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ACT Scores and High School Cumulative Grade Point Average as Indicators of College
Graduation at one High School in East Tennessee

A dissertation
presented to
the faculty of the Department of Educational Leadership and Policy Analysis
East Tennessee State University

In partial fulfillment
of the requirements for the degree
Doctor of Education in Educational Leadership, School Leadership

by
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August 2020

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Keywords: ACT, Bachelor's Degree Attainment, College Readiness, High School GPA

ABSTRACT

ACT Scores and High School Cumulative Grade Point Average as Indicators of College Graduation at one High School in East Tennessee

by

Ariane Sonia Day

The purpose of this quantitative study was to see if there was a significant difference in the mean American College Test (ACT) scores and high school grade point average (HSGPA) between students who attained a bachelor's degree within 6 years of starting college and those who did not attain a bachelor's degree within 6 years of starting college. Data from 2005-2013 high school graduates from one high school with only academic course choices were used. A series of independent t-tests were used to compare the mean ACT scores and HSGPA of students from both groups.

The goal was to find out whether high school educators can use existing high school data to know whether students who intend to continue their postsecondary studies at degree granting postsecondary institutions have the necessary preparation not just to be admitted to a postsecondary institution, but to attain a bachelor's degree. The results showed that for this group of participants, the mean ACT scores and HSGPA were significantly different between students who attained a bachelor's degree within 6 years and those who did not. Using Cohen's d to calculate the effect size for the results, ACT Composite, ACT English, ACT Science, and HSGPA were found to have a large effect size, and ACT Math and ACT Reading were found to have a medium effect size. HSGPA had the largest effect size.

The implications from the results are that high school personnel at all high schools should examine available data to see if it can be used as indicators of bachelor's degree attainment with the purpose of providing additional support to students who intend to pursue a bachelor's degree, but whose data indicate that they may not have the necessary preparation to successfully complete a degree.

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DEDICATION

This work would not have been possible without the sacrifices of the people closest to me:

- To my children Matthias, Janine, Kirsten and Luke, for picking up the slack while I was pursuing this goal.
- To my husband Nathan, for loving me for the past 28 years, for believing in me, and for supporting me always.

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Chapter 1. Introduction

High school teachers prepare students for their postsecondary and professional endeavors (ACT, 2005b; Barth, 2003; Cohen, 2001). High school graduation requirements are established at the state level by members of the Tennessee State Board of Education (2017). Aside from prescribed requirements, students may explore course options offered at their school from vocational, Early Postsecondary Opportunities (EPSO) such as dual-enrollment and State Dual Credit (SDC) courses, and elective courses among other offerings. Depending on the mission and the location of the high school, students will have more or fewer choices and opportunities. For the purpose of this study, the researcher looked specifically at students from one high school in east Tennessee where only an academic completion pathway is offered. The expectation for students attending this school is enrollment in a college or university after graduating high school and complete a bachelor's degree. Administrators and teachers of high school students who desire to earn a bachelor's degree need to be able to determine if students who satisfy the requirements to earn a high school diploma are both ready to be admitted to college and able to successfully complete a bachelor's degree. Ideally, there should be a way for high school educators to know with certitude that students are ready to pursue a bachelor's degree and have the background necessary to complete a bachelor's degree based on data that are available when students are in high school. The data most often used in Tennessee to determine college readiness are the students' cumulative High School GPA (HSGPA) and their ACT scores.

This is a study of all students who graduated from a small publicly funded college preparatory high school in east Tennessee between 2005 and 2013, in total about 540 students. Students who graduated from this school in May 2013 had 6 years to complete their bachelor's degree at a postsecondary institution by the time the researcher examined the data. In order to

only examine data from students who had up to 6 years to complete a bachelor's degree, data from the high school class of 2014 and subsequent classes were not used in this study. The purpose of this study was to examine whether students who participated in a college preparatory high school program of study earned a bachelor's degree within 6 years of beginning postsecondary studies. Six years represents 150% of the expected time it takes to complete a bachelor's degree from the time a student enrolls at a postsecondary institution and it is a measure of accountability for postsecondary institutions in Tennessee (Tennessee Higher Education Commission, n.d. a). In this study, the researcher used a series of independent *t*-tests to determine if there was a significant relationship between the attainment of a bachelor's degree within 6 years and the data available for each student: ACT scores (both composite and individual subscores) and HSGPA.

Statement of the Problem

High school educators of students who plan to attend college are preparing students with the goal that they will be successful in college and obtain a bachelor's degree as a result of successful completion of bachelor's degree requirements. Postsecondary success is measured by completing the required program of study thereby earning a bachelor's degree from a postsecondary institution. Students who have earned a bachelor's degree have been found to earn a significantly higher income than students who did not earn a college degree (Barth, 2003; Carey, 2005; Mayhew et al., 2016). Because of this gap in lifetime earning potential, there is a need for high school teachers and administrators at all high schools to know whether students who intend to complete a bachelor's degree are adequately prepared while in high school to successfully complete postsecondary programs of study and earn a bachelor's degree. While not all students intend to pursue a bachelor's degree, the preparation needed to be ready for college

success will benefit students who chose alternative paths after high school (Barth, 2003). High school graduation requirements and course standards in Tennessee public schools are set by state lawmakers and in theory are implemented equally across all high schools in Tennessee. The delivery of the content is in the hands of licensed teachers. Rigor and content, however, vary from school to school and from classroom to classroom despite having set standards (ACT, 2005b; Adelman, 1999). Because of this discrepancy, there is a need for secondary school teachers, counselors and administrators to have tools that measure how well students who want to go to college are prepared for success at the postsecondary level. Students need to be prepared not just to be admitted, but also to complete a bachelor's degree. Two important student data points that are available to teachers, counselors, and administrators in Tennessee at the secondary level are student ACT scores and subscores as well as student GPA. Educators in the United States consider those two data points important in determining postsecondary readiness. In an effort to increase student college readiness, lawmakers in Tennessee enacted a law to provide one free ACT administration to high school juniors starting with the 2007-2008 school year (Tennessee Department of Education, 2018a). More recently, it became law that, beginning with the 2018 high school graduation cohort, high school students in Tennessee were required to take the ACT in order to earn a high school diploma (Tennessee State Board of Education, 2017; Tennessee Department of Education, 2018a). The ACT test is administered during the school day to all juniors at their respective high schools. In an effort to improve college readiness for Tennessee high school students, the Tennessee State Board of Education added a second administration of the ACT to all seniors in 2016, essentially giving students two opportunities to take the ACT test at no cost to them (Tennessee Department of Education, 2018a). Taking the test several times is recommended as research shows that 40% of students improve their score

when taking the ACT a second time (ACT, 2017b; Tennessee Department of Education, 2018a). Student ACT scores are part of school accountability in Tennessee, but when students take the ACT more than once, only the highest scores are taken into consideration in the calculation for school accountability (Tennessee Department of Education, 2018b).

The HSGPA is a calculation where the weight of a course, the credit, is the divisor and the success value, the quality points earned in that course, is the dividend. It is an easily interpreted value that is almost universally used by secondary and postsecondary education institutions in the United States (Volwerk & Tindal, 2012). Student HSGPA and ACT scores are used at postsecondary institutions to determine admission to the institution, acceptance into more competitive college programs, and eligibility for scholarships (Barth, 2003; Cimetta et al., 2010; Volwerk & Tindal, 2012). The researcher wanted to know whether these data points, ACT scores and subscores and HSGPA, can be used by high school personnel as an indicator of whether students are prepared to be successful at the postsecondary level as measured by the completion of a bachelor's degree.

Research Questions

The following research questions were designed to frame the analysis of data for determining differences between bachelor's degree attainment and the following high school student data: ACT Composite scores, ACT Math subscores, ACT Reading subscores, ACT English subscores, ACT Science subscores, and HSGPA.

RQ1: Is there a significant difference in the ACT Composite scores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college?

- RQ2: Is there a significant difference in the ACT Math subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college?
- RQ3: Is there a significant difference in the ACT Reading subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college?
- RQ4: Is there a significant difference in the ACT English subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college?
- RQ5: Is there a significant difference in the ACT Science subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college?
- RQ6: Is there a significant difference in HSGPA between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college?

Significance of the Study

Many studies have compared ACT Composite scores, ACT subscores, and HSGPA with student success in college at various levels as well as with the ultimate earning of a college degree (ACT, 2008b; Hein et al., 2013; Noble & Sawyer, 2002). However, the focus of many researchers was not on the completion of postsecondary studies as measured by attainment of a bachelor's degree. Few studies have examined the relationship between high school student data and attainment of a bachelor's degree from a specific high school perspective and with the intent to improve postsecondary preparation at the secondary level. While many students go to college

after finishing high school and complete one year or even more, not all students who begin college do so with the intent to earn a degree (Bradburn, 2002). In this study, the researcher examined students who graduated from one college preparatory high school that is a school of choice, not the students' designated Local Education Agency (LEA). Parents or guardians of students had to apply for students to attend this high school and understood that the goal of this high school is to prepare students to continue their studies at the postsecondary level. The goal for students to complete a bachelor's degree was evident by the lack of vocational class offerings that would allow students to explore career choices that do not require pursuing a bachelor's degree. Based on this information, the assumption was made that the expectation was for students to enroll in a college or university after graduating from high school with the intent to complete a bachelor's degree.

Tennessee's high school graduation requirements were revised in 2017 (Tennessee State Board of Education, 2017). The revised requirements match recommendations from ACT of the high school coursework necessary for students to have an increased probability of completing college with a bachelor's degree. According to Barth (2003), 80% of high school students plan to go on to college after high school. High school teachers, counselors and administrators need indicators to determine if they are preparing students to be successful in college.

Limitations

This study was limited to examining student HSGPA, highest ACT Composite score and highest ACT subscores, and bachelor's degree attainment within 6 years of high school graduation. In this study, the researcher did not take into account other student factors that are known to improve or diminish bachelor's degree attainment rates. Because the ACT is a nationally normed test, academic exposure factors that affect student postsecondary preparation

before college would be reflected in their scores. The better the academic preparation in and out of the classroom, the better the ACT scores. Another factor that is not considered is the graduation rate of each postsecondary institution. Joy (2017) compared predicted bachelor attainment rates to actual bachelor attainment rates and found that some postsecondary institutions have better success graduating students than others regardless of students' prior preparation. According to the National Center for Educational Statistics (2019) and the U.S. Department of Education (2019), the overall rate of bachelor attainment for full-time students was 60%. However, there were many variations depending on the institution. Private for-profit institutions had the lowest graduation rates with 20% for women and 22% for men. Institutions with the lowest acceptance rates and the highest selectivity had the highest graduation rates with 87%. Non-selective institutions also had a low graduation rate at 31%.

Delimitations

For this study, data from students attending one small high school in east Tennessee were used. Factors that affected college graduation rates that may have only been present at this one high school are inevitable.

Definitions of Terms

In this study, specialized educational vocabulary for secondary and postsecondary levels were used. It is important to understand the following terms as they related to this study:

- ACT Composite score: The American College Test, or ACT as it is now called, is a college admission's test that is accepted by all 4-year colleges and universities in the United States (ACT, 2018). The ACT test is not an IQ or aptitude-based test. Instead it measures what students have learned in high school in the areas of math, English, reading

and science. The highest possible ACT Composite score is a 36, and it is an average of the 4 tested areas.

- ACT subscores: the ACT measures students' knowledge in 4 areas: math, English, reading, and science. Each area receives an individual score, which are called subscores, with the highest possible score being a 36.
- Bachelor's degree: a bachelor's degree is a postsecondary degree awarded for successful completion of undergraduate studies in postsecondary institutions, specifically colleges and universities, and it is the difference between being enrolled as an undergraduate student or a graduate student (Wallace, 2009). A bachelor's degree typically takes about 4 years to complete but can be completed faster or slower depending on how many credits a student completes during a semester among other factors.
- High school cumulative unweighted grade point average: a number on a scale of 4 that represents students' overall success in their high school classes over the span of their high school career. In courses where students earn credits, a letter grade from A to F is assigned to quantify how well students have learned the material of the course (U.S. Department of Education, 2008). Tennessee has set a grade scale for secondary schools where an A represents a percentage grade of 93%-100%, a B is 85%- 92%, a C is 75%-85%, a D is 70-74% and an F is 69% or below (Tennessee State Board of Education, 2017). To calculate a grade point average, each letter is assigned points on a four-point scale: a grade of A equals 4 points, B equals 3 points, C equals 2 points, D equals 1 point, and F equals 0 points. The points are then added, and the total is divided by the total number of attempted credits (a failed course is still an attempted credit) resulting in a cumulative unweighted grade point average (U.S. Department of Education, 2009).

Chapter Summary

There is a need for teachers, counselors and administrators at secondary schools to know how well they prepare students for their next step after graduating from high school, whether they plan on continuing their studies at a postsecondary institution or not. ACT (2005a; 2005b; 2008b) has identified what courses have the best results in preparing students for college and work, and the Tennessee State Board of Education (2017) has increased the high school graduation requirements to include many of those recommended courses. ACT scores and HSGPA are two data points that are available statewide in Tennessee. The researcher wanted to know if these data points can be used by teachers, counselors and administrators to determine student readiness to complete a bachelor's degree, especially in a school that offers only a college preparatory path. This study is significant because while many studies have examined ACT scores and HSGPA in relation to college success, that success was most often measured in terms of year to year retention and not bachelor's degree attainment. The participants of this study were graduates from a small college preparatory high school in east Tennessee.

Chapter 2. Review of Related Literature

In order to understand this study, one must first gain an understanding of what the ACT and HSGPA are, how they came to be, how they are calculated, and their current relevance. It is also noteworthy to highlight the importance of the ACT and HSGPA when it comes to admission to postsecondary institutions, scholarship eligibility, and other placement decisions based on those scores. Looking at the reasons why attaining a bachelor's degree is important and also provides information for the relevance of this study. Finally, looking at the predictive abilities of the ACT and the HSGPA as found in the literature provided the basis for this research.

American College Test

The American College Test (ACT) is a college admission test that is typically accepted by 4-year colleges and universities in the United States (ACT, 2018). According to the U.S. Department of Education (2016), the ACT was introduced in the 1950s as an alternative to the Scholastic Aptitude Test (SAT) which was widely used as a college admission tool in the 1940s. The SAT had begun being used in 1926 as a way to improve the objectivity of the college admission process (Beale, 2012). Both the ACT and the SAT were commonly used since their inception to the present day, and both have undergone changes since their inception. Beale (1970) found that the importance of college entrance exams like the ACT and SAT grew tremendously in the 1950s in an effort to make college admissions more efficient and based on the idea that standardized entrance exams were more reliable than previous methods of admission. Previous to this, the typical college admission was based on a review of high school records, available test scores, recommendations, and interviews with the applicants.

According to ACT (2018), the ACT test is not an Intelligence Quotient (IQ) or aptitude-based test. Instead, the ACT measures what students have learned in high school. The Tennessee Department of Education (2018a) considers the ACT to be a national measure of student readiness for postsecondary work and employment. Students are encouraged to choose more challenging courses throughout their high school career to be better prepared for college (ACT, 2018). Critics of the ACT however, argued that it should not be used as a national measure of student readiness because it assesses student mastery of a specific curriculum even though there are no national standards and because the test is norm-referenced and does compare student performances against other students (Atkinson & Geiser, 2009).

The ACT test is comprised of four areas that each receive a score, which are called subscores. The four subscores are averaged into a composite score. The highest possible score for any subscore and for the composite is a 36. There is also an optional writing portion of the ACT test that receives a score between a 2 and a 12 which is not taken into consideration in the composite score (ACT, 2018). For the purpose of this study, the optional writing test was not considered because it was not consistently taken by students and because it was not factored into the composite score.

The ACT is designed to give students and colleges a nationally normed score that can be utilized to interpret a student's level of readiness to meet the requirements for college readiness (ACT, 2008a). The scores do not rank the students against one another, although students can find state averages and national averages to which scores may be compared. The subscore benchmarks indicating college success are currently set at 18 for ACT English, 22 for ACT Reading, 22 for ACT Math and 23 for ACT Science (ACT, 2017a). Small variations in the benchmark scores have happened due to renorming, as ACT sets those benchmarks based on

student performance in college classes (ACT, 2010). In 2010 for example, the benchmark for the science subscore was 24 instead of the current 23, and the benchmark for the reading subscore was 21 instead of the current 22 (ACT, 2010). A student meeting the benchmarks in each area has a 50% probability of earning a B or higher and about a 75% probability of earning a C or higher in the corresponding college course (ACT, 2010).

Grade Point Average

The HSGPA is the result of a division of earned quality points divided by attempted credits. In order to understand what the HSGPA is, one must gain an understanding of what credits and quality points are.

High School Credits

In the United States, the accepted measure of educational progress at the high school level and at postsecondary institutions is the Carnegie Unit which is called “credit” (Silva et al., 2015). In 1905, Andrew Carnegie donated \$10,000,000 to create a pension fund for college professors. This resulted in the creation of the Carnegie Unit so that the work of college professors could be quantified, and it could be established who qualified for the pension. It indirectly resulted in defining high school and college graduation expectations as a measure of how much time students spent on a subject with the quality of students’ time being measured by grades assigned by teachers and professors. At the high school level, one credit translates to 120 hours of instruction over the length of one school year (U.S. Department of Education, 2009; Silva et al., 2015). At the postsecondary level, credit definitions vary from institution to institution, but the U.S. Department of Education established a guideline to help accredited institutions define what a credit is (East Tennessee State University, 2017a; Schulte, 2016). The

credit measure is used in the calculation of the Grade Point Average (GPA) and has become a fundamental measure of the American educational system. At the postsecondary level, federal financial aid can only be granted to students who attend institutions that use the Carnegie Unit system of measurement of educational achievement (Schulte, 2016; Silva et al., 2015).

Standardization of expectations allowed high schools and colleges to have a workable measure that facilitated recognizable achievement, but there is still much variation in student achievement due to rigor differences and professional freedom from one professor to another and from one institution to another. According to Silva et al. (2015), postsecondary institutions often reject transfer credits from other institutions, which reflects that the credit is not a good measure of achievement and lacks details of the actual achievements of the student. The Carnegie Unit is a measure of time investment and does not have a standard measure of the outcome in terms of achievement or student competency.

Postsecondary institutions set graduation requirements for their undergraduate and graduate programs based on successful completion of required courses and the completions of a set number of credits. At the secondary level, states implemented requirements for high school graduation. The U.S. Department of Education (2009) reported that from 1990 to 2009, the average total of credits earned by high school students rose from 23.6 to 27.2. Tennessee for example requires a minimum of 22 credits to graduate, with specific requirements: 4 credits of English, 4 credits of math with at least one above the Algebra 2 level, 3 credits of science, 3 credits of science, 3 credits of social studies, 0.5 credit of personal finance, 1 credit of Wellness, 0.5 credit of physical education, 2 credits of the same foreign language, 1 credit of fine arts, and 3 credits of elective focus courses (Tennessee State Board of Education, 2017). In 2009, the U.S. Department of Education defined three levels of high school curricula and discussed the

preparations required at the different levels. A curriculum requiring four credits of English, three credits of mathematics, science, and social studies respectively is considered standard. A midlevel curriculum requires four credits of English, three credits of mathematics which include Algebra 1 and Geometry, three credits of science which include two of either Biology, Chemistry, or Physics, three credits of social studies, and one credit of a foreign language. A rigorous curriculum requires four credits of English, four credits of mathematics which include Pre-calculus or a higher level, three credits of science which include Biology, Chemistry and Physics, three credits of social studies, and three credits of a foreign language. In 2009, 75% of high school graduates completed a curriculum that was at the standard level or above (U.S. Department of Education, 2009).

Quality Points

In courses where students earn credits, a letter grade is assigned to quantify how well students have learned the material of the course (criterion-referenced) or how the students rank against either other in the course (norm-referenced) (U.S. Department of Education, 2008). With either norm-referenced or criterion-referenced, it is common knowledge that letter grades from A to D signify that the students have passed the course and earned the credit. A grade of F signifies that the students did not pass the course, and that no credit was earned.

Cumulative Grade Point Average Calculation

To calculate a grade point average, each letter is assigned quality points on a four-point scale for unweighted GPA calculations and on a five-point scale for weighted GPA calculations: a grade of A equals four points (five points for weighted calculations), B equals three points (four points for weighted calculations), C equals two points (three points for weighted calculations), D equals one point (or two points for weighted calculations), and F equals zero

points for both weighted and unweighted calculations since no credit is earned with an F. The points are then added together, and the total is divided by the total number of attempted credits (a failed course is still an attempted credit) resulting in a cumulative grade point average (Uribe & Garcia, 2012; U.S. Department of Education, 2009).

Importance of the ACT Score and HSGPA

For college admission purposes, prestigious postsecondary institutions relied heavily on high school performance as reported by the HSGPA and class ranking (Uribe & Garcia, 2012). High school students aspiring to attend postsecondary institutions took college entrance exams, either the ACT or the SAT (Southern Regional Education Board, 2014; U.S. Department of Education, 2016). For students, parents, secondary and postsecondary institutions, the ACT was an easily understood number that corresponded to the likeliness of students performing well in basic college courses (ACT, 2005b; Southern Regional Education Board, 2014; Tennessee Department of Education, 2018a). According to Barth (2003), in order to make admission decisions many postsecondary institutions want to see nationally normed student data such as ACT scores in addition to class ranking and grade point average. More recently, many public and private postsecondary institutions have changed their admission policies to no longer requiring minimum scores on the ACT or SAT for college admission (Furuta, 2017; Southern Regional Education Board, 2014). For postsecondary institutions that were less selective and that may not have required a minimum entrance exam for general admission, these data points were still used for admission into selective programs such as nursing and physical therapy for example (Cimetta et al., 2010). In stark contrast to postsecondary institutions stepping away from college admission testing, the state of Tennessee made taking the ACT a graduation requirement for high school students (Tennessee Department of Education, 2018a, 2018b). Of the 16 states who were

members of the Southern Regional Education Board, Tennessee and five other states added ACT or SAT scores as a part of school accountability formula in the area of college readiness (Southern Regional Education Board, 2014). The Tennessee Department of Education's (2018a) goal was to increase the number of students who graduated from high school ready for their next step, whether it be more education or employment, and the ACT was the chosen measure to determine that readiness.

Entrance exam scores such as the ACT and SAT are not only used to determine admission, they are also used to determine eligibility for scholarships and scholarship retention (U.S. Department of Education, 2016). To understand how this affects students from the eastern Tennessee region, admission requirements and scholarship criteria for 13 local public and private postsecondary institutions awarding bachelor's degrees were examined. The following institutions both inside and outside of the state of Tennessee were researched: East Tennessee State University, Lincoln Memorial University, Milligan College, Tusculum University, King University, Lipscomb University, Belmont University, Vanderbilt University, Appalachian State University, Middle Tennessee State University, The University of Tennessee, Knoxville, University of North Carolina, Asheville, and Western Carolina University. While these institutions were not necessarily representative of all postsecondary institutions across the United States, they were examples of small and large institutions, public and private, and were representative of institutions that students from eastern Tennessee were likely to attend.

The following information pertaining to admission and scholarship requirements was gathered:

- All 13 postsecondary institutions researched required students to submit an ACT or SAT score for admission whether the use of the score (admission, scholarship, remedial placement) was specified or not.
- Four out of the 13 institutions required a minimum ACT and HSGPA for regular admission (East Tennessee State University, 2017b; Lincoln Memorial University, 2020; Milligan College, 2020a; Tusculum University, n.d.).
- Nine of the 13 institutions did not have minimum admission requirements in terms of benchmark ACT scores and HSGPA. The following institutions did reference ACT and/or GPA in their admission information:
 - A preference in terms of ACT score and HSGPA for admission as a first-time college student was listed for admission to King University while not required (King University, 2020).
 - Lipscomb University (2020) displayed an average HSGPA of 3.78 for freshmen admissions.
 - Belmont University (n.d.) explained that applicants rank in the top half of their graduating class and that there needed to be a strong correlation between standardized test scores and high school grades.
 - Vanderbilt University (2020) listed profile information for the Fall 2019 freshmen admissions. The admission rate of all first-time freshmen applicants was 9.1% and the admitted students had an ACT middle 50% range of 33 to 35 score for the 2019 freshman class.

- Appalachian State University (2020) also listed profile information for the Fall 2019 freshmen admissions. The middle 50% range of admitted freshmen were an ACT of 23-28 and a weighted HSGPA of 3.94-4.48.
- Three of the 13 institutions noted that the scores on the ACT and SAT would be used to determine placements in classes. East Tennessee State University and Middle Tennessee State University use the ACT score for placement in Learning Support Classes for math and English courses (East Tennessee State University, 2017b; Middle Tennessee State University, 2020a). Students with scores below an 18 on their ACT English subscore, or below a 19 on their ACT Reading or ACT Math subscores are required to enroll in learning support courses. At East Tennessee State University, these classes are regular education classes but are designed to provide additional support to students in their area of identified deficiency and require participation in a learning lab (East Tennessee State University, 2020a). At Middle Tennessee State University, the prescribed classes are additional classes that count as elective classes or count as general education requirement (Middle Tennessee State University, 2020b). The University of Tennessee, Knoxville, uses students' ACT Math scores to determine math prerequisites. If a student's program requires a specific math course, but the student's placement level is below that class, they will need to take their identified prerequisite before being able to take the required math (The University of Tennessee, 2020c).
- The University of Tennessee (2020b) and the University of North Carolina Asheville (2020) listed no benchmark requirements for regular admission in terms of ACT score or HSGPA and did not list average demographics of their incoming freshmen in terms of ACT Composite score averages or HSGPA averages.

- Western Carolina University (2020) did not list benchmark score requirements but had benchmark requirements of 4.0 HSGPA and 30 ACT score to be admitted to the honors college.

Scholarships were merit-based by the fact that they use ACT or SAT scores as well as HSGPA for initial eligibility. Duffourc (2006) reviewed state-funded scholarships that were available at the time of her publication. Of the 14 state-funded scholarships, 11 had a minimum ACT or SAT requirement for eligibility and 10 had a minimum HSGPA requirement. In Tennessee, the Hope Scholarship was a state operated merit-based scholarship that was first awarded in the fall semester of 2004 (Tennessee Higher Education Commission, 2013). High school graduates were eligible for the Tennessee Hope Scholarship if they had either a 21 ACT Composite score, or a 3.0 HSGPA (Tennessee Higher Education Commission, n.d. b). In addition to the Hope Scholarship, students who had a 3.75 or higher HSGPA and a 29 or higher ACT Composite score were eligible for the General Assembly Merit Scholarship (GAMS). Individual institutions also offered a range of scholarships, merit based and need based. Some examples of merit-based scholarship were:

- East Tennessee State University (2020b, 2020c) offered the Academic Performance Scholarship with varying levels of award depending on eligibility based on ACT Composite scores and HSGPA.
- East Tennessee State University (2020d) offered a selective Honors College Scholarship with a minimum ACT Composite score requirement of 29 and a 3.5 or above unweighted HSGPA.

- The University of Tennessee (2020d) offered the Volunteer Scholarship with varying levels of award depending on ACT/SAT Composite scores, beginning with an ACT score of 28.
- Milligan College (2020b) offered Academic Merit Scholarships of varying award amounts depending on eligibility based on ACT Composite scores and HSGPA.

As highlighted by these examples, student ACT scores and HSGPA were found to be of high importance at many colleges and universities for admission purposes and for scholarship eligibility. Fields and Parsad (2012) found that postsecondary institutions solely use college readiness test scores to determine placement in remedial classes. This was evident in 3 out of the 13 postsecondary institutions researched and referenced above. East Tennessee State University used the ACT English, ACT Reading and ACT Math subscores for placement in Learning Support courses (East Tennessee State University, 2020a). The University of Tennessee (2020a) determined students' mathematical level using the ACT Math subscore and mandates prerequisite courses based on the identified level. While only three listed the use of ACT scores to determine course placement, all required ACT or SAT scores for admission, and more could be using these scores for placements while not actually publishing this on their admission information pages. The reliance on a single data point to make the determination for remedial placement increases the likelihood of student being placed in remedial classes when they did not need to be, thereby potentially adding time and cost to students' attainment of a bachelor's degree. Hodara and Lewis (2017) reported that community colleges are changing their policy on remedial course assignments to include multiple data points.

Bachelor's Degree Attainment

The research outlined in this section supports that the attainment of a bachelor's degree makes a significant difference in an individual's quality of life. The benefits do not stop there: having more educated citizens has benefits for society as a whole. Postsecondary institutions also benefit from students completing their programs of study and earning a degree.

Importance for Society

Stewart (2012) and Rolffhus et al. (2017) made the argument that earning a degree is important not just for the student, but also for society as a whole. For society, having uneducated citizens results in higher unemployment rates, which in turn results in a slower economy and higher costs of law enforcement, prisons, and welfare. Educated citizens are more likely to be employed, contribute more to the economy and pay more taxes, and raise healthier children (Stewart, 2012). Carnevale and Desrochers (2002) reported that 60% of jobs are filled with workers with some postsecondary training. Workers with a high school education or less therefore have fewer opportunities at being hired for a job where they can make a living wage. According to a policy report completed by ACT (2005a) in 2005, the prediction for 2008 was that there would not be enough postsecondary graduates to fill the available jobs. The cost of having uneducated citizens is more than the cost of investing in education to improve the outcomes (Greene, 2000). Barth (2003) also argued that normal everyday life has gotten more complicated and requires citizens to be able to reason at an increased intellectual level than previously needed. Barth furthermore made the point that the preparation needed for college has become more and more similar to the preparation needed to be successful in the workplace. Additionally, education has been found to be an equalizer that closes the income gaps between citizens of various ethnic backgrounds (Barth, 2003; Finn et al., 2015; French et al., 2015).

According to Barth (2003), 73% of African American students who begin postsecondary studies with a strong high school preparation earn a bachelor's degree. Conversely, less than half of all African American students who begin postsecondary studies earn a bachelor's degree. For Latino students, 61% who begin postsecondary studies earn a bachelor's degree, but for those who enter college with an adequate preparation, 79% of them earn a bachelor's degree. French et al. (2015) found that when compared to white students with the same HSGPA scores, same school characteristics and background characteristics, African American students do better in the formal educational system as measured by degree completion.

Importance for Postsecondary Institutions

The importance of degree completion for higher education institutions has increased recently with a shift toward a performance-based funding model and accountability based on output such as degree completion (ACT, 2008b). Banta and Fisher (1984) found that the 1980s saw a shift of evaluation of higher education institutions from input to an evaluation based on output. Before this shift, universities' success was evaluated by such factors as the number of faculty members holding a terminal degree, library collection size, and money spent per student among others, all of which are measures of how much an institution invests into its students. In 1979, the Tennessee Higher Education Commission began experimenting with funding based on performance standards, which measure the impact that institution has on students. Tennessee higher education institutions could earn an additional 5% of their state allocation for meeting set performance standards (Banta & Fisher, 1984; Dougherty & Reddy, 2011). While the new focus was not based on graduation rates, it was mostly based on program quality, student learning, and the presence of a mechanism for stakeholder feedback and consistent improvement (Banta & Fisher, 1984). Dougherty and Reddy (2011) established that there were two rounds of

performance-based funding, which they called Performance Funding (PF) 1.0 and 2.0. PF 1.0 funding models were established in the 1980s and 1990s in Tennessee, Florida, Ohio and Washington. These programs were set up as incentives available in addition to the state allocations already in place. Dougherty and Reddy (2011) established that what they call PF 2.0 funding models are different from the earlier versions. PF 2.0 funding models have performance requirements that are a part of the state funding formula and are no longer a supplement to the base funding. Increased accountability on 2-year and 4-year institutions have resulted in more importance being placed on degree completion (Radunzel & Noble, 2012). Lawmakers across the country are demanding justification of the public resource investments in higher education resulting in an increased importance of graduation rates and other output measures rather than enrollment numbers and other input measures (Dougherty & Reddy, 2011; Radunzel, 2012).

Tennessee implemented the first performance funding policy in 1979, and several states followed this example (Dougherty & Reddy, 2011). Dougherty and Reddy reported there was an initial implementation of performance funding policy which was recently replaced by revised performance funding policies in each respective state. The initial policies have in common the fact that they reward higher education institutions based on performance indicators with additional funding. The updated and more recent policies include performance funding into higher education funding policies and have actually resulted in reduction of overall funding in some cases. In Tennessee, the revised performance-based funding policy was implemented in 2010 as the Complete College Tennessee Act. Since then, higher education funding is no longer predominantly based on enrollment numbers. The new funding focus is on performance with emphasis on course and degree completion (Dougherty & Reddy, 2011). Dougherty and Reddy determined that there was not a significant increase in graduation rates stemming from

performance funding. However, performance funding did have impacts on higher education institution policies. Braxton (2001) found that a high percentage of students who begin postsecondary studies but leave before completing a bachelor's degree caused problems for institution budgets and public perceptions of the institution. Dougherty and Reddy (2011) described several examples of policy changes attempting to alleviate the loss of students prior to degree completion. These policies mostly fit into two categories. Some institutions pass students through the programs whether they meet the standards or not, thereby weakening their academic standards. Other institutions developed more selective admission policies in order to select only students who met the qualifications necessary to be successful allowing the institutions to maintain program quality but becoming more selective.

Importance for Students

It is general knowledge that it has become a necessity for students to earn some sort of credentials beyond the high school diploma in order to compete for middle-class jobs that provide a stable income (Carnevale & Desrochers, 2002; Jimenez et al., 2016; Joy, 2017; Kuh et al., 2008; Rolffhus et al., 2017; Trusty & Niles, 2004). Barth (2003) found that a majority of high school students planned on attending a postsecondary institution and earn a degree. ACT (2019) found that for the 2019 high school cohort, 73% of graduates planned to continue their studies past high school. For students, earning a bachelor's degree increased the probability of significantly higher income over their lifetime. According to Carey (2005), ACT (2005a), and Carnevale and Desrochers (2002), individuals whose highest education level was a high school diploma earned about half of what individuals who earned a bachelor's degree earn. Individuals who completed an advanced degree earned even more than individuals whose highest education level was a bachelor's degree (Carey, 2005). Mayhew et al. (2016) reported that individuals with

a bachelor's degree earned 15% to 27% more than individuals without postsecondary education. According to Barth (2003), students who did not complete high school earned \$2,000 less annually than high school graduates. High school graduates earned \$4,000 less than students who completed an associate degree, but about \$18,000 less than students who earned a bachelor's degree. For every unemployed individual with a bachelor's degree, there are two unemployed high school graduates. Barth (2003) found that workers with a bachelor's degree earned on average \$2.1 million over their careers compared to \$1.2 million for workers whose highest education level is a high school diploma. While there was a time when high school graduates could find a job and work their way up internally to a better pay, today's higher paying jobs required additional education and training past the high school diploma from the get-go (Barth, 2003). Carnevale and Desrochers (2002) found that while in 1959, 20% of jobs were filled with workers who had some postsecondary education, that number was up to 60% in 2002.

According to Tinto (1993, as cited in Braxton, 2001) about 25% of students attending a 4-year institution left during their first year. Bradburn (2002) reported that almost 20% of students attending a 4-year institution left without completing a bachelor's degree, more so during the first year than during their second or third year. Bradburn (2002) found that not all students who begin postsecondary studies at a 4-year institution were planning on attaining a bachelor's degree upon beginning their postsecondary studies which influenced whether they completed a degree. Of the students who did not complete a degree, 40% did not plan on getting a degree initially, but 16% did plan on completing a bachelor's degree. Bradburn found that students who did not have a regular high school diploma, did not have standardized test scores (ACT or SAT), delayed their studies after graduating from high school, were part time students, worked full time while attending college, had to take remedial courses, or had a GPA lower than

2.75 were significantly less likely to complete a bachelor's degree. Trusty and Niles (2004) studied a group of 3,116 students who were eighth graders in 1988, and who had academic promise and planned to attain a bachelor's degree after high school. Of the total participants, 64% attained a bachelor's degree within eight years after graduating from high school. Trusty and Niles found that the three most important factors that affected students attaining a bachelor's degree were the intensity of the high school preparation, the students' behavior while in high school, and their socio-economic status.

When looking at the numbers of students not completing a degree, one must keep in mind that other factors may affect the numbers. For example, Adelman (2006) made the argument that researchers have not taken into account students who leave one postsecondary institution and enroll in another. Adelman studied data from a national sample representative of the high school class of 1992. He observed that of the 1992 graduating cohort, about 60% attended more than one institution thereby questioning the validity of using college dropout rates as a valid measure since students leaving one institution to attend another were not taken into account in the data. Witteveen and Attewell (2017) studied data from almost 9,000 students who began postsecondary studies at a 4-year institution in the fall of 2004 and accounted for students changing institutions. They found that students who attained a bachelor's degree within six years had certain criteria in common: they varied the intensity of the course work from semester to semester, and they also took less courses while taking more challenging classes. The students who did not attain a bachelor's degree did not show any variation in intensity from semester to semester or lighter loads while taking more challenging courses.

There are many reasons students do not complete a degree (Kuh et al., 2008). One reason is that they may graduate from high school underprepared for the expectations of postsecondary

work (Barth, 2003; Cohen, 2001; Jimenez et al., 2016; Kuh et al., 2008). Bradburn (2002) found evidence that lack of preparation affects students completing a bachelor's degree. Trusty and Niles (2004) found that math preparation of at least Algebra 2 increased the potential of students to meet their goal of attaining a bachelor's degree by 73%. ACT (2005a) and Cohen (2001) reported that of the 75% of high school graduates who enroll in postsecondary institutions, almost 30% needed remedial courses (one or more) in math, reading and writing, before being able to enroll in classes that count toward a degree. From the 1990s to the early 2000s, high numbers of students enrolled in at least one remedial course (ACT, 2005b). Bailey et al. (2010) found that 33% of students took remedial English courses and 59% took remedial math classes. Silva et al. (2015) found that 60% of students attending community colleges take remedial math classes. Barth (2003) argued that the reason that 25% of first-year college students do not return for a second year of college is that 50% of college students have to take at least one remedial course. Taking remedial classes adds more cost and time to the pursuit of a degree since those classes do not count toward the attainment of a degree. Taking remedial classes has an adverse effect on students completing the coursework necessary to earn a degree (Adelman, 2004; Barth, 2003; Cohen, 2009; Jimenez et al., 2016). Witteveen and Attewell (2017) found that the percentage of students who took remedial English, math or other courses was higher for students who did not complete a bachelor's degree than for those who did. ACT (2005a) reported that of the students who took remedial courses in reading, 70% did not earn a postsecondary degree. For students who took remedial courses in math, 58% did not earn a postsecondary degree. These statistics are even worse for some subgroups. According to Jimenez et al. (2016), while 35% of white students take remedial courses, the percentages for African American (56%) and Latino (45%) students are higher, thereby reducing their likelihood of completing a college

degree. Jimenez et al. calculated the financial impact of remedial classes to be \$1.3 billion per year, a staggering cost that could be greatly reduced by increasing the college readiness of high school students.

According to ACT (2005b; 2019) and Barth (2003), the reasons why students do not complete a college degree can be synthesized into one main reason: the education students received prior to entering a postsecondary institution did not prepare them for the demands and expectations of postsecondary work. More than 70% of students graduating from high school intended at one point or another to go on to college, but the reality is that they were not adequately prepared to do so (ACT, 2005b; ACT, 2019; Barth, 2003).

Importance for High Schools

To understand the importance of this study for high school teachers, counselors and administrators, it is important to understand the purpose of high schools. Barth (2003) found that one of the problems for high school students and their parents is that many assumed that earning a high school diploma equated with being ready for postsecondary expectations, which was not always the case.

Purpose of High School and High School Accountability. The purpose of high school is to prepare students for both the workplace and postsecondary educational opportunities without the need for remediation (ACT, 2005b; Barth, 2003; Cohen, 2001). More and more, it is becoming evident that graduates entering the workplace after high school need to be exposed to similar curriculum and expectations as those entering postsecondary institutions so that they are successful and enjoy a higher quality of life than less prepared high school graduates (ACT, 2005b; Barth, 2003; Cohen, 2001). Despite this need, many high school graduates lack the preparation necessary for college as well as the skill necessary to succeed in the workplace

(Barth, 2003; Cohen, 2001). One of the problems leading to the lack of preparation, is that while high schools offer the courses providing adequate preparation for postsecondary work and continuing studies, these courses are not required to graduate from high school. As a result, between 30% to 50% of students attending a postsecondary institution after high school did not take these courses (Barth, 2003). According to Barth, failure to expose students who are not college bound to foundations that prepare them for postsecondary training and learning is closing the door to future opportunities. High school graduates might not immediately want to pursue additional education and training, but as circumstances change and they want to better their lives, the opportunities would be non-existent without strong foundational knowledge and skills. How high school preparation is measured is also important because many postsecondary institutions use both nationally normed tests such as the ACT or SAT for admission and scholarship determination in addition to high school data such as transcript of coursework, grade point average, and class ranking. Carnevale and Desrochers (2002) argued that there was a missing link between secondary school preparation and what was needed to successfully complete postsecondary education and enter the workforce. They found that this gap began in high school. High school students preparing for college are taught disconnected academic subjects without an understanding of the relevance and importance or the connections to postsecondary education and employment. Students preparing for the work force are not exposed to the academic background necessary to complete postsecondary education and training thereby closing the door to future opportunities. Carnevale and Desrochers argued that there is a disconnect between secondary and postsecondary education that negatively impacts students in their transition from secondary school to postsecondary institutions or employment.

Recommended Areas of Improvement for High Schools. Finding out what high school administrators, counselors and teachers can do to better prepare students to complete a bachelor's degree is important foremost for students. The benefits do not stop there, however. Society as a whole, secondary and postsecondary education institutions benefit as well. Below are several areas that secondary institutions can improve upon as discussed in the literature.

Barth (2003) found that while almost 80% of high school students expressed that they wanted to attend a postsecondary institution after graduating from high school, high school teachers thought that only about 50% of the students planned on continuing their studies. Barth argued that there is a lack of communication to high school students and their parents about the preparation necessary to be successful at the postsecondary level, resulting in students relying on the high school diploma requirements as adequate preparation for postsecondary work. Barth (2003) and Venezia et al. (2003) make the point that parents do not have a clear understanding about the preparation needed to be successful in postsecondary institutions. Parents and students mistakenly assume that graduating from high school equates to being ready for postsecondary studies which is not always the case. High school teachers and counselors need to communicate better with parents and students to inform them of the difference between high school graduation requirements and college readiness. Trusty and Niles (2004) found that counselors have a crucial role of helping individual students determine and plan for further education or career paths. ACT (2008b) found that students who took both the PLAN® test in 10th grade and the ACT® test in 11th and 12th grades have a high probability of enrolling in a higher education institution (ACT, 2008b).

According to ACT (2005a; 2005b; 2008b; 2017a; 2019), the more rigorous the curriculum all students are exposed to, the higher their achievement on the ACT test, which

reflects their preparation for postsecondary expectations. ACT (2008b) also found that when students take a more rigorous path, the gender and racial gaps for enrollment and success at higher education institution are greatly reduced. ACT (2019) recommends a sequence of courses that best prepares students for college level curriculum and leads to higher ACT subscores and composite scores. The courses identified by ACT (2005a, 2005b) are: 9th, 10th, 11th and 12th grade English, Algebra 1, Geometry, Algebra 2 and at least one more math above the Algebra 2 level, Biology, Chemistry, Physics. Learning at least one foreign language and taking upper-level math and science courses also benefit postsecondary preparation and result in higher ACT scores (ACT, 2005a, 2005b). Taking Biology, Chemistry, Physics, and mathematics courses beyond the Algebra 2 level give students the needed preparation to transition to postsecondary coursework without needing to take remedial courses (ACT, 2005b). Getting students to take a college preparatory course sequence while in high school is important. However, it is equally important to examine the rigor of those courses. Even if students take these courses, the variation in rigor from one school to another and even one teacher to another cause the outcomes in terms of college readiness to greatly vary (ACT, 2005b; Adelman, 1999). The quality and rigor of high school coursework directly affects college success (Adelman, 1999; Barth, 2003). Adelman (1999) found that high school students who completed at least one math beyond the Algebra 2 level had a much better odds of earning a bachelor's degree. The American curriculum is too broad and disconnected compared to other countries scoring better than the United States on the worldwide Trends in International Mathematics and Science Study (TIMSS) assessment (ACT, 2005a; Schmidt et al., 2002; Schmidt, 2005). Other countries like Japan and Germany teach fewer topics but teach these more in depth allowing for a thorough understanding of the most important topics rather than a shallow familiarity of important and less important topics alike as

is the norm in the United States (Schmidt et al., 2002; Schmidt, 2005). Barth (2003) also argued that in the United States, there is a tendency to not believe that all students can master more rigorous coursework. This is another reason why not all students take a rigorous set of courses that would prepare them for postsecondary work. Research shows that this belief is flawed: low achieving students perform better in higher level courses than they do in lower level courses.

The transition from secondary to postsecondary has been found to be difficult due to the disconnect between what students learn in high school and what postsecondary institutions expect students to know (ACT, 2019; Barth, 2003; Stewart, 2012; Venezia et al., 2003). Trusty and Niles (2008) recommended collaboration between high school and college counselors in order to help students prepare adequately for their chosen paths. Radford and Ifill (2016) found that secondary school counselors have influence on high school students' postsecondary plans, and it is important that counselors work with students and their parents on postsecondary plans, especially at-risk students such as underrepresented students and first-generation college-going students. There is a need for alignment between what is taught in high school and what is required for admission to postsecondary institutions and for program completion (ACT, 2008b; Barth, 2003; Carey, 2005; Cohen, 2001; Venezia et al., 2003).

There is also a need to increase rigor at the high school level (Cohen, 2001). According to Greene (2000), basic study skills and expectations are lacking in K-12 schools. The expectations can be set at an adequate level meant to prepare students for postsecondary studies, but if students are not held to those expectations, they will not learn what is needed. According to Greene, postsecondary professors list the following complaints about high school education: high schools do not prepare students to handle homework, high schools have lax standards, and high school inflate grades. Kalenkoski and Pabilonia (2014) studied the effects of homework and

whether it increases academic achievement at the high school level. They concluded that homework for boys does have a significant effect on HSGPA and on the likeliness of students going on to college by age 20. Yet many high schools do not impart basic study skills to their students, such as homework completion (Greene, 2000). According to the U.S. Department of Education (2009), high school students completing a rigorous curriculum showed to be proficient on fundamental knowledge and skills based on their results on the National Assessment of Educational Progress (NAEP), whereas students who completed a midlevel or below curriculum showed only partial mastery of fundamental knowledge and skills. The U.S. Department of Education found that the percentage of students completing Algebra 2 increased almost 25% from 1990 to 2009 to 76%. While this is a positive change in terms of rigor, for students to be adequately prepared for postsecondary work or workforce expectations, they need to complete at least Pre-calculus to complete a rigorous curriculum in math. The U.S. Department of Education (2009) found that a portion of students who completed a midlevel to rigorous curriculum completed credits during the summer, presumably additional credits and not remedial credits. In 2009, 64% of students who completed a rigorous curriculum completed Algebra 1 while in middle school. Allowing students to complete high school courses such as Algebra 1, Geometry, Biology, and foreign languages, while in middle school is an option for increasing the rigor of the high school curriculum (U.S. Department of Education, 2009). In 2005, over half of secondary schools also provided access to online course options, giving students access to options that could increase the rigor of the curriculum offered at the school (U.S. Department of Education, 2009). Radford and Ifill (2016) found that offering dual-enrollment and Advanced Placement (AP) course options is related to the rate of student going on to college after high school. While offering a more rigorous curriculum is important, ensuring appropriate supports

for populations of students who are normally found to be less successful is also an area that high schools need to strengthen. According to the U.S. Department of Education (2009) in 2009, 8% of high school graduates were students with disabilities who qualified for an Individualized Education Plan (IEP) or 504 plan who were not in the gifted category. About half completed a standard curriculum with a small portion completing a midlevel curriculum, but the other half completed a curriculum that was below standard.

Predictors of College Success

The ACT test and GPA calculations have been around for many years. There have been many studies completed examining the results of standardized college placement tests and high school data among other factors to determine what factors affect student degree completion and which can be used as predictors. First of all, it is important to note that college success has been measured differently from one researcher to another. The following indicators of college success were in the cited literature:

- College GPA at the end of the first year (Allen et al., 2008; Kuh et al., 2008; Noble & Sawyer, 2002; Syverson et al., 2018).
- College success at end of first year including criteria such as number of credits completed and college GPA (Radunzel & Noble, 2012).
- College GPA at the end of the fourth year (Geiser & Santelices, 2007).
- Cumulative college GPA (Radunzel & Noble, 2012; Syverson et al., 2018).
- Graduation in four years (Geiser & Santelices, 2007; Pike et al., 2014).
- Graduation in five years (Pike et al., 2014).

- Graduation in six years (French et al., 2015; Radunzel, 2012; Pike et al., 2014; Radunzel & Noble, 2012).
- Graduation rates (Syverson et al., 2018).
- Retention of students to the second year of college (Kuh et al., 2008).
- Retention of student to the third year of college (Allen et al., 2008).
- Student transfer and dropout behaviors (Allen et al. 2008; Radunzel, 2012).
- And performance in college English and math courses (Hodara & Lewis, 2017).

It was evident that there was not consensus among researchers as to the definition of college success.

It was also evident from the literature that not all researchers came to the same conclusion on what constituted the best predictor of postsecondary success. Most of the variation came from the different ways of defining “college success.” Overwhelmingly studies found that HSGPA is the best predictor of college success. Noble and Sawyer (2002) completed a study of ACT scores and HSGPA and compared them to the college GPA of students after one year of college. They used data from two years, 1996 and 1997, and included almost 220,000 participants. The results showed that HSGPA was a better predictor of obtaining a first-year college GPA of 2.5 or 3.0 than ACT Composite scores, but for obtaining a first-year college GPA above 3.0, ACT Composite was a better predictor. A HSGPA below 3.0 was not accurate in predicting first-year college GPA. Noble and Sawyer found that predictions based on both the ACT Composite and the HSGPA were more accurate than either one alone. It is important to note that the HSGPA for this research was calculated using student self-reported grades when completing the demographic portion of the ACT before testing and may not be completely accurate.

Geiser and Santelices (2007) studied almost 80,000 entering freshmen into the University of California (UC) system and examined the predictive validity of the SAT and HSGPA. They found that the SAT was more correlated to student socioeconomic status than HSGPA. They also argued that proponents of using the SAT are the College Board, owner of the SAT, and other testing agencies. Their findings showed that HSGPA was consistently the best predictor by itself of fourth-year cumulative college GPA and when looking at individual institutions in the UC system or chosen majors. When looking at college GPA by each year independent from the other years, however, the HSGPA lost its predictive ability with each additional college year. Surprisingly, when looking at a cumulative college GPA, Geiser and Santelices found that HSGPA had the best predictive ability. They also found that using HSGPA in combination with SAT scores provided a more accurate prediction of fourth-year college GPA. Examining graduation rates in four years, Geiser and Santelices yet again found that HSGPA had the best predictive ability of predicting degree attainment in four years, and again using HSGPA in combination with SAT improved predictions.

Geiser and Santelices (2007) cautioned that the predictive ability of high school data was limited to explaining 30% of the variance in fourth-year college GPA. When looking at student admission, Geiser and Santelices did argue that using HSGPA was less likely to adversely impact students than using standardized scores which have a documented bias against students from lower socioeconomic backgrounds. Kuh et al. (2008) had similar findings to Geiser and Santelices (2007), with the exception that they found the predictive ability of pre-college academic achievement declined with each additional year in college. Kuh et al. studied almost 6,200 students from 18 four-year bachelor granting institutions. They examined student background, self-reported pre-college academic achievement collected during ACT or SAT

registration, student responses on the National Survey of Student Engagement (NSSE) given in 2000 and 2003, and student academic and financial aid information collected by colleges. The findings showed that pre-college experiences and academic achievement accounted for 29% of the variance for first-year college grades. After the first year, however, pre-college experiences and academic achievement were still statistically significant, but they lost some of their predictive validity as other factors such as study habits and engagement affected student success. It is important to note that pre-college academic achievement was represented by ACT and SAT scores for the purpose of this study.

Allen et al. (2008) conducted a study with approximately 8,500 participants who were entering freshmen at 48 four-year institutions across 25 states in the Midwest and southeast. They looked at the differences between students who stayed at their original institutions, students who transferred to another institution, and students who dropped out of college. Allen et al. found that ACT scores and HSGPA were highly intercorrelated with first-year college GPA. Pre-college education and academic performance had the highest effect on first-year college GPA and that it also had an indirect contribution to students staying through their third year or dropping out. Radunzel (2012) also completed a study of HSGPA and ACT Composite scores and their relationship to students staying, transferring, or dropping out. She found that the average HSGPA (3.59) and ACT Composite score (24.5) of students who complete a bachelor's degree within four years is higher than students who took longer to complete (3.39 average HSGPA; 22.3 average ACT Composite score). Radunzel also found that the average ACT Composite of students who stayed at their original institution or transferred to another four-year institution was almost 2 points higher than the average ACT Composite score of students who

dropped out or transferred to a two-year institution. The difference in average HSGPA was 0.15 points.

Radunzel and Noble (2012) had similar findings from Allen et al. (2008) and Radunzel (2012). Radunzel and Noble (2012) found that both the HSGPA and ACT Composite scores were predictors of college success. Using data from close to 125,000 students who enrolled in 61 four-year institutions between 2000 and 2006, they examined the predictive properties of ACT Composite scores and HSGPA against first-year college GPA, year-to-year progress measured by credits earned, degree attainment within six years, and cumulative college GPA at completion. The results indicated that HSGPA and ACT Composite scores were both direct predictors of first-year college GPA, but subsequent college success was more reliant on first-year college GPA than pre-college data. HSGPA did have a small but significant direct effect on bachelor's degree attainment. First-year college GPA was found to have the largest effect on bachelor's degree attainment. It is important to note that HSGPA data for this study came from student self-reported high school grades on the demographic questions of the ACT registration rather than provided by secondary or postsecondary institutions and may not be completely accurate.

Pike et al. (2014) used data from about 4,000 students enrolled in 2004-2005 at one four-year university in the Midwest to examine the relationship between bachelor's degree attainment in four, five, and six years, against several demographic factors, but also including preparation factors such as standardized test scores (SAT), high school percentile rank, intensity of high school coursework and comprehension of reading material at the high school level. They found that high school percentile rank and comprehension of high school reading material were significantly related to graduating in four, five, and six years. SAT scores and intensity of high

school coursework were significantly related to graduating in four and five years, but not six years. Although there were differences in the regression coefficient indicating to which degree factors were related to bachelor's degree attainment, Pike et al. did not weight one factor as being more important than another.

French et al. (2015) studied the relationship between HSGPA, educational attainment and subsequent earnings using data from almost 21,000 students from 80 high schools and middle schools. This was a longitudinal study started in 1994 and completed in 2009. The HSGPA data was collected from high school records instead of from self-reported student data, which made the data in this study more accurate than other studies relying on student self-reported grades. French et al. found that HSGPA had a positive and significant relationship with not just bachelor's degree attainment, but also higher levels of education attainment up to and including doctorate level studies for both men and women. French et al. estimated that an increase of one point on the HSGPA increased the likelihood for men and women to complete a bachelor's from 21% to 42%. The results also showed a significant relationship between annual earning and HSGPA for both men and women. French et al. calculated that an increase in one point on the HSGPA resulted in a salary increase of 11.85% for men and 13.77% for women. In addition to the effects of HSGPA, French et al. also found significant gaps between men and woman as well as between racial subgroups.

Syverson et al. (2018) found two different kinds of results based on the populations examined. They studied first-year and cumulative college GPA and college graduation rates using application records from almost one million applicants to participating institution with test-optional policies. One quarter of the applicants studied chose to opt out of submitting standardized test scores. The results showed that applicants without test scores were admitted at

lower rates than those who submitted test scores. Their HSGPA and first-year college GPA were lower than applicants who submitted test scores, but they were more likely to enroll after being admitted, and they had the same or slightly higher college graduation rates than applicants who did not submit standardized test scores. Syverson et al. also found that the HSGPA of students who did not submit standardized test scores when they applied was more predictive of their college cumulative GPA and probability of graduation than their standardized test scores. They found that standardized test scores and family socio-economic background are highly correlated and concluded that for some students, standardized test-scores provide negative and false predictive information. Among students who submitted standardized test scores with their college application, test scores were found to have a stronger correlation with college GPA. Another interesting finding from the study is that students who did not submit standardized test scores were found to need more resources to support them during their studies which required a financial commitment from the postsecondary institution.

Hodara and Lewis (2017) also found different results with a different population. Hodara and Lewis examined the predictability of success in college English and math courses based on standardized admission test scores and HSGPA. They used data from students who enrolled at the University of Alaska between 2008 and 2012. Students who enrolled immediately after graduating from high school were separated from the ones who waited at least one year to enroll. For students who enrolled at the university the fall after they graduated from high school, the results overwhelmingly showed that HSGPA was the best predictor of success in English and math college courses. For students who delayed enrollment by at least one year, their HSGPA was the best predictor of success in their English courses with the exception of the students who took the ACCUPLACER admission test. ACCUPLACER results showed to have almost the

same predictability as HSGPA. ACT and ACCUPLACER were better predictors for success in math courses, and SAT scores showed to have almost the same predictability as HSGPA.

Based on the overwhelming amount of studies concluding that HSGPA was a predictor of college success, it can be implied that pre-college academic preparation affected college success. Three of the studies cited explicitly mentioned the importance of secondary preparation. Allen et al. (2008) concluded from their study that high school preparation had a significant impact on college success and that it affected whether students stay at one postsecondary institution (thereby increasing their probability of completing a degree), transferred institutions, or dropped out. They recommended that academic preparation be a priority for secondary schools, such as providing access to rigorous coursework, and teaching of academic self-discipline and commitment to education. Pike et al. (2014) made the argument that their research demonstrated the importance of pre-college academic preparation and its effects on college graduation rates. They recommended that secondary and postsecondary schools work together to better align secondary preparation with postsecondary expectations to provide access to a rigorous curriculum and get students to understand the impact of academic excellence at the secondary school level. They also advocated for programs designed to improve student success and mitigate risk factors such as being a first-generation student or an underrepresented minority student. Hodara and Lewis (2017) discussed the possibility of identifying a HSGPA benchmark of college success, suggesting that secondary schools provide supports for students who fall below that benchmark point. Hodara and Lewis also argued that postsecondary course placement could be decided based on HSGPA.

Chapter Summary

Research shows that the purpose of high school is to adequately prepare all students for postsecondary educational opportunities as well as to enter the workforce (ACT, 2005b; Barth, 2003; Cohen, 2001). Research also shows that the preparation required for both has actually become the same (ACT, 2005b; Barth, 2003; Cohen, 2001). Even though this is the purpose of high school, unfortunately many students have been found to graduate from high school without the necessary preparation to be successful at the postsecondary level (Barth, 2003; Cohen, 2001). There are several areas as discussed in the literature where high schools can improve student postsecondary preparation. Two major high school data points are the ACT scores and the cumulative HSGPA. Both of these are explained in this chapter and are instrumental for high school graduates' postsecondary planning. Student ACT scores and cumulative HSGPA are used for postsecondary admission determination as described in this chapter because of their documented reliability in predicting success at the postsecondary level. ACT scores are also used to determine placement in learning support courses or prerequisite courses by some postsecondary institutions as described by the examples in this chapter. Merit-based scholarships offered by the state of Tennessee as well as by various institutions use ACT scores, or cumulative HSGPA, or both, to determine eligibility. Student ACT scores are also used by the state of Tennessee for secondary school accountability (Tennessee Department of Education, 2018b).

As has been evident in the literature, many factors affect students' success at postsecondary institutions and there are many studies that examine college success. The indicators of college success vary from study to study, which makes it difficult to pinpoint one particular factor over another. Year-to-year retention, college GPA at various points, and bachelor's degree attainment in a set amount of time (4-years, 5-years or 6-years) have been

examined by many researchers using smaller or larger groups of participants at one or multiple institutions. Overall, the literature does indicate that HSGPA has the best predictive ability of college success, indicating that secondary preparation plays an important role for students' postsecondary success.

Chapter 3. Methodology

High school administrators only have a few measures to evaluate student preparedness for college: college entrance exams and student cumulative grade point average. The goal of attending college is to complete a degree, which leads to higher wages and quality of life (Barth, 2003; Cary, 2005; Mayhew et al., 2016). For society investing in education has a lesser cost than dealing with the negative consequences of having a large population of uneducated citizens (Greene, 2000). Moreover, everyday life requires a higher education level to effectively navigate it, and the preparation needed to successfully complete a postsecondary degree is the same that one needs to successfully transition into the workplace after high school (Barth, 2003). Education is also the equalizer between people of different ethnic backgrounds (Barth, 2003; Finn et al., 2015). The preparation students receive in high school is an important factor in postsecondary success (Carnevale & Desrochers, 2002). The purpose of this study is to see if the college preparedness measures that are available to high school administrators and counselors (ACT and HSGPA) can also be used as a measure to determine if students are prepared to complete college, not just begin college.

An ex post facto correlational design quantitative study was used to establish if there is a significant difference in the ACT scores and unweighted high school grade point average of students who have earned a bachelor's degree vs. the scores of students who have not earned a bachelor's degree. For the purpose of this study, the highest ACT Composite and highest subscores as well as the cumulative unweighted grade point average were used for each participant.

Research Questions and Corresponding Null Hypotheses

An independent-sample *t* test was chosen for research questions 1 through 6. According to Green and Salkind (2011), “with an independent-samples *t* test, each case must have scores on two variables, the grouping variable and the test variable” (p.175). In the case of this study, the grouping variable is whether or not students earned a bachelor’s degree, and the test variable is their ACT Composite score (0-36), ACT Math score (0-36), ACT Science score (0-36), ACT Reading score (0-36), ACT English score (0-36), and their cumulative unweighted HSGPA (0-4).

RQ1: Is there a significant difference in the ACT Composite scores between students who completed a bachelor’s degree within 6 years of starting college and students who did not complete a bachelor’s degree within 6 years of starting college?

H₀₁: There is no significant difference in the ACT Composite scores between students who completed a bachelor’s degree within 6 years of starting college and students who did not complete a bachelor’s degree within 6 years of starting college.

RQ2: Is there a significant difference in the ACT Math subscores between students who completed a bachelor’s degree within 6 years of starting college and students who did not complete a bachelor’s degree within 6 years of starting college?

H₀₂: There is no significant difference in the ACT Math subscores between students who completed a bachelor’s degree within 6 years of starting college and students who did not complete a bachelor’s degree within 6 years of starting college.

RQ3: Is there a significant difference in the ACT Reading subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college?

H₀₃: There is no significant difference in the ACT Reading subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college.

RQ4: Is there a significant difference in the ACT English subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college?

H₀₄: There is no significant difference in the ACT English subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college.

RQ5: Is there a significant difference in the ACT Science subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college?

H₀₅: There is no significant difference in the ACT Science subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college.

RQ6: Is there a significant difference in the final unweighted cumulative HSGPA between students who completed a bachelor's degree within 6 years of starting

college and students who did not complete a bachelor's degree within 6 years of starting college?

H₀₆: There is no significant difference in the final unweighted cumulative HSGPA between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college.

Population

Participants in this study included students who have graduated from a small high school in east Tennessee. First of all, this high school is a school of choice, meaning that parents and students choose to attend this school instead of their assigned school. Students go through a lottery selection process due to limited space. Transportation at this school is not provided, so in choosing for their children to attend this high school, parents commit to providing transportation to and from school which inevitably prevented those students dependent on school-provided transportation from attending the school. Additionally, the population of this high school has had a lower percentage of students who were economically disadvantaged. For the 2012-2013 school year, the school's student population was 13.9% economically disadvantaged, while the 4 nearest high schools in the area had economically disadvantaged school populations of 36.7%, 51.9%, 36.7%, and 40% (Tennessee Department of Education, n.d.). The socioeconomic background of students was not taken into consideration in this research.

The number of students in a graduation cohort has varied from 50 to 70 students over the years. At this high school, students can earn six credits every year for a total of 24 credits in 4 years. Students who take online classes or dual-enrollment classes may earn more credits than 24. The online and dual-enrollment options have become more popular in the last 5 years and

would not affect the participants of the study since the last cohort considered is the 2013 graduating class. At this school, the classes that are offered are academic and there are not any career technical options. Students who only take classes that are offered at this school complete their graduation requirement by earning 4 credits of math (Algebra 1, Geometry, Algebra 2, and either Pre-Calculus or Advanced Algebra & Trigonometry), 4 credits of science (Biology, Physical Science, Chemistry, and an advanced science beyond Chemistry), 4 credits of English (English 9, 10, 11 and 12), 3.5 credits of social studies (World History, U.S. History, and a half credit each of U.S. Government, Economics, and Personal Finance), 2 credits of a foreign language, either Spanish, French, or German, 1 credit of a fine arts class, 1.5 credits of physical activity and health (Wellness and a PE course), and 1 credit of Technology. That is a total of 20 credits, leaving room for 4 classes that the students can choose, but 3 of which need to follow a focused elective series as required by the Tennessee graduation requirements (Tennessee State Board of Education, 2017). The elective offerings at this school are either arts, literature, social studies, advanced foreign language, advanced technology, or physical activity courses. With only 4 credits that are not prescribed and a limited choice of classes, students do not have many options to explore career and interests.

Participants are students who graduated from this high school, beginning with the graduation cohort of May 2005 and ending with the high school graduation cohort of May 2013. The school in this study had graduation cohorts of about 60 students on average, resulting in a total of about 540 participants in the study. For each participant, the following data were available: cumulative unweighted HSGPA, highest ACT Composite score, highest ACT Math subscore, highest ACT Science subscore, highest ACT English subscore, highest ACT Reading subscore, and postsecondary bachelor's degree completion at postsecondary institutions in the

United States. For the students where there were multiple ACT scores, the highest score in each category was used. The participants were grouped into one of two categories:

1. Student who did not complete a bachelor's degree from a postsecondary institution in the United States.
2. Students who completed a bachelor's degree from a postsecondary institution in the United States.

For the purpose of this study, participants who are counted in the category of having earned a bachelor's degree must have done so within 6 years of beginning their studies at a postsecondary institution. Six years is a commonly accepted maximum length of time for students to complete a bachelor's degree from the time they began and is one of the criteria used by the Tennessee Higher Education Commission when determining institutional success and funding since the passage of the Complete College Tennessee ACT of 2010 (Tennessee Higher Education Commission, n.d. a).

Instrumentation

Students' cumulative unweighted HSGPA, ACT Composite score, ACT Math subscore, ACT Science subscore, ACT English subscore, ACT Reading subscore were used in this study to determine if there was a significant difference between students who graduated with a bachelor's degree and students who did not graduate with a bachelor's degree. For students who took the ACT more than once, only the highest scores were used for the purpose of this study.

Data Collection

Administrators of the college preparatory high school in east Tennessee provided the data for analysis after the dissertation committee and the East Tennessee State University Institutional

Review Board (IRB) approved the research. Administrators from the high school under study collected this data for informational purposes. The intent for collecting the data was to establish how successful the high school was in preparing students to be successful at the postsecondary level, as measured by attainment of a bachelor's degree. Personnel at the high school removed all personal identifiers from the data before it was made available to the researcher. The researcher created a dataset in SPSS with the data received from the administrators of the school. In all, 545 students had HSGPA data, and 525 of those had ACT data.

Data Analysis

The researcher used a series of independent t tests to test for significant differences in ACT Composite and subscores and in cumulative unweighted HSGPA between students who graduated with a bachelor's degree within six years of beginning postsecondary studies and students who did not graduate with a bachelor's degree within that timeframe.

Chapter Summary

In order to explore the relationship between students completing a bachelor's degree within six years and their cumulative unweighted HSGPA and ACT scores, an ex post facto study was designed. The cumulative unweighted HSGPA and ACT scores were chosen as the focus for this study because these are the measures available to high school counselors, teachers and administrators to determine student readiness for postsecondary institutions' expectations.

The study population included high school graduates from a small college preparatory high school in east Tennessee beginning with the 2005 graduation cohort and ending with the 2013 graduation cohort. Independent t-tests were used to investigate the relationship between

participants' ACT scores (composite and subscores) as well as their cumulative unweighted HSGPA and whether or not they completed a bachelor's degree within a 6-year period of time.

Chapter 4. Findings

An ex post facto quantitative study was used to establish if there was a significant difference in the ACT scores and unweighted high school grade point average of students who have earned a bachelor's degree within 6 years of starting college vs. the scores of students who have not earned a bachelor's degree within 6 years of starting college. For the purpose of this study, the highest ACT Composite and highest subscores as well as the cumulative unweighted grade point average were used for each participant. Since the ACT was not required for high school students to graduate in Tennessee before 2008, there were 20 students who graduated between 2005 and 2007 who did not have ACT scores. This resulted in 20 fewer participants for the research questions involving ACT scores and subscores than the question involving HSGPA. In all, there were 547 students who graduated between 2005 and 2013 who had HSGPA data. Of those 547 high school graduates, 329 completed a bachelor's degree within 6 years of starting college, which is a bachelor's degree attainment rate of 60% for students who graduated from this high school between 2005 and 2013.

Research Question 1

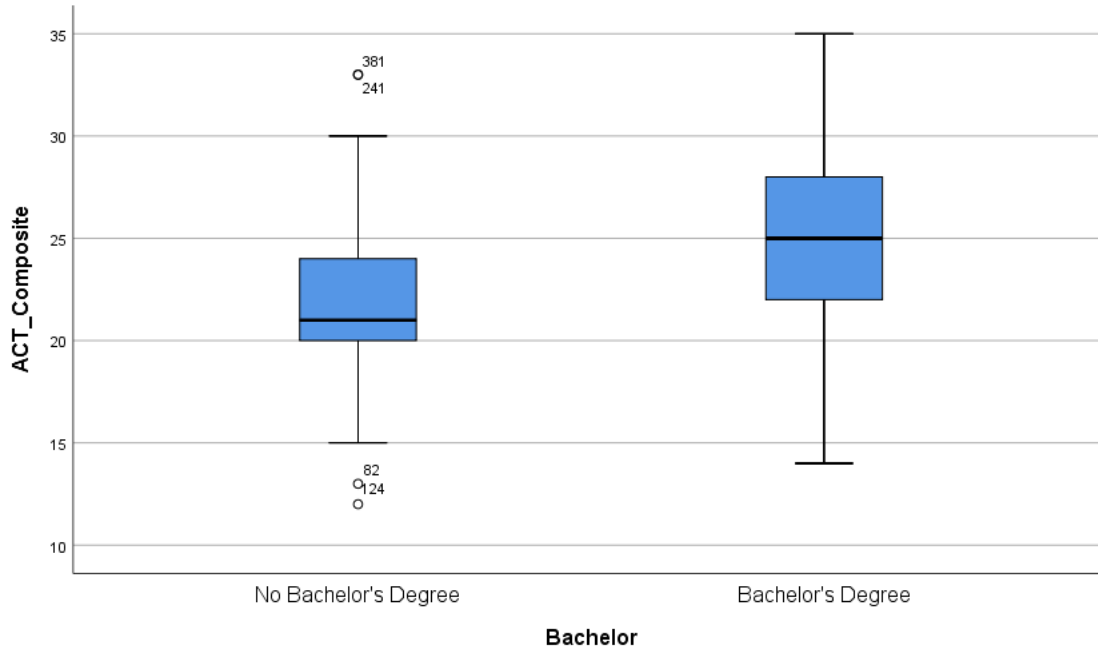
RQ1: Is there a significant difference in the ACT Composite scores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree?

H₀1: There is no significant difference in the ACT Composite scores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree.

An independent sample *t*-test was conducted to evaluate whether the mean ACT Composite score differs significantly between students who completed a bachelor's degree within 6 years of starting college and students who did not completed a bachelor's degree within 6 years of starting college. The grouping variable was the completion of a bachelor's degree within 6 years of starting college and the test variable was the ACT Composite score. The test was significant, $t(525) = 9.051$, $p < .001$. Therefore, the null hypothesis was rejected. Participants who completed a bachelor's degree within 6 years of starting college ($M = 25.03$, $SD = 4.181$) tended to have significantly higher ACT Composite scores than those who did not complete a bachelor's degree within 6 years of starting college ($M = 21.84$, $SD = 3.537$). The 95% confidence interval for the difference in means ranged from 2.497 to 3.881. Cohen's *d* test for effect size was 0.82, which indicated a large effect size. Figure 1 shows the distribution for ACT Composite scores for students who attained a bachelor's degree within 6 years of starting college and for students who did not attain a bachelor's degree within 6 years of starting college.

Figure 1

ACT Composite Scores Distribution Between the Two Groups



Research Question 2

RQ2: Is there a significant difference in the ACT Math subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree?

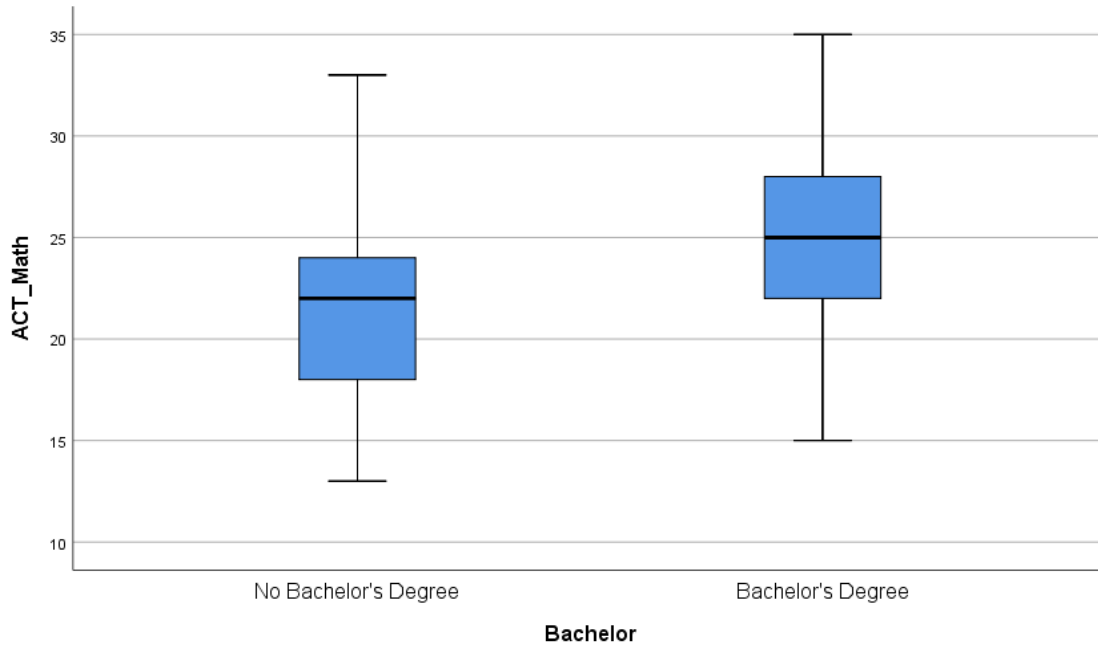
H₀2: There is no significant difference in the ACT Math subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college.

An independent sample *t*-test was conducted to evaluate whether the mean ACT Math score differs significantly between students who completed a bachelor's degree within 6 years of starting college and students who did not completed a bachelor's degree within 6 years of

starting college. The grouping variable was the completion of a bachelor's degree within 6 years of starting college and the test variable was the ACT Math score. The test was significant, $t(525) = 8.352$, $p < .001$. Therefore, the null hypothesis was rejected. Participants who completed a bachelor's degree within 6 years of starting college ($M = 24.78$, $SD = 4.432$) tended to have significantly higher ACT Math scores than those who did not complete a bachelor's degree within 6 years of starting college ($M = 21.66$, $SD = 3.744$). The 95% confidence interval for the difference in means ranged from 2.385 to 3.851. Cohen's d test for effect size was 0.76, which indicated a medium effect size. Figure 2 shows the distribution for ACT Math scores for students who attained a bachelor's degree within 6 years of starting college and for students who did not attain a bachelor's degree within 6 years of starting college.

Figure 2

ACT Math Scores Distribution Between the Two Groups



Research Question 3

RQ3: Is there a significant difference in the ACT Reading subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree?

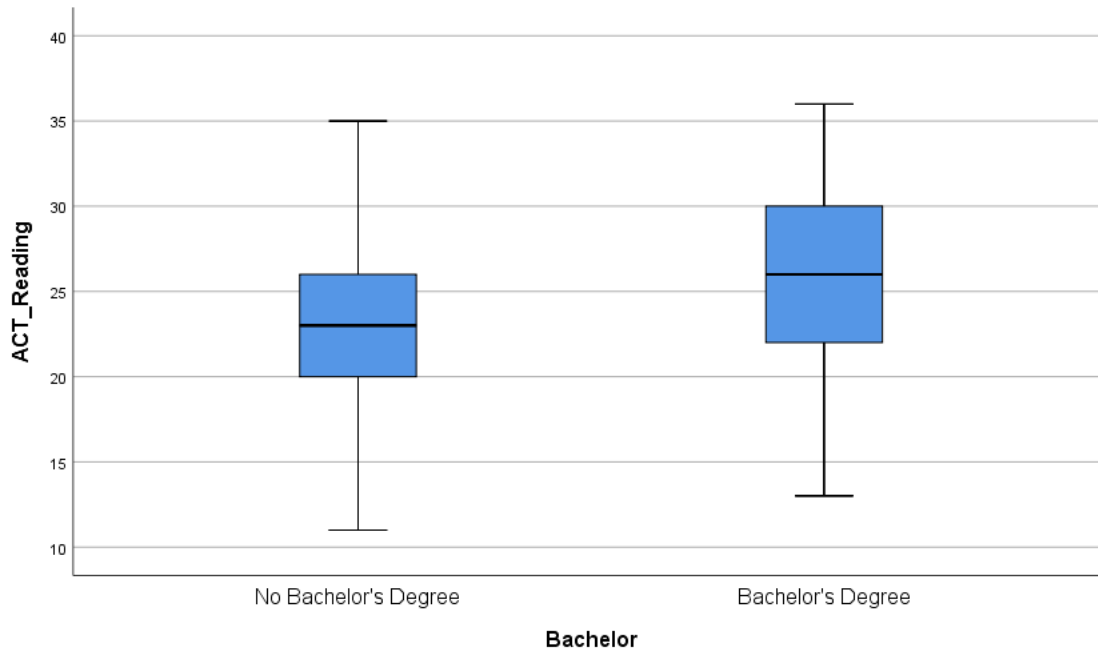
H₀₃: There is no significant difference in the ACT Reading subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree within 6 years of starting college.

An independent sample *t*-test was conducted to evaluate whether the mean ACT Reading score differs significantly between students who completed a bachelor's degree within 6 years of

starting college and students who did not completed a bachelor's degree within 6 years of starting college. The grouping variable was the completion of a bachelor's degree within 6 years of starting college and the test variable was the ACT Reading score. The test was significant, $t(525) = 7.329, p < .001$. Therefore, the null hypothesis was rejected. Participants who completed a bachelor's degree within 6 years of starting college ($M = 26.11, SD = 5.165$) tended to have significantly higher ACT Reading scores than those who did not complete a bachelor's degree within 6 years of starting college ($M = 22.80, SD = 4.858$). The 95% confidence interval for the difference in means ranged from 2.420 to 4.192. Cohen's d test for effect size was 0.66, which indicated a medium effect size. Figure 3 shows the distribution for ACT Reading scores for students who attained a bachelor's degree within 6 years of starting college and for students who did not attain a bachelor's degree within 6 years of starting college.

Figure 3

ACT Reading Scores Distribution Between the Two Groups



Research Question 4

RQ4: Is there a significant difference in the ACT English subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree?

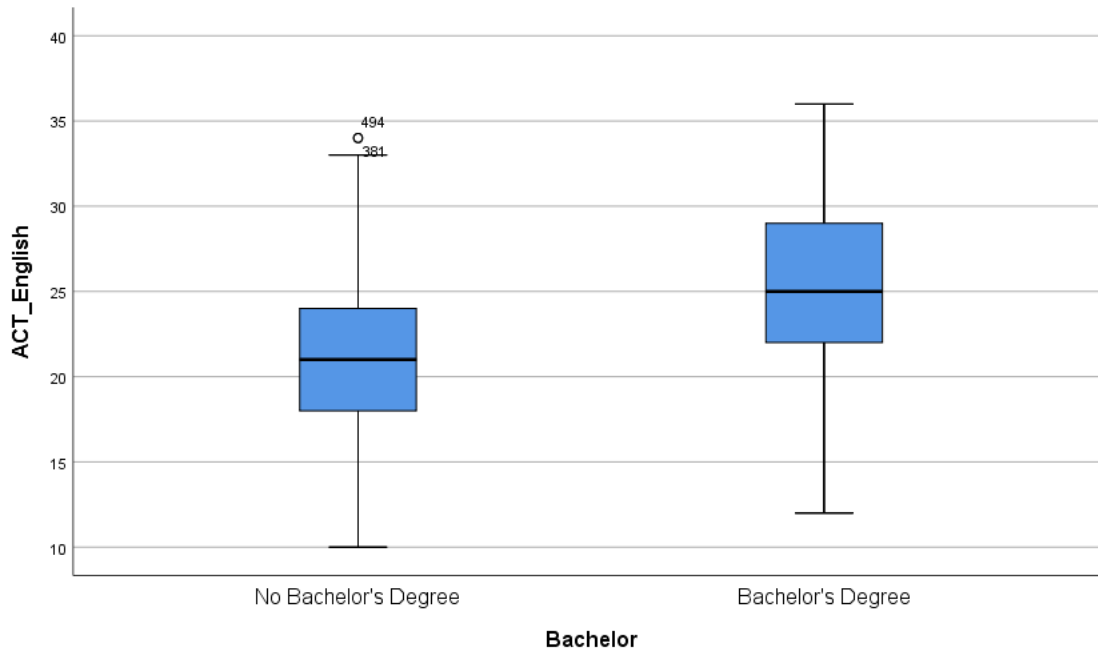
H₀4: There is no significant difference in the ACT English subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree?

An independent sample *t*-test was conducted to evaluate whether the mean ACT English score differs significantly between students who completed a bachelor's degree within 6 years of starting college and students who did not completed a bachelor's degree within 6 years of

starting college. The grouping variable was the completion of a bachelor's degree within 6 years of starting college and the test variable was the ACT English score. The test was significant, $t(525) = 8.791, p < .001$. Therefore, the null hypothesis was rejected. Participants who completed a bachelor's degree within 6 years of starting college ($M = 25.44, SD = 4.901$) tended to have significantly higher ACT English scores than those who did not complete a bachelor's degree within 6 years of starting college ($M = 21.63, SD = 4.775$). The 95% confidence interval for the difference in means ranged from 2.960 to 4.664. Cohen's d test for effect size was 0.79, which indicated a large effect size. Figure 4 shows the distribution for ACT English scores for students who attained a bachelor's degree within 6 years of starting college and for students who did not attain a bachelor's degree within 6 years of starting college.

Figure 4

ACT English Scores Distribution Between the Two Groups



Research Question 5

RQ5: Is there a significant difference in the ACT Science subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree?

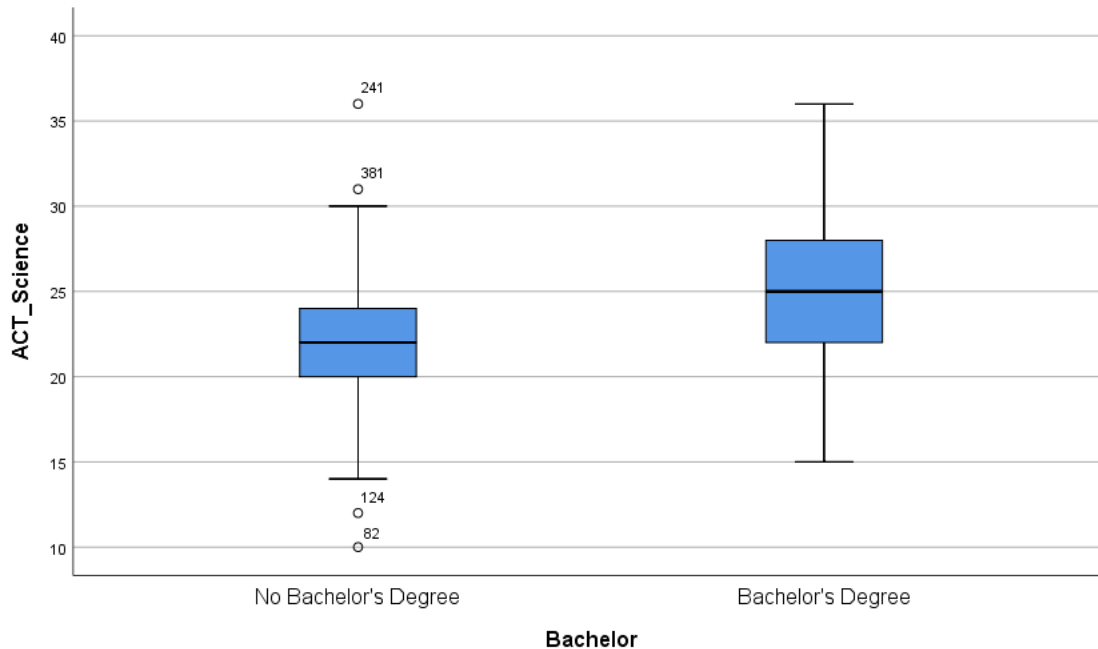
H₀5: There is no significant difference in the ACT Science subscores between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree.

An independent sample *t*-test was conducted to evaluate whether the mean ACT Science score differs significantly between students who completed a bachelor's degree within 6 years of starting college and students who did not completed a bachelor's degree within 6 years of

starting college. The grouping variable was the completion of a bachelor's degree within 6 years of starting college and the test variable was the ACT Science score. The test was significant, $t(525) = 8.697, p < .001$. Therefore, the null hypothesis was rejected. Participants who completed a bachelor's degree within 6 years of starting college ($M = 24.95, SD = 4.240$) tended to have significantly higher ACT Science scores than those who did not complete a bachelor's degree within 6 years of starting college ($M = 21.87, SD = 3.481$). The 95% confidence interval for the difference in means ranged from 2.383 to 3.774. Cohen's d test for effect size was 0.79, which indicated a large effect size. Figure 5 shows the distribution for ACT Science scores for students who attained a bachelor's degree within 6 years of starting college and for students who did not attain a bachelor's degree within 6 years of starting college.

Figure 5

ACT Science Scores Distribution Between the Two Groups



Research Question 6

RQ6: Is there a significant difference in the final unweighted cumulative HSGPA between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree?

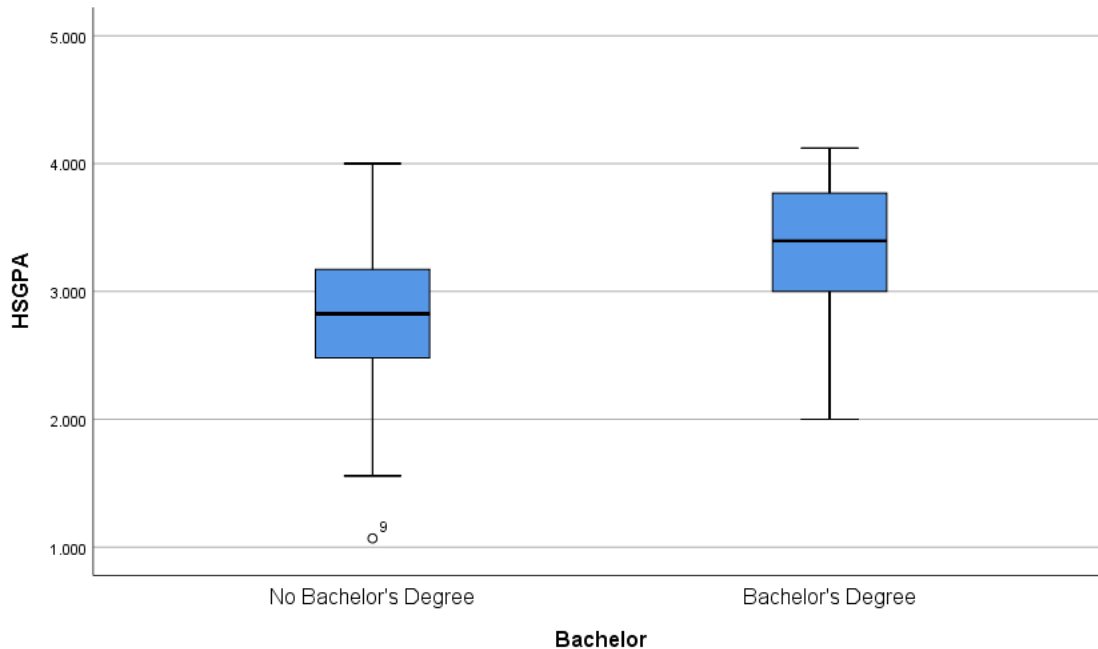
H₀6: There is no significant difference in the final unweighted cumulative HSGPA between students who completed a bachelor's degree within 6 years of starting college and students who did not complete a bachelor's degree.

An independent sample *t*-test was conducted to evaluate whether the mean HSGPA differs significantly between students who completed a bachelor's degree within 6 years of starting college and students who did not completed a bachelor's degree within 6 years of starting

college. The grouping variable was the completion of a bachelor's degree within 6 years of starting college and the test variable was the HSGPA. The test was significant, $t(545) = 11.923$, $p < .001$. Therefore, the null hypothesis was rejected. Participants who completed a bachelor's degree within 6 years of starting college ($M = 3.34542$, $SD = .487345$) tended to have significantly higher final unweighted cumulative HSGPAs than those who did not complete a bachelor's degree within 6 years of starting college ($M = 2.82302$, $SD = .524193$). The 95% confidence interval for the difference in means ranged from .436 to .608. Cohen's d test for effect size was 1.03, which indicated a large effect size. Figure 6 shows the distribution for HSGPA for students who attained a bachelor's degree within 6 years of starting college and for students who did not attain a bachelor's degree within 6 years of starting college.

Figure 6

HSGPA Distribution Between the Two Groups



Chapter Summary

An independent sample *t*-test was used for each research question to see if there were significant differences between students who attained a bachelor's degree within 6 years of starting college and those who did not. The following data were analyzed: ACT Composite, ACT Math, ACT English, ACT Reading, ACT Science, cumulative unweighted HSGPA. High school students who graduated between 2005 and 2013 from a small public high school in East Tennessee with only an academic program were used and the data was de-identified and provided to the researcher by the high school. In all, 547 graduates had HSGPA data and 525 of those had ACT data. In all cases, students who earned a bachelor's degree within 6 years of starting college had significantly higher ACT scores and HSGPAs than students who did not earn

a bachelor's degree within 6 years of starting college. Cohen's d indicated that ACT Composite (Cohen's $d = 0.82$), ACT English (Cohen's $d = 0.79$), ACT Science (Cohen's $d = 0.79$), and HSGPA (Cohen's $d = 1.03$) had a large effect on bachelor's degree attainment, with HSGPA having the largest effect size. ACT Math (Cohen's $d = 0.76$) and ACT Reading (Cohen's $d = 0.66$) had a medium effect size according to the results of Cohen's d .

Chapter 5. Summary, Conclusions, and Recommendations

Secondary school educators need indicators to help determine whether students who plan to continue their studies at degree granting postsecondary institutions have been adequately prepared and have the knowledge and tools necessary to successfully complete a bachelor's degree. Completing a bachelor's degree has been shown to significantly increase a person's quality of life (Carnevale & Desrochers, 2002). Four-year degree granting institutions are evaluated on degree completion for funding purposes (Banta & Fisher, 1984; Dougherty & Reddy, 2011; Radunzel, 2012; Radunzel & Noble, 2012). Society as a whole needs more educated citizens to function adequately in everyday life as well as to fill the increasingly complicated jobs that are more and more the norm (Barth, 2003; Greene, 2000; Rolfhus et al., 2017; Stewart, 2012) and that require postsecondary education. College admission and scholarship mostly require submission of HSGPA as well as standardized test scores. Recently, there is a movement for postsecondary institutions to move away from the use of minimum standardized score requirements for admission due to a documented racial bias in the scores (French et al., 2015; Geiser & Santelices, 2007; Toldson & McGee, 2014). While some colleges no longer require standardized test scores, states like Tennessee include taking standardized tests as a high school graduation requirement (Tennessee Department of Education, 2018b). This may be due to the fact that states are looking at gaps in student subgroups in an effort to close them, and standardized scores have shown gaps among racial and socioeconomic subgroups.

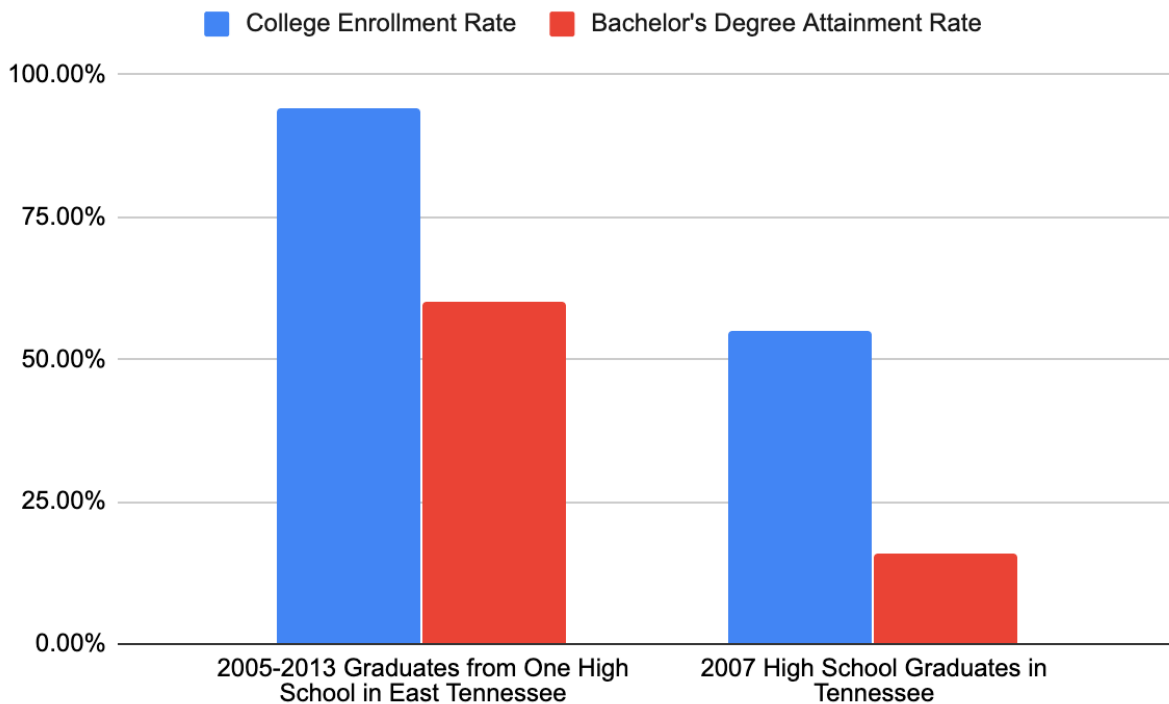
Success at the postsecondary level is quantified in the literature using many different definitions of college success: first year GPA, fourth year GPA, final cumulative college GPA, number of credits completed after 1 year, bachelor's degree attainment in 4, 5, and 6 years, year-to-year retention after 1 year and after 3 years, student transfer rates from one institution to

another, and performance in specific courses (Allen et al., 2008; French et al., 2015; Geiser & Santelices, 2007; Hodara & Lewis, 2017; Kuh et al., 2008; Noble & Sawyer, 2002; Pike et al., 2014; Radunzel, 2012; Radunzel & Noble, 2012; Syverson et al., 2018). The results of these studies were varied due to the many definition of college success. Several of the studies cited used student self-reported grades to calculate a HSGPA (Kuh et al., 2008; Noble & Sawyer, 2002; Radunzel & Noble, 2012), which may have impacted the accuracy of the results. However, despite the variations in definition and source of data, HSGPA was found to be the best indicator of college success overall among all researchers cited. Noble & Sawyer (2002) did find that ACT was a better predictor for success when looking at first-year college GPA. While the common thought is that high school preparation only has an impact on the initiation of college studies, French et al. (2015) found not only a correlation of high school preparation with bachelor's completion, but also with income level once the individuals entered the workforce. This study showed that for the 547 participants of the study who graduated from one college preparatory high school in East Tennessee from 2005 to 2013, 60% (327) attained a bachelor's degree within 6-years of starting college. This is very different from the findings of Rolfhus et al. (2017) for the Tennessee high school cohort who graduated in 2007 and had a bachelor's degree attainment within 6 years of 16%. One must keep in mind that looking at all high school graduates in Tennessee vs. only those who planned to continue their education at degree granting postsecondary institutions is not a fair comparison. However, Rolfhus et al. found that 55% of the class of 2007 did enroll in postsecondary institutions within six years of graduating from high school, and 69% or those did so the fall following high school graduation. If 55% enrolled in college, but only 16% completed a bachelor's degree, there is room for improvement in the secondary preparation and the transition from high school to college. Even though a 60%

bachelor’s degree attainment is impressive compared to a statewide rate of 16%, it also has room to be improved, especially considering that 94% of the students who graduated from this high school enrolled at a postsecondary institution after high school. Figure 7 illustrates the bachelor’s degree attainment within 6 years of the participants of this study compared to the entire Tennessee 2007 high school graduation cohort.

Figure 7

Bachelor’s Degree Attainment Within 6 Years of Starting College

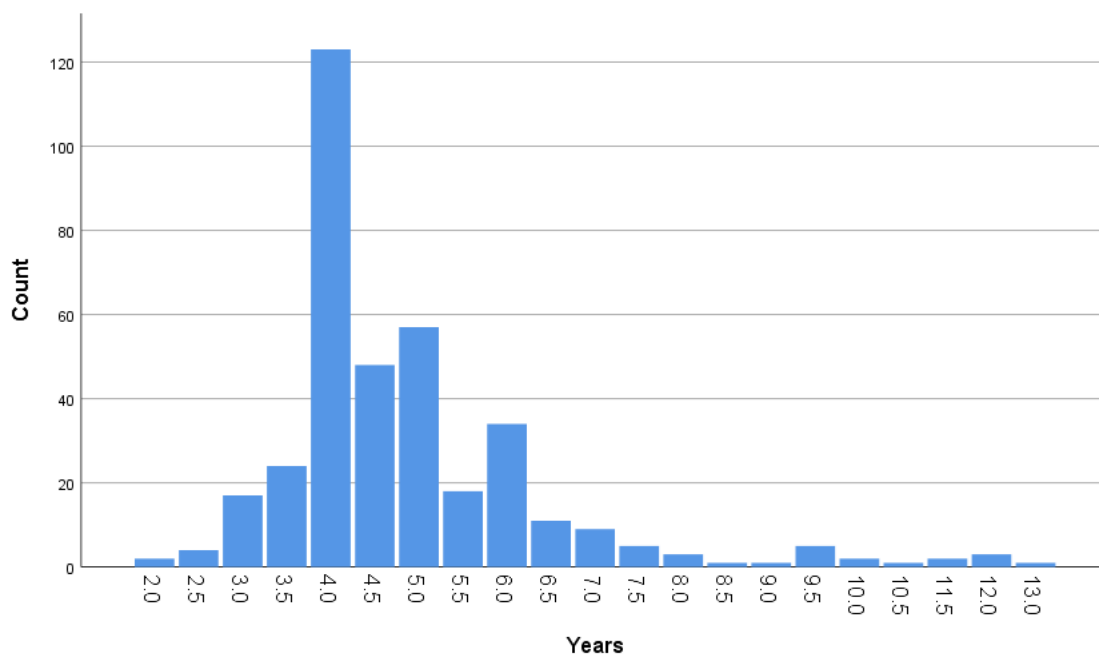


For the purpose of the study, bachelor’s degree attainment was only counted if it happened within 6 years of starting college. The data examined showed that 43 students who were counted as not completing a bachelor’s degree because they took longer than 6 years, did earn a bachelor’s degree. Figure 8 shows the distribution of years it took students to complete a

bachelor’s degree among the participants of this study. When looking at the total number of participants who did earn a bachelor’s degree without a time limit, the bachelor’s degree attainment rate increases from 60% to 68%, and it will undoubtedly continue to increase slightly as a few more students in the later cohorts attain a bachelor’s degree. The data also showed that the majority of students did graduate within 6 years, but a small group of students graduated between 6.5 and 8 years.

Figure 8

Years to Bachelor’s Degree Attainment for the Participants of the Study



Discussion and Conclusions

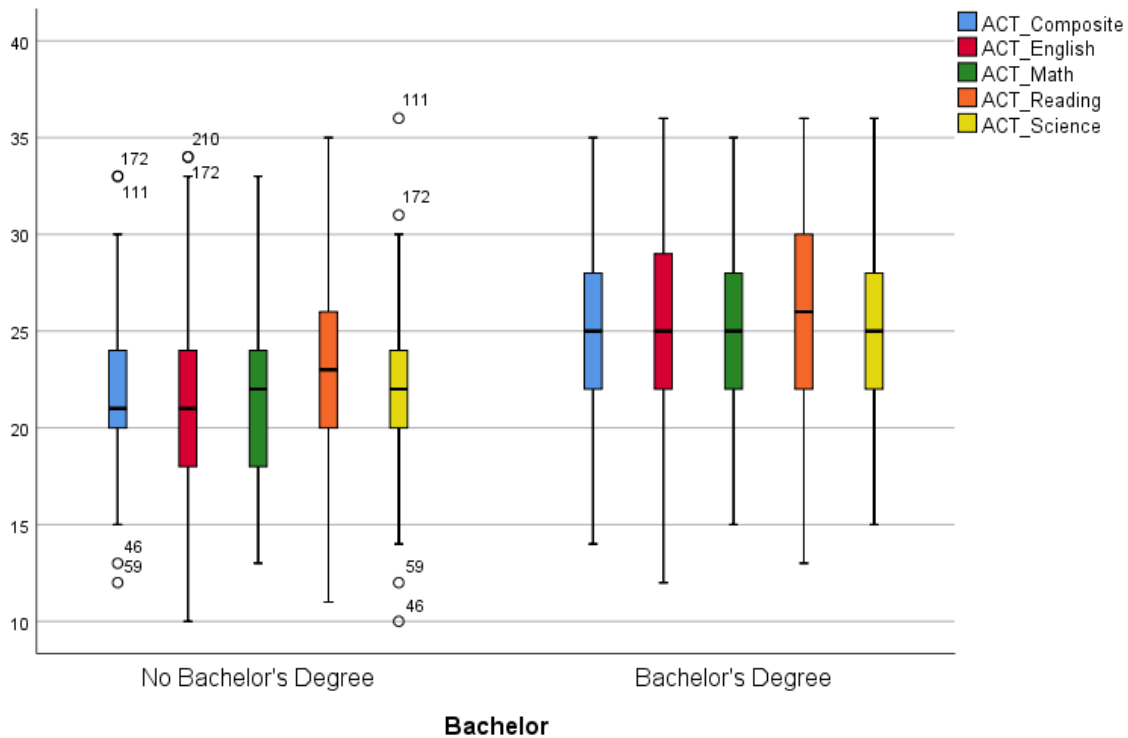
This ex post facto correlational design quantitative study was conducted to examine specifically students who had access to a college preparatory secondary education and the possible relationship of the students’ high school data, specifically ACT and HSGPA, and

students who attained a bachelor's degree within 6 years of starting college versus students who did not attain a bachelor's degree within 6 years of starting college. For students who intend to enroll in a postsecondary institution after high school with the goal of attaining a bachelor's degree, it is important for high school educators and administrators to have reliable indicators of how well these students are prepared to be successful beyond high school. This study was different in that it looked at student preparation for college and college success from the high school preparation perspective. By using data from students who graduated from one high school, the researcher was able to determine if ACT and HSGPA are data that can be used by high school personnel of this school to determine if students are on track with their preparation for college with the goal of attaining a bachelor's degree, not just being admitted to the postsecondary institution. The results of this study indicate that ACT and HSGPA are measures that, at this high school, can be used to identify students who need more support and those who are on track with their postsecondary preparation.

Research Questions 1 through 5 examined ACT data specifically to see if there were significant differences in the mean ACT scores between students who completed a bachelor's degree within 6 years of starting college and those who did not complete a bachelor's degree within 6 years of starting college. Figure 9 shows the results of ACT Composite and subscores in comparison with each other for the two groups.

Figure 9

Distribution of ACT Score Means Between the Two Groups



It is evident that there is an overlap within the first standard deviations of the two groups across all ACT scores, which is a reminder that while ACT scores can be used as indicator of college readiness, they should not be used to close opportunities for students. A student with a 23 ACT Composite scores is just as likely to complete a bachelor's degree within 6 years as they are to not complete a bachelor's degree. Table 1 shows the mean ACT scores and the standard deviation for both groups as well as the effect size (Cohen's d) for each score. As a reminder, the highest ACT score is 36, and the college readiness benchmarks set by ACT are: ACT English, 18; ACT Reading, 22; ACT Math, 22, ACT Science 23 (ACT, 2017a). It is interesting to note that score means for students who did not complete a bachelor's degree within 6 years met the ACT English, and ACT Reading, but not the ACT Science and ACT Math benchmarks set by

ACT. These benchmarks are set by examining student success (determined by final grades in the courses) in basic college course requirements in the areas of math, English and science.

Table 1

Effect Size, Means and Standard Deviations for ACT Composite and Subscores for the Two Groups

	Effect Size Cohen's <i>d</i>	Bachelor's		No Bachelor's	
		Mean	Std. Deviation	Mean	Std. Deviation
ACT Composite	0.82	25.03	4.181	21.84	3.537
ACT Math	0.76	24.78	4.432	21.66	3.744
ACT Reading	0.66	26.11	5.165	22.80	4.858
ACT English	0.79	25.44	4.901	21.63	4.775
ACT Science	0.79	24.95	4.240	21.87	3.481

While there was a significant difference for all ACT scores, ACT Math and ACT Reading had a medium effect size while ACT Composite, ACT English and ACT Science had large effect sizes. The large effect size calculated with Cohen's *d* signifies that the group means are far enough distant from each other that the significance matters. That being said, a student with a low ACT score may still complete a bachelor's degree, and someone with a high ACT score may not. The outliers with high ACT scores that can be seen on Figure 8 in the group of students who did not complete a bachelor's degree within 6 years are perfect examples of that.

Research Question 6 examined HSGPA data specifically to see if there was a significant difference in the mean HSGPA between students who completed a bachelor's degree within 6

years of starting college and HSGPA of students who did not complete a bachelor's degree within 6 years of starting college. The results showed that there was a significant difference between the two groups. Table 2 shows the mean HSGPA, the standard deviation for both groups, and the effect size (Cohen's d) for HSGPA. The unweighted HSGPA has a maximum of 4.0 points. The effect size for HSGPA is large (Cohen's $d = 1.03$), and the fact that it is larger than 1 indicates that there is a difference between the means of 1.03 standard deviation which is notable. The HSGPA effect size is larger than any of the ACT scores effect sizes, indicating that HSGPA, for this group of participants who graduated from one high school between 2005-2013, is a better indicator of bachelor's degree attainment within 6 years of enrolling in college than any ACT scores.

Table 2

HSGPA Effect Size, Means and Standard Deviations for the Two Groups

	Effect Size Cohen's d	Bachelor's		No Bachelor's	
		Mean	Std. Deviation	Mean	Std. Deviation
HSGPA	1.03	3.34542	0.487345	2.82302	0.524193

Implications for Practice

The data examined in this study show that ACT and HSGPA can be used as indicators of adequate college preparation for students attending this one high school. The results of this study show that postsecondary student data can be examined to evaluate student preparation. That information can then be used to make improvements, as well as support students whose data

show they may not be on track to be ready for success at the postsecondary level. The implications for practice from the results of this study are:

- high school personnel need to examine the available student data and collect student data beyond high school to understand the effectiveness of the preparation provided at each high school.
- if the available data are inconclusive, investigating possible new data sources to find an adequate measure of postsecondary readiness may provide school personnel with the necessary data.

Examining the data allows educators to determine how they have been preparing students and what improvement can be made. As a public-school educator, it is easy to get overwhelmed with the everyday emergencies, adherence to state requirements, and the routines of a school year. However, for improvements to happen, educational leaders and educators must make time to examine available data and identify areas that can be improved. It was established that the purpose of high school is to prepare students for the workplace or for postsecondary education (ACT, 2005b; Barth, 2003; Cohen, 2001). In recent years, the preparation for both has become very similar due to the increased knowledge expected of high school graduates who join the workforce after high school graduation (Barth, 2003; Carnevale & Desrochers, 2002). The majority of high school students do plan on going to college after they graduate from high school (ACT, 2019; Barth, 2003). The studies cited in the review of the related literature and the results of this study show that high school preparation does affect students' ability to complete a bachelor's degree. Therefore it is important for the sake of students and society for high school personnel to focus beyond high school graduation requirements and readiness for college admission, and to ensure that the preparation available at the high school level sets students up

for success beyond high school. It is a disservice to students and society if schools do not examine their practices and continue to strive for improvement. It is important for high school personnel to remember the importance of their impact and the consequences of inadequate student preparation. High school graduation should be viewed as the springboard for students' next step in life and not an end point or goal.

There are multiple documented areas where states and secondary school personnel can focus resources that will bring improvement in student preparation for success beyond high school:

- Secondary school and postsecondary school need to collaborate and communicate with each other to minimize the gaps in transitioning students from high school to postsecondary opportunities (ACT, 2008b; Barth, 2003; Carey, 2005; Cohen, 2001; Trusty & Niles, 2008; Venezia et al., 2003).
- There is a need to increase counseling resources at the secondary level so that students and families have accurate expectations of the necessary preparation for students next steps (Barth, 2003; Cohen 2001; Radford & Ifill, 2016; Trusty & Niles, 2004; Venezia et al., 2003).
- All students need both access and encouragement to take rigorous classes that prepare them for postsecondary success (Adelman, 1999; Barth, 2003; Cohen, 2001; Greene, 2000). Secondary schools need to collaborate across districts in order to examine the level and adequacy of rigor offered.

The bottom line is that secondary schools need to look beyond students successfully completing the requirements for a high school diploma and must instead work with students and

families to ensure that students are aware of their options after high school and get the necessary preparation while in high school to not just access those options, but successfully complete them.

Implications for Further Research

Following are implications for further research that emerged from the results of this study.

- Follow up study with the same participants to find out what prevented them from completing or helped them complete a bachelor's degree. Looking deeper into students whose data indicated readiness for college success but who did not complete a bachelor's degree within 6 years, and students whose data did not indicate readiness for college success, but who completed a bachelor's degree within 6 years.
- Repeating the study at other high schools and comparing the results to see if the results are similar or different.
- If there are significant differences in results from one high school to another, examining the impact of smaller specialized high schools and comparing them to large high schools where multiple paths of study are offered.

While there were significant differences in ACT scores and HSGPA between students who attained a bachelor's degree within 6 years of starting college and those who did not, it was also evident that those indicators are not absolute predictors as there are overlap in the standard deviations between both groups. It would be interesting to find out more information from the students who did not attain a bachelor's degree and from those who did attain a bachelor's degree as to what factors came into play to either help them or hinder them in their pursuit of a bachelor's degree.

Another area of further research is the impact of specific high schools. This study used graduates from one high school that only offers an academic preparation path, while many high schools offer multiple paths. The results from this study show that 94% of 2005-2013 graduates from this high school went on to college and 60% attained a bachelor's degree within 6 years of entering college. Data from the 2007 high school graduation cohort in Tennessee show that while 55% of high school graduates entered college, only 16% attained a bachelor's degree (Rolfhus et al., 2017). This high school has admittedly a higher bachelor's degree attainment rate from 2005-2013 than the state average for 2007 which can mostly be attributed to the fact that students attending this high school chose to do so knowing it only offers an academic path. Thereby, the assumption can be made that these are students who intend to continue their studies beyond high school. Researching whether high schools with multiple graduation paths have similar or different bachelor's degree attainment rates with the students who plan on postsecondary studies would help these schools know how to best prepare college-bound students. Looking at the impact of specialized high schools vs. large multi-option high schools would also be a research that would help educators and decision-makers in setting up students for success.

Summary

In this study, ACT and HSGPA data were analyzed for students who graduated between 2005 and 2013 from a small high school in east Tennessee that only offers an academic path. The students were divided into two groups: those who completed a bachelor's degree within 6 years of starting college, and those who did not complete a bachelor's degree within 6 years of starting college. The mean ACT scores and HSGPA were compared between the two groups and the differences were found to be statistically significant. This indicates that for the participants of this study, ACT scores and HSGPA can be used as indicators of adequate preparation for

postsecondary studies leading to bachelor's degree attainment. This also implies that educators at the participating school should use HSGPA and ACT among other measures to offer targeted support to at-risk students as indicated by their data.

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