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The Impact of High School Dual Enrollment Participation on Bachelor's Degree Attainment and Time and Cost to Degree

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THE IMPACT OF HIGH SCHOOL DUAL ENROLLMENT

PARTICIPATION ON BACHELOR'S DEGREE ATTAINMENT AND

TIME AND COST TO DEGREE

by

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ABSTRACT

THE IMPACT OF HIGH SCHOOL DUAL ENROLLMENT PARTICIPATION ON BACHELOR'S DEGREE ATTAINMENT AND TIME AND COST TO DEGREE

Thomas Earl Hughes
Old Dominion University, 2016
Director: Dr. Alan M. Schwitzer

Dual enrollment has become nearly ubiquitous in the U.S. with 82% of public high schools offering dual credit courses with student enrollment topping two million (Borden, Taylor, Park, & Seiler, 2013). Policymakers and proponents of dual enrollment have claimed that these programs better prepare students for college success and reduce the time and cost to a college degree. There is a growing body of empirical research showing that students who participated in dual enrollment programs completed bachelor's degrees at higher rates than non-dual enrollment participants do. However, most of this research has focused on single institutions or states, and not nationally representative samples.

This causal comparative study used *ex post facto* data from the Beginning Postsecondary Students Longitudinal Study (BPS: 04/09) to address the benefits of bachelor's degree attainment, shortened time to degree, and reduced cost of a degree attributed to dual enrollment. This study was limited to students who began their postsecondary studies at public community colleges with the intent to complete a bachelor's degree. The researcher employed propensity score matching to improve comparability of study outcomes between dual enrollment and non-dual enrollment

participants.

Conclusively determining how or why dual enrollment programs impact students is challenging. This study drew from two socialization theories—anticipatory socialization and validation theory. In accordance with these theories, this study found statistical and practical significance linking dual enrollment participation to increased bachelor's degree attainment. Dual enrollment participants were also statistically significantly more likely to experience a shorter time to degree and lower costs as measured by student loans than non-participants were. The effect sizes, however, for the time to degree and cost of a degree models were modest at best and not overly persuasive.

DEDICATION

To my Wife, Marcee and my sons, William and Grayson.

ACKNOWLEDGMENTS

need to pursue a Ph.D. May it inspire you to reach for and achieve your dreams. Lastly,

to my wife, Marcee, I am forever grateful for your love, support, and faith in me

throughout.

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INTRODUCTION

Speaking at Macomb Community College in 2009, President Obama announced the American Graduation Initiative (AGI) and challenged community colleges to assist the nation in strengthening its educational attainment levels (Brandon, 2009). Addressing the President's challenge the American Association of Community Colleges (AACC) launched the *21st-Century Initiative* with the overall goal to educate an additional five million students with associate's degrees, certificates, or other credentials by 2020. Through most of the twentieth century, the United States experienced steady educational attainment progress and unprecedented economic growth and had a workforce that was significantly more educated than most of Europe (Goldin & Katz, 2008). In 1970, America ranked number one in the world in the percentage of its workforce holding a postsecondary degree; however, educational attainment stagnated between then and 1990 (American Association of Community Colleges [AACC], 2012; HigherEdSolutions, 2008). Today the United States ranks number 12 in the share of adults ages 25 to 34 holding postsecondary degrees or certificates according to the latest Organization for Economic Cooperation and Development report (Organization for Economic Cooperation and Development [OECD], 2014).

If community colleges are to play a key role in increasing the share of the U.S. population with a postsecondary degree, improvements are necessary (AACC, 2012; Brandon, 2009). The majority of students who begin postsecondary studies at a community college and express the goal of earning a bachelor's degree do not complete their goal (Cohen, Brawer, & Kisker, 2014). In reality, only 14% of students with the

intent of obtaining a bachelor's degree did so within six years of starting at a public

community college (Radford, Berkner, Wheeless, & Shepherd, 2010). Additionally, even

for students completing a bachelor's (regardless of institution type the student started at),

the time to complete and cost of earning a degree have increased substantially over the

past decade (Complete College America, 2014). Secondary student preparedness is a key

indicator of postsecondary completion (Adelman, 2006). Hence, the intent of this study

is to examine the effect of dual enrollment (earning college credits while the student is

still enrolled in high school) on bachelor's degree attainment as well as time to degree

and cost of the degree.

Background of the Study

Dual enrollment has grown substantially in recent years. Borden, Taylor, Park,

and Seiler (2013) reported a 75% increase in dual enrollment between the 2002-2003

academic year and the 2010-2011 academic year with enrollment now exceeding two

million students. Dual enrollment programs take many different forms (Karp & Hughes,

2008). Some programs occur on college campuses while others operate at the high

schools. Dual enrollment faculty may be full-time college professors or high school

teachers credentialed as adjuncts. What remains common in all dual enrollment

programs is that students receive credit from both the high school and college.

The idea of integrating secondary and postsecondary institutions is not new. Most

integration efforts have focused on the last years of secondary schooling and the first two

years of postsecondary education. The advent of community colleges, first known as

junior colleges, began in the late nineteenth century. Often located in high schools, most

junior colleges operated as extensions of secondary schools until the early 1960s (Cohen

& Brawer, 2008). Leonard Koos, an influential professor of secondary education at the

Universities of Minnesota and Chicago, and his 6-4-4 plan of public school organization

represent one of the earliest attempts to integrate secondary schooling and the first two

years of postsecondary education (Koos, 1946). The 6-4-4 plan advocated by Koos

pushed for a realignment of the nation's public education system. Elementary school

would make up years one through six, junior high school years seven through 10, and

junior college 11 through 14. The 6-4-4 plan never gained wide appeal, and only ten

public school systems were operating under this model by 1941 (Kisker, 2006).

     With post-World War II economic growth and increased demand for four-year

degrees, pre-college activities evolved to prepare secondary students for baccalaureate-

granting colleges and universities. In 1955, the College Board introduced the Advanced

Placement (AP) program that allows secondary students to take AP courses as part of the

high school curriculum and potentially earn credit by taking an end-of-course exam

(Bailey & Karp, 2003). Colleges may or may not award college credit for courses based

on the student's AP exam score. Likewise, the International Baccalaureate (IB) program,

introduced in the 1960s, is a comprehensive curriculum designed to prepare students for a

liberal arts education. Like the AP program, students in IB programs must pass end-of-

course exams and then petition colleges to award college credits based on test cutoff

scores (Bailey & Karp, 2003). Both the AP and IB programs target high-achieving

students with postsecondary aspirations. In 2012, more than one million United States

public high school graduates completed AP exams with 61% receiving scores that signify

college readiness in a subject and may be accepted for college credit (College Board,

2014).

It would not be until the 1970s that another significant effort would be put forth to integrate the community college and high school—the Middle College High School. Created to assist at-risk students, Middle College High Schools were a response to the nation's increasing secondary dropout rate (Jordan, Cavalluzzo, & Corallo, 2006; Kisker, 2006). Middle College High Schools offer both secondary and postsecondary curricula in a flexible manner that allows students to progress at their own pace (Wechsler, 2001). The first Middle College High School opened in 1974 at LaGuardia Community College. Middle College High Schools numbered 30 in 2000 and enjoy exceptionally high graduation rates (90%) and college going rates (75%) (Kisker, 2006; Wechsler, 2001). Middle College High Schools, like the 6-4-4- model, struggled to grow because of disparate regulations such as state policies establishing independent and unconnected funding and governance models for secondary and postsecondary institutions (Wechsler, 2001).

Unlike the previous more complex models, basic dual enrollment uses intergovernmental agreements between high schools and colleges to set up and guide programs. In 1976, California was the first to create policy establishing dual enrollment programs (Mokher & McLendon, 2009). Dual enrollment expanded considerably in the 1990s and today 47 states have enacted policies directing some aspect of these programs (Borden et al., 2013; Karp, Calcagno, Hughes, Jeong, & Bailey, 2008). Dual enrollment is differentiated from AP and IB programs in that the former earn college-level credit while the latter are college-type courses. Once restricted to high achieving students, dual enrollment programs are now enrolling middle achieving students to increase academic rigor and instill postsecondary aspirations in students who may not have seen themselves

as college bound (Karp et al., 2008). Another impetus behind dual enrollment growth is

the belief that these programs improve college readiness.

Secondary student preparedness is a key indicator of postsecondary completion.

American College Testing (2014) reported that almost three-quarters of college-bound

students do not pass all four college-readiness benchmarks (English, mathematics,

reading, and science). As many as two-thirds of students entering community colleges

today require some level of remediation (Bailey, Jaggars, & Jenkins, 2015; Cohen et al.,

2014). Dual enrollment is one practice that educators and state policymakers can

implement to improve college readiness by enhancing curriculum and clarifying the

alignment between secondary and postsecondary standards (Venezia, 2006). Reducing

the time and cost of obtaining a college degree is another benefit attributed to dual

enrollment (Borden et al., 2013; Karp, Calcagno, Hughes, Jeong, & Bailey, 2007).

There is little debate that college affordability is a concern for students and their

families (Abel, 2014; Complete College America, 2014). The College Board reported

that public two-year and four-year institutions had increased tuition and fees over the last

30 years by 150% and 225% respectively (College Board, 2014). With rising college

prices and stagnant wages, many Americans are wondering if college is worth the cost.

Related to college costs is the time it takes a student to obtain a degree. Beyond tuition

and fees, the expense of transportation, housing, and foregone wages are related to the

time it takes a student to complete a degree (Complete College America, 2014).

Although bachelor's degrees are referred to as four-year degrees, the four-year graduation

rates for bachelor's degree-granting institutions range from 19% to 36% (Complete

College America, 2014).

Absent from most research on dual enrollment is an explicit theoretical framework. Although some research focusing on dual enrollment outcomes has occurred, there remains a need to understand how these programs affect students. Roberts (2010) stated a conceptual model or theoretical framework explaining the relationship between relevant variables and constructs is necessary.

Conceptual Framework: Anticipatory Socialization Theory and Validation Theory

Conclusively determining how or why dual enrollment programs impact students is challenging. This study draws from two socialization theories. The first is Merton's (1968) anticipatory socialization theory. Anticipatory socialization is "the process or set of experiences through which individuals come to anticipate correctly the values, norms, and behaviors they will encounter in a new social setting" (Pascarella, Terenzini, & Wolfle, 1986, p. 156). The researchers build off Merton's theory and conceptualize that precollege programs can prepare transitioning students to be better integrated and successful when they enter college (Pascarella et al., 1986).

The second is Rendon's validation theory. Rendon's theory describes validation as "an enabling, confirming and supportive process initiated by in- and out-of-class agents that foster academic and interpersonal development" (Rendon, 1994, p. 44). Rendon maintains that the earlier validation from college agents such as advisers, testing staff and enrollment services staff begins the better, especially for minority and at-risk students (Rendon, 2002). Students must feel a sense of academic and interpersonal validation before they can become involved in the social and academic fabric of college life (Rendon, 2002). Students who feel validated by their institutions of higher learning have increased odds of academic success according to validation theory (Rendon, 1994,

2002).

Lastly, Adelman (1999) found that momentum points such as earning 20 credits in the first year of college significantly enhance a student's chance of completing a bachelor's degree. Adelman argued that the "academic resources"—a term that includes earning college credits while in high school—is one of the largest and most significant explanatory factors for successful bachelor's degree completion. Adelman (1999, 2006) builds the case for dual enrollment-type programs as a method of increasing rigor and college credit accumulation for high school students and preparing students for postsecondary studies.

Purpose Statement

The purpose of this study was to compare dual enrollment participants and non-participants who begin college at a public community college in the areas of (1) bachelor's degree attainment, (2) time to a bachelor's degree as measured by months, and (3) loans incurred in obtaining a bachelor's degree as measured by total student loan amount taken.

Research Questions

The study addressed the following research questions:

1. How do dual enrollment participants compare to non-participants in terms of bachelor's degree attainment for students who begin their postsecondary studies at a community college?

2. How do dual enrollment participants compare to non-participants in terms of time to bachelor's degree attainment for students who begin their postsecondary studies at a community college?

3. How do dual enrollment participants compare to non-participants in terms of loan debt incurred in obtaining a bachelor's degree, as measured by the total amount of Stafford, Perkins, and PLUS undergraduate loans, for students who begin their postsecondary studies at a community college?

Professional Significance of Study

Proponents of dual enrollment frequently cite shortened time to degree and reduced college costs as primary benefits of such programs. However, the case for such time and cost saving statements has not been convincingly established (Borden et al., 2013). There has been very limited empirical research on the effect of dual enrollment on the cost of a bachelor's degree. Prior research on the relationship between dual enrollment and time to degree has almost exclusively focused on single institutions or individual state systems (Karp et al., 2007; Westcott, 2009). Swanson (2008) is the only researcher to use a national dataset to examine the relationship between dual enrollment and time to degree. Swanson's research used the National Education Longitudinal Study of 1988 (NELS: 88). This study utilized national data from the Beginning Postsecondary Students Longitudinal Study (BPS: 04/09) to evaluate the effect of dual enrollment on bachelor's degree attainment, time to degree, and cost of a degree for dual enrollment participants and non-participants beginning at a public community college.

Additionally, one of the chief criticisms in the dual enrollment literature is the failure of researchers to account for factors outside the dual enrollment programs like student motivation, prior academic work, economic status, and student characteristics (Bailey & Karp, 2003; Karp et al., 2008). This study controlled for preexisting academic, socioeconomic, and demographic student characteristics.

Given the demand for increased educational attainment, rising college costs, and the ubiquity of dual enrollment programs, a study of the effects of dual enrollment with a national scope is merited. The study's findings will provide insights to policymakers and practitioners who operate or are considering dual enrollment activities to improve students' college readiness.

Overview of Methodology

This causal comparative study used *ex post facto* data from the Beginning Postsecondary Students Longitudinal Study (BPS: 04/09) to address the research questions. Authorized by the U.S. Department of Education, the National Center for Education Statistics conducted the BPS: 04/09. The BPS: 04/09 is a nationally representative cohort of students who first enrolled in postsecondary education in 2003-2004 and who were followed for six years. This study was limited to students who began their postsecondary studies at a public community college with the intent to complete a bachelor's degree.

A combination of binary logistic and multiple linear regression was used to answer the research questions. In addition to dual enrollment participation (the main independent variable of interest), the analysis controls for preexisting differences between participants and non-participants. Including race, gender, socio-economic status (SES), first generation status, high school GPA, highest high school mathematics, pre-college credit dosage, ACT/SAT scores, and Advanced Placement (AP) coursework.

The Old Dominion University Darden College of Education's Human Subject Research Committee approved and granted permission for this study. The National Center for Education Statistics (NCES) authorized use of the BPS: 04/09 dataset.

Delimitations

The study was limited to first-time college students who began their postsecondary studies at a community college with the intent of earning a bachelor's degree. In addition, study participants were traditionally aged (age 24 or younger) when entering in the 2003-2004 academic year.

For students earning multiple bachelor's degrees, only the first degree was considered for the time to degree and cost of degree outcomes.

Definitions of Key Terms

The following listing serves as a reference for key terms used during this study.

Advanced Placement (AP): College-type courses accredited by the College Board that are taught as part of the high school curriculum. Students may potentially earn college credit by taking an end-of-course exam. It is at the discretion of the postsecondary institution to award college credit or not.

Beginning Postsecondary Students Longitudinal Study (BPS: 04/09): A survey project of the National Center for Education Statistics, the BPS: 04/09 is a nationally representative cohort of students who first enrolled in postsecondary education in 2003-2004. Beginning students are surveyed at three points in time: at the end of their first year, and then three and six years after beginning their postsecondary education. The survey collected a wide range of data on high school experiences, student demographics, work, student loans, persistence, transfer, and degree attainment.

Degree Attainment: Indicates bachelor's degree attained by a student beginning their postsecondary studies in 2003-2004 and followed through 2009.

Degree Cost: Indicates the total amount of Stafford, Perkins, and PLUS undergraduate loan amounts incurred as of 2009.

Dual Enrollment: Indicates whether the student took courses at a college or university for which he/she earned college credit while in high school.

Dual Enrollment Participant: Indicates a student who earned college credits while in high school, excluding AP credits.

Dual Enrollment Program: Partnership agreements between secondary and postsecondary institutions that allow high school students to enroll in college courses prior to high school graduation.

First Generation Student: Indicates that neither parent of the student had completed a bachelor's degree at the time the student entered college.

Highest Degree Attained: Indicates the highest postsecondary degree attained at any institution June 2003 through June 2009.

Highest High School Math: Indicates the highest level of math the student completed or planned to take. Math courses include algebra II, trigonometry/algebra II, pre-calculus, calculus, and none of these.

International Baccalaureate (IB): A high school curriculum that includes college-type courses approved by the International Baccalaureate organization. Students may potentially earn college credit by taking an end-of-course exam. It is at the discretion of the postsecondary institution to award college credit or not.

Non-Dual Enrollment Participant: Indicates a student who did not earn any college credits while in high school.

Pre-College Credit Dosage: Indicates if a student earned enough early college credits to enter college as a sophomore.

Pre-College Programs: Coursework that leads to or may lead to college credit awarded upon successful course completion or an end-of-course exam taken by students prior to high school graduation. Examples include dual enrollment, AP, IB, and CLEP.

Time to Degree: Number of months elapsed from the first month enrolled to month attained highest degree as of June 2009.

Socioeconomic Status (SES): SES was determined by Pell Grant eligibility. Students receiving a Pell award in any semester were classified as economically disadvantaged.

Conclusion and Organization of the Work

History has documented that a highly educated populace is not just fundamental, but critical to economic growth. The connection between an educated workforce and America's economic and social wellbeing has received prominent and needed attention (AACC, 2012; Brandon, 2009; Goldin & Katz, 2008). Community colleges have been at the center of recent debates on how to improve educational attainment and bolster the U.S. workforce (AACC, 2012; Brandon, 2009). Today, almost half of all undergraduates begin their studies at community colleges (American Association of Community Colleges [AACC], 2015; Cohen et al., 2014). The focus on community colleges highlights the importance of this postsecondary sector and its vital role in assisting the U.S. to meet its goal of increased educational attainment. While more high school graduates are going on to college, their success rates, as measured by obtaining a college degree, have stagnated. A lack of college readiness has been identified as a significant barrier to postsecondary

success (ACT, 2010; Adelman, 2006). Insights from this study provide an opportunity to improve our understanding of the relationship between college preparedness and dual enrollment, a ubiquitous but under evaluated pre-college program.

The remaining chapters of this dissertation are organized as follows: Chapter 2 contains an exhaustive review of the pertinent literature. The review begins with a description of public community colleges in higher education today. Presented next is research literature on the nexus between the new knowledge economy and postsecondary education. It continues with the case for increased college readiness – student preparedness, alignment of secondary and postsecondary standards, and dual enrollment and pre-college programs' effects on postsecondary readiness. In addition, research on the relevancy of time to and cost of a college degree are reviewed. This chapter concludes with a more detailed explanation of the conceptual framework and its relevance to understanding the effects of dual enrollment on postsecondary success. Chapter 3 addresses in detail the BPS: 04/09 data source and quantitative methods used in this study. Chapter 4 reports the study's findings. Presented last in Chapter 5 is a discussion that considers the results through the lens of anticipatory socialization and validation theories. The study concludes with recommendations for future practice and implications for policymakers, educators, and students.

CHAPTER 2

LITERATURE REVIEW

This chapter examines the literature on dual enrollment and its role in creating a

pathway for secondary students to access and succeed in postsecondary studies. This

section first examines the context of public community colleges in higher education

today. Subsequently, the necessity of postsecondary skills in today's knowledge

economy is explored. Next, current literature documenting the need for improving

college readiness among the United States' secondary student population is reviewed.

The ensuing section presents historic and current secondary and postsecondary

integration efforts. The chapter concludes with a description of anticipatory socialization

theory and validation theory and how each possibly influences the outcomes of this study.

Public Community Colleges

The first public two-year higher education institution was Joliet Junior College,

founded in 1901 (Cohen et al., 2014). The purpose of early two-year colleges, known as

junior colleges, was to offer lower cost and accessible lower-division coursework. Early

proponents of junior colleges even suggested abdicating lower-division and general

education to junior colleges, so that universities could focus on higher-order scholarship

and research (Cohen et al., 2014). Events such as the depression in the 1930s, World

War II, and the 1948 Truman Commission recommendations would serve to expand the

scope of two-year schools to include vocational training and evolve to be recognized as

community colleges (American Association of Community Colleges [AACC], 2000).

The footprint of public community colleges has grown significantly from just 19

institutions in 1916 to 992 in 2015. Today, community colleges educate almost half of

all undergraduate students (Cohen et al., 2014), and 47 percent of all bachelor's degree

recipients have completed one or more classes at a two-year institution (National Center

on Education and the Economy [NCEE], 2013).

   With rising higher education costs, especially at four-year colleges and

universities, community colleges will increasingly serve as the starting point for students'

intent on earning a bachelor's degree. This is particularly true for economically

disadvantaged students. Adelman (2005) found that characteristics like gender, race, and

first-generation status were not statistically significant predictors of who begins at a

community college, but SES does play such a role. Students who began their studies at

community colleges, unfortunately, are statistically less likely to complete a bachelor's

degree compared to students starting at a four-year institution (Long & Kurlaender,

2009). Wang (2009) studied persistence and baccalaureate attainment of community

college transfer students and found rigor in high school was one of the strongest

predictors of degree completion. Degree completion is integral to success in today's

economy.

The Nexus between Postsecondary Education and the Knowledge Economy

   The twenty-first-century workplace landscape has experienced significant

changes driven by rapid technological innovations and globalization (Goldin & Katz,

2008; Kirsch, Braun, Yamamoto, & Sum, 2007). Technology has shrunk the world, and

jobs can be located anywhere on the globe where an educated workforce exists (Goldin &

Katz, 2008). The continuing transition from a manufacturing economy to a knowledge

economy necessitates that the skill sets required for all levels of jobs will increase, as will

need for continuing education (American Association of Community Colleges [AACC],

2012; Goldin & Katz, 2008; Kirsch et al., 2007). Researchers estimate that 65% of

American jobs by 2020 will require postsecondary education or training (Carnevale,

Smith, & Strohl, 2013). Increased postsecondary certificate and degree production is

critical to America staying competitive in the global workplace, and growing

technological innovation will require twenty-first-century workers to access continuing

education throughout their work life.

　　　　Our Nation's history indicates that a highly educated populace is not just

fundamental, but critical to economic growth (Goldin & Katz, 2008; Stanley, 2003).

Through most of the twentieth century, the United States experienced steady educational

attainment progress and unprecedented economic growth and had a workforce that was

significantly more educated than most of Europe (Goldin & Katz, 2008). In 1970,

America ranked number one in the world with 28% of its workforce holding a

postsecondary degree; however, educational attainment stagnated between then and 1990

(AACC, 2012; Brooks, 2008; HigherEdSolutions, 2008). De Vise (2011) reported that

current leaders South Korea, Canada, and Japan now outpace the United States on

postsecondary attainment for adults age 25 to 34.

　　　　Recognition of the connection between an educated workforce and America's

economic and social wellbeing have received prominent and needed attention. Speaking

at Macomb Community College in 2009, President Obama announced the American

Graduation Initiative (AGI) and challenged community colleges to assist the nation in

strengthening its educational attainment levels (Brandon, 2009). The President stated:

　　　　Time and again, when we have placed our bet for the future on education, we

　　　　have prospered as a result - by tapping the incredible innovative and generative

potential of a skilled American workforce. That is what happened when President

Lincoln signed into law legislation creating the land grant colleges which not only

transformed higher education, but also our economy. That is what took place

when President Roosevelt signed the GI Bill which helped educate a generation -

and usher in an era of unprecedented prosperity

That is why, at the start of my administration I set a goal for America: by 2020,

this nation will once again have the highest proportion of college graduates in the

world. (Obama Macomb, 2009, para. 12-13)

Addressing the President's challenge the American Association of Community

Colleges (AACC) launched the *21st-Century Initiative* with the overall goal to educate an

additional five million students with associate's degrees, certificates, or other credentials

by 2020 (AACC, 2012). Correspondingly, the American Council on Education, along

with other higher educational associations, has embraced the President's goal by

introducing publications and programs to assist member institutions in increasing

postsecondary bachelor's degrees (http://www.acenet.edu). New research indicates that

the United States is making modest improvement based on current data showing 42% of

the population attaining some postsecondary credential (U.S. Census Bureau, 2014).

This improvement, while positive, may be happening too slowly as evidenced by the

United States ranking of 12 out of 36 OECD nations in the share of adults ages 25 to 34

holding degrees according to the latest Organization for Economic Cooperation and

Development report (OECD, 2014). Similarly, South Korea has already passed the

United States' 2020 goal of 60% of the population attaining a postsecondary award, and

Japan and Canada are at 56% (American Council on Education [ACE], 2012).

International comparisons are not without problems. There is evidence suggesting that the data for these comparisons are questionable. Adelman (2009) in "*The Spaces Between Numbers: Getting International Data on Higher Education Straight*" suggested the United States and other countries are not able to benefit from educational attainment comparisons because the flaws are so significant. Criticisms raised include flawed degree completion data, counts of countries bachelor's degrees regardless of time to earn the degree, and various ratios in the data do not reflect significant changes in population trends or growth of educational opportunities making the ratios meaningless (Adelman, 2009). Particularly compelling is the criticism regarding degree completion comparing United States community colleges (where many students are not degree-seeking) with students in other countries that have institutions offering sub-baccalaureate awards, but that enroll only degree-seeking students (Adelman, 2009). Additional criticisms fault the United States Education Department for its collection methodology which is limited to first-time, full-time students that enroll in the fall semester and complete a degree at the same institution (Cohen et al., 2014). The National Student Clearinghouse and the American Council on Education collaborated on a study that followed not the institution, but the student to track degree completion and persistence (Cook, 2012). Cook (2012) presented data showing that first-time, full-time students at two-year public institutions have a 22% graduation rate leading students, parents, and policymakers to assume that 78% of students dropped out. When one looks at graduation from any institution and/or students still enrolled, however, the 22% jumps to 63%.

While international comparisons may be flawed, the need for America to produce more postsecondary award recipients is clear. Human capital (learned education and skill

sets that add economic value) is integral to the United States economic and social

wellbeing (Goldin & Katz, 2008). Goldin and Katz (2008) cited the lack of college

readiness as one of the key factors holding educational attainment back and threatening

America's human capital supply.

The Case for Increased College Readiness

At a time when the United States needs increased postsecondary credential

production the country struggles with an aging workforce and high school graduates who

are underprepared for the workforce or college (Crook, 2008; Sasser, 2010). While

unimaginable a generation ago, the quality of the United States workforce shows signs of

decline. As baby boomers exit the workforce, their replacements are no better educated

as witnessed by recent data showing Americans age 55 to 59 hold more advanced

postsecondary degrees than their 30 to 34 counterparts (Crook, 2008). The United States

high school graduation rates have rebounded to 80%, matching the peak experienced in

the late 1960s (Yettick & Lloyd, 2015). The disparity in graduation rates by state,

however, is large. For example, Iowa boasts a 90% graduation rate, while only 62% of

District of Columbia students graduated on time; three states—Arizona, Illinois, and

Wyoming—have experienced declines in their graduation rates from 2011 to 2013

(Yettick & Lloyd, 2015).

Improved high school completion is a must, but equally significant is the need for

high school graduates to be academically challenged and college-ready. ACT (2014)

reported that almost three quarters of college-bound students do not pass all four college-

readiness benchmarks (English, mathematics, reading, and science). As many as two

thirds of students entering community colleges today require some level of remediation

(Bailey, Jaggars, & Jenkins, 2015; Cohen et al., 2014). Similarly, Rose (2012) stated 35% to 40% of students attending state colleges and universities require at least one remedial course.

Secondary student preparedness is a key indicator of postsecondary completion. In a longitudinal research study focusing on high school and college curricula and academic performance culled from transcripts, Adelman (2006) found that students taking any remedial courses had degree completion rates at 48% compared to 70% for students with no remedial coursework. Adelman's findings point to serious issues in the secondary education system. The literature suggests that high school students are graduating with one set of criteria, only to enter college and encounter a different set of standards required to succeed (Conley, 2003; Venezia, 2006). Attempts to measure student learning in the U.S. public schools has been underway for two decades now with the focus on meeting specified content standards; however, only recently have states begun to adopt standards or policy with the goal of increasing college enrollment and success (Glancy et al., 2014). Secondary students are lulled into a sense of college readiness based on passing state testing standards and receipt of a high school diploma, but the evidence for most students is contrary. Educators and state policymakers can improve college readiness if they better align secondary and postsecondary standards. Venezia (2006, p. 16) wrote, "State policies send important signals to students about what they need to know and be able to do, to educators about what is important to teach and to researchers and policymakers about what students need."

Current college readiness levels indicate a systemic failure in the United States education system. Secondary and postsecondary standards must be aligned. Dual

enrollment is one solution that prepares high school students for college-level work by extending a bridge between secondary and postsecondary institutions.

College-Type or College-Level Courses in High School and College

Readiness. High school curriculum, more than academic standing and admission test scores, is the greatest predictor of postsecondary success (Adelman, 1999). Exposure to college-type or college-level courses is one way to increase the rigor for secondary students and prepare them for postsecondary work (Bailey & Karp, 2003; Hoffman, Vargas, & Santos, 2009). Programs designed to expose secondary students to college-type courses include Advanced Placement (AP), International Baccalaureate (IB), and college-level courses in Middle College High School, and basic dual enrollment partnerships. Community colleges have historically led this effort, and today 98% of public two-year schools have secondary students enrolled in college courses (Hoffman et al., 2009). Dual enrollment programs consisting of partnerships between colleges and high schools that award dual credit have become increasingly popular due to cost effectiveness and flexibility in administration of the programs (Borden et al., 2013; Kisker, 2006).

History of Secondary and Postsecondary Integration

The idea of integrating secondary and postsecondary institutions is not new. Most efforts in this vein have focused on integration between the last years of secondary schooling and the first two years of postsecondary education. The advent of community colleges, first known as junior colleges, began in the late nineteenth century. Often located in high schools, most junior colleges operated as extensions of secondary schools until the early 1960s (Cohen & Brawer, 2008). Leonard Koos, an influential professor of

secondary education at the Universities of Minnesota and Chicago, developed the 6-4-4 plan of public school organization which was one of the earliest attempts to integrate secondary schooling and the first two years of postsecondary education (Koos, 1946).

Early proponents of the junior college, President William Rainey Harper of the University of Chicago, and organizations like the American Association of School Administrators saw the last two years of high school and first two years of college as similar in purpose (Kisker, 2006). Many scholars, including Koos, supported and expected that the first two years of college would be folded into the high school experience. The 6-4-4 plan advocated by Koos pushed for a realignment of the nation's public education system. Elementary school would make up years one through six, junior high school years seven through 10, and junior college 11 through 14. Koos (1946) argued that the 6-4-4 model would reduce the overlap in curricula and cut administrative and facilities cost in half by having dual-level assignment of administrative functions and dual-level use of instruction facilities such as classrooms and libraries. The 6-4-4 plan never gained acceptance, and only ten public school systems were operating under this model by 1941 (Kisker, 2006).

Three primary factors contributed to the failure of the 6-4-4 model. First, America was experiencing changing societal attitudes toward college. Walter Eells, an influential professor of education at Stanford noted that the thought of attending college had moved from an ambition to an expectation for many Americans (Wechsler, 2001). Educational leaders may have seen the first two years of high school and college as similar, but the American public did not. Eells (1931, p. 728) said the idea of a four-year junior college goes against the "psychology of the American people." Second, the

passing of the Servicemen's Readjustment Act of 1944 (P.L. 78-346) following World

War II opened access for vast numbers of Americans, many wanting to earn a four-year

degree (Altschuler & Blumin, 2009; Goldin & Katz, 2008). Finally, state policies

legislating separate governance and funding arrangements for secondary and

postsecondary education deterred integration of high school and the first two years of

college as proposed in the 6-4-4 plan (Kisker, 2006; Mokher & McLendon, 2009).

       With the post-World War II economic growth and increased demand for four-year

degrees, college preparatory efforts evolved to prepare secondary students for

baccalaureate-granting colleges and universities. In 1955, the College Board introduced

the Advanced Placement (AP) program that allows secondary students to take AP courses

as part of the high school curriculum and potentially earn credit by taking end-of-course

exams (Bailey & Karp, 2003). Colleges may or may not award college credit for courses

based on the student's AP exam score. Likewise, the International Baccalaureate (IB)

program introduced in the 1960s is a comprehensive curriculum designed to prepare

students for a liberal arts education. Like the AP program, students in IB programs must

pass end-of-course exams and then petition colleges to award college credits based on

test cutoff scores (Bailey & Karp, 2003). Both the AP and IB programs target high-

achieving students with postsecondary aspirations. In 2012, more than one million

United States public high school graduates completed AP exams with 61% receiving

scores that signal college readiness in a subject and may be accepted for college credit

(College Board, 2014).

       It would not be until the 1970s that another significant effort would be put forth to

integrate the community college and high school—the Middle College High School.

Created to assist at-risk students, Middle College High Schools were a response to the

nation's increasing secondary dropout rate (Kisker, 2006; Jordan, Cavalluzzo, & Corallo,

2006). Middle College High Schools offer both secondary and postsecondary curricula

in a flexible manner that allows students to progress at their pace (Wechsler, 2001). The

first Middle College High School opened in 1974 at LaGuardia Community College.

Middle College High Schools numbered 30 in 2000 and enjoy exceptionally high

graduation rates (90%) and college-going rates (75%) (Kisker, 2006; Wechsler, 2001).

Middle College High Schools, like the 6-4-4- model, struggled to grow because of

disparate regulations for secondary and postsecondary institutions (Wechsler, 2001).

     Unlike the previous more complex models, basic dual enrollment uses

intergovernmental agreements between high schools and colleges to setup and guide

programs (Kisker, 2006). In 1976, California was the first to create policy establishing

dual enrollment programs (Mokher & McLendon, 2009). Dual enrollment expanded

considerably since the 1990s and today 47 states have enacted policies directing these

programs (Borden et al., 2013). Dual enrollment programs take many different forms.

Some programs occur on college campuses while others operate at the high schools.

Dual enrollment faculty may be full-time college professors or high school teachers

credentialed as adjuncts. What remains common in all dual enrollment programs is that

students receive credit from both the high school and college. Dual enrollment is

differentiated from AP and IB programs in that the former earn college-level credit while

the latter are college-type courses. Once restricted to high achieving students, dual

enrollment programs are now enrolling middle achieving students to increase academic

rigor and instill postsecondary aspirations in students who may not have seen themselves as college bound (Karp, Calcagno, Hughes, Jeong, & Bailey, 2008).

Benefits and Limitations of Dual Enrollment

    Benefits. Borden, Taylor, Park, and Seiler (2013) completed an extensive review of dual enrollment state policy and best practices. From their descriptive analysis, Borden et al. (2013) identified four "promises" attributed to dual enrollment programs: Enhance and Diversify High School Curricula, Increase Access to Higher Education, Improve High School and College Relationships, and Shorten Time to Degree and Lower the Cost of College.

    Dual enrollment is credited for improving course options for students, especially in rural areas. As public schools struggle with state divestment, dual enrollment is one pathway for high schools to access expanded and rigorous curricula for prepared students. State policy can play an important and active role in enhancing high school curricula. Today, 16 states require dual enrollment be offered to high school students, while another 14 states have a policy that highly encourage dual enrollment opportunities (Borden et al., 2013).

    Still predominantly focused on academically well-prepared students, dual enrollment is slowly integrating moderately-prepared students, and results have been positive (Karp et al., 2008). Recent studies have shown that so-called middle-achieving students can benefit from these programs and that participation can improve the students' college aspirations (Borden et al., 2013; Karp et al., 2008; Kim, 2012). State policy often determines whether students can access dual enrollment programs. According to Borden

et al. (2013), state policy often sets the access standards in terms of high school grade

level, GPA requirements, standardized test scores, and course prerequisites.

High school students are not the only beneficiary of dual enrollment benefits.

There is growing literature that suggests that dual enrollment facilitates collaboration

between secondary and postsecondary institutions (Borden et al., 2013; Kisker, 2006).

Borden et al. (2013) cited state policies in Kansas and Arizona that require high schools

and college faculty to establish advisory councils, establish evaluative processes, and

provide professional development opportunities to credentialed high school instructors

teaching as dual enrollment adjuncts.

The literature on dual enrollment suggested that program participation reduced

both the time and cost to a college degree; however, most of the evidence is anecdotal

(Allen & Dadgar, 2012). Borden et al. (2013) suggested that the critical factor between

dual enrollment and time and cost to degree has to do with how well the programs

prepare high schools students to be ready for subsequent college courses once they

matriculate from high school to college.

> Ultimately, taking fewer college courses to reduce the cost may be less important
>
> financially than shortening the time to degree: student loan debt burden is more
>
> substantially impacted by taking longer to complete (and borrowing to cover
>
> living expenses) than by tuition costs. (Borden et. al., 2013, p. 39)

A number of factors contribute to rising costs and time to a college degree.

Complete College America (2014) reported that unnecessary degree requirements,

poorly designed degree paths, and remedial courses are key factors driving up the time

and cost of obtaining a college degree. At public two-year colleges, it is estimated each

extra year costs students nearly $15,000 more in tuition, fees, and room and board;

almost $23,000 for each additional year at public four-year schools (Complete College

America, 2014). In addition to college-related costs for each extra year, students have

opportunity costs in the form of lost wages. Zeidenberg (2012) researched excess credits

earned by associate's degree completers in one state's community college system and

found that 12% of earned credits did not contribute to degree requirements at an

estimated cost of $6 million per year. It is important to note that Zeidenberg's analysis

excluded failed or dropped courses and remedial coursework. Similarly, a recent

Education Department study found that the average bachelor's degree recipient earned

18.4 excess credits and paid for 20.3 credits for failed, repeated, or withdrawn

coursework (Douglas-Gabriel, 2014). There is a growing body of evidence that dual

enrollment improves postsecondary academic outcomes that align with the Nation's call

for college accountability and increased degree production.

Recent studies have found positive outcomes for students participating in dual

enrollment including increased high school graduation rates, increased postsecondary

aspirations, reduced need for remediation, and improved college persistence and

completion rates (Allen & Dadgar, 2012; An, 2015; Hoffman et al., 2009; Karp et al.,

2008; Swanson, 2008). Adelman (1999, 2006) argued for dual enrollment type programs

as a method of increasing rigor for high school students and preparing students for

postsecondary studies. Research shows that momentum points such as earning 20 credits

in the first year of college significantly enhance a student's chance of completing a

postsecondary degree (Adelman, 1999; Swanson, 2008). Dual enrollment offers students

a head start on these 20 credit hours by allowing students to earn college credits while

still enrolled in high school. Recent research by Allen and Dadgar highlighted the results

from one of the country's largest dual enrollment programs.

Allen's and Dadgar's (2012) research on New York City's College Now program

has been cited as one of the most robust and rigorous studies of dual enrollment. The

study employed a quantitative, non-randomized pretest and posttest group design. The

sample included 22,962 first-time freshmen who within 15 months of graduating from a

New York City public high school enrolled in a City University of New York (CUNY)

college in fall 2009. Two groups were evaluated: group one consisted of CUNY first-

time freshmen who completed at least one dual enrollment course; group two, the control

group, consisted of CUNY first-time freshmen who never enrolled in a dual enrollment

course. The authors utilized an extensive set of demographic and prior achievement

control variables in conducting a series of regression analyses. Additionally, a difference

in differences analysis was conducted to account for unobserved differences among

College Now participants and nonparticipants that were not captured by the study's

demographic and prior academic achievement variables.

The initial regression results indicated that completing one or more dual

enrollment courses is associated with significant gains in college credit attainment, higher

college GPA, and increased retention rates. A subsequent regression analysis employing

the difference in differences (DID) framework resulted in similar findings to the initial

regression results. Credit attainment and GPA outcomes were significantly higher for

College Now participants; however, no effect for improved retention was detected.

Results suggested that College Now program impacts were not driven by prior academic

achievement or differences in eligibility and high school attended. While the College

Now program results are encouraging, the lack of uniformity across the country in dual enrollment programs leaves room for concern.

Proponents have suggested that dual enrollment can benefit non-traditional students. Current research has indicated that low-income students benefit from dual enrollment, and first-generation students see an increase in degree attainment compared to non-participants (An, 2013).

Limitations. As well as identifying promising aspects of dual enrollment programs, Borden et al. (2013) cited potential pitfalls. Potential limitations to dual enrollment included inadequate rigor to prepare students for college, dual enrollment instructor qualifications, lack of an authentic college experience, and transferability of dual enrollment coursework (Borden et al., 2013).

One of the most common concerns surrounding dual enrollment is the question of rigor and whether dual enrollment courses truly represent college coursework. Borden et al. (2013) in their review of state policies on dual enrollment, said it was common to find references to course quality. However, there is a lack of research indicating that dual enrollment courses are equivalent to traditional college courses. Closely related is the issue of dual enrollment course instructor qualifications—the majority of these instructors are high school teachers credentialed as adjunct community college faculty. Most state policies rely on the postsecondary institutions regional accreditation requirements for faculty qualifications (Borden et al., 2013).

Additionally, there is the concern that offering college courses at the high school does not provide an authentic college experience (Karp, 2012; Smith, 2007). What is the holistic impact on learning when dual enrollment students do not have access to on-

campus experiences and services, or interaction with a diversity of college-level students?
Again, little to no research has addressed this facet of dual enrollment.

The last potential pitfall centers on course transferability. Critics and even some
supporters of dual enrollment worry rapid growth and the admittance of students who
may not be ready (middle-achieving) diminish the rigor and legitimacy of dual credit
courses, and that postsecondary institutions will refuse transfer credits from these courses
(Mangan, 2016). Only a handful of states including Arkansas, Indiana, and Kentucky
include explicit language in state statute that ensures transferability of dual enrollment
courses among the state's higher education institutions (Borden et al., 2013). The
researcher's review of the dual enrollment literature did not uncover any examples where
transfer institutions rejected courses because they were earned through dual enrollment.

Research on the effectiveness of dual enrollment is at an early stage. Given the
rapid growth and variability in dual enrollment offerings from state to state, it is difficult
to make any conclusive statements at this time. The chief criticism in the literature is the
failure to account for factors outside the dual enrollment programs like student
motivation, prior academic work, economic status, and student characteristics (Bailey &
Karp, 2003; Karp et al., 2008). Despite the noted shortcomings, there is a preponderance
of evidence warranting further investigation into dual enrollment programs and their roles
in postsecondary readiness.

**Dual Enrollment from a Theoretical Perspective: A Remaining Need in the
Literature**

Absent from most research on dual enrollment is an explicit theoretical
framework. Conclusively determining how or why dual enrollment programs affect

students is challenging. Although some research has occurred in dual enrollment

outcomes, there remains a need to understand how these programs affect learners. To do

that, a conceptual model or theoretical framework that explains the relationship between

important variables and constructs is needed (Roberts, 2010).

The literature indicates there are two theoretical models that may be relevant to

elucidating how dual enrollment programs support students in making a successful

transition from high school to college. Anticipatory socialization and validation theory

are two socialization/change theories that hold promise. Descriptions of both anticipatory

socialization and validation theory are presented along with an explanation of how each

theory is hypothesized to affect the outcomes of this study.

Anticipatory Socialization

Merton (1968) in his work on reference group behavior developed the conceptual

framework of anticipatory socialization. Anticipatory socialization is "the process or set

of experiences through which individuals come to anticipate correctly the values, norms,

and behaviors they will encounter in a new social setting" (Pascarella, Terenzini, &

Wolfe, 1986, p. 156). Merton examined data from *The American Soldier* study to explain

how enlisted soldiers desiring to become officers would adopt the values and attitudes of

the reference group (officers) to which they aspired to join. Merton found that privates

who embraced and modeled the values and behaviors of the Army as enlisted men were

more likely to be promoted than those who did not (Merton, 1968). Furthermore, Merton

hypothesized that anticipatory socialization would ease the soldiers' adjustment to their

new officer status. It is important to note that for anticipatory socialization to serve a

positive function there must exist an accepting environment in the desired group (Merton,

1968). Karp (2012) and Pascarella et al. (1986) applied the theory of anticipatory

socialization to the transition of students from high school to college.

Anticipatory Socialization and Dual Enrollment Outcomes. Pascarella et al.

(1986) studied precollege orientation as a form of anticipatory socialization. An

intensive two-day orientation was designed to familiarize students with the expected

behaviors of the college and increase the student's knowledge of the institution's social

and academic programs (Pascarella et al., 1986). It was hypothesized that students

participating in the precollege orientation would be positively integrated into the campus

and function successfully in the new environment. The researchers found the orientation

had a considerable and significant positive effect on social integration and persistence

(Pascarella et al., 1986).

More recently, Karp (2006) and Swanson (2008) adapted the theory of

anticipatory socialization to dual enrollment. Karp (2006) argued dual enrollment

provides students with information about their ability to succeed in college by letting

them experience college expectations and take on the role of a college student while still

in high school. Swanson (2008) discussed anticipatory socialization as a conceptual

framework to explain dual enrollment's role in successfully transitioning students from

high school to college. Swanson found that dual enrollment participants were less likely

to delay entry into college and persisted at greater rates through the second year of

college than non-participating students (Swanson, 2008).

Validation Theory

Rendon's theory describes validation as "an enabling, confirming and supportive

process initiated by in- and out-of-class agents that foster academic and interpersonal

development" (Rendon, 1994, p. 44). Rendon maintains that the earlier validation from

college agents begins, the better, especially for non-traditional, at-risk students (Rendon,

2002). Students must feel a sense of academic and interpersonal validation before they

can become involved in the social and academic fabric of college life (Rendon, 2002).

Rendon (2002) contends that postsecondary institutions were originally designed to serve

the privileged; traditional students came to college with the social capital necessary to

succeed. In validation theory, faculty and staff are expected to initiate and take an active

role in assisting students with integration and affirming students as capable and valued

members of the institution (Rendon, 2002). Students who feel validated by their

institutions of higher learning have increased odds of academic success according to

validation theory (Rendon, 1994, 2002).

Validation theory is particularly relevant given the historic and rapidly changing

demographics in the United States. United States Census Bureau statistics showed that

85% of the U.S. population was White in 1960, while 11% were Black, 4% Hispanic, and

1% Asian (Wade, 2012). In 2013, Whites have declined to 63% while minority groups

(17% Hispanic, 12% Black, and 5% Asian) have increased as a proportion of the U.S.

population (United States Census Bureau, 2015). Taylor and Cohn (2012) reported by

2050 the Hispanic share of the population will nearly double, and the White population

will slide to 47% representing for the first time in U.S. history a minority majority. For

minorities and other non-traditional groups (first-generation, low-income, and disabled),

community colleges continue to be the primary choice to begin one's undergraduate

education (AACC, 2015; Cohen et al., 2014; Wood, 2012).

The United States has made great strides in racial and ethnic equality over the last half-century (Montalvo, 2013). Nonetheless, many non-traditional groups including Hispanics and Blacks continue to lag in educational attainment and socioeconomic status compared to their White peers (Gerald & Haycock, 2006).

> What is needed to transform these students is for faculty, administrators, and counselors to fully engage in the validation of students and to recognize that not all students can be expected to learn or to get involved in institutional life in the same way. (Rendon, 1994, pg. 51)

Students who feel validated by their institutions of higher learning have increased odds of academic success according to validation theory (Rendon, 1994, 2002). Once reserved for high-achieving students, dual enrollment programs are being expanded to encompass middle-achieving students. Kim (2012) found that midrange academic students allowed to participate in dual enrollment perform better than similar non-participants do when they matriculate to college.

Validation Theory and Dual Enrollment Outcomes. Rendon contends that nontraditional students are often less sure of their academic abilities, hence, requiring validation of their presence in higher education and academic competencies (Rendon, 2002). Community college students, the subjects of this research study, are more prone to be nontraditional students (Cohen et al., 2014). American Association of Community Colleges (AACC) data indicated community college students are likely to be first-generation, minorities, low-income, employed, and/or attend part-time compared to their peers beginning at four-year institutions (AACC, 2015 Fact Sheet; Cohen et al., 2014). Dual enrollment programs afford students early contact with college staff through

admissions, advising, and other student services and in class interaction with college

faculty. Dual enrollment provides an environment for students to experience

postsecondary validation that they may not receive from parents or peers.

Current Study: Utilizing Anticipatory Socialization and Validation Theory

Constructs to Examine Effects of Dual Learning

Postsecondary institutions in general and community colleges specifically have

advocated for open access as a means to increase educational attainment and produce a

skilled workforce (Cohen et al., 2014). With over 70% of recent high school graduates

attending postsecondary institutions, it is clear that the message of access has been

received by colleges and students alike (Kirst & Bracco, 2004). However, high rates of

remediation and low rates of degree completion suggest that access to higher education

alone is not the answer. Researchers argued that high schools need to do more to

emphasize preparation for college-level work (Adelman, 2006; Kirst & Bracco, 2004).

Dual enrollment is one method by which high schools and colleges can both emphasize

preparation and allow students to experience college while still in high school. Dual

enrollment programs move beyond access by communicating the values and performance

expectations of postsecondary education to participants, a level of preparation that non-

participants likely did not receive. Using a nationally representative dataset with robust

demographic and academic variables, this current study used the lens of anticipatory

socialization and validation theory to address the research questions and test the study

hypotheses.

Research Questions and Hypotheses. The study addressed the following research questions:

1.   How do dual enrollment participants compare to non-participants in terms of bachelor's degree attainment for students who begin their postsecondary studies at a community college?

2.   How do dual enrollment participants compare to non-participants in terms of time to bachelor's degree attainment for students who begin their postsecondary studies at a community college?

3.   How do dual enrollment participants compare to non-participants in terms of loan debt incurred in obtaining a bachelor's degree, as measured by the total amount of Stafford, Perkins, and PLUS undergraduate loans, for students who begin their postsecondary studies at a community college?

This study tested the following hypotheses:

Hypothesis 1: Degree attainment will be significantly higher for students who were dual enrollment participants compared to non-dual enrollment participants.

Hypothesis 2: Time to bachelor's degree will be significantly shorter for students who were dual enrollment participants compared to non-dual enrollment participants.

Hypothesis 3: The loans incurred in obtaining a bachelor's degree will be significantly less for students who were dual enrollment participants compared to non-dual enrollment participants.

In relation to the study's research questions and hypotheses, if dual enrollment and the anticipatory socialization experience it provides affect students' expectations and skills required to be successful in college, then one would expect that dual enrollment

participants are significantly more likely to attain a bachelor's degree than non-dual

enrollment participants. In addition to degree attainment, dual enrollment gives students

experience in navigating college and a head start on college credit completions. Hence, it

is hypothesized that dual enrollment participants will earn their bachelor's degree in less

time than non-participants. Moreover, it is hypothesized that this decreased time to

degree will allow graduates to enter the workforce earlier and avoid lost opportunity costs

that result with college attendance. As a result, dual enrollment students should have

significantly lower loan amounts incurred in obtaining a bachelor's degree compared to

non-dual enrollment participants.

Likewise, given this study's population of students beginning their postsecondary

studies at a public community college, Rendon's validation theory is another explanation

of how dual enrollment programs could positively influence students' postsecondary

success. Relative to the three research questions put forth in this study, one would expect

dual enrollment participants who experienced early postsecondary validation to be better

socially integrated and significantly more likely to attain a bachelor's degree when

compared to non-participants. Similarly, being validated as college-capable, dual

enrollment students should experience decreased time to a bachelor's degree as measured

in months and consequently have significantly reduced loans incurred in obtaining a

bachelor's degree compared to non-participants.

Anticipatory socialization and validation theories represent two potential

explanations of how dual enrollment programs prepare high school students to be

successful in college. Dual enrollment programs not only provide students with college-

level work experience, but also provide socialization practice and insights into

postsecondary mores, values, and norms. Students also experience early and direct

contact with college staff and faculty that validation theory postulates will enable

nontraditional students to effectively transition from high school to college. Linking each

of these theories to the study's population and research questions will assist in assessing

the mechanisms that dual enrollment programs contribute to students' college readiness

and will be revisited in Chapter 5.

Conclusion

Technology and globalization have reshaped the American workplace. The skill

sets required in the new knowledge economy will increasingly require postsecondary

training. To remain economically competitive, the U.S. must raise the educational

attainment level of its workforce. One impediment to increasing educational attainment

levels is the lack of college readiness for many recent high school graduates. A review of

the extant literature on dual enrollment documents how these programs can prepare

students both socially and academically to be successful in college. However, gaps

remain in the literature. Policymakers and dual enrollment proponents advocate that dual

enrollment programs reduce the time to and cost of a college degree for students and

taxpayers alike. This study proposes to advance secondary and postsecondary educators

knowledge of dual enrollment programs by addressing these specific gaps in the

literature. Chapter 3 provides an explanation of the data source, methodology, research

design, and analysis used for this study.

CHAPTER 3

METHODOLOGY

The purpose of this study was to investigate the effect of dual enrollment on students' bachelor's degree attainment, and the impact on students' time and cost of attaining their degree. This quantitative study used a national sample of recent high school graduates to compare dual enrollment participants and non-dual enrollment participants in their efforts to attain a bachelor's degree. Additional independent variables included students' race, gender, socio-economic status (SES), first generation status, high school GPA, highest high school mathematics, pre-college credit dosage, Advanced Placement (AP), ACT/SAT scores, and college academic intensity.

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   Hypothesis 3: The loans incurred in obtaining a bachelor's degree will be significantly less for students who were dual enrollment participants compared to non-dual enrollment participants.

Research Design

   Using an *ex post facto* data source, this study employed a causal comparative research design. While the causal comparative design lacks the random assignment component that makes true experimental designs the highest standard for causal explanations (Rossi, Lipsey, & Freeman, 2004) it is still more rigorous than correlation or pre-experimental designs (Nachmias & Nachmias, 1987). To adjust for selection bias and improve causal inference, the statistical method of propensity score matching (PSM) was utilized. Propensity score matching uses observable covariates to match the treatment (dual enrollment participant) and control (non-dual enrollment participant) groups and make them comparable (Rosenbaum & Rubin, 1983). Estimation of the propensity score and sample balance diagnostics are discussed in Chapter 4. Table 1 summarizes the study design and methods.

Table 1

Overview of Study Design and Research Methods

Research Questions	Dependent Variable	Independent Variable	Covariates	Analysis
R1	Bachelor's degree attainment (Yes/No)	Dual enrollment participation (Yes/No)	PS	Binary Logistic Regression
R2	Time to degree (in Months)		Pre-college credit dosage (enough credits to enter as a sophomore)	OLS Multiple Regression
R3	Loans incurred (Stafford, Perkins, PLUS loans taken in Dollars)		College attendance intensity (full- vs. part-time)	OLS Multiple Regression

Note. Propensity Score (PS) = race, gender, socioeconomic status, first generation status, h.s. GPA, AP participation, ACT/SAT scores, and highest h.s. mathematics course completed.

Dependent variables. Much of the research on dual enrollment and its relationship to postsecondary academic success has focused on short-term outcomes such as first-year persistence, first-year GPA, and credit accumulation (Allen & Dadgar, 2012; Karp, Calcagno, Hughes, Jeong, & Bailey, 2007). The goal for participants in the current study, however, is ultimately bachelor's degree attainment. Given the paucity of research on dual enrollment and bachelor's degree attainment (An, 2013), the dependent variable for research question 1 is bachelor's degree attainment. Similarly, both popular and scholarly literature on dual enrollment frequently cited reduced time to and cost of a degree as benefits or reasons for supporting dual enrollment programs (Cowan & Goldhaber, 2015; Jones, 2014; Karp et al., 2007). Nevertheless, there is an absence of

empirical research to support these claims (Borden et al., 2013). Thus, the dependent

variable for research question 2 is time to degree measured in months. For research

question 3, the dependent variable is loan amount incurred in obtaining a degree as

measured by Stafford, Perkins, and PLUS undergraduate loan amounts acquired.

Independent variable. The dichotomous independent or treatment variable for

this causal observation study was participation status in dual enrollment (earned college

credits while in high school or not).

Covariates. The rationale of selected covariates are separated into pre- and post-

treatment explanatory variables. The pre-treatment variables included race, gender,

socioeconomic status, first generation status, high school GPA, AP participation, highest

high school mathematics course completed, and ACT/SAT college readiness scores.

Dual enrollment participant status was regressed on the pre-treatment covariates to create

the propensity scores. Previous research has recommended or identified the background

variables of race, gender, socioeconomic status, and first generation status as important

covariates to control for when modeling the effects of dual enrollment on academic

success (An, 2015; Bailey, 2003; Karp et al., 2007; Karp, 2015). Adelman (2006) found

that highest high school mathematics course was one of the strongest predictors of

postsecondary degree attainment. Pretlow and Wathington (2013) included high school

setting as a control because research has indicated unequal access to dual enrollment

courses depending on the schools geographic location (city, suburb, town, rural). Jones

(2014) recommended using high school GPA when matching dual enrollment participants

to non-dual enrollment participants to reduce selection bias. Additionally, An (2015)

identified ACT scores as a valid pre-college control variable when studying the effects of

dual enrollment programs. Long and Kurlaender (2009) added that ACT or SAT scores

are strong indicators of baccalaureate degree intent and are particularly appropriate when

matching community college students. The study's post-treatment control covariates

follow.

Post-treatment covariates included pre-college credit dosage and college

attendance intensity. Ganzert (2010) found a positive correlation between the number of

dual enrollment courses completed and postsecondary graduation rates. Likewise, Giani,

Alexander, and Reyes (2014) reported that dual enrollment dosage was significantly

related to postsecondary outcomes. Researchers have reported that the subject of the dual

enrollment course is important when determining the impact on postsecondary success

(Speroni, 2011). Giani et al. (2014) found that vocational dual enrollment courses had

little impact on postsecondary degree completion, while academic courses such as

English, mathematics, and science significantly improved students' chances of degree

completion. Lastly, An (2006) reported that college attendance intensity was

significantly related to bachelor's degree attainment with full-time students

outperforming part-time students.

Data Source

Data for this study were provided by the U.S. Department of Education's National

Center for Education Statistics. Specifically, this study used the restricted version of the

BPS: 04/09. The target population for the BPS: 04/09 study was students who began

their postsecondary studies for the first time during the academic year 2003-2004 at any

institution in the United States or Puerto Rico (Wine, Janson, & Wheeless, 2011).

According to Wine et al. (2011), 16,684 students had adequate data to be classified as the

BPS: 04/09 study respondents. BPS: 04/09 comprises data files containing student-level

data collected from student interviews and transcripts, and supplemented by information

from government and administrative databases (Wine et al., 2011).

Participants

      Participants for this study are recent high school graduates who are first-time

college students beginning at a public community college during the 2003-2004 academic

year. In addition, students entering college with the intent to earn a bachelor's degree

were included in the study sample. Study participants and their academic outcomes were

tracked for six years (2003-2004 to 2008-2009) across all institutions attended in the

United States or Puerto Rico.

Data Analysis

      All data were analyzed using the statistical software, SPSS version 21. To reduce

selection bias, Rosenbaum and Rubin (1983) suggested the statistical method of

Propensity Score Matching (PSM). A logistic regression model regressing dual

enrollment participation status on the eight pre-treatment covariates was used to create

the predicted probability score (PS) to match the control group (non-dual enrollment

participants) to dual enrollment participants. Next, as recommended by Austin, (2009)

balance diagnostics were examined to ensure that the propensity score model was

adequately specified. The PSM sample was used for all the descriptive and causal

analyses. A detailed description of the matching methods and statistical assumptions are

presented in Chapter 4.

Assumptions

The principal assumption underlying this study is that bachelor's degree attainment—and the time to and cost of a degree—differ according to dual enrollment status (dual enrollment participant or not).

Data from the BPS: 04/09 are assumed accurate and complete with the exceptions noted in the limitations section. Inferential statistical tests met required distributional and independent observation assumptions to ensure valid analyses results.

Limitations

The BPS: 04/09 lacks specificity in its measurement of dual enrollment. Dual enrollment programs take many different forms. Some programs occur on college campuses, while others operate at the high schools. Others incorporate distance delivery through interactive television. Dual enrollment faculty may be full-time college professors or high school teachers credentialed as adjuncts. The BPS: 04/09 data do not distinguish between the different types of dual enrollment.

Although the BPS: 04/09 allows for differentiation between other types of pre-college transition programs such as Advanced Placement (AP) and International Baccalaureate (IB), it does not negate the fact that students may participate in multiple pre-college programs. Untangling the direct and indirect effects of these pre-college programs from dual enrollment is another limitation. For students participating in multiple pre-college programs, discerning the effect between the different program types is a limitation. In these cases, the findings may only be able to detect that pre-college programs have an effect or no effect on bachelor's degree attainment and time and cost to a degree.

Missing variables are another limitation. The literature suggested that high school setting (city, suburb, town, rural) was an important pre-treatment covariate. While high school setting was included in the initial study design, the variable was not available in BPS: 04/09. Likewise, two recommended predictor variables (dual enrolled credits and dual course type) that were to be derived from transcript data were not available. Pre-college credit dosage (enough early college credits to enter college as a sophomore-yes/no) was available as a proxy for the missing continuous variable, dual enrolled credits.

Another limitation of using BPS: 04/09 is that some of the data are self-reported through student interviews, and thus respondent bias is a potential concern. While not a unique limitation to this study, there may be unobserved covariates such as student motivation or family support that could influence the study outcomes.

Conclusion

The purpose of this study was to investigate the effects of dual enrollment on students' bachelor's degree attainment, time to a degree, and cost of a degree applying the conceptual framework of anticipatory socialization and validation theory. Using an *ex post facto* data source, the researcher employed the statistical method of propensity score matching to reduce selection bias and improve the validity of resulting causal inferences. The statistical analysis used logistic regression to address the research question of bachelor's degree attainment while ordinary least squares regression was used answer the questions of time to and cost of a degree. A strength of this study was its use of a nationally representative sample of college students. Nonetheless, there are limitations regarding the specificity of dual enrollment information collected and the

potential respondent bias that exists with survey data. Chapter 4 reports the study's

findings.

CHAPTER 4

FINDINGS

Given the rapid growth of dual enrollment programs across the United States, coupled with a shortage of empirical research to effectively inform the debate between proponents and critics of such programs, the purpose of this study was to address the influence of dual enrollment participation on bachelor's degree attainment, and time to and cost of a degree. The study examined a national sample of traditionally aged, first-time college students who began their postsecondary studies at a public community college in the academic year 2003-2004. The study tested the following hypotheses:

Hypothesis 1: Degree attainment will be significantly higher for students who were dual enrollment participants compared to non-dual enrollment participants.

Hypothesis 2: Time to bachelor's degree will be significantly shorter for students who were dual enrollment participants compared to non-dual enrollment participants.

Hypothesis 3: The loans incurred in obtaining a bachelor's degree will be significantly less for students who were dual enrollment participants compared to non-dual enrollment participants.

Data Set and Sample

For this analysis, the researcher used the Beginning Postsecondary Students Longitudinal Study (BPS: 04/09) from the U.S. Department of Education, National Center for Educational Statistics (NCES). The BPS: 04/09 had an unweighted study population of 16,684 first-time college students. Due to the complex sampling design and longitudinal nature of the BPS: 04/09, all analysis for this study used weighted data (WTB000) as recommended by NCES. The researcher employed propensity score

matching to improve comparability of study outcomes between dual enrollment and non-dual enrollment participants.

Propensity score matching (PSM) was conducted using Thoemme's (2012) PSM guidelines for the Statistical Package for the Social Sciences (SPSS) version 21. First, the researcher filtered the data to include only participants of interest for the study—first-time, traditionally aged (24 years or less) college students beginning their postsecondary studies at a public community college with the intent of earning a bachelor's degree. Using weighted data as recommended by Ridgeway et al. (2015), the propensity score estimate was produced using a 1:1 nearest neighbor matching logistic regression algorithm using the pre-treatment covariates of gender, race, socioeconomic status, first-generation status, high school GPA, AP participation, highest high school mathematics course completed, and ACT/SAT scores. To improve matching, a caliper of .15 was imposed (tolerance allowable between two participants based on their estimated propensity score).

Before the PSM procedure, the control group (non-dual enrollment) had 834,945 students, and the treatment (dual enrolled) had 180,585. After the PSM, the non-dual enrollment group had 131,316, while the dual enrollment group had 153,267. Balance diagnostic tests including standardized differences before and after matching (Figure 1) and a visual dot plot of standardized mean differences showed nearly no imbalance based on observed covariates and interactions among all covariates. The overall balance test indicated that the non-dual enrollment and dual enrollment groups were not statistically different, $\chi^2(38) = 20.107$, $p = .992$. Similarly, the multivariate imbalance test showed that the matched sample (.967) was smaller than the unmatched sample (.979) which

indicated that PSM improved the overall balance (Austin, 2009; Thoemmes, 2012).
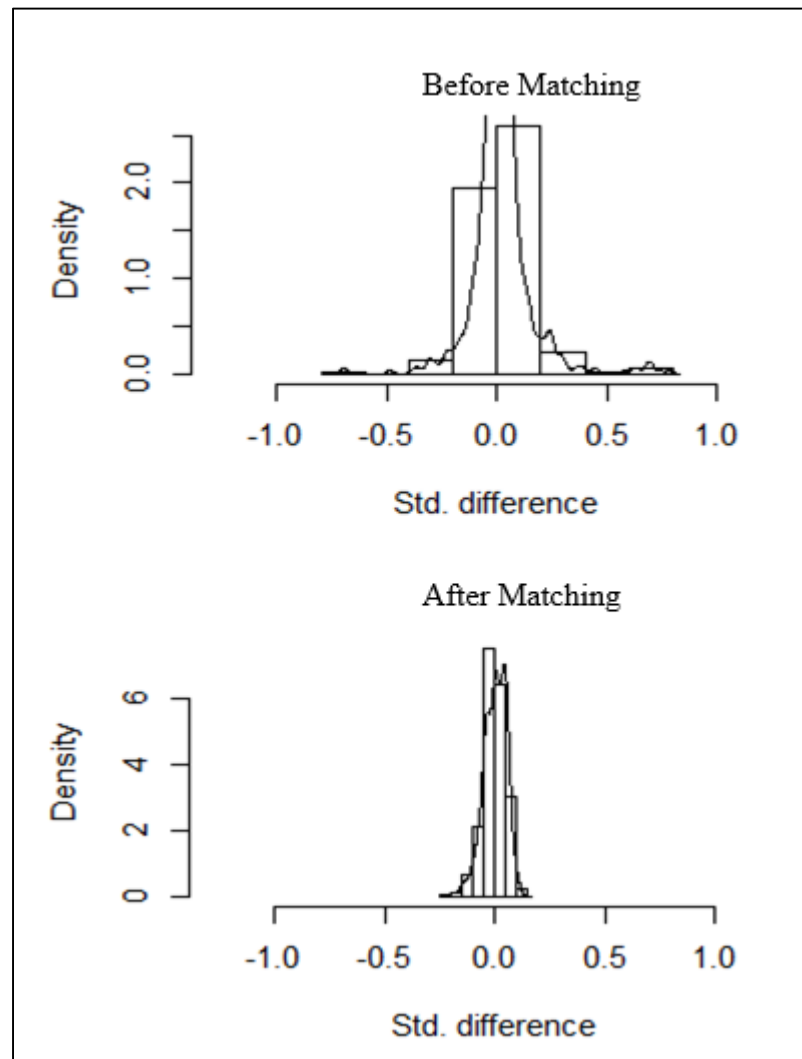
Figure 1. Improvement in standardized differences after propensity score matching procedure indicating balanced groups.

Morgan and Winship (2007) suggested that adjusting on the propensity score amounts to statistical randomization. Hence, the researcher can estimate the treatment effect (dual enrollment) by matching dual enrollment participants with observationally equivalent non-dual enrollment participants (based on propensity scores). Table 2 displays the pre-treatment covariate differences between the original and matched

samples. Across most pre-treatment characteristics, differences decreased in the matched

sample. Study participants on average were more likely to be female, White, first-

generation, and have a high school GPA between 3.0 and 3.4.

Table 2

Characteristics of First-Time College Students in the Original and Matched Samples

Characteristic	Original Sample			Matched Sample		
	Non-Dual	Dual	Diff	Non-Dual	Dual	Diff
n/%	834,945	180,585	654,360	131,316	153,267	-21,951
Female	52.3	53.1	-0.8	60.2	52.1	8.1
White	59.1	61.7	-2.6	62.9	60.7	2.2
Black or African American	14.0	10.3	3.7	10.7	11.9	-1.2
Hispanic or Latino	15.9	17.6	-1.7	18.0	17.9	0.1
Asian	5.2	6.2	-1.0	4.5	5.6	-1.1
American Indian/Alaska Native	0.7	0.5	0.2	0.0	0.4	-0.4
Native Hawaiian/Pacific Islander	0.3	0.2	0.1	0.3	0.1	0.2
Other	1.7	0.9	0.8	0.7	1.1	-0.4
More than one race	3.2	2.5	0.7	2.8	2.4	0.4
Economically Disadvantaged	42.9	41.6	1.3	46.4	39.4	7.0
First Generation	67.1	59.6	7.5	65.8	60.7	5.1
Pre-Calculus or higher while in high school	18.1	31.9	-13.8	21.6	31.2	-9.6
Median High School GPA Category	3.0-3.4	3.0-3.4	0.0	3.0-3.4	3.0-3.4	0.0
Avg. ACT/SAT Score	894.1	929.7	-35.6	917.2	923.7	-6.5
AP Credits accepted	0.8	14.9	-14.1	3.7	14.9	-11.2

Descriptive Statistics

The first level of analysis used descriptive statistics to portray the essential

features of the data and observe measures of central tendency, dispersion, and frequency.

Tables 3-5 summarize the study's dependent variables.

As shown in Table 3, dual enrollment participants (28.1%) earned a bachelor's

degree at close to double the percentage earned by non-dual enrollment students (15.9%).

A two-sample t-test between percentages showed that the difference in earning a

bachelor's degree between dual enrollment and non-dual enrollment students was

statistically significant ($p < .001$).

Table 4 shows that the majority of study participants did not receive student loans

to pay for their education. The use of student loans to pay for college was similar for

both non-dual enrollment (45.8%) and dual enrolled students (45.1%).

Table 3

Bachelor's Degree Attainment Within Six Years by Dual Enrollment Status

Bachelor's Degree	Non-Dual Enrollment ($n = 131,316$)	Dual Enrollment ($n = 153,267$)
	%	%
Yes	15.9	28.1
No	84.1	71.9

Table 4

Student Loan Status by Dual Enrollment Status

Student Loans	Non-Dual Enrollment (n = 131,316)	Dual Enrollment (n = 153,267)
	%	%
Yes	45.8	45.1
No	54.2	54.9

For study participants completing a bachelor's within six years, Table 5 displays the mean and standard deviation by dual enrollment status for time to a bachelor's degree and total student loans incurred. On average, dual students (M=58.42, SD=8.22) completed their degree faster than non-dual enrollment students (M=60.37, SD=8.35). An independent-samples t-test showed that the difference in months to bachelor's degree between the groups was statistically significant, M = 1.94, 95% CI [1.81, 2.08], t(40604) = 27.71, p < .001. Skewness measures showed no violation for either dual enrollment status group. Regarding student loan amounts incurred, dual students (M=12,301.91, SD=13,740.31) had slightly lower average loan amounts than non-dual enrollment students (M=12,820.86, SD=15,157.62). An independent-samples t-test showed that the difference in student loans incurred between the groups was statistically significant, M = 518.95, 95% CI [275.56, 762.34], t(37784) = 4.18, p < .001. The standard deviations for both the dual enrollment and non-dual enrollment groups show a high amount of loan variability. Total student loans are markedly skewed to the right for both the dual enrollment group (1.13) and non-dual enrollment group (1.45).

Table 5

Mean Time to Degree (in Months) and Student Loans (in Dollars) by Dual Enrollment Status for Students completing a Bachelor's Degree

Characteristic	Non-Dual Enrollment (*n* = 20,824)		Dual Enrollment (*n* = 43,035)	
	M	*SD*	*M*	*SD*
Months to Bachelor's Degree	60.37	8.35	58.42	8.22
Total Student Loans in Dollars	12,820.86	15,157.62	12,301.91	13,740.31

Table 6 presents study participant's college attendance patterns. The majority of students had mixed enrollment patterns where they sometimes attended school full-time and other terms part-time. Approximately one-third of both non-dual enrollment and dual enrollment students attended exclusively full-time. Attending college exclusively as a part-time student was the least common attendance pattern.

Table 6

College Attendance Intensity by Dual Enrollment Status

Characteristic	Non-Dual Enrollment (n = 131,316)	Dual Enrollment (n = 153,267)
Attendance Intensity	*%*	*%*
Exclusively Full-Time	34.3	32.6
Exclusively Part-Time	11.8	10.6
Mixed Full- and Part-Time	53.9	56.8

The measure, pre-college credit dosage (combination of dual enrollment credits and AP credits) are presented in Table 7. The vast majority of students in both groups did not attain enough credits in high school to enter college as a sophomore. For those students entering college as a sophomore, dual enrolled students did so at more than three

times the rate of non-dual enrollment students.

Table 7

Credits to Enter College as a Sophomore by Dual Enrollment Status

Characteristic	Non-Dual Enrollment ($n = 131,316$)	Dual Enrollment ($n = 153,267$)
Pre-College Credit Dosage	*%*	*%*
Sophomore Standing	3.7	14.9
Less than Sophomore	96.3	85.1

To summarize the preliminary analysis, balance diagnostics based on observed

pre-treatment covariates and descriptive statistics confirmed that the groups of interest,

non-dual enrollment and dual enrolled students are statistically similar. Independent-

samples t-tests showed the dual enrolled group having statistically significantly better

results on the study's outcome variables completing a bachelor's degree, time to degree

in months, and cost of degree as measured by student loans incurred. These descriptive

analyses, however, do not indicate causality or take into account confounding covariates.

The next section presents the binary logistic regression and ordinary least squares (OLS)

multiple regression analyses used to address the study's research questions.

Research Questions

Research Question 1: How do dual enrollment participants compare to non-

participants in terms of bachelor's degree attainment for students who begin their

postsecondary studies at a community college?

Hypothesis 1: Degree attainment will be significantly higher for students who

were dual enrollment participants compared to non-dual enrollment participants.

For research question 1, binary logistic regression was implemented. Leech,

Barrett, and Morgan (2015) recommended logistic regression when the dependent

variable is dichotomous. Before proceeding with the analysis, logistic regression

assumptions were verified. Unlike multiple regression, logistic regression has no

distributional assumptions (Leech et al., 2015). "However, observations must be

independent and independent variables must be linearly related to the logit of the

dependent variable" (Leech et al., 2015, p. 167). Observations are independent. The

linearity of the continuous variable, propensity score, was assessed using the Box-

Tidwell test. The propensity score variable violated the assumption that it be linearly

related to the logit of the dependent variable. A Bonferroni correction was applied using

all six terms in the model, but the propensity score was still found to violate the linearity

assumption. As a result, the propensity score variable was removed from the model.

There were three studentized residuals with values exceeding three standard deviations,

which were included in the analysis.

  With assumptions met, a binary logistic regression was performed to ascertain

whether the predictor variables: dual enrollment participation, college attendance

intensity, and pre-college credit dosage, significantly predicted whether a student earned

a bachelor's degree. The logistic regression model was statistically significant, $\chi2 =$

13791.750 $p < .001$, df = 3, indicating that when all three predictor variables were

considered together, they significantly predicted whether a student earned a bachelor's

degree or not.

  All three predictor variables were statistically significant: dual enrollment status,

college attendance intensity, and pre-college credit dosage (Table 8). Dual enrollment

participants had a 2.07 increased likelihood of earning a bachelor's degree compared to

non-dual enrollment participants. Attending college exclusively full-time was associated

with a 2.28 increased likelihood of earning a bachelor's degree. Earning enough college

credits in high school to enter college as a sophomore also increased the odds of earning a

bachelor's degree. Unlike R^2 in OLS regression, there is no widely agreed upon variance

explained measure for logistic regression (Garson, 2011). Garson (2011) stated that

pseudo-measures like Nagelkerke's R^2 are not true goodness of fit tests and

recommended classification rate as the preferable measure of effect size. The model

correctly classified 71.6% of cases in bachelor's degree attainment. As shown in Table 9,

prediction success had a sensitivity (events correctly predicted) of 42.2% and specificity

(non-events correctly predicted) of 80.1%. The c statistic was .80. The c statistic and

classification results indicated a moderate to medium effect size for the prediction model.

The logistic model statistically confirmed hypothesis 1, and more importantly, it

suggested a causal link between the dual enrollment predictors and bachelor's degree

attainment.

Table 8

Summary Binary Logistic Regression Analysis Predicting Likelihood of Bachelor's Degree Attainment

Variable	B	SE	Wald	p	Exp(B)
Dual Enrollment Participation	0.73	0.01	5595.69	.001	2.07
College Attendance Intensity	0.82	0.01	7537.13	.001	2.28
Pre-College Credit Dosage	0.33	0.02	497.83	.001	1.39

Table 9

Classification Table for Full Model: Dual Enrollment Participation, College Attendance Intensity, and Pre-College Credit Dosage

Observed		Predicted		
		Bachelor's Degree		Percentage Correct
		No	Yes	
Bachelor's Degree	No	176,770	43,954	80.1
	Yes	36,917	26,943	42.2
Overall Percentage				71.6

Note. The cut value is .270

Research Question 2: How do dual enrollment participants compare to non-participants in terms of time to bachelor's degree attainment for students who begin their postsecondary studies at a community college?

Hypothesis 2: Time to bachelor's degree will be significantly shorter for students who were dual enrollment participants compared to non-dual enrollment participants.

For research question 2, ordinary least squares (OLS) multiple regression was chosen. Leech et al. (2015) stated that OLS multiple regression is appropriate for models with continuous dependent variables. Preceding the analysis, assumptions for multiple regression were checked. As assessed by a Durbin-Watson statistic of 1.816, there was independence of observations (uncorrelated errors). No outliers were found as evidenced by no standardized residuals greater than three standard deviations, no leverage values greater than 2.0, and no values for Cook's distance above 1.0. A visual inspection of the plot of studentized residuals by the unstandardized predicted values showed homoscedasticity (linear relationship exists between the dependent variable and independent variables collectively). The assumption of normality was confirmed by

visual inspection of the standardized residual histogram and Normal P-P Plot. High

tolerance values indicated no evidence of multicollinearity.

An OLS multiple regression was run to predict time to bachelor's degree based on

the best linear combination of dual enrollment participation, college attendance intensity,

pre-college credit dosage, and propensity score. The multiple regression model was

statistically significant, $F(4, 63855) = 1141.145$, $p < .001$, indicating that when all four

predictor variables were considered together as a whole, they significantly predicted time

to bachelor's degree.

All four predictor variables were statistically significant: dual enrollment status,

college attendance intensity, pre-college credit dosage, and propensity score. The means,

standard deviations and intercorrelations are presented in Table 10. The beta weights

presented in Table 11 indicated that propensity score and dual enrollment participation

contributed the most to predicting time to a bachelor's degree. Participating in dual

enrollment reduced the time to degree by 1.86 months when holding constant the other

predictors. Counterintuitively, attending college exclusively as a full-time student

increased the time to degree by .39 months when holding constant the other covariates.

The model explained 6.7% (adjusted R^2) of the variance in time to a bachelor's degree.

According to Cohen (1988), this is a small effect. Hill, Bloom, Black and Lipsey (2007),

however, argued that standardized guidelines for measuring effect sizes such as Cohen's

d overlook context and potentially risk dismissing interventions that have substantive

significance, especially in the area of student academic achievement. Hill et al. (2007)

recommended determining effect size based on empirical benchmarks of comparison

such as policy-relevant gaps, and effect size results from similar research. The model

statistically confirmed hypothesis 2. The effect size is modest and represents practical

significance.

Table 10

Means, Standard Deviations, and Intercorrelations for Time to Bachelor's Degree (in Months) and Predictor Variables

Variable	*M*	*SD*	1	2	3	4
Time to Degree	59.60	8.31	-.11**	-.02**	-.01**	-.23**
Predictor Variable						
1. Dual Enrollment Participation	0.67	0.47	—	.04**	.21**	.00
2. College Attendance Intensity	0.47	0.50		—	-.14**	.01
3. Pre-College Credit Dosage	0.12	0.33			—	-.15**
4. Propensity Score	0.30	0.23				—

Note. **$p < .01$.

Table 11

Multiple Regression Analysis Summary for Variables Predicting Time to a Bachelor's Degree (in Months)

	B	*SE_B*	β	*p*
Dual Enrollment Participation	-1.86	0.07	-.11	.001
College Attendance Intensity	0.39	0.06	.02	.001
Pre-College Credit Dosage	-0.63	0.10	-.03	.001
Propensity Score	-8.41	0.14	-.24	.001

Note. B = unstandardized regression coefficient; SE_B = standard error of the coefficient; β = standardized coefficient.

Research Question 3: How do dual enrollment participants compare to non-participants in terms of loan debt incurred in obtaining a bachelor's degree, as measured by the total amount of Stafford, Perkins, and PLUS undergraduate loans, for students who begin their postsecondary studies at a community college?

Hypothesis 3: The loans incurred in obtaining a bachelor's degree will be significantly less for students who were dual enrollment participants compared to non-dual enrollment participants.

Given the continuous dependent variable and its assumed linear relationship with the independent variables, OLS multiple regression was selected. The following assumptions for multiple regression were checked and met before beginning the analysis. Due to positive skewness and resulting heteroscedasticity, the dependent variable, student loans, was transformed (quadratic or $\sqrt{Y}$) and used in the analysis. There was independence of observations (uncorrelated errors) as assessed by a Durbin-Watson statistic of 2.016. Review of case diagnostics, leverage values, and Cook's distance indicated no significant outliers. A visual inspection of the plot of studentized residual by the unstandardized predicted values showed homoscedasticity (linear relationship exists between the squared dependent variable and independent variables collectively). The assumption of normality was checked by visual inspection of the standardized residual histogram and Normal P-P Plot. There was no evidence of multicollinearity as assessed by tolerance values.

Multiple regression was conducted to predict student loans incurred from dual enrollment participation, college attendance intensity, pre-college credit dosage, and propensity score. The multiple regression model statistically significantly predicted

student loan amount incurred, $F(4, 63855) = 727.501$, $p < .001$, suggesting that the

combination of predictor variables significantly predicted student loans incurred.

All four predictor variables were statistically significant: dual enrollment status,

college attendance intensity, pre-college credit dosage, and propensity score. The means,

standard deviations and intercorrelations are presented in Table 12. The beta weights

presented in Table 13 indicated that college attendance intensity and pre-college credit

dosage contributed the most to predicting student loan amounts. Not surprisingly,

attending college exclusively full-time reduced the student loan amount when controlling

for the other predictors. Having a large number of early college credits (enough to enter

college as a sophomore) increased the student loan amount when controlling for the other

predictors. Due to the squaring of the dependent variable (student loans), meaningful

interpretation of the regression results required transforming the unstandardized beta

coefficients. Table 14 depicts the transformation process, and resultant predicted student

loan amount by way of example. The model explained 4.4% (adjusted R^2) of the

variance in student loans incurred. Similar to hypotheses 2, the regression model

statistically confirmed hypothesis 3, but the low effect size indicated caution should be

used when interpreting the practical significance of the relationship between the dual

enrollment predictors and student loans incurred.

Table 12

Means, Standard Deviations, and Intercorrelations for Student Loans Incurred (in Dollars Squared) and Predictor Variables

Variable	M	SD	1	2	3	4
Student Loans Incurred [a]	84.58	72.92	-.01	-.16**	.14**	.02**
Predictor Variable						
1. Dual Enrollment Participation	0.67	0.47	—	.04**	.21**	.00
2. College Attendance Intensity	0.47	0.50		—	-.14**	.01**
3. Pre-College Credit Dosage	0.12	0.33			—	-.15**
4. Propensity Score	0.30	0.23				—

Note. **$p < .01$.
[a] Mean of square root of student loans incurred.

Table 13

Multiple Regression Analysis Summary for Variables Predicting Student Loan Amount Incurred (in Dollars Squared)

Variable	B	SE_B	β	p
Dual Enrollment Participation	-4.21	0.62	-.03	.001
College Attendance Intensity	-20.99	0.57	-.14	.001
Pre-College Credit Dosage	30.13	0.90	.14	.001
Propensity Score	11.64	1.23	.04	.001

Note. B = unstandardized regression coefficient; SE_B = standard error of the coefficient; β = standardized coefficient.

Table 14

Multiple Regression Equation Transformation Example for Predicted Student Loan Amount Incurred (in Dollars)

	Student Loans in Dollars	Constant	DE	ACI	ECD	PS
Model with Dual	7996.29 =	(90.14	+ -4.21 * (1)	+ -20.99 * (0)	+ 30.13 * (0)	+ 11.64 (.30))^2
Model without Dual	8766.95 =	(90.14	+ -4.21 * (0)	+ -20.99 * (0)	+ 30.13 * (0)	+ 11.64 (.30))^2

Note. Model compares predicted loan amount between dual enrollment and non-dual enrollment participants when controlling for the other predictors. DE (1 = dual, 0 = non-dual enrollment), ACI (1 = exclusively full-time, 0 = mixed or part-time), ECD (1 = early college credits to enter as a sophomore, 0 = not enough credits to enter as sophomore), PS (propensity score).

Conclusion

The purpose of this study was to compare dual enrollment participants and non-participants who begin college at a public community college in the areas of (1) bachelor's degree attainment, (2) time to a bachelor's degree as measured by months, and (3) loans incurred in obtaining a bachelor's degree as measured by total student loan amount taken. The data source was the Beginning Postsecondary Students Longitudinal Study (BPS: 04/09). The analysis was conducted using the data subset of first-time, traditionally aged (24 years or less) college students beginning their postsecondary studies at a public community college with the intent of earning a bachelor's degree. To reduce selection bias, and create equal treatment (dual enrolled) and control (non-dual enrolled) groups, the statistical method of propensity score matching was used.

Examining demographics, study participants were more likely to be female, White, first-generation, and have a high school GPA between 3.0 and 3.4. Frequencies

and independent-samples t-tests showed statistically significant differences between the groups with dual enrollment participants attaining bachelor's degrees at a higher rate, a reduced time to degree, and lower student loan amounts compared to non-dual enrollment students. Although statistically significant differences were found between dual enrollment and non-dual enrollment participants, the tests do not infer a causal relationship.

The study addressed three research questions using binary logistic regression (question 1) and multiple regression (questions 2 and 3) analyses.

1.   How do dual enrollment participants compare to non-participants in terms of bachelor's degree attainment for students who begin their postsecondary studies at a community college?

2.   How do dual enrollment participants compare to non-participants in terms of time to bachelor's degree attainment for students who begin their postsecondary studies at a community college?

3.   How do dual enrollment participants compare to non-participants in terms of loan debt incurred in obtaining a bachelor's degree, as measured by the total amount of Stafford, Perkins, and PLUS undergraduate loans, for students who begin their postsecondary studies at a community college?

The regression models for each of the three research questions were statistically significant. Moreover, in each model all the independent predictors were significant, p <.001. Question 1 examined the likelihood of earning a bachelor's degree, and the classification table correctly classified 71.6% of cases with a sensitivity (events correctly predicted) of 42.2% and specificity (non-events correctly predicted) of 80.1%. Questions

2 and 3 were modest to low predictor models with adjusted R^2s of 6.7% and 4.4%

respectively.

CHAPTER 5

DISCUSSION

This chapter abridges the study's various components, findings, and recommendations. Discussed first is the educational context that encouraged this research. The next section restates the research purpose and questions. Following is a summary of the methodological approach, study limitations, and discussion of the study's major findings. The ensuing section presents implications for practice for policymakers, secondary and postsecondary educators, and students and their families grounded on the study's findings. Addressed next are recommendations for future research. The chapter ends with the researcher's concluding remarks.

Context

Dual enrollment programs have grown significantly in recent years. Borden et al. (2013) reported a 75% increase in dual enrollment between the 2002-2003 academic year and the 2010-2011 academic year with enrollment now exceeding two million students. Dual enrollment programs take many different forms (Karp & Hughes, 2008). Some programs occur on college campuses while others operate at the high school. Dual enrollment faculty may be full-time college professors or high school teachers credentialed as adjuncts. What remains common in all dual enrollment programs is that students receive credit from both the high school and college.

Basic dual enrollment uses intergovernmental agreements between high schools and colleges to set up and guide programs. In 1976, California was the first to create policy establishing dual enrollment programs (Mokher & McLendon, 2009). Dual enrollment expanded considerably in the 1990s, and today 47 states have enacted policies

directing some aspect of these programs (Borden et al., 2013; Karp et al., 2008). Dual

enrollment is differentiated from AP and IB programs in that the former earn college-

level credit while the latter are college-type courses. Once restricted to high achieving

students, dual enrollment programs are now enrolling middle-achieving students to

increase academic rigor and instill postsecondary aspirations in students who may not

have seen themselves as college bound (Karp et al., 2008). Another impetus behind dual

enrollment growth is the belief that these programs improve college readiness.

Secondary student preparedness is a key indicator of postsecondary completion.

ACT (2014) reported that almost three quarters of college-bound students do not pass all

four college-readiness benchmarks (English, mathematics, reading, and science). As

many as two thirds of students entering community colleges today require some level of

remediation (Bailey et al., 2015; Cohen et al., 2014). Dual enrollment is one practice that

educators and state policymakers can implement to improve college readiness by

enhancing curriculum and clarifying the alignment of secondary and postsecondary

standards (Venezia, 2006). Reducing the time and cost of obtaining a college degree is

another benefit attributed to dual enrollment (Borden et al., 2013; Karp et al., 2007).

There is little debate that college affordability is a concern for students and their

families (Abel, 2014; Complete College America, 2014). With state disinvestment in

higher education, public two-year and four-year institutions have responded by increasing

tuition and fees over the last 30 years by 150% and 225% respectively (College Board,

2014). With rising college prices and stagnant wages, many Americans are wondering if

college is worth the cost. Related to college costs is the time it takes a student to obtain a

degree. Beyond tuition and fees, the expense of transportation, housing, and foregone

wages are related to the time it takes a student to complete a degree (Complete College America, 2014). Although bachelor's degrees are referred to as four-year degrees, the four-year graduation rates for bachelor's degree-granting institutions range from 19% to 36% (Complete College America, 2014).

Proponents of dual enrollment frequently cite shortened time to degree and reduced college costs as primary benefits of such programs. However, the case for such time and cost saving statements has not been convincingly established (Borden et al., 2013). There has been very limited empirical research on the effect of dual enrollment on the cost of a bachelor's degree. Prior research on the relationship between dual enrollment and time to degree has almost exclusively focused on single institutions or individual state systems (Karp et al., 2007; Westcott, 2009). Swanson (2008) is the only researcher to use a national dataset to examine the relationship between dual enrollment and time to degree. Swanson's research used the National Education Longitudinal Study of 1988 (NELS: 88). The current study utilized national data from the Beginning Postsecondary Students Longitudinal Study (BPS: 04/09) to evaluate the effect of dual enrollment on bachelor's degree attainment, time to degree, and cost of a degree for dual enrollment participants and non-participants beginning at a public community college.

Additionally, one of the chief criticisms in the dual enrollment literature is the failure of researchers to account for factors outside the dual enrollment programs like student motivation, prior academic work, economic status, and student characteristics (Bailey & Karp, 2003; Karp et al., 2008). The current study controlled for preexisting academic, socioeconomic, and demographic student characteristics.

Given the demand for increased educational attainment, rising college costs, and

the ubiquity of dual enrollment programs a study of the effects of dual enrollment with a national scope is merited. The study's findings provide insights to policymakers and practitioners who operate or are considering dual enrollment activities to improve students' college readiness. Furthermore, this study examined the outcomes through the theoretical lens of anticipatory socialization and validation theory. Interpreting the findings through these theories provides insights into how and why dual enrollment programs influence students and allows greater generalizability of the results.

Purpose Statement and Research Questions

The purpose of this study was to compare dual enrollment participants and non-participants who begin college at a public community college in the areas of (1) bachelor's degree attainment, (2) time to a bachelor's degree as measured by months, and (3) loans incurred in obtaining a bachelor's degree as measured by total student loan amount taken.

The study addressed the following research questions:

1. How do dual enrollment participants compare to non-participants in terms of bachelor's degree attainment for students who begin their postsecondary studies at a community college?

2. How do dual enrollment participants compare to non-participants in terms of time to bachelor's degree attainment for students who begin their postsecondary studies at a community college?

3. How do dual enrollment participants compare to non-participants in terms of loan debt incurred in obtaining a bachelor's degree, as measured by the total amount of Stafford, Perkins, and PLUS undergraduate loans, for students who begin their

postsecondary studies at a community college?

Review of Methodology

This causal comparative study used *ex post facto* data from the Beginning

Postsecondary Students Longitudinal Study (BPS: 04/09) to address the research

questions. The BPS: 04/09 is a nationally representative cohort of students who first

enrolled in postsecondary education in 2003-2004 and who were followed for six years.

This study was limited to traditionally aged (24 years or less) students who began their

postsecondary studies at a public community college with the intent to complete a

bachelor's degree. To adjust for selection bias and improve causal inference, the

statistical method of propensity score matching (PSM) was utilized. Propensity score

matching uses observable covariates to match the treatment (dual enrollment participant)

and control (non-dual enrollment participant) groups and make them comparable

(Rosenbaum & Rubin, 1983).

Much of the research on dual enrollment and its relationship to postsecondary

academic success has focused on short-term outcomes such as first-year persistence, first-

year GPA, and credit accumulation (Allen & Dadgar, 2012; Karp et al., 2007). The goal

for participants in the current study, however, is ultimately bachelor's degree attainment.

Given the paucity of research on dual enrollment and bachelor's degree attainment (An,

2013), the dependent variable for research question 1 is bachelor's degree attainment.

Similarly, both popular and scholarly literature on dual enrollment frequently cited

reduced time to and cost of a degree as benefits or reasons for supporting dual enrollment

programs (Cowan & Goldhaber, 2015; Jones, 2014; Karp et al., 2007). Nevertheless,

there is an absence of empirical research to support these claims (Borden et al., 2013).

Thus, the dependent variable for research question 2 is time to a degree measured in months. For research question 3, the dependent variable is loan amount incurred in obtaining a degree as measured by Stafford, Perkins, and PLUS undergraduate loan amounts acquired.

The dichotomous independent or treatment variable for this causal observation study was participation status in dual enrollment (student earned college credit in dual enrollment program while in high school or not).

The pre-treatment variables included race, gender, socioeconomic status, first-generation status, high school GPA, AP participation, highest high school mathematics course completed, and ACT/SAT college readiness scores. Dual enrollment participant status was regressed on the pre-treatment covariates to create the propensity scores.

Post-treatment covariates included pre-college credit dosage, college attendance intensity, and propensity score.

A combination of binary logistic and multiple linear regression was used to answer the research questions. All analyses used weighted data due to the BPS's complex study design.

Limitations

The BPS: 04/09 is the most current national data source for researchers interested in studying dual enrollment; nonetheless, there remain limitations. The data lacks specificity in its measurement of dual enrollment. Dual enrollment programs take many different forms. Some programs occur on college campuses while others operate at the high school. Others incorporate distance delivery through interactive television. Some focus on vocational coursework and others on academic. Not being able to distinguish

between the different types of dual enrollment potentially affects the findings for this study's outcomes.

The exclusion of student motivation variables like teacher or counselor's college aspirations for students, parent/child academic discussions, and peers' influence on postsecondary plans are limitations. The failure to collect students' high school transcripts is another shortcoming. The inclusion of these excluded variables in future national data collection efforts would facilitate and enhance future research.

Another limitation of using BPS: 04/09 is that some of the data are self-reported through student interviews, and thus respondent bias is a potential concern. Lastly, there may be unobserved or unknown covariates that could influence the study outcomes.

Major Findings and Relationship to the Literature

Research Question 1: How do dual enrollment participants compare to non-participants in terms of bachelor's degree attainment for students who begin their postsecondary studies at a community college?

The current study found dual enrollment participants were 2.07 times more likely to earn a bachelor's degree than the control group of non-dual enrollment participants. Likewise, attending college exclusively full-time was associated with an increased likelihood (2.28) of earning a bachelor's degree. While not as strong a predictor as dual enrollment participation and college attendance intensity, high pre-college credit dosage (enough hours to enter college as a sophomore) increased the odds of degree attainment by 1.39. The logistic regression model and all three individual predictors were statistically significant, $p < .001$. The effect size was moderate with the model correctly classifying 71.6% of cases in bachelor's degree attainment. Prediction success had a

sensitivity of 42.4% and specificity of 80.1%, which suggested that dual enrollment

participation and college attendance intensity add to our understanding of the factors that

explain bachelor's degree attainment, but also indicated that other components influence

degree completion. The findings are consistent with anticipatory socialization and

validation theories.

Anticipatory socialization developed by Merton (1968) and applied by Karp

(2006) and Swanson (2008), argued dual enrollment programs provide participants with

information and experiences essential for college success while students are still in high

school. These researchers assert dual enrollment improves students' college readiness.

The current study findings are aligned with previous research crediting dual enrollment

for facilitating collaboration between secondary and postsecondary institutions (Borden

et al., 2013; Kisker, 2006), and improving college persistence and completion rates

(Allen & Dadgar, 2012; An, 2015; Hoffman et al., 2009; Karp et al., 2008; Swanson,

2008). Regarding the modest positive benefits attributed to the intensity of dual

enrollment participation, the current study findings are similar to outcomes found by

Karp et al. (2007) for Florida dual enrollment students. The mix of dual enrollment

course offerings available to students could be one explanation of why attaining high pre-

college credit dosage had only a modest effect on degree attainment. High pre-college

credits are most effective when they align with the student's college major. Hence, some

dual credit classes such as vocational coursework may not apply to four-year college

degree requirements.

Similarly, the current study's population of students beginning their studies at a

public community college, are disproportionately at-risk (first-generation and low SES)

compared to their four-year college peers. Rendon's validation theory suggested early

college validation, such as that provided by dual enrollment programs, enhances students'

social integration and validates students as college-capable. Previous research has

suggested middle achieving students' participation in dual enrollment programs improves

students' college aspirations (Borden et al., 2013; Karp et al., 2008; Kim, 2012).

The results of this study align with the reported outcomes from other pertinent

studies that focused on bachelor's degree attainment. Westcott (2009) whose research

population of community college students was most similar to this study found that dual

enrolled students earned a larger number of bachelor's and advanced degrees than non-

dual enrollment students. Swanson (2008) found positive and statistically significant

outcomes for bachelor's degree attainment for dual enrolled students who do not delay

entry to college and who stop out no more than one semester in their first two years of

college. An (2013) examined low-SES students and found that dual enrollment had a

positive impact on increasing college degree attainment rates.

While a majority of dual enrolled students in the current study did not complete a

bachelor's degree, this should not be construed as a refutation of anticipatory

socialization and validation theories. Time to bachelor's degree completion was limited

to a six-year follow-up. Most community college students take more than six years to

complete any degree (Cohen et al., 2014; Complete College America, 2014). Also, the

current study does not control for the fact that dual enrollment programs take many forms

(some programs occur on college campuses while others operate at the high school, some

use full-time faculty, and others use high school teachers credentialed as adjunct

instructors). Given that both groups were statistically matched on eight observable pre-

treatment covariates and the significant findings that dual enrollment participants were two times more likely to earn a bachelor's degree than non-participants aligns with the conceptual framework of anticipatory socialization and validation theories.

Research Question 2: How do dual enrollment participants compare to non-participants in terms of time to bachelor's degree attainment for students who begin their postsecondary studies at a community college?

Proponents cite shorter time to degree as one of the primary benefits of dual enrollment programs. The regression model for research question 2 was statistically significant, $p < .001$. This study found that dual enrollment participation reduced the time to degree by almost two months (-1.86) when controlling for the other predictors. The findings also show lower time to degree for students at the higher end of the propensity scale (-8.41) and for those with enough credits to enter college as a sophomore (.-63). Counterintuitively, attending college exclusively as a full-time student increased the time to degree by .39 months. Within the scope of education research and the relevance of producing more baccalaureate recipients, the explained variance of 6.7% represents a practical but modest effect size. With the exception of the statistically significant full-time student negative finding, the results are consistent with anticipatory socialization and validation theories. Anticipatory socialization gives students experiences in navigating college and a jump-start on college credit accumulation. Similarly, if dual enrollment validates students as college proficient, one would expect these students to be better socially integrated, possibly leading to a shorter time to a bachelor's degree.

Reduced college and living expenses and the opportunity to enter the workforce

sooner are some of the benefits of completing a bachelor's degree in a shorter time.

Earlier research on the relationship between dual enrollment and time to a bachelor's

degree is both sparse and mixed. Swanson (2008) using a national sample found no

statistical difference in time to bachelor's degree between dual enrollment and non-dual

enrollment participants. Likewise, Menzel (2006) examined dual enrollment students'

perception of time saved in earning a bachelor's degree and found that students did not

perceive a shorter time to degree. A plausible explanation for why Menzel and Swanson

found no difference may be that dual students are well socialized and integrated to

succeed in college but make decisions to change majors or experience institutional factors

such as canceled courses that impact time to degree. Examining students beginning at

Virginia community colleges, Westcott (2009) found that dual enrollment participants

had statistically shorter time to bachelor's degree than non-participants did. The modest

effect size for the current study and the findings from previous research suggest that dual

enrollment participation on its own may not be sufficient for understanding the

mechanisms driving shorter time to degree attainment.

Research Question 3: How do dual enrollment participants compare to non-participants in terms of loan debt incurred in obtaining a bachelor's degree, as measured by the total amount of Stafford, Perkins, and PLUS undergraduate loans, for students who begin their postsecondary studies at a community college?

This final research question utilized student loan debt as a proxy for measuring

the cost of a bachelor's degree. Again, the regression model was statistically significant,

$p < .001$. Dual enrollment participation and attending college exclusively full-time were

found to reduce student loan debt. Having high early college credits (enough to enter

college as a sophomore), however, increased the student loan amount when controlling

for the other predictors. This finding was not consistent with the literature or the two

theories offered. The model explained 4.4% (adjusted R^2) of the variance in student loans

incurred. Hence, despite statistical significance, the low effect size makes for a tenuous

causal link between the dual enrollment predictors and the study outcome of the cost of a

degree as measured by student loans.

While the literature is rich with anecdotal evidence suggesting that dual

enrollment programs reduce the cost of a college degree, this is the first study to test this

hypothesis. These findings present the first empirical evidence that dual enrollment may

reduce the cost of earning a bachelor's degree, even though the explained variance was

low. There are many possible reasons why dual enrollment did not have a strong

explanatory effect on the cost of a degree as measured by student loan debt. Although

student loans incurred was the best proxy for college costs in this study, the findings may

have been different if actual college costs were used. Borden et al. (2013) suggested that

reducing the cost of a degree is less a function of tuition costs and more closely tied to

time to a degree where increased time is influenced by students borrowing to cover living

expenses. Previous research suggested that dual enrollment programs are often offered at

a reduced or no cost to high school students (Borden et al., 2013; Menzel, 2006;

Swanson, 2008). Anticipatory socialization theory would suggest that familiarizing

students with college costs and financial aid literacy, rather than just academic matters,

might have the effect of reducing student loan debt.

Implications for Practice

A highly educated populace is not just fundamental, but critical to economic growth (Goldin & Katz, 2008; Stanley, 2003). Recognition of the connection between an educated workforce and America's economic and social wellbeing have received prominent and needed attention in the last decade. Findings from this study can provide direction to policymakers, practitioners at both the secondary and postsecondary level, and students and their families.

Implications and Recommendations for Policymakers. Researchers argue that state policies have a significant impact on educators as to what is essential to teach and what students need to learn (Venezia, 2006). Policymakers at both the state and national levels have acknowledged the need to improve the alignment between secondary and postsecondary standards as a means to increase the number of college graduates (Hoffman, Vargas, Venezia & Miller, 2007). An implication from this study for policymakers is that dual enrollment participants graduate from college at significantly higher rates and in less time than non-dual enrollment participants. These findings are consistent with previous dual enrollment studies on bachelor's degree attainment; policymakers should consider dual enrollment programs as one strategy to align secondary standards with postsecondary expectations.

Furthermore, it is recommended that states, not individual schools or districts, fund dual enrollment programs to ensure equitable access for all qualified students. Although dual enrollment benefits all participants, research has shown that low-SES students receive an even greater boost regarding degree attainment (An, 2014). Society and taxpayers benefit from the outcomes of dual enrollment programs. Dual enrollment

has been shown increase the number of students who choose to graduate from high

school and persist on to college (Allen & Dadgar, 2012; An, 2015). Researchers also

suggest that dual enrollment programs increase rigor for participants and reduce the need

for costly remediation at the postsecondary level (Adelman, 2006). While the social and

economic returns on investment created by dual enrollment programs are not immediate,

long-term the more college credits students earn results in a reduced demand for

government social services, reduced health care costs, lower incarceration rates, and

higher tax contributions (Economic Modeling Specialists International, 2015). Dual

enrollment programs also represent a cost savings opportunity for states as most

programs are affiliated with community colleges (Borden et al., 2013) that receive lower

state funding (FTE reimbursement) than their four-year counterparts for the same

coursework. States should also consider legislating guaranteed transfer articulation of

dual coursework between state public institutions. Guaranteed articulation saves states

and students money by reducing repeated coursework and supporting the goal of shorter

time to degree. Presently 18 states mandate transfer articulation of dual enrollment

coursework (Borden et al., 2013).

Another implication from this study is the need for improved data collection and

tracking of students across the K-20 education spectrum. Implementation of

comprehensive statewide data systems gives states and education researchers the ability

to accurately evaluate the effectiveness of school programs and interventions.

Implications and Recommendations for Secondary and Postsecondary

Institutions. Too often high school students are graduating with one set of criteria, only

to enter college and encounter a different set of standards required to succeed (Conley,

2003; Venezia, 2006). Dual enrollment is one way to address this misalignment. Dual enrollment programs by their nature require secondary and postsecondary institutions to collaborate. Such collaboration opens a dialog to identify gaps and develop solutions for improving student preparedness for college and the workforce. For prepared students, dual enrollment offers expanded and rigorous curriculum. For underprepared students, these partnerships can encourage high school and college faculty collaboration in developing a curriculum that prepares students to be college-ready upon graduation. In Denver, for example, high school juniors who fail a college-readiness exam can take remedial courses in their senior year using community college curriculum so they will be ready for college coursework after they graduate (Zalaznick, 2013).

Secondary and postsecondary institutions should collaborate to build intentional dual enrollment programs that align dual credit offerings with the student's college intent. The offering of random college courses may contribute to socializing high school students and preparing them for college, but will do little to reduce the time and cost of earning a bachelor's degree.

The quality of dual enrollment offerings remains a lingering concern. It is recommended that institutions involved in dual enrollment agreements follow the lead of Kansas and Arizona that require high schools and college faculty to establish advisory councils, establish evaluative processes, and provide professional development opportunities for adjunct instructors. Furthermore, to strengthen program effectiveness, dual enrollment programs should consider accreditation through the National Association of Concurrent Enrollment Partnerships (NACEP). NACEP is the sole accrediting body for dual enrollment programs and has established guidelines and best practices that assure

that programs adhere to high-quality standards.

  Implications and Recommendations for Students and their Families. A

growing body of research (Allen & Dadgar, 2012; An, 2015; Hoffman et al., 2009; Karp

et al., 2008; Swanson, 2008), including this study, find that students and their families

benefit from participation in dual enrollment programs. Adelman (2006) proffered that

academic rigor in high school is one of the best predictors of bachelor's degree

attainment and that dual enrollment programs are an effective way to provide such rigor.

Benefits resulting from dual enrollment participation include increased high school

graduation rates, increased postsecondary aspirations, reduced need for remediation,

improved postsecondary persistence, and increased college completion.

  Traditionally, dual enrollment programs have been limited to high-achieving

students. Some states, such as Florida require students taking dual enrollment to have a

cumulative GPA of 3.00 or higher (Karp et al., 2007). New evidence is emerging,

however, indicating that middle-achieving students and traditionally at-risk students can

benefit from dual enrollment programs (An, 2013; Karp et al., 2008). Dual enrollment

has shown promise to increase college aspirations in students who may not have seen

themselves as college bound and represents an opportunity to narrow the achievement

gap. Non-dominant groups continue to lag in educational attainment and socioeconomic

status compared to their White peers, and they are the fastest growing populations in the

United States. Increased educational attainment of non-dominant group members is

essential to addressing replacement needs for the nation's aging workforce. For society

to fully benefit from the impact of dual enrollment programs, educators and policymakers

must ensure that at-risk, low-income, and middle-achieving high school students have

opportunities to participate in these programs. Open access to dual enrollment programs is imperative. It is recommended that program access not solely rest on high school grades, but consider other measures like teacher recommendations, college placement tests, or SAT/ACT scores. Dual enrollment programs should remain as free as possible for students and their families with scholarships for low-income students to guarantee equitable access.

Recommendations for Future Research

This study was able to empirically and rigorously address some of the chief criticisms cited in previous research on dual enrollment. As detailed throughout the study, the findings contribute to narrowing the gaps in the literature about the relationship between dual enrollment and postsecondary outcomes. Nevertheless, many gaps and areas for improvement remain. Following are recommendations and direction for future research that may enhance our understanding of dual enrollment programs.

Dual enrollment programs take many different forms. Few studies have included the location of dual enrollment offerings. This exclusion has resulted in a situation where there is little evidence to demonstrate if one type of program is superior to others. Hence, the need for further research examining dual enrollment delivery (on college campus, interactive television between college and high school, online, or on the high school campus) is warranted. This focus could clarify if the location is one of the underlying mechanisms explaining how dual enrollment programs benefit students.

In addition to course delivery location, the research on dual enrollment programs would be furthered by including variables that are not typically available. These important variables include measures of student motivation, faculty and counselor

aspirations for students, dual enrollment course type (academic vs. vocational), and prior academic history (high school and middle school transcripts).

A further investigation comparing dual enrollment outcomes to AP outcomes for students is warranted. Included in this research should be a focus on instructor credentials to determine if the higher credential requirement for dual enrollment instructors has an impact on student outcomes at the postsecondary level.

A national K-20 data warehouse is the ideal system to collect common and comprehensive information on America's educational institutions and programs. However, the improbability of a national data system highlights the importance of expanding the list of explanatory variables in surveys like the BPS: 04/09. Creating a multi-state database from existing K-20 data systems is another option for future research.

The cost of and time to a college degree continues to be of high importance to students and their families (Complete College America, 2014). Following students for four or even six years is not sufficient. Following students for longer periods may provide researchers with clues such as degree intent or major changes that explain why the majority of students fail to complete a bachelor's degree in the prescribed four years. Regarding college costs, data instruments need to include robust elements like tuition, fees, room and board, books and supplies, scholarships, parental contributions, financial aid (grants and loans), institution type (public vs. private), and student major. While difficult to capture, this financial information is fundamental to understanding students' higher education costs.

In addition, future research on the cost of and time to degree should examine

student's dual enrollment coursework and its alignment to participant's college major. Studying the alignment of dual enrollment course offerings with students' postsecondary intent is vital to understanding related cost and time concerns. If students are accumulating high pre-college credits but the credits do not contribute to the student's degree plan, then high pre-college intensity will not have the desired effect of reducing time and cost of a bachelor's degree.

Results of this study suggested that dual enrollment provided benefits to students beginning at a public community college with the intent to earn a bachelor's degree. Future studies could be replicated for students with different degree goals (associates degree or certificate). Similarly, future research could examine degree attainment for dual enrolled students beginning their college studies at a four-year institution. While the literature has called for a more rigorous quantitative evaluation of dual enrollment programs, a mixed method approach incorporating qualitative investigation would broaden and deepen the education community's understanding of such programs.

Conclusion

Economic changes driven by technological innovations and globalization necessitate that the skill sets for all level of jobs will increase (AACC, 2012; Goldin & Katz, 2008; Kirsch et al., 2007). At a time when the U.S. needs increased postsecondary educational attainment, the country struggles with an aging workforce and high school graduates who are underprepared for the workforce or college (Crook, 2008; Sasser, 2010). Proponents of the rapidly growing dual enrollment movement claim that these programs are effective in improving college readiness and increasing postsecondary degree production. Much of the rhetoric surrounding dual enrollment benefits is

anecdotal or research based on single institutions or individual state systems. The goal of

this study was to use a national dataset to examine the effects of dual enrollment

participation on bachelor's degree attainment and time and cost of a degree. Since most

dual enrollment programs are affiliated with community colleges and almost half of all

undergraduates begin at two-year institutions, this research looked at students beginning

their studies at a public community college with the intent to earn a bachelor's degree.

Although the results regarding shorter time to degree and lower costs were

modest, the study suggests compelling evidence that dual enrollment significantly

increases the likelihood of bachelor's degree attainment for participants. While reducing

the time to and cost of a college degree is important, the ultimate goal is that students

persist to degree completion. The results of this study support the continuation and

expansion of dual enrollment programs as a strategy for increasing bachelor's degree

recipients.

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APPENDIX A

Human Subjects Exempt Research Letter

OLD DOMINION
UNIVERSITY
IDEA FUSION

Thomas Hughes <thugh019@odu.edu>

Re: IRBNet Board Document Published

1 message

Schwitzer, Alan <aschwitz@odu.edu>   Tue, Mar 22, 2016 at 8:12 AM
To: "HUGHES, THOMAS E." <thugh019@odu.edu>
Cc: "Baker, Peter B." <PBaker@odu.edu>

Tom: Please see below and save for your records this letter of EXEMPT status for your dissertation research!

From: Petros Katsioloudis <no-reply@irbnet.org>
Sent: Tuesday, March 22, 2016 11:04 AM
To: Schwitzer, Alan
Subject: IRBNet Board Document Published

Please note that Old Dominion University Education Human Subjects Review Committee has published the following Board Document on IRBNet:

Project Title: [877256-1] The impact of high school dual enrollment participation on bachelor's degree attainment and time and cost to degree
Principal Investigator: Alan Schwitzer, Ph.D.

Submission Type: New Project
Date Submitted: February 29, 2016

Document Type: Exempt Letter
Document Description: Exempt Letter
Publish Date: March 22, 2016

Should you have any questions you may contact Petros Katsioloudis at pkatsiol@odu.edu.

Thank you,
The IRBNet Support Team

www.irbnet.org

VITA

THOMAS EARL HUGHES

EDUCATION

Ph.D., Community College Leadership, Old Dominion University, December 2016

M.A., Sociology, Arizona State University, May 1993

B.S., Sociology, Arizona State University, December 1989

PROFESSIONAL EXPERIENCE

Director, Office of Institutional Effectiveness and Research

     Yavapai College, Arizona. May 2003-Current

Adjunct Faculty, Sociology

     Yavapai College, Arizona. May 2003-Current

Senior Research Analyst, Office of Institutional Research

     Yavapai College, Arizona. January 1999-May 2003

Epidemiologist/Health Statistician, Office of Epidemiology and Statistics

     Arizona Department of Health Services. January 1997-January 1999

Epidemiologist Specialist II, Office of HIV/STD Services

     Arizona Department of Health Services, December 1994-August 1998

Human Capital Research Analyst

     Options and Choices, Inc., Wyoming. September 1995-January 1996

RECENT PROFESSIONAL PRESENTATIONS AND PUBLICATIONS

2016   Hughes, Tom. "Strategic Planning, Budgeting, and Accountability—Collecting and Connecting the Dots" Rural Community College Alliance Conference. Orange Beach, Alabama. September 30, 2016

McGraw, Matt and Hughes, Tom. "Rural Community College Faculty Perceptions of Teacher Evaluations" Rural Community College Alliance Conference. Orange Beach, Alabama. September 29, 2016

2015   Ewell, C., & Hughes, T. (2015). Dashboard distillation: Yavapai College's award-winning web-based reporting tool extracts finance, student, and human resources data that make it easier for stakeholders to connect costs with productivity. *Business Officer*, January 2015, 31-34.

Lou Guthrie; Tom Hughes; and Kristy Bishop. "Best Practices for Using Community College Benchmarking Data." Higher Learning Commission's Annual Conference. Chicago, Illinois. March 30, 2015

Hughes, Tom and Moody, Carl. "Building an Instructional Cost Dashboard" National Higher Education Benchmarking Institute Annual Conference. Overland Park, Kansas, May 14, 2015 (Invited Workshop)

2014   Hughes, Tom and Moody, Carl. "Instructional Cost Dashboard for Informed Decision-Making and Institutional Effectiveness." Higher Learning Commission's Annual Conference. Chicago, Illinois. April 12, 2014

Hughes, Tom; Grieshaber, Larry; Merrifield, Mary and Long, Paul. "Sculpting Accreditation Clay: Designing and Articulating a Quality Initiative." Higher Learning Commission's Annual Conference. Chicago, Illinois. April 11, 2014