

University of Nevada, Reno

**An Investigation of the Factors Influencing the Postsecondary Success of Nevada
GEAR UP Students using Logistic Regression**

A dissertation submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy in Education

by

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THE GRADUATE SCHOOL

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Abstract

The federally funded Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) is designed to “increase the number of low-income students who are prepared to enter and succeed in postsecondary education” (U.S. Department of Education, 2021). Despite this stated purpose, the majority of research on GEAR UP program outcomes has focused on only college enrollment and/or retention; few published studies have investigated rates of college completion for program participants.

The purpose of this study was to examine which academic and personal variables, if any, can predict whether GEAR UP eligible students that enroll in college complete postsecondary education and obtain a college degree within 150% of the normal time to degree completion. The academic and personal variables included in the study comprise 12th grade GPA, 7th grade college aspirations, cumulative GEAR UP program service hours, gender, middle school setting, and race/ethnicity. A binary logistic regression was conducted, resulting in a model that included 12th grade GPA and cumulative GEAR UP program service hours as predictors of college completion; students with higher GPA and higher levels of program participation were more likely to be in the graduated in 150% of normal time group.

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Chapter One: Introduction

Assisting individuals in obtaining a college education is recognized as an effective strategy for facilitating upward, intergenerational social and economic mobility (Creusere et al., 2019; Chetty et al., 2017). Individuals with some college attendance or a college degree have, on average, higher annual median incomes and lower unemployment rates than individuals with a high school degree or less (Hein et al., 2020). The recognition of the strength of a college education in positively impacting the lives of students, their families, and their communities has led to major investments from federal, state, and local governments; non-profit and non-governmental organizations; and private citizens and foundations (Kuenzi, 2005; Redden, 2021; U.S. Department of Education, 2016).

Despite the well-established benefits of a college education, research shows vast disparities in rates of postsecondary enrollment and completion amongst groups with differing backgrounds. Specifically, students that come from low-income households are far less likely to be prepared for or attend college, more likely to attend undercapitalized or less selective institutions and/or drop out quickly if they do attend, and graduate at rates significantly lower than individuals from more advantaged households (Horn, 2006; U.S. Department of Education, n.d.; Rowan-Kenyon, 2007; Nellum & Hartle, 2016; Engle & Tinto, 2008). While recent reports have indicated an increase in the number of students from low-income families that are attending college since the mid 1990's, "these changes are not occurring uniformly across the postsecondary landscape. The rise of poor and minority students has been most pronounced in public two-year and the least selective four-year colleges and universities" (Pew Research Center, 2019, p. 3). As more

selective institutions are often associated with higher rates of student success, such as increased degree completion, this disparity means that the increase in low-income student college enrollment may not be resulting in the increased social mobility and economic stability associated with degree attainment.

Better understanding the factors that may be contributing to low income students having lower rates of postsecondary enrollment or completion is a necessary element of designing programs to address these discrepancies. However, complicating any investigation into the enrollment and completion rates of low-income students are the multitude of factors that research has shown to impact rates of college enrollment. These factors include, but are not limited to gender, race or ethnicity, geographic location of elementary and secondary schools, academic rigor of pre-college coursework, and awareness of college opportunities. Studies that include factors beyond a student's income level have the ability to provide more robust data to individuals and organizations that are developing and refining programs designed to serve students at risk of not attending or completing college. One such program that can benefit from an increased availability of data is the federally-funded GEAR UP program.

Background of the Study: the GEAR UP Program

Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) is a federally-funded competitive grant program that is designed to increase the number of low-income students who are prepared to enter and succeed in postsecondary education. The GEAR UP Program was established under the 1998 reauthorization of the Higher Education Act of 1965. This legislation supported the establishment of a program that would guarantee eligible low-income students access to the financial assistance

necessary to attend institutions of higher education, facilitate supportive services to students who are at risk of dropping out of K-12 schools, and provide information to parents and students about the benefits of obtaining postsecondary education (1998 Amendments to Higher Education Act of 1965, PL 105-244). This ongoing program provides grants to states or partnerships consisting of educational partners and optional community partners. Although recipients have flexibility in how they design the programming funded through the grants, awardees must provide postsecondary education financial aid information and postsecondary scholarships to participating and eligible students, must encourage students to enroll in rigorous coursework at the middle school or secondary level, and must provide services aimed at increasing the number of students who complete high school and apply and enroll in postsecondary education. Recipients may also choose to customize their program by including other elements like academic tutoring and college exposure events such as tours (U.S. Department of Education, 2020).

Generally, students are identified as GEAR UP eligible during their 7th grade year and are provided with activities, supports, and resources through the end of high school. These include mentorship, academic support, college awareness programming, life preparation, and parent resources related to college readiness (U.S. Department of Education, 2021). Some cohorts, such as the one that is the focus of this study, are also provided with college scholarships if they attend postsecondary institutions in the state of Nevada (Nevada GEAR UP, 2021).

As of the time of this study, the State of Nevada had received four six- or seven-year GEAR UP grants. This study focused on the students that participated in GEAR UP programming that began during the 2006-2007 academic year. In AY2006-2007, the

Nevada GEAR UP program identified close to 6,000 students across 19 middle schools that were eligible to receive GEAR UP services. These students were offered supports through AY2011-2012, the anticipated high school graduation year for the majority of participants. The study also includes postsecondary enrollment and completion data through July 2018.

Statement of the Problem and Significance of this Study

Although the stated purpose of the GEAR UP program is to “increase the number of low-income students who are prepared to enter and succeed in postsecondary education” (U.S. Department of Education, 2021), few published studies have investigated rates of college completion of GEAR UP participants. Instead, Department of Education publications, peer-reviewed journal articles, and other studies have focused on interim outcomes of the program that are believed to be correlated with eventual college enrollment and success. These include a positive association between program participation and parental awareness of postsecondary education, higher parental academic expectations for their children, and enrollment in more rigorous pre-college science coursework (U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service, 2008); and increased secondary enrollment rates and reading proficiency (Leuwerke et al., 2021). Other studies have found that in comparison with non-GEAR UP students, GEAR UP students demonstrated higher rates of high school persistence and graduation (Lunceford et al., 2017) as well as of college enrollment (Fogg & Harrington, 2015). Several more recent studies have also investigated college persistence, although results are mixed as to

whether researchers found a relationship between GEAR UP participation and this indicator of college success (Bowman et al., 2018; Sanchez et al., 2018).

Even fewer studies have evaluated the primary GEAR UP program outcome through the lens of other factors. Understanding which common demographic and academic factors of GEAR UP program participants predict their college completion and degree attainment is information that can be used by GEAR UP staff to refine and improve programming to better serve participants and further increase their rates of college completion.

Purpose of the Study

The purpose of this study was to examine which academic and personal variables, if any, can predict whether GEAR UP eligible students that enroll in college complete postsecondary education and obtain a college degree within 150% of the normal time to degree completion.

Research Questions

The research question and subquestions answered through this study comprise:

1. Can postsecondary completion of GEAR UP eligible students who enroll in college be reliably predicted from knowledge of 12th grade GPA, 7th grade college aspirations, cumulative GEAR UP program service hours, gender, middle school setting, and race/ethnicity?
 - a. If postsecondary completion can be predicted, which variables are central in the prediction?
 - b. How good is the resulting model at classifying cases?

Research Design

This study was a quantitative investigation of the factors that predict the college completion of Nevada GEAR UP eligible students that enrolled in college. Existing data from and about students who attended Nevada middle and high schools at which GEAR UP services were offered and were therefore eligible to receive GEAR UP supports and services provided the basis of the study. Data from this cohort of students were selected in part because the timing of service delivery enabled the researcher to access postsecondary data about these students; with the standard high school graduation date for this cohort being spring 2012, the 150% of normal time to bachelor's degree completion was spring 2018 for these students. The timing of data availability allowed for both associate's and bachelor's degree completion to be considered.

This study attempted to predict group membership regarding postsecondary completion based on academic and personal variables. Binary logistic regression was used to analyze the data and address the research questions. This approach was selected because it is a flexible approach that is robust to violations of distribution and normality and is able to utilize a combination of categorical and continuous variables to predict membership in a dichotomous categorical outcome. The sample set was GEAR UP Cohort 2 eligible students that enrolled in college. The dependent variable was postsecondary completion as evidenced by degree attainment within 150% of the normal time to degree. The categorical independent variables were 7th grade college aspirations, cumulative GEAR UP service hours, gender, middle school setting, and race/ethnicity. The continuous independent variable was 12th grade GPA.

Delimitations

This study is confined to existing data associated with students who were part of the Nevada GEAR UP program between AY2006-2007 and AY2011-2012 and received services beginning in their 7th grade year in 2006. The dataset included students who were eligible to receive GEAR UP services but who may not have participated in every year of the program. The results of this study should not be generalized to groups outside the selected participants, and areas of inquiry and variables investigated were limited to those described in Chapter Three.

Limitations

This study was limited to data collected by others as part of GEAR UP programmatic activities and to postsecondary data produced by others upon request. The researcher did not collect any of the data utilized in this study and therefore cannot validate its accuracy. Additionally, the college aspiration variable utilized data provided by program participants in their 7th grade year and accuracy of this data was dependent on the answers provided by students.

GEAR UP data were available only for three periods during program service delivery: the 7th, 9th, and 12th grade years of program participation. This limitation was most relevant to the cumulative service hours variable, which summed the number of service hours reported in each of these years. It is possible that inclusion of service hour totals in student's 8th, 10th, and 11th grade years would have resulted in different statistical outputs and interpretation of results, but this information was not available for use in this study.

The postsecondary data report produced by the National Student Clearinghouse (NSC) did not contain data for all GEAR UP program participants. Specifically, the NSC reported that postsecondary data were blocked for 53 students due to institution or student restrictions. Since personally identifiable information was not available for these students, they could not be removed from the analysis. It is possible that their inclusion in the analysis may have skewed the final results, as up to 53 students may have been classified incorrectly as not completing a college degree due to unavailable data.

Analysis of the data also required merging of datasets and the manual coding of some key variables. While the resulting merged dataset was spot checked and no errors were noted, not every record was checked following the merge. The researcher utilized the methodology described within this report for any activities that required manual coding, but it is possible that other researchers would have differed in the determinations made.

Definition of Terms

150% of Normal Time to Degree Completion. Six years for a bachelor's degree and three years for an associate's degree.

Associate's Degree. Any postsecondary academic degree traditionally completed in four semesters or two years at an institution of higher education.

Bachelor's Degree. Any postsecondary academic degree traditionally completed in eight semesters or four years at an institution of higher education.

College or University. Institutions of higher education that afford academic degrees, traditionally beginning in the 13th grade.

First-generation Students. Students who are the first in their family to attend college. In some studies referenced in this report, first-generation may refer to students whose parents attended but did not complete college.

GEAR UP. Gaining Early Awareness and Readiness for Undergraduate Program, federally funded competitive grant program established in 1998 that is designed to increase the college readiness and success of low-income students.

Normal Time to Degree Completion. Four years for a bachelor's degree and two years for an associate's degree.

Middle School. Sometimes also referred to as junior high, in Nevada traditionally covers the 7th and 8th grade years. For the purposes of this study, middle school references the school attended by students in the 7th grade.

Postsecondary Education. Education provided after high school at a degree-seeking institution of higher education.

Postsecondary or College Completion. Graduation from an academic, degree-granting institution of higher education.

Secondary Education. Also referred to as high school or education offered during the 9th-12th grade levels.

Summary of Chapter One

This chapter provided an overview of the research study, beginning with relevant background, a statement of the problem, and the significance and design of the study.

College degree attainment is recognized as an effective strategy for facilitating social and economic mobility. However, low-income individuals, who may be most in need of experiencing economic upward mobility, enroll in and complete postsecondary

education at rates much lower than their higher-income peers. The federal government, state entities, and other organizations are developing and investing in programs to address this disparity, but evidence as to the efficacy of these programs is often lacking. This is the case with the federally funded GEAR UP program, which was launched in 1998 to increase the number of low-income students who enroll in and complete college. Data on the college completion rates of GEAR UP participants is scarce, as are studies that investigate the profile of students most benefiting from GEAR UP programming.

The study described in this paper utilized binary logistic regression to investigate which, if any, academic and personal variables can predict the degree attainment of GEAR UP participants that enroll in college. The predictor variables investigated included both categorical and continuous variables, comprising 7th grade college aspirations, 12th grade GPA, cumulative service hours, gender, middle school setting, and race/ethnicity. The results of this study may be used to better understand the impact of these types of programs and refine program design to better serve the target population.

Chapter Two: Review of Relevant Literature

The purpose of this study was to examine which academic and personal variables, if any, can predict whether Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) eligible students who enroll in college complete postsecondary education and obtain a college degree within 150% of the normal time to degree completion. The research questions answered through this study comprise:

1. Can postsecondary completion of GEAR UP eligible students who enroll in college be reliably predicted from knowledge of 12th grade GPA, 7th grade college aspirations, cumulative GEAR UP program service hours, gender, middle school setting, and race/ethnicity?
 - a. If postsecondary completion can be predicted, which variables are central in the prediction?
 - b. How good is the resulting model at classifying cases?

Existing data from the 2006-2012 Nevada State GEAR UP Program was used to explore the factors that contribute to postsecondary completion within 150% of normal time to completion.

This chapter is divided into three sections. The first section focuses on a review of the factors that contribute to college preparation, admission, and completion, both of students in general as well as more specifically on those which research shows are less likely to enroll and complete college. The second section includes a description of the GEAR UP program, a federally-funded initiative that has been designed to increase the college preparation, enrollment, and completion of low-income, first-generation college students. Finally, the chapter is summarized.

Factors Associated with Postsecondary Enrollment and Completion

Understanding the factors that may influence a student's postsecondary enrollment or completion, especially those that may relate to or interact with family income level, is a critical step in designing programming that increases the success of low-income students. As such, many studies have been conducted to determine the program factors, personal factors, and academic factors that influence college success. For instance, factors of college-readiness programs such as academic rigor of secondary courses, FAFSA completion, smaller secondary class sizes, participation in structured youth development activities, and access to social capital are related to enrollment and/or completion rates (Lapan & Poynton, 2020; Dynarski et al., 2013; Morgan et al., 2018; Belasco, 2013). For this study, the college-readiness factor investigated was participation in structured activities.

The following literature review focuses on five additional personal and academic factors that may impact the postsecondary success of students: educational aspirations of students, gender, geographic setting of secondary education, high school grade point average and other indicators of secondary academic achievement, and race/ethnicity. Whenever possible, included is a summary of the current research available that addresses the impact of each factor on the postsecondary enrollment and completion specifically of low-income students. As relevant, the literature review also provides information on the impact of postsecondary success on low-income students versus their higher income counterparts to provide a more robust picture of the interplay between demographic and socioeconomic characteristics on college success and the benefits of college success on different population groups. While each of these factors is presented

within its own section, it should be noted that in many cases these factors are interrelated; considerations around the impact of these relationships on future research is noted in the Chapter Two summary.

Educational Aspirations

The U.S. Department of Education reported that the proportion of high school students that anticipated completing a college degree rose from 1980 through 2002, the most recent year these data were collected as part of the 2002 National Center for Education Statistics Education Longitudinal Study (ELS); in 2002, nearly double the percentage of 10th graders reported that they expected to earn at least a bachelor's degree compared to 1980, and over double reported that they planned to obtain a graduate degree (U.S. Department of Education, National Center for Education Statistics, 2004). Most relevant to this literature review, the greatest increases in college aspirations were seen in students coming from low-income families:

in 1980, about 13 percent of such [low socioeconomic status] students intended to earn a bachelor's degree, but this figure tripled (to 38 percent) in 2002. The proportion of low-SES students expecting to complete a graduate degree also tripled over this 22-year period (from 9 to 28 percent). In contrast to 1980, by 2002 there was no longer a statistically significant difference in the proportions of low- and high-SES students who expected to earn a bachelor's degree. (p. 60)

Recent literature indicates that college aspirations of high school-aged students are associated with college enrollment rates when compared to students who do not aspire to attend college, with youth who develop a 'college-going identity' being more likely to attend a postsecondary institution following high school. A 2020 study of 405

individuals found that students who had developed a college-going identity by the 10th grade were more likely to decide to enroll, and then actually enroll, in a two- or four-year college upon graduation (Lapan & Poynton, 2020). These students had also taken more steps towards achieving this goal, such as submitting more college applications, enrolling in more advanced high school courses, and earning better grades during secondary school. There is also evidence that a higher stated postsecondary goal is related to college enrollment; this same 2020 study found that high school seniors “were more likely to enroll in college if they set higher postsecondary goals for themselves” (Lapan & Poynton, 2020, p. 419). A Canadian research team had previously published similar results, noting that students aspiring to attend college while in high school increased the probability of enrolling in a postsecondary institution, with this effect being stronger in females than males (Christofides et al., 2015).

There is also evidence that establishing aspirations prior to high school can increase college enrollment. A longitudinal study of 681 students published in 2004 found that a youth’s plan for college as early as 6th grade was a significant predictor of full-time college enrollment. In this study, students were asked to indicate if they planned to go to a four-year college after finishing high school; results indicated that “sixth-grade certainty of college plans predicted to college enrollment status even after [other factors] were controlled” (Eccles et al., 2004, p. 71). One of the factors that was controlled for was family income, as this study, consistent with other research, found that higher family incomes predicted college enrollment. With sixth-grade certainty of college enrollment being a predictor of college enrollment, even after family demographics were controlled for, Eccles et al. asserted that early college planning and encouragement to attend college

could increase enrollment rates among all groups, including low-income students. Many studies have found that parent, family, and teacher expectations also have a strong influence on whether students develop and retain aspirations to attend college (Mitchall & Jaeger, 2018; U.S. Department of Education, National Center for Education Statistics, 2001; Turner et al., 2019), supporting Eccles et al.'s assertion that familial support and expectation setting can influence the college aspirations of students, and thereby increase their college enrollment rates, regardless of income levels.

While relationships between aspirations and enrollment have been established, there is evidence that aspiring to attain a college degree, unfortunately, does not necessarily align with postsecondary achievement, specifically for low-income students. The association between aspirations and postsecondary completion has not been published for the entire ELS 2002 cohort, but a 2017 Institute of Education Sciences report investigated this topic for a subset of the cohort. An analysis of the students included in the ELS 2002 cohort from the Regional Educational Laboratory Midwest Region found that nearly two-thirds of these students had failed to realize their postsecondary aspirations by 2012. Specifically, the researchers found that “students who had higher socioeconomic status were more likely than students who had lower socioeconomic status to match rather than to fall short of their postsecondary education expectations” (Molefe et al., 2017, p. 9). An earlier longitudinal study, the National Education Longitudinal Study of 1988, found similarly that high school student expectations around college achievement fell short of actual enrollments (U.S. Department of Education, National Center for Education Statistics, 2004).

Overall, the literature indicates that college aspirations of school-aged children and youth are associated with increased postsecondary enrollment, but that aspirations may not have the same positive effect on postsecondary completion. There is also conflicting research around whether the relationship between aspirations and postsecondary enrollment is similar to or weaker for low-income students compared to higher income students.

Gender

The Digest of Education Statistics reported that females have represented a higher percentage of both part-time and full-time enrollments in degree-granting postsecondary institutions since approximately 1990; this trend is projected to continue through 2029 (De Brey et al., 2021). Other, more regional studies support these trends. Robson et al. (2019) found that males in two different cities (Toronto and Chicago) were less likely to go to a four-year college than females, and also found that low-income status had a stronger, negative effect on males than their female counterparts.

While postsecondary enrollment has favored females for decades, trends in postsecondary completion are more nuanced according to the most recent Digest (De Brey et al., 2021). Females have accounted for over half of the total associate's, bachelor's, and Master's degrees conferred by postsecondary institutions since

approximately the late 1980's, but males dominated completion of Doctor's¹ degrees until the 2004-05 academic year, at which point females accounted for approximately 50% of Doctor's degrees conferred. Following the 2004-2005 year, females have accounted for over half of all Doctor's degrees as well. Females are projected to be awarded between 54% and 61% of all degree types through 2030 (De Brey et al., 2021).

While females are completing and on track to continue completing more degrees than their male counterparts, a 2019 study focused on intergenerational economic mobility found that females may not be receiving the same level of economic benefit from their degrees as males, depending on their parental income level (e.g., low-income status). Creusere et al. (2019) found gender to be a strong predictor of upward economic mobility, with “male graduates 50.2% more likely than female graduates to be upwardly mobile after controlling [for other factors]” (p. 929). However, when parental income was considered, rates of mobility were similar for very low-income males and females (e.g. that come from families with parental incomes under \$23,500/year). This equivalency was reduced as parental incomes increased; economic mobility was approximately 12% higher for males than females when parental income was between

¹ This sentence follows the naming conventions used in the cited publication, with Doctor's degrees including Ph.D., Ed.D., and comparable degrees at the doctoral level, as well as most degrees that were classified as first-professional prior to 2010–11, such as M.D., D.D.S., and law degrees.

\$40,500-\$65,500/year and double when parental income was between \$65,500 and \$106,500/year (Creusere et al., 2019).

Taken together, the existing literature indicates that while females are more likely to complete postsecondary education, and that students from very low-income families will experience similar upward economic mobility regardless of gender, males from families with parental incomes levels over ~\$23,500/year will experience more upward mobility based on degree attainment than their female peers.

Geographical Location of High School

Multiple studies have found that students from rural areas have lower educational aspirations, and both enroll in and graduate college at rates lower than their urban or suburban peers (Chen et al., 2010; Hu, 2003; United States Department of Agriculture Economic Research Service, 2003; Provasnik, et al., 2007). Koricich et al. (2018) combined the ELS 2002 data with Integrated Postsecondary Education Data System (IPEDS) data and found that “rural students are not only less likely to attend any postsecondary education within two years of completing high school, but they are also less likely to attend four-year institutions, more-selective institutions, and those that confer graduate degrees” (Koricich et al., 2018, p. 294). Comparisons of the socioeconomic status of these students found that rural students did not benefit as much from a higher socioeconomic status (SES) standing as did their nonrural counterparts; of students from similar, higher SES backgrounds, rural youth were still more likely than nonrural students to attend a two-year versus a four-year institution.

A previous study with similar findings sought to explore more of the complexities around educational disparities in rural vs. nonrural students and found that rural students

had a higher level of community social resources (i.e. social capital), which slightly increased their likelihood of degree attainment (Byun et al., 2012). When socioeconomic status was taken into account, Byun et al. found that rural students overall were less likely to enroll or graduate from college. Other studies that have found that rural students tend to lag behind nonrural students in college success, citing higher levels of poverty within rural areas as a key factor explaining the disparities, along with lower parental educational expectations and academic achievement within rural families, and increased distance from more selective institutions of higher education which disproportionately impacts low-income rural students who need to live at home to afford college (Byun et al., 2012; Roscigno & Crowley, 2001).

More recent studies contradict the findings that rural students experience lower rates of college success, in one case through use of similar datasets. The same report referenced in the Educational Aspiration section by Molefe et al. (2017) that investigated the college attainment of ELS 2002 participants found that while nonrural students had, on average, higher college aspirations (i.e., completing more college or attaining more advanced degrees) than rural students, ultimately “after background characteristics were controlled for, rural and nonrural students still had similar educational attainment levels, both in the REL Midwest Region and in the rest of the nation” (Molefe et al., 2017, p. 10).

In summary, there is conflicting research around whether the geographic location of a student’s high school within either an urban or rural area influences their college enrollment and success rates. The impact that socioeconomic factors such as family income have on differential college-success outcomes between urban and rural students is

similarly unclear, as higher levels of poverty within rural areas may contribute to findings that associate rural areas with reduced rates of college success.

High School Grade Point Average (GPA) and Other Indicators of Academic Achievement

Secondary academic achievement is, unsurprisingly, associated with increased college enrollment and graduation. Students that aspire to attend college may prioritize their academic achievement in anticipation of completing college applications and GPA is used as an admittance standard by colleges, explaining the relationship between secondary academic achievement and college enrollment. Additionally, students that do well academically in high school are more prepared for the rigors of college (i.e. college ready), which may explain the association with college completion (Nagaoka et al., 2009; Davidson, 2014; Hein, et al., 2020; Ou & Reynolds, 2014).

The impact of secondary academic achievement on college success has been the focus of several recent dissertations. A 2017 dissertation found that both 7th grade and 12th grade GPA were significant predictors of postsecondary enrollment, while 7th grade and 11th grade GPA were significant predictors of postsecondary persistence (Ecker-Lyster, 2017). Likewise, Johns (2019) found that of ten possible predictor variables, three, including two associated with secondary academic achievement, were significant predictors of postsecondary enrollment. Specifically, students that completed higher math courses were 1.3 times as likely, and students with a higher GPA were almost three times as likely, to enroll at a postsecondary institution immediately following high school than those with a lower GPA. In further support of these findings, a doctoral candidate from Tarleton State University found that “when looking specifically at low-income students

only, GPA is a statistically significant predictor of postsecondary enrollment, indicating the higher the GPA, the more likely the student enrolled in a postsecondary program” (Rhone, 2019, p. 60).

Research published in peer-reviewed journals aligns with the findings in these dissertations. The same 2020 study by Lapan and Poynton referenced in the Educational Aspirations section of this chapter found that a demonstrated record of academic achievement in high school (e.g. earning better grades, scoring higher on standardized testing, and enrolling in higher-level courses) was an indicator both of college enrollment as well as retention after the students’ first year at college. Eccles et al. (2004) also found that students enrolled in college at age 20 had higher 12th grade GPAs than the not-enrolled group. Related to the assumption that higher GPAs may serve as an indicator of college aspiration, Eccles et al. found that 6th grade college plans significantly predicted 12th grade GPAs; in other words, college plans as early as 6th grade likely affected high school academic performance and eventual college enrollment. Similar to Rhone (2019), Engberg and Wolniak (2010) found that final high school GPA was very influential in predicting enrollment at both two- and four-year institutions, but the effect was much stronger for enrollment at a four-year institution.

When reviewed together, the research indicates that indicators of secondary school academic achievement, including high school GPA, are positively associated with college enrollment for students generally and low-income students specifically. Data on college completion related to high school GPA are largely unavailable.

Race/Ethnicity

The most recent volume of the Digest of Education Statistics provides a historical view of postsecondary enrollment by student race and ethnicity (De Brey et al., 2021). White students have, and are projected to represent the majority of degree-seeking postsecondary enrollment through 2029. However, the percentage of total enrollment that White students represent has been declining since 1976 (84.3%), reaching levels that are relatively consistent with the demographic make-up of the United States by the time of the Digest's 2021 publication. The American Community Survey (ACS) 2019 5-Year Estimate indicates that White, non-Hispanic or Latino individuals comprise ~61% of the population, and the Digest notes they accounted for 55.2% of 2018 postsecondary enrollment (PE). Ratios of other racial and ethnic groups for these time periods are Asian, ACS: 5.5%/PE: 7%; Black, ACS: 12.3%/PE: 13.4%; Hispanic, ACS: 18%/PE: 19.5%; Pacific Islander, ACS: .2%/PE: .3%; American Indian/Alaska Native, ACS: .7%/PE: .7%; Two or more races, ACS: 2.4%/PE: 3.9% (De Brey et al., 2021; United States Census Bureau, 2020).

While percentages of total college enrollment rates appear to be approaching proportionately with overall population statistics, other, large-scale analyses show patterns of over- and under- representation of racial and ethnic groups by type of college. Asian and White students are overrepresented, and Black and Hispanic students are underrepresented, at more selective institutions. This underrepresentation of Black students is most pronounced in the southern United States, and while rates of representation at more selective institutions have been equalizing for White and Hispanic

students, they have remained stagnant for Black students (Monarrez & Washington, 2020).

The most recent volume of the Condition of Education reported that college enrollment rates have increased for college-aged students within all racial and ethnic groups since 2000, with an aggregated increase of 6% between 2000 and 2018 (Hussar, et al., 2020). The largest increases have been Hispanic students (increased by 14%), American Indian/Alaska Native (increased by 6%), and Black students (increased by 6%). The smallest increase was Asian and White students (both 3%). Asian students have had the highest rates of college enrollment since at least 2000 (59% in 2018), and even with the recent increases by Hispanic and other non-White students, White students still have the third highest college enrollment rates (42%) after students of two or more races (44%). Comparatively, 24% of both Pacific Islander and American Indian/Alaska Native, 37% of Black, and 36% of Hispanic college-aged students enrolled in college in 2018.

The picture for postsecondary completion is varied, based on institution type, according to the Status and Trends in the Education of Racial and Ethnic Groups Report 2018 (De Brey et al., 2019). Mirroring enrollment rates, Black students had the lowest graduation rates with 150% of normal time for both bachelor's (40%) and associate's (23%) degrees. Asian students had the highest graduation rates for both degree types, 74% and 36%, respectively. White students had the next highest completion rate at four-year institutions (64%), while Pacific Islander students had the next highest completion rate at two-year institutions (34%). When combined, enrollment and graduation data indicate that while college enrollment rates of minority students have increased over time and are approaching proportionality with overall U.S. demographics, there are stark

discrepancies in the rates of degree attainment, with Black or African American students having overall the lowest rates of college enrollment and graduation.

Researchers have explored the intersection between race, ethnicity, gender, college enrollment, and other factors, such as social capital. Riegle-Crumb (2010) examined gender gaps in college enrollment rates between Hispanic and White students, finding that females of both ethnicities attended college at higher rates than their co-ethnic male peers. Their research indicated that the higher access to social capital through academically-focused friend groups (for females of both ethnicities), and interactions with high school counselors on the subject of college (for Hispanic students only), served as predictors for the higher college enrollment rates of females.

The intersection between race, ethnicity, familial income, and college enrollment has also been an area of investigation. Compared to above-poverty-level students, large-scale analyses have found that low and very-low income undergraduate students were more likely to be Black, Hispanic, or Asian (Chen & Nunnery, 2019). A 2017 study found that African American and Hispanic students were significantly less likely to complete a four-year degree than their White peers, and that this association held even when examined by income category (Blankenherger et al., 2017). However, this conflicts with other work. Tekleselassie et al. (2013) that found that after controlling for socioeconomic status, the racial gap between African American and Caucasian students around college enrollment disappeared. The researchers did find that even after controlling for other variables, a gap between females and males similar to what was noted in the Gender section was seen, and this gap was exacerbated within the African American sample set. Citing other work that supported their eventual findings,

Tekleselassie et al. noted that while the gender gap for college enrollment among Caucasian students was approximately 2% in favor of females, with African American students it was 36% in favor of females. As the authors stated “given the social and economic benefits a college education provides... African American men's disadvantages in college attainment when compared to their female counterparts is concerning” (p. 140).

The link between finances, race, and college enrollment is not surprising. As noted in the introduction, research shows that low-income students attend college and persist to graduation at rates much lower than their higher income peers. Wealth disparities likely account for some of the differences in postsecondary outcomes seen between groups, specifically between White, and Black and Hispanic, students, as “the typical White family has eight times the wealth of the typical Black family five times the wealth of the typical Hispanic family” (Bhutta et al., 2020, para. 1). The same study cited in the Gender section which examined economic mobility rates among postsecondary attendees and graduates also investigated the impact of race and ethnicity on these rates (Creusere et al., 2019). Consistent with other research, it was found that, in general, mobility rates for underrepresented minority students were lower than for non-underrepresented minority students. As with their gender analysis, the race/ethnicity of students played “a complicated role in intergenerational mobility” when combined with parental income status, as “at the lowest income levels, the difference in mobility rates is quite small” (Creusere et al., 2019, p. 934). As with gender, race/ethnicity equivalences are reduced as parental incomes increase.

A summary of the literature indicates that students of different racial and ethnic groups experience disproportionate rates of college enrollment, particularly when the

selectivity of the institution is considered. There is also disproportionality in college graduation rates, with Black or African American students experiencing the lowest rates of postsecondary completion. It is likely that this statistic is interrelated with the lower rates of college success seen in low-income students, as Black and African American families are more likely to experience poverty in the United States than other racial or ethnic groups.

Summary of Factors Impacting the College Success Rates of Low-Income Students

While low-income students aspire to complete college at rates similar to higher-income students, research shows that they consistently enroll, graduate, and attend selective colleges at rates lower than their higher income peers. This disparity is not the result of one factor. Instead, low-income students face numerous challenges that have been shown to lower their chance of college persistence and graduation. They may live in impoverished areas and attend schools with limited resources, and as such may not be as academically prepared for college as their higher-income peers. They may have less access to social capital, caused by either the rurality of their environment and distance from institutions of higher education, lower parental knowledge about college due to lower parental educational achievement, the make-up of their social networks, and/or a combination of these and other factors. They may not have adults in their life that model college success, again, perhaps because of lower parental education level, and as such never develop the college-going identity that research shows is critical to college enrollment and graduation. And finally, due to their low-income status, they simply may not have the financial resources available to support a college education and may not

have the information necessary to identify and access alternate sources of funds that support the college enrollment of low-income students.

Identifying ways to help individuals overcome these barriers is critical to breaking the cycle of poverty for low-income students, by enabling them to attain the degrees necessary to achieve social and economic mobility. College readiness programs, as well as state- and college-level initiatives, play important roles in preparing students for college. More in-depth studies that explore the efficacy of these programs in increasing college graduation, in addition to those that focus on the college readiness and enrollment of participants, may provide important contextual information that can increase the success of the programs in achieving their goals, ultimately increasing the success of participating students in achieving their postsecondary educational goals as well.

Federally-funded Intervention Programs for At-Risk Students

The Higher Education Act of 1965 was signed into law on November 8, 1965 under the administration of President Lyndon B. Johnson, with the stated purpose “to strengthen the educational resources of our colleges and universities and to provide financial assistance for students in postsecondary and higher education” (Higher Education Act of 1965, Public Law 89-329, 1965). The Act was connected to then President Johnson’s assertion that national problems like poverty and community development could be addressed through a strengthened higher education system, particularly one that provided more opportunities and assistance to low- and middle-income families and less developed colleges (National TRIO Clearinghouse, 2003). The Act has been reauthorized eight times since its original inception, with each reauthorization amending, removing, and adding to the programs it supports and funds

(Hegji, 2018). The most recent reauthorization occurred in 2008. This legislation has been called “the single most important piece of legislation overseeing the relationship between the federal government, colleges and universities, and students” (American Council on Education, 2019, para. 1), as it provides support to strengthen institutions of higher education and for students pursuing postsecondary education through a variety of federal aid programs. These include Federal Pell Grants, Federal student loan and work-study programs, and student services programs designed to support the college readiness and success of students (Hegji, 2018).

It has been demonstrated through numerous studies that college enrollment and completion rates vary by student populations, with low-income and first-generation students particularly at risk of not being college-ready upon high school graduation, of not attending selective institutions of higher education, and of not attaining a college degree (Horn, 2006; Pew Research Center, 2019). Programs that address and mitigate the factors that lead to these lower postsecondary success rates, such as the programs authorized through the many iterations of the Higher Education Act that are intended to help students from disadvantaged backgrounds pay for and complete college, have the opportunity to address equity issues within education. The following sections provide an overview of one of the student services programs authorized through the Higher Education Act legislation and reauthorizations that are specifically tasked with increasing the college-going rates of low-income students: the GEAR UP program. Also included is relevant research on the accomplishments of this program in supporting its stated purposes.

Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP)

The following sections provide an overview of the GEAR UP program, including governing legislation, the rationale for program design, and a summary of available research that evaluates the success of this program in meeting its stated objectives.

Legislation and Program Overview². The GEAR UP program was first authorized in the 1998 reauthorization of the Higher Education Act of 1965. The 1998 authorization supports the establishment of a program that

- (1) encourages eligible entities to provide or maintain a guarantee to eligible low-income students who obtain a secondary school diploma (or its recognized equivalent), of the financial assistance necessary to permit the students to attend an institution of higher education; and
- (2) supports eligible entities in providing: (A) additional counseling, mentoring, academic support, outreach, and supportive services to elementary school, middle school, and secondary school students who are at risk of dropping out of school; and (B) information to students and their parents about the advantages of obtaining a postsecondary education and the college financing

² Unless otherwise indicated, all information in this section was obtained from the U.S. Department of Education Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) website: <https://www2.ed.gov/programs/gearup/index.html>, including subpages, 2021b.

options for the students and their parents. (1998 Amendments to Higher Education Act of 1965, PL 105-244)

Although the original authorization has been amended several times, primarily in 1999 and 2008, the focus, required services, target population, and eligible organizations have stayed consistent with the original authorization (Gaining Early Awareness and Readiness for Undergraduate Programs Statute, 2008). The following descriptions are based on current descriptions of the GEAR UP program which are consistent with the scope of funded awards made since the program's inception. The GEAR UP program offers competitive grants for two types of awardees, both of which are "designed to increase the number of low-income students who are prepared to enter and succeed in postsecondary education" (U.S. Department of Education, 2021).

The first type of award is made to states and funds six-year matching grants that provide early intervention services designed to raise the college expectations of low-income students, increase their college enrollment and success, and provide scholarships to eligible students. States may only have one active GEAR UP grant at a time; states may only apply for new GEAR UP awards if they do not currently have an active award, or if that award will end prior to the funding start date of the new grant. The second type of award is made to partnerships consisting of at least one local education agency and at least one degree-granting institution of higher education and have the option of including community organizations. If opting to include community organizations, partnerships must include at least two separate organizations, which may be businesses, professional organizations, state agencies, or other public or private agencies or organizations. Awards to partnership applicants are also six-year matching grants that must include the same

types of services described above for state grants, but partnerships may administer more than one active GEAR UP award at a time, although overlap between students and services between the awards is not allowed. Both types of grantees have the option to request a seven-year grant if they plan to provide services through the students' first year of postsecondary education, and both grantee types must provide at least a 50% match to be considered eligible for funding, although partnership grantees may request a waiver of up to 75% of the requirement based on circumstances and partnership composition.

Grant awardees have both required services that they must, and optional services that they may, include in their funded programming. Required services comprise providing postsecondary education financial aid information and postsecondary scholarships for in-state enrollment to participating and eligible students (scholarships are a requirement only for state grants, and grantees may elect to offer scholarships for students who attend institutions of higher education outside the state), encouraging students to enroll in rigorous coursework to reduce their enrollment in remedial education at the postsecondary level, and increasing the number of students who complete high school and apply and enroll for postsecondary education. Grantees use a combination of mentoring, outreach, and provision of supportive services to facilitate the latter program outcomes. Additionally, they may opt to customize their program to meet the needs of their target population, adding in services such as academic tutoring, college tours and job shadowing, and cultural enrichment content.

GEAR UP awardees also have flexibility in identifying their target audiences. The program has two implementation models: a cohort model and a priority student model. In the cohort model grantees begin offering services to all students in a particular grade that

attend eligible schools (i.e. “originating school”), or that reside in public housing. Eligibility is determined by the percent of students enrolled in the originating school that are eligible for reduced-price or free lunch; at least 50% of the students must meet this criterion for the school to be eligible. Once school eligibility has been determined program services are available to all students in designated grade levels regardless of family income. The school must have a 7th grade class, as projects must begin offering services to students by 7th grade but may opt to begin services (i.e. start the cohort) with students in an earlier grade. Since grant services must be offered to students through their senior year of high school if part of a six-year grant, and through their first year of postsecondary if they are part of a seven-year grant, beginning services prior to grade seven may result in needing to serve students after the end of the GEAR UP funding award. Programs may serve students that have not completed high school by the end of the funding award term through a subsequent GEAR UP grant, but this is not recommended because there is a risk that an additional grant will not be awarded. Services must be provided to all students in the beginning grade (often, but not always, 7th grade) at the originating school(s), and services must follow the majority of the cohort as they progress to high school.

An alternate to the cohort model is the priority student model, which allows programs to identify the criteria of their target audience. In this case, awardees prioritize offering services to secondary students who are low-income, have limited English proficiency, are experiencing homelessness or are in foster care, or are from other groups traditionally underrepresented in postsecondary education. Partnership awardees must

utilize the cohort model, while states may utilize either the cohort or priority student model.

Rationale for Program Design. The GEAR UP program was specifically developed to “address the continuing imbalance in postsecondary enrollment rates by specifically promoting equal access to higher education for low-income students” (U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service, 2008, p. 1). A key element of the program is its focus on the role of peers, which is supported through the development of cohorts either within a specific grade or by targeting subpopulations that share common characteristics. The use of peers and inclusivity was based on its use in other initiatives such as the I Have a Dream project, which, as of 2019, had reported that low-income participants in their college readiness programs had high school completion rates 16% higher than their non-participating, low-income peers, and were three times more likely to earn a bachelor’s degree (I Have a Dream Foundation, 2021). GEAR UP also mandates some of the same best practices seen in TRIO programming, such as supporting secondary academic achievement and assisting with completion of financial aid and scholarship applications. The conceptual framework for the program highlights the involvement of, and provisioning of services to and with students, families, schools, and communities. Programs have the flexibility to implement services as they believe will best serve their target population, but it is anticipated that these services should be based on research-based best practices. If implemented as conceptualized, the expected interim or intermediate outcomes of the program are increased family, teacher, and student expectations and knowledge around college; increased secondary academic achievement;

and collaboration with partner organizations. It is then expected that these interim outcomes support the long-term outcomes of increased college enrollment and success of participating students (U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service, 2008).

GEAR UP Program Accomplishments. In 2008, the U.S. Department of Education published the *Early Outcomes of the GEAR UP Program* report, which investigated the interim outcomes of the first cohort of students served via GEAR UP funds (U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service, 2008). The evaluation included up to 140 students from each of 18 GEAR UP participating middle schools and up to 140 students from each of 18 non-GEAR UP participating middle schools. Evaluation activities took place during the five years following the initial grants, which began serving students in fall 1999. This evaluation could only report interim outcomes, as the high school graduation date, and thus anticipated postsecondary enrollment date, for members of the initially served cohort fell after the term of the evaluation. Although the sample size was relatively small and the authors noted that the results of this initial evaluation should not be considered definitive, they provide several key findings that speak to the initial success of the program and its impact on intermediate outcomes. The authors found that attending a GEAR UP school was positively associated with parents' knowledge of the benefits of postsecondary education and opportunities available to their children, with parents' involvement in the school and their children's education, and with parents' higher academic expectations for their children. Although there was no positive association between attending a GEAR UP school and the student's college aspirations,

there was a positive association with attending a GEAR UP school and student knowledge of postsecondary opportunities. There was also a positive association between attending a GEAR UP school and students enrolling in above-grade-level science courses in middle school. In summary, this report found that GEAR UP students and their parents had more knowledge of postsecondary education, parents of GEAR UP students had higher academic expectations for their children, and GEAR UP students were more likely to enroll in some more rigorous coursework, than similar parents and students at non-GEAR UP schools. As these factors are all associated with increased rates of college success, they indicated that initial GEAR UP efforts were supporting the long-term outcomes of the program to increase college entrance and completion of low-income students.

Other studies have supported the relationship between GEAR UP participation and the achievement of some intermediate outcomes. Bausmith and France (2012) found that program participation was associated with increases in college readiness as demonstrated by significant increases in PSAT and Advanced Placement course *participation*, but that participants failed to realize significant increases in *performance* within the PSAT and Advanced Placement courses. Leuwerke et al. (2021) compared secondary school data for over 30,000 GEAR UP and non-GEAR UP students, finding that GEAR UP participation had a significant effect on 10th grade attendance and on 10th grade reading proficiency. They also found that low-income (as determined by Free or Reduced-Price Lunch eligibility) GEAR UP participants may benefit more from the program than their higher income peers, as students in the Free or Reduced-Price Lunch group demonstrated increased 10th grade math proficiency while their higher income

peers did not. Both studies indicate mixed results of GEAR UP programming's efficacy in achieving interim outcomes, but more recent studies have not been as ambiguous. Lunceford et al. (2017) compared both indicators of interim program success (i.e., secondary attendance, GPA, rates of behavior incidents, and high school graduation rates) and the long-term outcome indicator of college enrollment rates, between GEAR UP and non-GEAR UP participating students and found that GEAR UP students "performed significantly better on all measures" (p. 185). Similarly, a 2015 report published by the New England Board of Higher Education indicated that GEAR UP participants showed higher secondary persistence, high school graduation, and college enrollment rates than a comparison group (Fogg & Harrington, 2015).

As described in a previous section, the GEAR UP program mandates some program components and allows grantees flexibility in adding other components. Some studies have focused on identifying which of these optional and mandated program components are most linked to the anticipated outcomes of high school graduation and college success, in some cases with unexpected results. Dalpe (2008) found that over 50% of an eligible cohort did not access the postsecondary scholarship that was part of the GEAR UP program for this group. A possible rationale for this finding was tied to the timing of the funding, as this cohort did not receive GEAR UP services in their senior year of high school; without continued access to supportive services that encouraged completion of college applications, eligible students may not have applied to attend a postsecondary institution and therefore did not access the available scholarship funds. This shortfall in programming was resolved through subsequent GEAR UP legislation, which now provides funding for GEAR UP programming to be used through the senior

year of high school, and in some cases the first year of college, and illustrates the importance of continued evaluation and program refinement.

Other studies have also focused on identifying the most impactful service components. A 2015 study focused on 294 GEAR UP students within one cohort found that participants had a high school graduation rate of 95%, compared to the average school rate of below 60%. When asked which program components had impacted their academic success and college aspirations, GEAR UP participants in the 12th grade indicated that college tours and fairs, test preparation, tutoring, and financial aid workshops had the greatest impact (Morgan et al., 2015). This aligns, in part, with other work done on the topic. An Iowa-based research team found that college visits, financial aid counseling, college campus activities, academic assistance, and ACT/SAT test preparation had positive effects on the college enrollment of GEAR UP participants, while college visits and college campus activities had a positive effect on their college persistence (Kim et al., 2021). The authors noted that these college-based activities may increase persistence as they prepare students for the challenges and realities of college before they enroll.

Similar to Fogg and Harrington (2015), Lunceford et al. (2017), and Kim et al. (2021), recent research has moved beyond investigation of only interim outcomes and has included investigation of the primary goals of the GEAR UP program, namely college enrollment and college success. These studies have primarily been focused on the impact of GEAR UP programming on college enrollment and persistence and have not included postsecondary graduation as an outcome measure. Prior to the mid-2010's literature on any postsecondary outcomes of GEAR UP students was more or less unavailable; a

review of the available literature conducted by Knaggs et al. (2015) found eleven GEAR UP program evaluations available in peer reviewed journals or public reports. Of these, only one included college enrollment as an outcome measure and none included persistence or graduation. In response to this deficit Knaggs et al. evaluated the linkages between GEAR UP programming and college-related outcomes for one GEAR UP cohort, finding that GEAR UP participation was associated with increased college enrollment and persistence, and with enrollment at more selective institutions. Of most relevance to the stated outcomes of the GEAR UP program, this study reported that low-income GEAR UP participants had significantly higher rates of college enrollment and persistence compared to low-income non-GEAR UP participating students, indicating that the program increases success for its target population in addition to increasing success for all participants. Similarly, Sanchez et al. (2018) found that GEAR UP did impact college persistence, as GEAR UP students were as likely to persist in college as their peers from less disadvantaged backgrounds enrolled at the same university. This is contrary to other research that found that the target population served by GEAR UP had lower rates of persistence when interventions were not provided. Conversely, Bowman et al. (2018), in their analysis of over 17,000 students found that “GEAR UP Iowa improved college enrollment rates shortly after high school graduation, but it did not contribute to college persistence” (p. 414).

Summary of the GEAR UP Program. While there are discontinuities visible in the available research regarding the impact of GEAR UP programming on specific indicators of college readiness and success, overall the literature supports the finding that GEAR UP programming is helping participating students achieve college readiness and

success through a variety of services. There is even some evidence that the efficacy of GEAR UP programming may be increasing over time with regards to college enrollment. The National Council for Community and Education Partnerships (2018) reported a 17.4% increase between 2011 and 2014 in the percentage of former GEAR UP high school graduates who immediately enrolled in college. However, it is clear from this review that research is lacking around the long-term program outcome of college success of GEAR UP students, particularly pertaining to college degree attainment. One group seeking to rectify this scarcity is the College and Career Readiness Evaluation Consortium (CCREC), a group comprised of 13 GEAR UP state grant projects that have agreed to adopt common data collection and evaluation practices. The CCREC has developed a research and evaluation framework, and plans to evaluate the postsecondary enrollment, persistence, and graduation of two longitudinal cohorts of students through FY2025 (National Council for Community and Education Partnerships, 2018).

The pre-2015 lack, and recent proliferation of studies that explore college outcomes is not surprising. The first cohort of GEAR UP students likely did not graduate high school until around 2005, and data on four-year college graduation would not have been available for four to six more years (based on 150% normal time to degree completion). With multiple cohorts completing GEAR UP programming, secondary education, and college since 1999, and the large numbers of students being served annually through this program, it is possible that the literature will soon reflect a strong uptick in the number of published studies that explore the efficacy of this program as it relates to its long-term outcomes of college enrollment, persistence, and graduation.

Summary of Chapter Two

This chapter first provided an overview of several key factors that impact the college preparation, enrollment, and completion of students. Central to this study is an understanding of the impact of familial income level on college success, with research indicating that low-income students are less likely than their peers from higher income families to attend college, are more likely to attend undercapitalized or less selective institutions, and are less likely to graduate with a college degree. Other factors associated with college enrollment and completion were also explored in this chapter, with some showing a stronger connection to postsecondary success than others. Higher levels of secondary academic achievement that speak to increased college preparedness are associated with increased college enrollment and graduation, and females account for the majority of college degree completion. Students from different racial and ethnic groups experience disproportionate rates of college enrollment, particularly when the selectivity of the institution is considered, as well as college completion; Black or African American students experience the lowest rates of postsecondary completion. Students that aspire to attend college are more likely to enroll in postsecondary institutions, but aspirations do not have as strong a connection to graduation as they do to enrollment. Finally, the impact that the geographic location of a student's secondary education institution has on college enrollment or completion varies based on the study referenced.

This chapter then explored the design and efficacy of the GEAR UP program, one of several federally-funded intervention programs that are designed to increase the college readiness of low-income students. Evidence from funder-produced reports, peer-reviewed journal articles, and other sources such as dissertations support the conclusion

that this program is increasing college readiness and enrollment for the target groups, although evidence on how, and whether, the programs are enabling college completion is relatively absent. Additional studies are needed to better understand the efficacy of the GEAR UP program in increasing the college completion rates of low-income students. Studies that also explore the intersection of GEAR UP participation and other factors known to impact the college success of students, namely the five explored in the first section of this chapter, may provide additional context that can be used to refine programming to better serve target populations. The methodology and results of one such study are presented in future chapters.

Chapter Three: Research Design and Methodology

The purpose of this study was to examine which academic and personal variables, if any, can predict whether GEAR UP eligible students who enroll in college will obtain a college degree within 150% of the normal time to degree completion. Research questions and subquestions explored comprise:

1. Can postsecondary completion of GEAR UP eligible students who enroll in college be reliably predicted from knowledge of 12th grade GPA, 7th grade college aspirations, cumulative GEAR UP program service hours, gender, middle school setting, and race/ethnicity?
 - a. If postsecondary completion can be predicted, which variables are central in the prediction?
 - b. How good is the resulting model at classifying cases?

Existing data from the 2006-2012 Nevada State Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) were used to explore the factors that contribute to postsecondary degree attainment within 150% of normal time to completion.

This chapter is divided into six sections. Following this introduction, the research design is described. Data sources and data preparation are delineated in detail, each in their own section, followed by a description of the data analysis conducted. Finally, the chapter is summarized.

Research Design

This study utilized binary logistic regression as the primary method for analysis. This approach was determined to be the most appropriate statistical test to explore the

research questions above based on the composition of the variables as well as the focus of the area of inquiry. Logistic regression is a flexible approach that can be used to predict a categorical outcome or membership in a group when there are multiple predictors and it is unclear if those predictors are the causes of the outcome (Menard, 2010). Logistic regression is “currently considered *the* best practice when dealing with outcomes that are dichotomous or categorical in nature” (Osborne, 2017a, italics in original). Mertler and Reinhart (2017) added that logistic regression is appropriate when the independent variables are a mix of categorical and continuous, as is the case in this study. Unlike other approaches such as discriminant analysis or multiple regression, logistic regression is also considered to be more flexible and versatile as it does not require that assumptions about predictor variables, such as that they are normally distributed or be have intra-group equal variances, be met (Mertler & Reinhart, 2017).

Variables

The following variables were considered in this analysis.

Dependent Variable (DV). The dichotomous, categorical dependent variable for this analysis was postsecondary completion, as defined by GEAR UP students that enrolled in college either obtaining or failing to obtain an associate’s, bachelor’s, or advanced degree within 150% of the time traditionally needed for program completion. Students were considered to have met the 150% threshold if they obtained an associate degree of any variety (AA, AS, etc.) within three years of high school graduation, and/or if they obtained a bachelor’s degree of any variety (BA, BS, etc.) within six years of high school graduation, and/or if they obtained an advanced degree within any timeframe covered by the National Student Clearinghouse report.

Independent/predictor Variables. Six independent variables were explored as possible predictors of students being placed in the obtained a degree in 150% normal time to completion category. Each categorical variable below, with the exception of middle school setting, used the category group names established and utilized as part of the Nevada GEAR UP program's internal data collection and management approach.

- 12th grade Point Average (GPA): This continuous variable represents the non-weighted GPA of participants in their senior year of high school.
- College aspirations as communicated in 7th grade: Students were asked in 7th grade about their educational attainment goals and had the ability to select from one of three options. This categorical variable comprises the answer choices of completing “high school or less”, “some college but less than a 4-year degree”, and a “4-year degree or more”.
- Cumulative service hours: The GEAR UP program collected service hour data as represented by number of hours of participation in program activities for students in their 7th grade, 9th grade, and 12th grade years. Cumulative service is, in essence, a proxy used to assess levels of participation in the GEAR UP program. The total number of hours spent participating in GEAR UP activities was combined across all years for which data were collected to determine a cumulative service hour total for each student. These totals were placed within one of four categorical groupings: no participation (0 hours), low participation (>0 to <100 hours), moderate participation (100 to <1000 hours), and high participation (1000+ hours). The methodology for these groupings is described in more detail on page 54.

- Middle school setting: This categorical variable comprises either “rural” or “urban”, as determined by the location of the middle school the student attended. The name of the middle school that each student attended in 7th grade is available in the existing dataset and was used to code the setting as either rural or urban. The methodology for these groupings is described in more detail on page 55.
- Gender: This categorical variable comprises “female” or “male”.
- Race/ethnicity: This categorical variable comprises “American Indian”, “Asian”, “Black”, “Hispanic”, or “White”.

Data Sources

This analysis required the use of the two datasets described below. Institutional Review Board (IRB) approval was obtained to conduct this research as an exempt study ([Appendix A](#)).

Dataset One—Nevada GEAR UP Cohort 2 Report

The first dataset, hereafter referred to as the Cohort 2 Report, was provided by Nevada GEAR UP program staff and includes demographic, academic, and survey data for 5,977 students (after deduplication) that were identified as eligible for participation in GEAR UP Cohort 2. Note that this report contains information on students that were eligible for but did not participate in GEAR UP activities, as represented by a cumulative service hours total of 0. This cohort began receiving services in their 7th grade years during academic year 2006-2007 and graduated high school in spring 2012. This dataset contains information for, or that informs the coding of, all independent variables.

Dataset Two—National Student Clearinghouse

The second dataset comprises reports generated by the National Student Clearinghouse (NSC) in January 2019 that include the postsecondary enrollment and attainment data for these same 5,977 GEAR UP program-eligible students. The names and other required personally identifiable information for these 5,977 students were submitted to NSC on December 16, 2018. Based on the data submitted, NSC produced three reports.

Studenttracker Control Report. This report provides the total number of students in the initial request (5,977); the number of students with no response data available either because they did not participate in postsecondary education, because they could not be matched based on the data provided, or because they attended one of the 2% of institutions nationwide that do not participate in the NSC system (3,000); the number of students for which postsecondary records were found and included in the aggregate report (2,977); and the number of students for whom detail level data was available (2,924). The difference between the number of students for which postsecondary data were found (2,977) and the number of students for which detail level data were reported (2,924) is due to student level reporting being blocked either by the student or their school for 53 students.

Aggregate Report by Institution of Higher Education. This report provides the initial postsecondary institution attended by the GEAR UP students for which postsecondary data were available and the total number of degrees awarded to these students. This report was not used in this study as it does not relate to the research questions.

Disaggregated Report by Student. This report provides enrollment and graduation records for each student for which data were available and serves as the source of postsecondary completion data for the GEAR UP Cohort 2 students (the dependent variable). It covers the periods August 2010 through July 2018, and contains 5,964 unique student names. It must be noted that the dataset submitted to NSC contained 5,977 students, and the Studenttracker Control Report indicated that the presence of postsecondary records could be determined for 5,924 students (3,000 had no response data available, 2,924 had data that could be reported at the detail level, and 53 had data that was blocked by the student or institution). The cause of the discrepancy between the number of students included in the Disaggregated Report and the totals provided on the Control Report is unknown but is noted as a possible limitation to the analysis. It was ultimately decided that the Disaggregated Report by Student provided the most appropriate data for merging with the GEAR UP dataset as described in the Data Preparation subsection of this chapter that follows.

Data Preparation

Exploration of the research questions and analysis using binary logistic regression required that the two datasets (Nevada GEAR UP Cohort 2 Report and National Student Clearinghouse Disaggregated Report by Student) be merged, so that all dependent and independent variables were assigned to the same student record. Prior to merging the data, both datasets were reviewed and cleaned, including the removal of duplicates.

For the GEAR UP Cohort 2 Report, cleaning included the removal of six students. Four entries were removed because they did not include student names that could be matched to the postsecondary records included in the Disaggregated Report by Student.

Two additional students in the Cohort 2 Report had the same full name, but differed on their other personally identifiable information and so could not be matched conclusively to a postsecondary record. These six students that could not be matched were removed from the analysis, leaving a final dataset of 5,971 in the Cohort 2 Report.

The NSC dataset was provided in such a way that it required manipulation before it could be merged with the Cohort 2 Report. Postsecondary data by student were provided by NSC in the Disaggregated Report by Student in an Excel CSV format, with each semester the student attended included as a separate row. This is illustrated in Table 1, using the raw data for a deidentified student. Note that the actual export included the student's first name, middle initial, and last name. Additional data were provided in this export, but only fields relevant to the merge and analysis are provided below.

Table 1*Structure of Disaggregated Report Provided by National Student Clearinghouse*

College Name	College State	2-year / 4-year	Public / Private	Enrollment Begin	Enrollment End	Graduated?	Graduation Date	Degree Title	Degree Major 1	College Sequence
MINERAL AREA COLLEGE	MO	2	Public	2012 0820	2012 1215	N				1
MINERAL AREA COLLEGE	MO	2	Public	2013 0114	2013 0518	N				
MINERAL AREA COLLEGE	MO	2	Public	2013 0819	2013 1214	N				
MINERAL AREA COLLEGE	MO	2	Public	2014 0113	2014 0517	N				
MINERAL AREA COLLEGE	MO	2	Public	2014 0818	2014 1213	N				
MINERAL AREA COLLEGE	MO	2	Public	2015 0112	2015 0516	N				
MINERAL AREA COLLEGE	MO	2	Public			Y	2015 0516	AAS	BUS MGMT-ACCOUNT	
COLLEGE OF SOUTHERN NEVADA	NV	4	Public	2012 0827	2012 1215	N				2

The table above indicates that this student attended Mineral Area College (MAC) from August 2012 through May of 2015, at which point they graduated with an AAS in Business Management-Accounting. They simultaneously enrolled at both MAC and the

College of Southern Nevada for the fall 2012 semester. Based on a high school graduation date of spring 2012 (used for all students in this analysis, based on their 12th grade school year taking place in AY 2011-12), this student graduated with their AAS within three years of high school graduation and would be considered to have obtained a degree within 150% normal time to degree completion.

Because of the structure of the Disaggregated Report by Student, merging postsecondary graduation data (the dependent variable of this study) with GEAR UP program data provided in the Cohort 2 Report (which contains all independent variables of this study) was not possible without additional cleaning of the Disaggregated Report. Rather than engage in this cleaning and the subsequent combination of the datasets by hand and risk operator error, a software engineer was engaged to participate in the process. Using Python, they first merged all data records for each student within the Disaggregated Report, resulting in one row by student that summarizes all postsecondary enrollment and graduation data, as illustrated in Table 2 for the same student who was utilized for the example provided in Table 1. The resulting output was spot checked for accuracy before merging with the Cohort 2 Report.

Table 2

Structure of Postsecondary Report Following Row by Student Combination

Row Header	College Names	College State	2-year / 4-year	Public / Private	Enrollment Begin	Enrollment End	Graduated?	Graduation Date	Degree Title	Degree Major 1	College Sequence
Description of Combined Data	All listed colleges separated by ;, each listed once	All states separated by ;, each listed once	All year types separated by ;, each listed once	Type for each institution listed once, separated by ;	Earliest enrollment date	Latest enrollment date	Graduated by school, separated by ;	All graduation dates, separated by ;	All degree titles, separated by ;	All degree majors, separated by ;	Highest number listed in any row associated with name
Example Row	MINERAL AREA COLLEGE; COLLEGE OF SOUTHERN NEVADA	MO; NV	2;4	Public; Public	20120820	20150516	Y; N	20150516	AAS	BUS MGMT- ACCOUNTING (AAS)	2

Merging The Datasets

Following creation of a by-student postsecondary dataset as illustrated in Table 2, the resulting rows were merged with the GEAR UP data also using Python, using full names as the matching fields (hereafter the resulting dataset is referred to as the “merged dataset”). This was done after reconfirming that there were no duplicate names that could impact this merge. The resulting output was an Excel spreadsheet that was spot checked for accuracy to ensure the merge successfully matched students in the two datasets. The merged dataset was converted into a table within Excel to assist with filtering, sorting, coding, and basic analysis. The merged dataset contains 5,971 records, with postsecondary enrollment information available for 2,950 students. The remaining 3,021 are assumed not to have attended or graduated from a postsecondary institution at the time the report was generated.

Manual Coding of Three Variables

The dependent variable and two independent variables required further coding by the researcher before analyses could be conducted. Additional columns were added to the merged dataset to capture the following information.

150% Normal Time to Degree Completion. Students were determined to have graduated college by the National Student Clearinghouse as reported in the Disaggregated Report by Student; all students for which this report indicated “Y” within the “Graduated” field are included in the “Enrolled in and Graduated College” count in Table 5 located on page 62. Students that were marked as having graduated from college were subsequently assigned to one of three categories based on their data of graduation information and degree type: completed in 150% normal time to completion (Y), did not

complete within 150% normal time to completion (N), or could not be determined (U). Students were placed in the first category if they completed an associate's degree by the end of June 2015, a bachelor's degree by the end of June 2018, or an advanced degree (master's, JD. etc.) within any timeframe covered by the *Disaggregated Report by Student*. Students noted as only having obtained something other than an associate's, bachelor's, or advanced degree (e.g. "diploma", "certificate of achievement", etc.) regardless of timing were marked as not having obtained a degree in 150% of normal time. This review was degree specific, and a student obtaining at least one degree within the 150% normal time to completion was considered having met the standard for inclusion as a degree recipient. For example, a student that took four years to obtain an AAS (outside the 150% normal time for completion), but also obtained a BA within six years, was placed in the "Yes" category. Each entry was reviewed and coded manually, as the structure of the merged report did not allow for the coding to be handled by either Excel or SPSS. An example of the merged dataset structure for the utilized fields and subsequent coding is provided in Table 3. The researcher completed the initial coding on one day and reviewed each entry on a separate day.

Table 3

Example of Structure of Merged Dataset for Graduation Date and Degree Title and Subsequent 150% Normal Time to Completion Coding

Graduation Date	Degree Title	Subsequent Coding and Notes
;20150515;;20171217	;ASSOCIATE OF APPLIED SCIENCE;; BACHELOR OF ARTS	This individual was coded as Y, did complete a degree in 150% normal time to degree completion based on attainment of an associate's degree in May 2015 and a bachelor's degree in December 2017.
::20160512;20180510;	::CERTIFICATE OF COMPLETION;ASSOCIATE OF APPLIED SCIENCE;	This individual was coded as N, did not complete a degree in 150% normal time to degree completion. While they completed an associate's degree, it was not completed until May of 2018.
20140927	No information provided	This individual was coded as U, 150% normal time to completion could not be determined as no information on degree type was provided by the National Student Clearinghouse.

Cumulative Service Hours. Service hours were collected during participants' 7th, 9th, and 12th grade years and recorded in separate columns (one column per grade at which data was collected). These three columns were summed for each student, creating a new column entitled *Srvhourstotal* in the merged dataset. The resulting totals were then

placed within one of four categorical groupings: no participation (0 hours), low participation (>0 to <100 hours), moderate participation (100 to <1000 hours), and high participation (1000+ hours). These categories were developed through consultation with University of Nevada, Reno College of Education faculty, and are based on a consideration of average weeks of school per year the data were collected and what would constitute low versus moderate versus high participation. However, as is noted in the limitations section of this paper, not all students for which cumulative service hours are available participated in all three years during which data was collected. For example, a student coded to the low participation group due to a total participation of 80 hours may have logged those 80 hours over the course of one, two, or three data collection years.

Middle School Setting. The determination of setting was based on input from faculty within the University of Nevada, Reno College of Education. The 12 schools categorized as urban are located in the two major cities of the state. Each city is home to a large community college and a public university. The 8 schools categorized as rural are located either in the county seat of small, rural counties or in more remote, frontier communities with limited educational resources (J. Usinger, personal communication, April 2019). A summary of the schools included in each category is provided in Table 4.

Table 4*Setting of Nevada GEAR UP Cohort Two Participating Middle Schools*

School Name	County	Setting
Amargosa Valley School	Nye	Rural
Cannon Junior High School	Clark	Urban
Clarke Middle School	Nye	Rural
Cortney Junior High School	Clark	Urban
Dean's Future Scholars	Washoe	Urban
Esmeralda County Schools	Esmeralda	Rural
Findlay Middle School	Clark	Urban
Fremont Middle School	Clark	Urban
Gabbs School	Nye	Rural
Keller Middle School	Clark	Urban
Knudson Middle School	Clark	Urban
McDermitt Combined School	Humboldt	Rural
O'Callaghan Middle School	Clark	Urban
Owyhee Combined School	Elko	Rural
Pershing County Middle School	Pershing	Rural
Robison Middle School	Clark	Urban
Schurz Elementary School	Mineral	Rural
Traner Middle School	Washoe	Urban
Vaughn Middle School	Washoe	Urban
Woodbury Middle School	Clark	Urban

Coding Variables for SPSS

Categorical variables were coded for SPSS as follows.

Dependent Variable: Postsecondary Completion in 150% Normal Time

Degree. No (0), Yes (1)

Independent Variable: 7th grade college aspirations. High school or less (1), Some college but less than a 4-year degree (2), 4-year degree or more (3)

Independent Variable: Cumulative Service Hours. Low participation (1), Moderate participation (2), High participation (3)³

Independent Variable: Gender. Female (1), Male (2)

Independent Variable: Middle School Setting. Rural (1), Urban (2)

Independent Variable: Race/Ethnicity. American Indian (1), Asian (2), Black (3), Hispanic (4), White (5)

Data Analysis

The following steps were taken to complete a logistic binary regression using the SPSS Statistics software program [Version: 28.0.0.0 (190)], as outlined in *Advanced Multivariate Statistical Methods: A Practical Application and Interpretation* (Mertler & Reinhart, 2017).

Data Screening and Testing Assumptions

Prior to analysis, the merged dataset was screened for missing data and outliers, and all assumptions of binary logistic regression were investigated. These include confirming that the predictor variables were independent. The results of these

³ No students included in the logistic regression had zero hours of service hours.

investigations are presented in Chapter Four. Binary regression is robust to violations of normality and distribution, so those factors were not investigated. Only complete records were included in the analysis; any records missing data for either the dependent variable or any of the independent variables were removed from the binary regression. A total of 1,654 cases remained after the removal of records with missing data.

As this research was exploratory, a forward logistic regression was conducted. This resulted in a model that only includes those independent variables that significantly predicted the dependent variable.

Summary of Chapter Three

This chapter provided a summary of the research design and methodology of this study, beginning with the research questions that guided the investigation of which, if any, personal and academic variables can predict whether GEAR UP eligible students who enroll in college will complete postsecondary education. This study utilized a binary logistics regression as the primary method for analysis, based on the structure of the research questions (i.e. the focus on predicting membership in a group based on multiple variables), as well as the composition of the variables involved (i.e. the dichotomous categorical dependent variable and mix of categorical and continuous independent variables). The dependent variable is postsecondary completion within 150% of the normal time to degree for GEAR UP eligible students that enrolled in college and the six independent variables included in the analysis are 12th grade GPA, 7th grade college aspirations, cumulative GEAR UP program service hours, gender, middle school setting, and race/ethnicity.

Data to inform this study were drawn from two sources. All GEAR UP participation data and personal demographics were accessed from the GEAR UP program-provided Cohort 2 Report. All postsecondary completion data were accessed from the National Student Clearinghouse-provided Disaggregated Report by Student. Both datasets were reviewed and deduplicated; via the assistance of a software engineer the datasets were merged together to facilitate analysis in SPSS. Best practices for completing a forward logistic regression, including data screening and testing of assumptions, as well as data presentation and analysis were followed as described in Chapter Four.

Chapter Four: Results

The purpose of this study was to examine which academic and personal variables, if any, can predict whether GEAR UP eligible students who enroll in college will obtain a college degree within 150% of the normal time to degree completion. The results included in this chapter are presented to explore the following research question and subquestions.

1. Can postsecondary completion of GEAR UP eligible students who enroll in college be reliably predicted from knowledge of 12th grade GPA, 7th grade college aspirations, cumulative GEAR UP program service hours, gender, middle school setting, and race/ethnicity?
 - a. If postsecondary completion can be predicted, which variables are central in the prediction?
 - b. How good is the resulting model at classifying cases?

This chapter is divided into six sections. Following this introduction, a description of the dataset and preparation activities are described. This section includes descriptive statistics for the entire GEAR UP Cohort 2 dataset. The binary logistic regression is then delineated in detail in a third section, including descriptive statistics only for those records included in the analysis. Finally, the chapter is summarized.

Description of the Dataset and Data Preparation

The data utilized for this study comprise an Excel spreadsheet with 5,971 records. This spreadsheet was created through the merging of two datasets. The first contained all demographic and pre-college data utilized in this analysis and was provided by the Nevada GEAR UP program. The second contained the college enrollment and

completion data for the same students included in dataset one. These datasets were combined as described in Chapter Three prior to being imported to SPSS.

The binary logistic regression analysis includes only those students for which data on all variables were available ($n = 1,632$ after the removal of missing cases and outliers). Students that were missing data for any of the independent variables (12th grade GPA, 7th grade college aspirations, cumulative GEAR UP program service hours, gender, middle school setting, and race/ethnicity), or that did not enroll in college, are not included in the binary logistic regression. Descriptive statistics for all GEAR UP Cohort 2 eligible students ($n = 5,971$) are provided in the following section; descriptive statistics for only those students whose records are included in the logistic regression are presented in detail within the Binary Logistic Regression session.

Overview of GEAR UP Cohort 2 Eligible Students

Descriptive statistics are provided for all GEAR UP Cohort 2 students for which relevant data was available in Table 5. This table provides a summary of the number of GEAR UP eligible students that did not enroll in college, did enroll in college, completed college, and completed college within 150% normal time to completion. The methodology for these determinations is described in detail in Chapter Three. While this table includes students that are outside the scope of the stated research questions (i.e. not only those that enrolled in and/or completed college in 150% normal time to degree completion), the data are included to provide a more robust picture of the GEAR UP

Cohort 2 population, and because, as Chapter Two illustrated, data on the enrollment and graduation rates of GEAR UP participating students is often lacking in the literature.

Table 5

College Aspirations, Cumulative Service Hours, Gender, Middle School Setting, Race/Ethnicity, and 12th Grade GPA of GEAR UP Eligible Students by College Enrollment and Completion

	Total	No College Enrollment Indicated	Enrolled in College	Enrolled in but Did Not Complete College	Enrolled in and Graduated College	Completed an AA, BA, or Advanced Degree in 150% Normal Time to Completion
GEAR UP Eligible Students	5,971	3,021	2,950	2,080	870	572
7th Grade College Aspiration						
<i>High school or less</i>	401 (6.7)	291 (9.6)	110 (3.7)	86 (4.1)	24 (2.8)	11 (1.9)
<i>Some college but less than a 4-year degree</i>	1,107 (18.5)	670 (22.2)	437 (14.8)	319 (15.3)	118 (13.6)	57 (10.0)
<i>4-year college degree or higher</i>	3,178 (53.2)	1,328 (44.0)	1,850 (62.7)	1,289 (62.0)	561 (64.5)	386 (67.5)
<i>Data not available</i>	1,285 (21.5)	732 (24.2)	553 (18.7)	386 (18.6)	167 (19.2)	118 (20.6)
Cumulative Service Hours						
<i>No participation or data not available</i>	180 (3.0)	130 (4.3)	121 (4.1)	43 (2.1)	7 (.8)	6 (1.0)
<i>Low participation (>0 to <100 hours)</i>	1,816 (30.4)	1,280 (42.4)	536 (18.2)	431 (20.7)	105 (12.1)	48 (8.4)
<i>Moderate participation (100 to <1000 hours)</i>	3,843 (64.4)	1,600 (53.0)	2,243 (76.0)	1,560 (75.0)	683 (78.5)	455 (79.5)
<i>High participation (1000+ hours)</i>	132 (2.2)	11 (<1)	50 (1.7)	46 (2.2)	75 (8.6)	63 (11.0)

	Total	No College Enrollment Indicated	Enrolled in College	Enrolled in but Did Not Complete College	Enrolled in and Graduated College	Completed an AA, BA, or Advanced Degree in 150% Normal Time to Completion
Gender						
<i>Female</i>	2,934 (49.1)	1,293 (42.8)	1,641 (55.6)	1,095 (52.6)	546 (62.8)	348 (60.8)
<i>Male</i>	3,036 (50.8)	1,728 (57.2)	1,308 (44.3)	984 (47.3)	324 (37.2)	224 (39.2)
<i>Data not available</i>	1 (<.1)	0 (0)	1 (<.1)	1 (<.1)	0 (0)	0 (0)
Middle School Setting						
<i>Rural</i>	543 (9.1)	254 (8.4)	289 (9.8)	188 (9.0)	101 (11.6)	64 (11.2)
<i>Urban</i>	4,363 (73.1)	2,179 (72.1)	2,184 (74.0)	1,565 (75.2)	619 (71.1)	397 (69.4)
<i>Data not available</i>	1,065 (17.8)	588 (19.5)	477 (16.2)	327 (15.7)	150 (17.2)	111 (19.4)
Race/Ethnicity						
<i>American Indian</i>	124 (2.1)	64 (2.1)	60 (2.0)	40 (1.9)	20 (2.3)	8 (1.4)
<i>Asian</i>	362 (6.1)	134 (4.4)	228 (7.7)	144 (6.9)	84 (9.7)	58 (10.1)
<i>Black</i>	740 (12.4)	345 (11.4)	395 (13.4)	309 (14.9)	86 (9.9)	55 (9.6)
<i>Hispanic</i>	3,116 (52.2)	1,730 (57.3)	1,386 (47.0)	999 (48.0)	387 (44.5)	242 (42.3)
<i>White</i>	1,624 (27.2)	746 (24.7)	878 (29.8)	587 (28.2)	291 (33.4)	208 (36.4)
<i>Data not available</i>	5 (<.1)	2 (<.1)	3 (<.1)	1 (<.1)	2 (.2)	1 (.2)
12th Grade GPA						
<i>Mean</i>	2.69	2.27	2.89	2.73	3.20	3.34
<i>Range</i>	0.0-4.0	0.0-4.0	0.0-4.0	0.0-4.0	0.0-4.0	0.0-4.0

Note: numbers in parentheses are percentages and may not equal 100% for each category due to rounding. Mean and range are based on available data for each group; 12th grade GPA data was not available for 2,913 students.

In total, data provided by NSC indicated that 2,950 out of the 5,971 GEAR UP Cohort 2 eligible students enrolled in college ($2,950/5,971 = 49.4\%$); 2,080 of these students did not complete college ($2,080/2,950 = 70.5\%$) while 870 did complete college ($870/2,950 = 29.5\%$) by the time the NSC report was run. Not all enrolled students could be determined to have graduated within 150% normal time to degree completion; 2,916 of the 2,950 students that enrolled in college could be coded as having either graduated ($n = 572$, $572/2,916 = 19.6\%$) or not graduated ($n = 2,344$, $2,344/2,916 = 80.4\%$) with a postsecondary academic degree within 150% of the normal time to degree completion. Degree type or other relevant data was missing for 34 students and their inclusion in the 150% normal time to completion category could not be determined.

Students that enrolled in college ($n = 2,950$) varied from students that did not enroll in college ($n = 3,021$) on a few key characteristics. Less variation is seen in students that enrolled in but either did ($n = 870$) or did not ($n = 2,080$) complete college. These differences are described in the narrative that follows. Note that statistical analyses were not used to assess the significance of these differences and the following narrative and preceding table are provided as informational only. The extent to which any of these characteristics predict college completion in 150% normal time to graduation for those students that did enroll in college is explored via a binary logistic regression later in this chapter.

7th Grade College Aspirations. Students that enrolled in college had higher rates of college aspiration (77.5%, 62.7% aspiring to a four-year degree + 14.8% aspiring to some college) than those for which no college enrollment data was indicated (66.2%, 44% aspiring to a four-year degree + 22.2% aspiring to some college). Less variation was

seen between students that enrolled and did not complete (77.3%, 62% aspiring to a four-year degree + 15.3% aspiring to some college) and those that enrolled and did complete (78.1%, 64.5% aspiring to a four-year degree + 13.6% aspiring to some college).

Cumulative Service Hours. Students that enrolled in college demonstrated higher rates of moderate or high participation in GEAR UP programming (77.7% = 76% + 1.7%) compared to students for which no college enrollment data was indicated (54% = 53% + <1%). Students that enrolled in and completed college also demonstrated higher rates of moderate or high participation (87.1% = 78.5% + 8.6%) compared to students that enrolled in and did not complete college (77.2% = 75% + 2.2%).

Gender. Females made up less than half of the GEAR UP Cohort 2 (49.1%), but were more highly represented than males in both the enrolled in college group (55.6% compared to 44.3%) and completed college group (62.8% compared to 37.2%).

Middle School Setting. No meaningful differences were seen in the proportions of rural and urban students that enrolled in, did not enroll in, or graduated college compared to the total GEAR UP Cohort 2 population.

Race/Ethnicity. Compared to the total Cohort 2 population ($n = 5,971$), Asian and White students were overrepresented in the groups that enrolled in and graduated college (i.e. made up a larger proportion of these groups than they did in the Cohort 2 population). Asian and White students comprised 7.7% and 29.8%, respectively, of the “enrolled in college” group, but only 6.1% and 27.2% of the total population. Similarly, Asian and White students comprised 9.7% and 33.4%, respectively, of the “enrolled in and graduated college” group, but only 6.1% and 27.2% of the total population. Hispanic students were underrepresented within these same groups, making up 52.2% of the total

population but only 47% of the group that enrolled in college and only 44.5% of the group that enrolled in and graduated college. Black students were slightly underrepresented in the group that graduated college, comprising 12.4% of the total population but only 9.9% of the group that enrolled in and completed college.

12th Grade GPA. While all groups had consistent unweighted GPA ranges of 0-4.0, differences are evident in the means between college attendance and completion groups. Mean GPAs increased as college success measures increased. Students that enrolled in college had a higher mean GPA (2.89) compared to students that did not enroll in college (2.27). Students that completed college in 150% normal time to completion had the highest mean GPA of all groups (3.34) compared to students who enrolled in and graduated college (3.20) and students who enrolled in but did not complete college (2.73).

Binary Logistic Regression

A binary logistic regression was used to determine which, if any, of the six independent variables predicted college completion in 150% of normal time to degree for GEAR UP eligible students that enrolled in college. Only complete cases (i.e. those records for which data on all six independent variables as well as the dependent variable were available) were included in the analysis, resulting in a total of 1,654 students. A preliminary multiple linear regression was conducted to calculate Mahalanobis distance and assess multivariate outliers, as well as to evaluate multicollinearity between the predictor variables. Multicollinearity, a problem caused when independent variables are very highly correlated with each other, was explored through review of the tolerance statistics within the regression coefficients table generated during the linear regression.

Tolerance for all independent variables exceeded .1 as presented in Table 12 within the [Appendix B](#), indicating that multicollinearity was not violated.

All cases in which the Mahalanobis value exceeded the chi-square criteria for the number of variables being investigated were eliminated using the Select Cases function [$\chi^2(6) = 22.458$ at $p = .001$]. This resulted in the removal of 22 cases. Following the removal of outliers, 1,632 records remained in the dataset.

Descriptive Statistics for the Dataset Used in the Logistic Regression

A total of 1,632 cases were included in the binary logistic regression. Descriptive statistics and a brief narrative are provided prior to the results of the regression analysis. The majority of students included in the binary logistic regression did not obtain a degree within 150% normal time to completion, as illustrated in Table 6; 77.6% of the 1,632 students did not graduate within 150% normal time and 22.4% did graduate within 150% normal time to completion.

Table 6

Frequencies of the Dependent Variable (Graduation in 150% Normal Time to Degree Completion)

Group	Frequency	Percent
Graduated in 150% Normal Time to Completion	365	22.4
Did not Graduate in 150% Normal Time to Completion	1,267	77.6
Total	1,632	100.0

Table 7 provides descriptive statistics for the continuous independent variable used in the regression: 12th grade non-weighted GPA. Students that graduated in 150% normal time to completion had a higher mean GPA than students that did not graduate in 150% normal time to completion. They also had a slightly lower standard deviation, indicating less variation in the spread of the data. This is also evident in the range of GPAs within each group. While both groups had a maximum GPA of 4.0, students that graduated in 150% normal time had a higher minimum GPA value (1.3 compared to 0.9).

Table 7

Descriptive Statistics of the Continuous Independent Variable

	Graduated in 150% Normal Time to Completion (<i>n</i> = 365)			Did not Graduate in 150% Normal Time to Completion (<i>n</i> = 1,267)		
	Mean	Range	Standard Deviation	Mean	Range	Standard Deviation
12 th Grade Non Weighted GPA	3.4	2.7 (1.3-4.0)	0.4	2.8	3.1 (.9-4.0)	0.5

Table 8 provides frequencies of each of the categorical independent variables, followed by a brief narrative summary for each variable.

Table 8

Frequencies of the Categorical Independent Variables

	Graduated in 150% Normal Time to Completion		Did not Graduate in 150% Normal Time to Completion	
	Frequency (<i>n</i> = 365)	Percent	Frequency (<i>n</i> = 1,267)	Percent
7th Grade College Aspiration				
<i>High school or less</i>	7	1.9	47	3.7
<i>Some college but less than a 4-year degree</i>	42	11.5	241	19.0
<i>4-year college degree or higher</i>	316	86.6	979	77.3
Cumulative Service Hours				
<i>Low participation (>0 to <100 hrs)</i>	2	0.5	62	4.9
<i>Moderate participation (100 to <1000 hrs)</i>	302	82.7	1,150	90.8
<i>High participation (1000+ hrs)</i>	61	16.7	55	4.3
Gender				
<i>Female</i>	220	60.3	698	55.1
<i>Male</i>	145	39.7	569	44.9
Middle School Setting				
<i>Rural</i>	51	14.0	106	8.4
<i>Urban</i>	314	86.0	1,161	91.6
Race/Ethnicity				
<i>American Indian</i>	4	1.1	10	0.8
<i>Asian</i>	35	9.6	96	7.6
<i>Black</i>	31	8.5	151	11.9
<i>Hispanic</i>	176	48.2	695	54.9
<i>White</i>	119	32.6	315	24.9

The following paragraphs narratively describe differences observed within each categorical independent variable by college graduation category. Significance of these

differences was not assessed as it is outside the scope of the research questions but is presented to provide context to the binary regression results that follow.

7th Grade College Aspirations. Students that graduated in 150% normal time had slightly higher rates of college aspiration (98.1%, 11.5% aspiring to attend some college and 86.6% aspiring to complete a four-year degree) than those who did not (96.3%, 19.0% aspiring to attend some college and 77.3% aspiring to complete a four-year degree). Students that graduated in 150% normal time had higher rates of aspiring to complete at least a four-year degree (86.6%) compared to those who did not graduate in 150% normal time (77.3%).

Cumulative Service Hours. Students that completed college in 150% normal time had lower frequencies of low participation (.5%) and higher frequencies of high participation (16.7%) compared to students who did not graduate in 150% normal time (4.9% and 4.3%, respectively).

Gender. Females were slightly overrepresented in the graduated in 150% normal time to completion group compared to males, but this difference was minor. Females comprised 56.2% of the total dataset ($220 + 698 / 1,632 = 56.2\%$), 60.3% of the graduated in 150% normal time group, and 55.1% of the did not graduate in 150% normal time group. Males comprised 43.7% of the total dataset ($145 + 569 / 1,632 = 43.7\%$), 39.7% of the graduated in 150% normal time group, and 44.5% of the did not graduate in 150% normal time group.

Middle School Setting. Students that attended a rural middle school were slightly overrepresented in the graduated in 150% normal time to completion group compared to urban students. Rural students comprised 9.6% of the total dataset ($51 + 106 / 1,632 =$

9.6%), 14% of the graduated in 150% normal time group, and 8.4% of the did not graduate in 150% normal time group. Urban students comprised 90.4% of the total dataset ($314 + 1,161 / 1,632 = 90.4\%$), 86% of the graduated in 150% normal time group, and 91.6% of the did not graduate in 150% normal time group.

Race/Ethnicity. Asian and White students were slightly overrepresented in the group that completed college in 150% normal time (9.6% compared to 8% in the overall dataset, and 32.6% compared to 26.6%, respectively). Hispanic and Black students were underrepresented within this same group (48.2% compared to 53.4% in the total dataset, and 8.5% compared to 11.2%, respectively).

Binary Logistics Regression Results Summary

As this analysis was exploratory, a forward binary regression, as described by Mertler and Reinhard (2017), was conducted to determine which of the six independent variables are predictors of college completion within 150% of normal time for GEAR UP Cohort 2 eligible students that enrolled in college. This approach sequentially enters variables to the model, with the variable with the greatest relationship entered into the equation first, followed by all remaining variables that meet thresholds of significance (Osborne, 2017b).

Regression results indicated that the overall model of two predictors (12th grade GPA and cumulative service hour) was questionable (-2 Log likelihood = 1,339.36) but statistically reliable in distinguishing between completing or not completing a college degree in 150% normal time [$\chi^2(2) = 395.431, p < .001$], with Cox & Snell $R^2 = .215$ and Nagelkerke $R^2 = .329$. The results of the analysis are presented in Tables 9 through 11.

Table 9*Model Summary*

Step	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
2	1339.357 ^a	.215	.329

Table 10 shows the regression coefficient, standard errors, Wald tests, *dfs*, *p* values, odds ratios, and the 95% confidence intervals around them when all other predictors are held at a constant, the odds ratio of 12.072 means the change in the odds of 150% normal time to degree completion given a one-unit increase in 12th grade GPA. In addition, the odds of a student with low participation in service hours being able to graduate in 150% normal time to degree completion were .107 times as great as the odds of a student with high participation in service hours graduating in 150% normal time to degree completion. The odds of a student with moderate participation in service hours being able to graduate in 150% normal time to degree completion were .426 times as great as the odds of a student with high participation in service hours graduating in 150% normal time to degree completion. In other words, students in the high participation group were more likely to graduate within 150% normal time to degree completion than students in the other two participation groupings.

Table 10

Logistic Regression Analysis of Graduating in 150% Normal Time to Degree Completion as a Function of the Predictors

	B	S.E.	Wald	Df	P	Odds Ratio	95% Confidence Interval for Odds Ratio	
							Lower	Upper
12 th Grade GPA	2.491	.165	226.780	1	<.001	12.072	8.73	16.70
Cumulative Service Hours			18.248	2	<.001			
<i>Low Participation vs. High Participation</i>	-2.232	.775	8.3	1	.004	.107	.024	.490
<i>Moderate Participation vs. High Participation</i>	-.853	.224	14.442	1	<.001	.426	.275	.662
Constant	-8.150	.590	190.85	1	<.001	.000		

Table 11 illustrates that the model correctly classified 81.3% of cases. The final model correctly classified 94.1% of cases that did not graduate in 150% normal time and 37.0% of cases that did graduate in 150% normal time to completion.

Table 11*Percent of Correctly Classified Cases*

Observed	Predicted		Percentage Correct
	Graduated in 150% Normal Time	Did Not Graduate in 150% Normal Time	
Graduated in 150% Normal Time	135	230	37.0
Did Not Graduate in 150% Normal Time	75	1,192	94.1
			81.3

Summary of Chapter Four

This chapter provides descriptive statistics both for the entirety of the GEAR UP Cohort 2 as well as the cleaned dataset utilized in the binary logistic regression. It also summarizes the results of the logistic regression.

Differences between the independent variable categories were summarized within Table 5 and narratively described, but not assessed statistically, for GEAR UP eligible students by five key college success categories: did not enroll in college, did enroll in college, did not complete college, did complete college, and did complete college in 150% normal time to degree completion. The results of the binary logistic regression were then presented, including a similar description of the frequencies and other relevant statistics for the independent variable within the two dependent variable categories specific to those students included in the regression after the data was cleaned. Regression results indicated that the overall model of two predictors (12th grade GPA and cumulative service hour) was questionable (-2 Log likelihood = 1,339.36) but statistically

reliable in distinguishing between completing or not completing a college degree in 150% normal time [$\chi^2(2) = 395.431, p < .001$]. Students with higher GPA and higher levels of program participation were more likely to be in the graduated in 150% of normal time group. The model correctly classified 81.3% of all cases; the model correctly classified 94.1% of cases that did not graduate in 150% normal time and 37.0% of cases that did graduate in 150% normal time to completion.

Chapter Five: Discussion and Conclusions

The purpose of this study was to examine which academic and personal variables, if any, can predict whether GEAR UP eligible students who enroll in college will obtain a college degree within 150% of the normal time to degree completion. Specifically, this study sought to determine if postsecondary completion could be reliably predicted from knowledge of students' 12th grade GPA, 7th grade college aspirations, cumulative GEAR UP program service hours, gender, middle school setting, and race/ethnicity.

The population of this research was the Nevada GEAR UP Cohort 2, comprising 5,971 students after deduplication and data cleaning. Descriptive statistics were provided for the entire population. A binary logistic regression was conducted on a subset of 1,632 students for whom all variables included in the investigation were available.

The variables included in the binary regression were selected based both upon a review of the literature related to predictors of postsecondary completion as well as on personal and academic information collected by the GEAR UP program for eligible students.

This chapter summarizes findings of this study, specifically in relation to existing literature, as well as implications for practice and recommendations for future research.

Overview of Findings and Relevance to Existing Literature

This section provides a summary of the key findings of the study and discussion on their alignment (or, in some cases, lack thereof) to existing literature.

Key Findings

Results of this study indicate that both 12th grade GPA and participation in GEAR UP programming were predictors of college degree attainment within 150% normal time to completion. The remaining four independent variables (7th grade college aspirations, gender, middle school setting, and race/ethnicity) were not identified as predictors within the final model. These results and their alignment with the existing body of literature are discussed in more detail in the following sections.

Although beyond the scope of the study/research question, several areas of note were seen within the descriptive statistics for the GEAR UP Cohort 2 students. The first is that GEAR UP eligible students within this cohort had a slightly higher average college enrollment rate compared to recently reported national averages for low-income students. Of the 5,971 GEAR UP eligible students included in the GEAR UP 2 Cohort, 3,021 (51%) did not show evidence of college enrollment while 2,950 (49%) did enroll in college. The recent *2018 Indicators of Higher Education Equity in the United States: Historical Trend Report* produced by the Pell Institute reported that college enrollment rates for recent high school leavers in the lowest income quartile were in the mid-45 percent range around 2012, the time at which GEAR UP Cohort 2 students were graduating high school and enrolling in college (Calahan et al., 2018)⁴. The same report

⁴ This report also provided data on the college graduation rates of low-income students, but the groupings were determined to be too different in scope to draw any meaningful conclusions.

also estimated that the college participation rate for low-income students in Nevada was 35% around the same time period (percentage is for the 2016 year). There are a few caveats that should be applied to these comparisons. The first is that because GEAR UP services are provided to all students within the starting cohort grade level based on a Free and Reduced Priced Lunch rate of at least 50% for the school, not all GEAR UP Cohort 2 students were necessarily low-income or within the lowest income quartile (under \$37,564 annual family income). The second is that not all students included in the cohort had evidence of GEAR UP participation (approximately 3% did not participate in GEAR UP programming during the years for relevant which data was collected). With these caveats, this finding provides some evidence that the GEAR UP Cohort 2 program was associated with higher than average college participation rates.

The second set of noteworthy observations pertain to differences in academic and personal factors seen between GEAR UP eligible students that did or did not enroll in college, and between students who enrolled in but did or did not complete college. Students that aspired to enroll in some college or obtain a four-year degree or higher were more highly represented in the group that enrolled in college compared to the group that did not (77.5% compared to 66.2%). They were only slightly more represented within the subgroup that completed rather than did not complete college (78.1% compared to 77.3%). This aligns with the body of available literature, which has found that college aspirations of school-aged children and youth are associated with increased postsecondary enrollment but not necessary college completion, especially for low-income students (Christofides et al., 2015; Eccles et al., 2004; Lapan & Poynton, 2020; Molefe et al., 2017).

GEAR UP Cohort 2 composition by college-going and college-completion also reflected current literature for academic achievement, gender, middle school setting, program participation, and race/ethnicity. Consistent with the literature (Ecker-Lyster, 2017; Engberg & Wolniak, 2010; Johns, 2019; Lapan & Poynton, 2020), students in this study that experienced college success, as represented by enrollment in and completion of college, had increased levels of secondary academic achievement as demonstrated by 12th grade GPA. Female students were more highly represented than expected based on the total cohort composition within the college-going and college-completing groups, aligning with both historic and projected data within the Digest of Education Statistics (De Brey et al., 2021). Middle school setting of either rural or urban did not appear to have a large impact on college enrollment, although within the enrolled in college group rural students made up a slightly larger proportion of the completers subgroup than was expected based on the composition of the entire cohort. This aligns for the most part with existing studies on the topic that report conflicting results regarding the impact of rural and nonrural setting on educational success (Byun et al., 2012; Koricich et al., 2018; Molefe et al., 2017).

Evaluations of the GEAR UP program have found that program participation is associated with increased college enrollment (Fogg & Harrington, 2015; Knaggs et al., 2015; Lunceford et al., 2017), which is reflected in the descriptive statistics of GEAR UP Cohort 2: students with moderate to high participation levels were more highly represented in the enrolled in college and completed college groups than was expected. Asian and White students made of larger proportions of the enrolled and completing groups than was expected, while Hispanic students made up smaller proportions of these

groups and Black students made up a smaller proportion of the college completing but not college enrolling groups. These results align with trends and projections seen within large-scale studies that report Asian and White students have the highest rates of college completion and Black students having, on average, the lowest rates of college graduation (De Brey et al., 2021).

Overall, the general composition of the GEAR UP 2 Cohort when disaggregated into college enrolling and college completing subgroups was as expected based on existing literature for the variables of academic achievement, college aspiration, gender, middle school setting, program participation, and race/ethnicity.

This section focused on an exploration of the general GEAR UP Cohort 2 population and college-going and -graduating subgroup composition in relation to existing literature; the sections below specifically discuss the key findings associated with the results of the binary logistic regression.

Variables Found to be Significant in the Model

Two variables, 12th grade unweighted GPA and cumulative service hours, were found to be predictors of college degree attainment within 150% normal time to completion. As discussed below, these variables serving as predictors of college success is consistent with existing literature on the topic.

12th Grade GPA. Research consistently shows that secondary academic achievement is associated with increased college enrollment and persistence, both because students who aspire to attend college likely prioritize pre-college academic achievement and because students that do well academically are more prepared for the rigors of college (Nagaoka et al., 2009; Davidson, 2014; Hein, et al., 2020; Ou &

Reynolds, 2014). Some researchers have specifically found a relationship between high school GPA and college enrollment, with higher GPAs being significant predictors of college enrollment and persistence (Ecker-Lyster, 2017; Johns, 2019; Rhone, 2019).

Although there is little published research on the relationship between secondary academic achievement and college graduation, both college enrollment and persistence are interim outcomes associated with college completion and therefore it is not unexpected that 12th grade GPA, as an indicator of secondary academic achievement, was the most significant predictor of college achievement within 150% normal time to graduation.

Cumulative Service Hours. The placement of GEAR UP service hours as a proxy for GEAR UP participation within the model is likely due to the structure and composition of offered services. Researchers have found that particular characteristics of secondary education and certain college preparatory activities are associated with postsecondary enrollment and/or completion rates; these activities include academic rigor of secondary courses, smaller secondary class sizes, FAFSA awareness and completion, participation in structured youth development activities, and access to social capital (Lapan & Poynton, 2020; Dynarski et al., 2013; Morgan et al., 2018; Belasco, 2013). Several of these activities are required components of GEAR UP programming. Required GEAR UP services comprise providing postsecondary education financial aid information (aligning with FAFSA awareness and completion) and encouraging students to enroll in rigorous coursework to reduce their enrollment in remedial education at the postsecondary level (aligning with academic rigor of secondary courses). GEAR UP providers must use a combination of mentoring, outreach, and provision of supportive

services, which may increase access to social capital. Finally, the GEAR UP program itself is a structured youth development activity. The use of best practices for facilitating student success within the GEAR UP program may explain the relationship between increased GEAR UP participation and increased college success as indicated by predicted placement within the degree attainment within 150% normal time to completion category.

Although evaluation activities of GEAR UP programming have found that participation is associated with college enrollment and persistence (Kim et al., 2021; Sanchez et al., 2018), little to no research is available that speaks to the impact of GEAR UP programming on college degree attainment. This shortfall was one of the primary reasons that this particular research study was conducted. Based on these results, participation in GEAR UP programming is not only associated with college enrollment, it is also a predictor of college completion within 150% normal time. Furthermore, increased levels of participation (1000+ hours) more strongly predicted placement in the college completion group.

Variables Not Found to Be Significant in the Model

The remaining four dependent variables of 7th grade college aspirations, gender, middle school setting, and race/ethnicity were not found to be predictors of college degree attainment within 150% normal time to completion. As described earlier in this chapter as well as in Chapter Four, the descriptive statistics for these four variables for both the general Cohort 2 population and subset of students included in the regression align with for the most part with existing literature. The following information is provided to explore possible reasons why these variables were not found to be predictors of college completion.

The results of middle school setting more or less align with existing literature, which provides conflicting data on whether being from a rural or urban setting impacts college success (Byun et al., 2012; Koricich et al., 2018; Molefe et al., 2017). In contrast, these results do not align with existing literature for college aspirations, gender, and race/ethnicity, which report that aspiring to attend college has a positive relationship with eventual enrollment (Christofides et al., 2015; Eccles et al., 2004; Lapan & Poynton, 2020), that females are more likely to complete college (De Brey et al., 2021), and that students of particular racial or ethnic groups are more and less likely to graduate with a college degree, with Black and African American students having the lowest rates of degree attainment (De Brey et al., 2021).

A possible explanation for the variance between this study and the findings of others may be that the GEAR UP program is successful at overcoming these traditional barriers to college success. The provision of GEAR UP programming may be leveling the playing field, so to speak, ensuring that all students, regardless of their personal circumstances or characteristics (specifically gender or race/ethnicity) are provided with the information they need to prepare for and succeed in college. It is also possible that the program is encouraging college attendance, and increasing the aspirations for students that in the 7th grade did not aspire to attend or complete college.

The majority of literature that explores these variables, specifically college aspirations, does so through the lens of college enrollment rather than graduation. It is possible that similar studies that explore college completion rather than enrollment would produce results consistent with what is demonstrated in these findings. Overall, these

inconsistencies speak to the need for more studies that investigate college completion rather than enrollment or other proxy measures of college success.

Implications for Practice

As the model shows that academic preparation (as demonstrated through 12th grade GPA) and participation in service hours to be predictors of college completion, GEAR UP programs should consider prioritizing activities that support increased academic readiness and increased program participation. Additionally, the model did not indicate that variables that traditionally impact college success, namely 7th grade college aspirations, gender, middle school setting, and race/ethnicity, were predictors of college completion. That may indicate that the GEAR UP programming offered to Cohort 2 between the time period of fall 2006 through spring 2012 was successful in overcoming these barriers, and current and future GEAR UP programs may consider modeling program activities on those that were offered to Cohort 2 in order to replicate these successes.

Recommendations for Future Research

Much of the existing literature explores predictors of college enrollment or other proxy measures of college success rather than college completion. This is due to several challenges that can be difficult to overcome. The first is that GEAR UP grants traditionally cover a six- to seven-year period that begins during students' 7th grade year and closes either upon the end of their 12th grade year or their first year of college. This timeline does not allow for the inclusion of evaluation activities focused on college completion to be funded through the grant. Those researchers that are interested in pursuing this line of inquiry may also face barriers to obtaining and merging GEAR UP

participant data; the activities required for completing this study utilized the assistance of a software engineer, which many researchers likely do not have access to or cannot afford, especially if they are conducting this research outside of a funded grant. While the condensing and merging of the datasets could have been done manually, these efforts would have taken substantial amounts of time and been more prone to errors. These challenges are noted both to provide context for the lack of comparable research that focuses on college graduation as well as to allow researchers to address and overcome these through the planning process. Overall, the body of literature would benefit from studies that included college completion, especially within 150% normal time, as an outcome to better understand the true impact of college readiness programs.

As this study is one of few that explores predictors of college completion for GEAR UP eligible students, similar studies should be conducted on additional cohorts from Nevada and other states to test whether the findings from this study are consistent and replicable to other groups. Additionally, this study did not have the ability to parse out the dosage of specific GEAR UP program activities. Other GEAR UP research has found that participation in particular programming modules, such as academic and financial preparation and college visits, were the most impactful to participants (Kim et al., 2021; Morgan et al., 2015). Studies that take a similar approach and tease out which activities were more effective would best allow for the provision of targeted programming. Luckily for the field, the College and Career Readiness Evaluation Consortium (CCREC) has announced plans to combine secondary and postsecondary outcomes data, including graduation and intervention data on key student and family services, for 13 GEAR UP

state recipients. Only through the completion of additional, complementary studies can the true impact of GEAR UP programming be understood.

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Appendix A: IRB Exempt Letter



University of Nevada, Reno

Research Integrity
218 Ross Hall / 331,
Reno, Nevada 89557
775.327.2368 / 775.327.2369 fax
www.unr.edu/research-integrity

DATE: May 29, 2020
TO: Janet Usinger, Ph.D.
FROM: University of Nevada, Reno Institutional Review Board (IRB)

PROJECT TITLE: [1611012-1] Predictors of Enrollment, Persistence, and Completion of Postsecondary Education
REFERENCE #: Social Behavioral
SUBMISSION TYPE: New Project
ACTION: DETERMINATION OF EXEMPT STATUS
REVIEW TYPE: Exempt
DECISION DATE: May 29, 2020
REVIEW CATEGORY: Exemption Category # [4]

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An IRB member has reviewed this project and has determined it is EXEMPT FROM IRB REVIEW according to federal regulations. Please note, the federal government has identified certain categories of research involving human subjects that qualify for exemption from federal regulations.

Only the IRB has been designated by the University to make a determination that a study is exempt from federal regulations. The above-referenced protocol was reviewed and the research deemed eligible to proceed in accordance with the requirements of the Code of Federal Regulations on the Protection of Human Subjects (45 CFR 46.101).

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Reviewed Documents

- Application Form - Exempt Core Application Research with Records or Specimens.docx (UPDATED: 05/21/2020)
- Other - 19-01 GU FY19 Research Long UNR (1).pdf (UPDATED: 05/21/2020)
- Training/Certification - Hopkinson, Kim gp 1 CITI 10.29.17.pdf (UPDATED: 05/23/2020)
- Training/Certification - Garcia, Mariluz gp 1 CITI 10.06.16.pdf (UPDATED: 05/23/2020)
- University of Nevada, Reno - Part I, Cover Sheet - University of Nevada, Reno - Part I, Cover Sheet (UPDATED: 05/21/2020)

If you have any questions, please contact Nancy Moody at 775.327.2367 or at nmoody@unr.edu.

NOTE for VA Researchers: You are not approved to begin this research until you receive an approval letter from the VASNHCS Associate Chief of Staff for Research stating that your research has been approved by the Research and Development Committee.

Sincerely,

Richard Bjur, PhD
Co-Chair, UNR IRB
University of Nevada Reno

Janet Usinger, PhD
Co-Chair, UNR IRB
University of Nevada Reno

Appendix B: Additional Statistical Tables

Table 12*Tolerance Statistics for Binary Logistic Regression*

Model	Collinearity Statistics	
	Tolerance	VIF
1 (Constant)		
Gender	.985	1.015
Race/Ethnicity	.972	1.028
Middle School Setting	.956	1.046
7th Grade College Aspiration	.961	1.040
12th Grade GPA	.894	1.119
Cum Service Hours	.927	1.079

a. Dependent Variable: StudyCaseID