SAT scores were more likely to earn higher first year GPAs. This finding may be attributed to the stringent
admissions criteria of this specific University. It may be prudent for other institutions to consider non-cognitive factors, such as grit and perseverance, as additional indicators of academic performance.

Higher education administrators and faculty can develop grit and, in particular, perseverance in students by providing opportunities to take on long term goals worthy of students’ effort and providing a rigorous and supportive environment to attain their goals (U.S. Department of Education, Office of Technology, 2013). An academic mindset is necessary for students to cultivate grit and perseverance. Mindset refers to how students perceive themselves as learners, their learning environment, and their relationship to the learning environment (Dweck, Walton, & Cohen, 2013). Students must understand that ability and competence increase with effort and experiencing challenge is necessary for success in achieving their goals. Academic challenge is part of the process of learning and students should not attribute facing academic difficulties as a personal failure. Higher education administrators and faculty can support students in understanding their academic mindsets by first introducing the idea of academic mindsets, if they are not familiar with the concept. Furthermore, administrators and faculty can nurture students’ academic mindsets by clarifying the goals in which students are striving toward and demonstrate how to anticipate potential obstacles when working toward their goals. Reinforcing that encountering difficult tasks and setbacks should be expected in the process of learning is an important function of higher education administrators and faculty when working with students.

The goals that are determined by students should be aligned with their interests, as well as challenging. Students’ learning experiences must bridge their interests and
background knowledge to the learning outcomes that help them conquer the more complex learning goals. Administrators and faculty can help students reflect on how the academic activities they engage in relate to their long-term goals. Reflecting on learning experiences helps students to focus on the process of learning and appreciate the effort they put into their work. Faculty and administrators must also support students in planning and monitoring the progress toward their goals.

It is important for higher education administrators and faculty to recognize that grit and perseverance may look different based on the goals the students are working to accomplish and the individual challenges they may face. In working with diverse student populations, administrators and faculty must be aware of the differences among students and how grit and perseverance may change from student to student.

Lastly, administrators and faculty should be aware of the potential risks of encouraging grit and perseverance. Grit, in particular perseverance, may not always be in the best interest of the student. If a student is persevering toward goals that are unimportant to the student or inappropriate for the student in some way, it may have detrimental effects on the student’s learning. When supporting students in putting forth effort and perseverance to achieve their goals, higher education administrators and faculty must always keep the student’s best interest in mind.

**Limitations and Future Research**

The first limitation of this study is the potential for social desirability bias from the use of self-report surveys, where respondents may answer questions in a way they think is more positive. It is the nature of self-report surveys that may result in social desirability bias, however researchers should continue to encourage respondents to
answer truthfully on the Grit-S, as there would not be negative repercussions from their responses. In an effort to reduce the social desirability bias from the Grit-S, future research on grit should use informant-report versions of the grit survey along with the Grit-S to validate the self-reported grit scores. Duckworth and Quinn (2009) found that informants could reliably assess the grit of others ($\alpha = .83$). To ensure a more accurate grit score, faculty members or higher education administrators familiar with the students could serve as informants and complete the informant version of the Grit-S. The questions on the informant-report survey are identical to the self-report version, but the first person pronouns are replaced with third-person pronouns.

This study used data from a single institution, thus limiting the generalizability of the results. The institution in which the sample for this study was obtained is a highly selective institution with stringent admissions requirements. DeBerard, Spielmans, and Julka (2004) affirm that more selective universities in terms of SAT should expect greater achievement of their students. Therefore, a personality trait like grit may not be as meaningful in the current sample. The proportion difference between the sample and population of students by gender in this study showed a significant difference indicating that there were more females in the sample than in the population. This indicates that the results might be limited in representing male students. Therefore, a more nationally representative sample of students may produce different results in the ability of grit to predict academic performance in the first year of college. To that end, further research on grit should include a more representative sample, so the results can be generalized to all college freshmen students.
An additional concern comes from the nature of the secondary data for this study. The researcher did not control how and what data were collected; therefore the available data did not directly answer the research questions of the study. For instance, high school GPA (HSGPA) was a variable that could not be examined in this study due to lack of information putting students’ HSGPAs on an equivalent metric. Some colleges and universities are moving away from using standardized tests scores as a gauge of potential student academic performance in college. Cornwell et al. (2009) concluded that HSGPA is a stronger predictor of college success than SAT scores. Researchers conducting further studies on grit can directly administer the surveys to ensure the proper collection of data to specifically address their research questions, as well as the collection of data on all of the variables of interest, including HSGPA.

Further research can also consider examining the factor structure of grit \textit{(consistency of interest and perseverance of effort)} that was proposed by Duckworth and Quinn (2009) in more details and its validity to different samples. As a supplement, this study looked at \textit{consistency of interest} and \textit{perseverance of effort} as subscale scores suggested by Duckworth and Quinn in the Hierarchical Multiple Regression, however, confirmatory factor analysis would have been a better choice to check the underlying factor structure of grit and further its relation to student achievement after controlling for student demographics and previous achievement.

The Higher Education Research Institute (HERI) administers many surveys to capture student experiences before college, after the first year, in diverse learning environments and as college seniors. The CIRP freshmen survey is designed for incoming freshmen before they start classes at an institution. The survey examines areas
such as high school behaviors, academic preparedness, and student values and goals. Your First College Year survey was designed specially to assess the academic and personal developments of students during the first year of college, while the Diverse Learning Environment survey assesses the diverse environments that shape student learning. The College Senior Survey measures the impact of college by connecting academic, civic, and diversity outcomes with college experiences (HERI, 2015). These surveys administered by HERI include a survey item similar to that of the Grit-S. For future research, the survey items can be compared with the Grit-S items and be analyzed for the same predictive ability of student retention. It may be possible to calculate a student’s equivalent grit score in order to predict student retention using existing survey data.

This study did not find grit as a composite score to be a significant predictor of academic performance in the first year of college for this sample, but this study did find that the perseverance subscale scores of grit were shown to predict first year college GPA. Moreover, this study provided empirical evidence to support previous research that finds gender and SAT scores are predictive of first year college GPA. Institutions, higher education administrators, and faculty members might want to consider the implications of grit and subscale scores of grit on students’ academic performance. Research shows that grit increases with age (Duckworth et al., 2007), and it would be valuable to understand how student grit levels may change through completing a college degree. Grit, in particular perseverance, can be measured annually to see if it increases with experience and time in college. It may also be possible that specific learning experiences in college teach students to be grittier. Interviews can be conducted with students who have
increased their grit to see what specific experiences increased their level of grit. Additional data can also be gathered about students who persist through graduation. Their grit scores can be correlated with their post-bachelor’s degree plans (graduate school, entering the work force) and overall success beyond college. Although grit was not predictive of first year GPA, grit may be predictive of cumulative GPA at the time of graduation. Grit may become a useful tool to assist administrators, faculty and institutions in supporting student success; however, more research on grit is necessary to add and expand on the results of this study.
References


Notes

1 Degree of Freedoms ($df$) related to $F$-statistics in ANCOVA was not provided in the study conducted by Nonis and Wright (2003).
Table 1.

Summary of Previous Studies on Grit and Academic Performance

<table>
<thead>
<tr>
<th>Author</th>
<th>Sample</th>
<th>Statistical Method</th>
<th>Variable 1</th>
<th>Variable 2</th>
</tr>
</thead>
</table>
| Duckworth, Peterson, Matthews, & Kelly (2007) | Undergraduate in psychology  
69% Women  
31% Men | Pearson Product Moment Correlation                | Grit                     | GPA**  
SAT*** |
| Jaeger, Freeman, Whalen, & Payne (2010) | First year engineering students  
| Mean comparisons | Grit                     | Gender*  
Honors †  
Athletes †  
Age †  
Academic level † |
| Strayhorn (2014) | Black Males  
Undergraduate  
61% First Generation Students  
35% Urban neighborhoods  
33% Science, Technology, Engineering, Math majors  
86% Living in residence halls | Pearson Product Moment Correlation  
Multiple Regression with age, HSGPA, ACT, international student, transfer student, student athlete, Greek affiliation, year in college, grit $(F = 4.42**, R^2 = .18)$ | Grit                     | GPA**  
HSGPA**  
ACT**  
GPA**  
GPA*  
GPA** |

*Note. †No significant finding; Grit was measured by Grit-S survey; * $p < .05$, ** $p < .01$, *** $p < .001$*
Table 2.

*Frequency of Sample and Population by Gender and Race*

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Table 3.

*Descriptive Statistics of SAT, Grit, and Subscale Grit Scores for the Sample*

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<th>M</th>
<th>SD</th>
<th>Range</th>
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Pearson Product Moment Correlation Coefficients among Variables in Proposed Model

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### Table 5.

**Results from Hierarchical Multiple Regression Analysis for Proposed Model**

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\( \Delta R^2 \) | .01 | .01 |

\( F(\Delta R^2) \) | 1.75 | .39 |
\( df1 \) | 1 | 5 |
\( df2 \) | 289 | 284 |
\( F \) | 6.24** | 5.81** | 3.96** |
\( df1 \) | 9 | 10 |
\( df2 \) | 290 | 289 |
\( R \) | .40 | .41 | .42 |
\( R^2 \) | .16 | .17 | .17 |
adjusted \( R^2 \) | .14 | .14 | .13 |

Note. * \( p < .05 \), ** \( p < .01 \)
Table 6.

Pearson Product Moment Correlation Coefficients among Variables in Supplementary Model

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*Note.* 1. First year GPA, 2. Female, 3. Asian, 4. Black, 5. Hispanic, 6. SAT, 7. Interest Score, 8. Perseverance Score, 9. Interest x Perseverance; *p < .05, **p < .01
Table 7.

Results from Hierarchical Multiple Regression Analysis for Supplementary Model

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Note. * $p < .05$, ** $p < .01$
Figure 1

Moderating effect of grit on student performance
Hierarchical multiple regression analysis for proposed model
Figure 3

Hierarchical multiple regression analysis for supplementary model
7. I finish whatever I begin.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

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

---

**Scoring:**

1. For questions 2, 4, 7 and 8 assign the following points:
   - 5 = Very much like me
   - 4 = Mostly like me
   - 3 = Somewhat like me
   - 2 = Not much like me
   - 1 = Not like me at all

2. For questions 1, 3, 5 and 6 assign the following points:
   - 1 = Very much like me
   - 2 = Mostly like me
   - 3 = Somewhat like me
   - 4 = Not much like me
   - 5 = Not like me at all

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

---

**Grit Scale citation**


http://www.sas.upenn.edu/~duckwort/images/Grit%20JPSP.pdf