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Providing Hope For Another Generation: The Effect Of Federal Pre-College Outreach Programs On Disadvantaged Students' Educational Aspiration, College Preparedness, and College Access

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PROVIDING HOPE FOR ANOTHER GENERATION: THE EFFECT OF FEDERAL PRE-COLLEGE OUTREACH PROGRAMS ON DISADVANTAGED STUDENTS' EDUCATIONAL ASPIRATION, COLLEGE PREPAREDNESS, AND COLLEGE ACCESS

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Newsoul Deus

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To: Dean Michael R. Heithaus
College of Arts, Sciences and Education

This dissertation, written by Newsoul Deus, and entitled Providing Hope for Another Generation: The Effect of Federal Pre-College Outreach Programs on Disadvantaged Students' Educational Aspiration, College Preparedness, and College Access, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Florida International University, 2020

ABSTRACT OF THE DISSERTATION

PROVIDING HOPE FOR ANOTHER GENERATION:

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Miami, Florida

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The United States has long been recognized as the land of opportunity. However, one of the major problems that plague the nation is the disparity in educational opportunities (Pfeffer & Hertel, 2015). It is crucial that all students—regardless of their race/ethnicity, family socioeconomic status, and geographic location—have an equal opportunity to higher education. Unfortunately, students from disadvantaged backgrounds (i.e., first-generation college students, those from low-income households, and those from historically underrepresented racial/ethnic groups) have lower rates of college enrollment, retention, and completion compared to their counterparts (Baker et

al., 2018). The gap in enrollment and success is indicative of inequitable distribution of educational opportunities.

Precollege outreach programs were created to address the educational opportunity gap. Talent Search, Upward Bound, and Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) programs were created to serve students of disadvantaged backgrounds. However, more than 50 years since the inception of such programs, the effect of the programs on educational attainment remain largely theoretical and program results are mixed (Thomas et al., 1998). To add to the body of knowledge about the effects of these programs, this dissertation evaluated the effects of precollege outreach programs on the student success measures of educational aspiration, college preparedness, and college access.

Using data from the Educational Longitudinal Study of 2002 of the National Center of Education Statistics (NCES), these three educational outcomes of program participants were compared to those of non-program participants. In evaluating the causal effect of the above precollege outreach programs on student educational outcomes, Propensity Score Matching (PSM) was used to treat preexisting imbalances in baseline characteristics (Lingle, 2009) that could impact the outcomes.

Participation in these pre-college programs had a significant statistical impact on college access. After matching, program participation caused a .5% increase in college enrollment. There was no direct impact on educational aspiration and college preparedness. The results of the present study are relevant for the current discourse on the effectiveness of pre-college programs and aid the efforts of practitioners, researchers, and policymakers looking to close the educational opportunity gap in their sphere of influence.

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CHAPTER I

INTRODUCTION

Background of the Problem

The United States has long been recognized as the *land of opportunity.* However, one of the major problems that plague the nation is the disparity in educational opportunities for particular marginalized groups (Pfeffer & Hertel, 2015; Rovai, Gallien, & Wighting, 2005; Torche, 2016). It is crucial that all students—regardless of their race/ethnicity, family's socioeconomic status, and geographic location—should have an equal opportunity to higher education (Baker, Klasik, & Reardon, 2018; Wilbur & Roscigno, 2016; Xu, 2018).

Swail and Perna (2002) contended that educational attainment has a true propensity to affect change in the lives of its beneficiaries and their families and communities. Although a college degree alone does not guarantee a higher quality of life, current research continues to point to its benefits and the need to extend educational opportunity to all children (Gladieux & Swail, 2000; Torche, 2016; Xu, 2018). At the individual level, educational attainment allows one to obtain the training and credentials to have a competitive edge in the labor force, develop interpersonal skills to navigate real-world dynamics, and ultimately reach higher socioeconomic quartiles, (Gladieux & Swail, 2000; Haveman & Smeeding, 2006; Howard, Tunstall, & Flennaugh, 2016; Shavers, 2007; Van Eijck, 1999). At the societal level, educational attainment decreases the probability of youth delinquencies and government incarceration while facilitating access to high quality health care and enhanced distribution of public assistance (Belfield & Levin, 2007; Long & Boatman, 2013; Van Eijck, 1999).

Educational attainment has risen over the past decade. At the end of 2015, college enrollment increased by 14%, taking enrollment from 17.5 million in 2005 to 20 million (NCES, 2016), and undergraduate enrollment is expected to grow by another 14% by 2024 (NCES, 2016). According to the US National Center for Education Statistics (NCES), undergraduate degrees conferred increased from 29% in 2004 to 34% in 2014 (NCES, 2016). In essence, more youths are accessing college, and more young people are better positioned to earn more and maintain a better quality of life.

Unfortunately, there are disparities between certain demographic groups in terms of access to, success in, and completion of college (Sirin, 2005; White, 1982). When comparing college enrollment, fewer Blacks go on to college than Whites (Haycock, Jerald, & Huang, 2001; Perna, 2006; Zhan & Sherraden, 2011). Students from disadvantaged backgrounds (i.e., first-generation college students, those from low-income households, and those from historically underrepresented racial/ethnic groups) have lower rates of college enrollment, retention, and completion compared to their advantaged counterparts (Baker, Klasik, & Reardon, 2018; Gladieux & Swail, 2000; Perna, 2002). The gap in enrollment and success is indicative of unequal educational opportunities; the inequitable distribution of educational opportunities results in socioeconomic disadvantages during adulthood.

Pre-college academic outreach programs were first created in the 1960s when the federal government recognized educational disparities and addressed the educational opportunity gap. Programs such as the Federal TRIO Programs (TRIO) and Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP*)* were created to help students of disadvantaged backgrounds obtain their degrees, providing services

and support during their pre-college and college years. However, more than 50 years later, the effect of the programs on educational attainment remains mostly theoretical, and program results are mixed (Thomas et al., 1998; King, 2009).

My dissertation was designed to evaluate pre-college academic outreach programs. Their effect on student success: measures that were operationally defined as educational aspiration, college preparedness, and college access were examined using data from the Educational Longitudinal Study of 2002. Educational outcomes of program participants versus non-participants were compared. The results of my study are relevant for the current discourse on the effectiveness of pre-college programs and was designed to aid the efforts of practitioners, researchers, and policymakers looking to close the educational opportunity gap in their sphere of influence.

History of TRIO and GEAR UP Programs

In the 1960s, President Lyndon B. Johnson stated that poverty was a national problem, declaring "unconditional war" on poverty (TheLBJLibrary, 2012). He believed that denying both Blacks and Whites the opportunity to improve their circumstances would be detrimental to themselves, their families, the local community, and ultimately the global community. In the years that followed that speech, President Johnson's administration passed several pieces of legislation that targeted what they believed to be the cause of poverty. Johnson’s political position became known later as the “War on Poverty" (TheLBJLibrary, 2012). The Economic Opportunity Act of 1964 is one of the first pieces of legislation that resulted from the multifaceted battle against poverty; as President Johnson said, "no single weapon or strategy will suffice" (TheLBJLibrary, 2012). However, collaborative efforts from local and state governments, and even the

federal government, would be needed. One of the strategies that President Johnson employed was equity-based educational policies, which are the focus of this section.

Equity-based educational policies provide direct support services to reach educational opportunities and attainment. TRIO, one of the first federally funded educational programs, targets students from disadvantaged backgrounds, low-income households, and first-generation families.

The year 2013 marked the 50th anniversary of these federal programs. According to the US Department of Education 2013 fact sheet, 2,731 TRIO projects have been opened, and 753,352 students have been served (US Department of Education, 2014). To date, the Office of Economic Opportunity has nine TRIO programs. Initially, however, only three foundational programs existed: Upward Bound (UB), Talent Search (TS), and Student Support Services (SSS).

Both UB and TS are pre-college programs that serve students during high school years, designed to lead to their college enrollment. These programs work with local high schools and students who face academic, financial, career, and personal barriers to enter or re-enter post-secondary schools and graduate. Correspondingly, SSS is a program that functions at the collegiate level, serving low income and disadvantaged students while they are in college. These three programs work together to allow those students equitable participation in higher education.

Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP), which was enacted by the Clinton Administration in 1998, serves the same purpose as TRIO but on a larger scale. GEAR UP starts preparing low-income students as early as

middle school to participate in post-secondary education and served 1 million students by 2001 (Fields, 2001).

According to the Pell Institute (2009), these programs are funded to function as outlined in Table 1 below. These pre-college academic programs include direct support services, such as student mentoring, academic tutoring, financial assistance counseling, admissions and career counseling, and summer internships, to name a few. These programs are designed to assist students who would otherwise never have been able to access post-secondary education or complete college. Together, these programs serve individuals who are low-income, first-generation, and students with disabilities in many ways, helping to supplement secondary education systems.

Table 1

Pre-college Outreach Program	
Talent Search (TRIO):	Serves low-income youth in grades 6–12; provides information about college admissions requirement, scholarships, and various student financial aid programs
Upward Bound (TRIO):	Helps low-income and potential first-generation college students prepare for higher education by bringing high school students to a college campus after school, on the weekends, and during the summer to receive instruction in mathematics, laboratory sciences, composition, etc. Tutoring, counseling, and mentoring are other components
GEAR UP:	Designed to increase college attendance and success and raise the expectations of low-income students; includes a scholarship component

Problem Statement

Disadvantaged students face a range of barriers that impede their educational success. The US education landscape is riddled with inequality, which is considered a root cause of poverty. These obstacles are encountered by students as early as in kindergarten and tend to continue well into post-secondary education. It is not uncommon for students from underserved and racial/ethnic minority groups to perform substantially worse on achievement measures than their privileged or nonminority counterparts. Such students, who tend to come from low-resourced high schools, are inadequately prepared for college, typically requiring remedial or developmental work (Strayhorn, 2011, p.143).

Educational opportunity programs were created to address the challenges faced by disadvantaged students and continue to fulfill that mission currently. The current study was conducted because, although pre-college outreach programs have been evaluated in the past, the results of these evaluations are mixed (Thomas et al., 1998; and King, 2009). The inability to demonstrate the effectiveness of the programs unequivocally has prompted much scrutiny and a reduction in funding, all to the detriment of students who can potentially benefit from the services and support provided by these programs. Empirical and rigorous studies such as the present study are needed to validate the contributions of these programs so their efforts to close the educational opportunity gap and support students from disadvantaged backgrounds may be redoubled.

Research Hypotheses

1. There are significant preexisting differences in the variables of high school students who do and do not participate in pre-college outreach programs.

2. After matching the variables of participants and non-participants, the effects of the program participation can be examined without much bias caused by other variables.
3. After matching, the participants of pre-college outreach programs show higher educational aspiration than non-participants.
4. After matching, the participants of pre-college outreach programs show higher college preparedness than non-participants.
5. After matching, the participants of pre-college outreach programs show higher college access than non-participants.

Purpose of The Study

The primary purpose of the present study was to examine the effects of pre-college outreach programs on student success measures, Educational Aspiration, College Preparedness, and College Access. Data from the Education Longitudinal Study of 2002 (ELS, 2002) were used to evaluate these success measures. It was conducted because, although some studies had been conducted that attested to the necessity of pre-college interventions, rigorous analyses and thorough reviews of the effectiveness of pre-college programs were still needed. Swail stated:

> We often treat school reform as a finite process that will, at some point in the future, be achieved. Our third reality is that educational reform is infinite, a continual renewal of our beliefs and practices. It is a process that can never be completed, nor should it. Instead, as our society continues to evolve, so must our educational system. (2002, p. 2)

With Swail's (2002) tenet in mind, the study was conducted to provide a clear understanding of the impact of pre-college outreach programs on minorities and disadvantaged students' educational outcomes after controlling for confounding variables. The assumption under which it was conducted is that for appropriate analysis of program impacts, there should be no significant differences in the program participation caused by demographic factors, such as student socioeconomic status (SES), school SES, racial and ethnic backgrounds, and gender. After controlling for those factors by matching, the study examined the outcomes of outreach program participation on participants and non-participants. The research will contribute to the discussions on the effectiveness of pre-college outreach programs, and can be used as a reference by practitioners, researchers, and policymakers as they collaborate to revamp programs in their effort to continue to support disadvantaged students.

CHAPTER II

LITERATURE REVIEW

This chapter presents a review of the literature relevant to student success and the impact of pre-college programs (i.e., federal Trio programs and GEAR UP) on the educational aspirations, academic performance, and college access of disadvantaged students. This review begins with a discussion of how student success was operationalized for the study, followed by the theoretical frameworks that guided the research. Finally, a review of the impact of educational outreach programs on student success is included.

Definition of Student Success

The term *student success* does not have a universal conceptualization and thus does not have a universal measure. For some, success is merely deciding to attend college after high school, whereas others never succeed in making a goal to attend college nor in taking necessary steps to attend. In college readiness literature, deciding to attend college is an example of *educational aspirations* (Kao & Tienda, 1998; Little, Gaier, & Spoutz, 2018; McCarron & Inkelas, 2006; Sáinz & Müller, 2018). An additional aspect of success can also be seen in high school students' intentional behaviors preparing for and being proactive about attending college. Success can take the form of maintaining a competitive high school grade point average (GPA), signing up for college entry test preparation, or going on college visits. In the college student success literature, that aspect of success is known as *academic preparation* (Hertzog & Morgan, 1998; Warburton, Bugarin, & Nunez, 2001). Student success can be measured in undergraduate degree attainment (Harper, 2012; Nora, Barlow, & Crisp, 2005), graduation from college within four years

(Berkner & Cataldi, 2003; Kuh, et al, 2008), and obtaining a college degree from selective institutions (Davies & Guppy, 1997).

Kuh and colleagues (2008) conducted a literature review for the National Center of Education to better understand better what factors constituted student success. In their paper, a broad definition of student success was used in an attempt to capture all possible terms and measures of student success. The measures of success they listed include academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills and competencies, persistence, attainment of educational objectives, and post-college performance. In education research, the definition of success also varies depending on the type of institution. Goldrick-Rab (2010) pointed out that at the community college level, success should not solely be measured by significant milestones (i.e., degree attainment) as 50% of the students who enroll never complete their degree at that institution. Those measuring student success in college focus more on expectation and aspirational measures and their effect on success.

Winkle-Wagner (2015) analyzed the literature on the success of ethnic minorities using college GPA (i.e., academic performance) as a measure of success but added particular emphasis with respect to gender. He contended that Black women's and Black men's academic success (or lack thereof) is often confounded as a consequence of gender grouping and aggregating GPA measures. Thus, although success is still measured in terms of academic performance, performance outcome measures should be disaggregated to gain a better understanding of group differences in success. In his research, performance measures are presented as Black female student outcomes and Black male student outcomes.

Nevertheless, Perna and Thomas (2006, 2008) provided a suitable conceptual model of student success. One of the strengths of their model is that it is not limited by an ambiguous understanding of success; in their research, success is understood as access, retention, and completion. In reviewing over 10 years of research and publications across four disciplines, Perna and Thomas found student success to be influenced by four major contexts: (a) the individual's internal context; (b) the family context, (c) the school context; and (d) the broader social, economic, and policy context. These scholars measured student success as simply completion and educational attainment of specific indicators arranged in a longitudinal process. These indicators include four categories of outcomes, which transition from one into the next: college readiness, college enrollment, college achievement, and post-college attainment. Perna and Thomas (2008) pointed out that their indicators for student success are not comprehensive. However, their indicators tend to match up with the outcomes that are measured in research and policy on student success, specifically with the research that evaluates the effectiveness of pre-college programs such as TRIO federal outreach programs. In the longitudinal model, there are 10 indicators of educational attainment (see Table 2).

Table 2

Student Success: A Longitudinal Process

10 Indicators of Educational Attainment
Transition 1 – College Readiness
Indicator 1: Educational Aspirations
Indicator 2: Academic Preparation
Transition 2 – College Enrollment
Indicator 3: College Access
Indicator 4: College Choice
Transition 3 – College Achievement

Table 2 continued

Student Success: A Longitudinal Process
10 Indicators of Educational Attainment
Indicator 5: Academic Performance
Indicator 6: Transfer
Indicator 7: Persistence
Transition 4 – Post-college Attainment
Indicator 8: Post-BA Enrollment
Indicator 9: Income
Indicator 10: Educational Attainment

Perna, L. W., & Thomas, S. L. (2008)

Perna and Thomas (2006, 2008) indicated that their conceptual model for student success is limited. The model is not a one-size-fits-all; that implementation is important in yielding desired outcomes and is directly correlated with success. Moreover, Perna and Thomas (2006) reviewed studies and research between 1995 and 2005; thus, it is possible that new college success indicators or outcomes have been developed. Furthermore, success measures vary across student groups and across pre-college programs that focus on specific student groups. As a result, several considerations should be made when determining which outcome indicator best measures the success of a particular program.

For my study, student success was measured by one of the indicators listed by Perna and Thomas (2008). The college access indicator was measured and compared in terms of program participants' and non-participants' (a) *Educational Aspirations,* (b) *Academic Preparation,* and (c) *College Access*. These indicators are related to college readiness and college enrollment and are crucial for examining student success. Moreover, these three indicators align with the research hypotheses and provided a comprehensive evaluation of the effectiveness of the pre-college programs of interest.

Theoretical Framework of Student Success

Two criteria were considered in selecting the appropriate theoretical framework that would undergird the present evaluation of the effect of educational outreach programs on student success. First, consideration was given to theories that would provide an understanding of the challenges of the particular student groups of interest: ethnic/racial minorities and disadvantaged students. These are the students who are underrepresented in higher education and too often fail to ever successfully transition to college. Second, in selecting theories, consideration was given to those who could not only provide general guidance in understanding disadvantaged students' barriers to success, but more specifically at theories that spoke to a very specific timeframe in disadvantaged students' educational journey: the transition from high school to college. The reason for this was that TRIO educational outreach programs are types of early intervention programs that service disadvantaged students as early as middle school and throughout high school. The current study operationalized student success as educational aspirations, college preparedness, and college access. All three of these success measures are developed and cultivated by educational outreach programs during the high school years before the start of college.

The review of literature also presents the theoretical framework of Hossler and Gallagher's College Choice Model (1987) because this theoretical framework shaped and guided development of the research questions (see Figure 1). The College Choice Model makes sense of disadvantaged and minority students' transition from high school to college. The model "comprises three phases which students progress as they move from educational aspiration to college enrollment" (Bergersen, 2009, p.22). Moreover, The

College Choice model informed the research questions, guided the literature review, and supported the selection of key variables. Hossler and Gallagher's model aligns with the objectives of pre-college outreach programs. Their theory was the ideal framework to use in the evaluation of the effectiveness of selected pre-college outreach programs.

Figure 1

Hossler & Gallagher's (1987) entire College Choice Model

A Three Phase Model of College Choice

Model Dimensions	Influential Factors		Student Outcomes
	Individual Factors	Organizational Factors	
Predisposition (Phase One)	*Student Characteristics *Significant Others *Educational Activities	*School Characteristics	a. College Search Options for: b. Other options
Search (Phase Two)	* Student preliminary college values * Student search activities	*College and University search activities (Search for students)	a. Choice set b. Other options
Choice (Phase Three)	*Choice set	*College and University courtship activities	*Choice

Hossler and Gallagher's College Choice Model

There are three phases or stages in Hossler and Gallagher's model: Predisposition, Search, and Choice. The *predisposition* stage is where students are determining if they will continue education beyond high school. This stage is where students are developing

college aspirations and expectations. The next stage of the model is *Search.* In the Search stage, students gain knowledge about colleges: college culture and academic programs, college entrance requirements, and financial aid availability. As knowledge is being gained, students are prompted to make preparations for college entrance requirements. Academic achievement and test scores align with ideal college choices. The final stage is *the Choice.* This final stage of the model in which "students use the information to select an institution and complete the enrollment process" (Bergersen, 2009, p. 27). Students' ability to gather information from various sources and reconcile this information is critical in the college application and enrollment process.

It is important to note that there are factors that make or break the process from aspiration to enrollment in all three stages of the model. The factors that are cited for impacting college aspirations are "family socioeconomic status, parental involvement, peers, teachers, counselor, interaction with higher education institutions, and high school involvements" (Bergersen, 2009, p.22). Unfortunately, these are the very factors that disadvantaged students struggle with. These factors and their impact will be discussed in greater detail later in this literature review.

Educational Outreach Programs

Educational outreach programs, according to Domina (2009), are designed to smooth the transition to higher education for students who are traditionally underrepresented in higher education (p.127). These programs provide the resources and support that disadvantaged students need to succeed in college. According to Elam, Stratton, and Gibson (2007), many of today's students are successful in school because they have the financial backing of their parents. Their parents are cognizant of the

admission process. They are actively involved in their student's academic pursuits, and they provide their children with the technological support needed to excel (p. 25).

Advantaged students tend to be successful in college because they "have been reared in the middle- and upper-class environments offering ample opportunities" (Elam et al., 2007, p. 25). In contrast, disadvantaged students are "first-generation college students that may be less familiar with technology or less likely to have reaped the benefits of touring, travel, and/or support services of the more educationally advantaged" (Elam et al., 2007, p. 25). Disadvantaged students face an array of barriers that the majority of today's college student body, the privileged, do not encounter. There is a clear and pronounced gap in resources and support available to disadvantaged students within the secondary and post-secondary schools and within the family unit. It is within this gap that college outreach programs become crucial in the lives of these underprivileged students.

Disadvantaged students face many barriers in accessing and succeeding in college. These students are often from underrepresented minority groups, come from low-income households, or are first-generation college students. Such students, often Black, and Hispanic, are disproportionally underprepared for college, requiring remedial or developmental work as a result of their poorly resourced high schools (Strayhorn, 2011, p.143). Research has consistently recommended and supported the development of programs and the investment of resources that would help disadvantaged students. Strayhorn (2011) indicated that there are two factors needed for success: continuous enrollment and academic resources (p.143). These factors influence an effective transition to college and academic preparedness of disadvantaged students from their

high school years. According to Elam, et al. (2007), universities, faculty, and administration need to "continually rethink strategies to recruit students from disadvantaged backgrounds, assist them in defraying educational costs and provide opportunities to remediate deficits in key areas" (p. 25). In addressing retention and preparedness issues, Garcia (1991) contended that Summer Bridge programs are the oldest strategies and among the list of highly recommended practices used to improve academic persistence and retention (p. 91). In studying the effects of participating in Summer Bridge programs, Strayhorn (2011) found that this college outreach program effectively provides different support structures that mirrored those of the advantaged students (p.153).

Domina (2009) found that outreach programs have a positive impact on educational outcomes for anyone enrolled in them, compared to those who are not; however, the improvements in outcomes are modest. Moreover, he argued that college outreach programs target students who are already motivated to learn and desire to succeed, only superficially addressing the issues of disadvantaged students (p.147). Nevertheless, college outreach programs play an essential role in the academic success of disadvantaged students. Whether the improvements were substantially better or modestly better, they remain an important step in the right direction. With time and refinement, outreach programs can likely yield results that are more pronounced. Gullatt and Jan (2003) indicated that college programs, pre-collegiate programs, and the like aim to "counter the negative school and community influences (lack of rigorous curriculum, poorly trained teachers, lack of role models) by providing the missing elements that help students aspire to, prepare for, and obtain college enrollment" (p. 5). Pre-college

programs' effects will vary because of factors like the quality of a student's high school, community, or individual backgrounds. However, its efforts are ultimately realized by working to overcome the persistent barriers of educational progress.

Program Effects on Student Success

In 1998, Thomas et al. investigated the effect of the Rutgers University Student Support Services (SSS) program. Rutgers University's program was used in that study because the university provided a comprehensive support services program that dates back to 1971 when TRIO programs were created. Moreover, the scholars investigated the SSS program specifically, among the other TRIO programs, because research at such time did not successfully link support services to two-year retention, nor did it link such support services to college graduation rates (p. 391).

The program participants' college graduation rate was one measure used to determine the success of SSS among the TRIO programs. The measure was evaluated for two main reasons. First, unlike most other TRIO programs, the Student Support Services program supported students while they were enrolled in college. With this ability to reach students beyond admissions and other pre-college experiences, SSS programs have a unique ability that is more far-reaching than any other TRIO program throughout students' educational journey. With that, the Department of Education assessed the program's success and set criteria primarily using participants' graduation rates. Second, the graduation rates of the population of students that TRIO serves, according to Thomas et al. (1998), provided a unique perspective that highlighted the challenges of students of low-income, first-generation, and minority racial/ethnic backgrounds (p. 391).

A longitudinal study over 13 of the success of SSS participants years was conducted. The study population consisted of full-time, first-time in college, and freshman cohorts between 1980 and 1992. For the first analysis, the Rutgers SSS program was compared to support service programs with similar characteristics. The results were that the non-Rutgers SSS participants had higher graduation rates in all but 2 of the 13 years, as compared to Rutgers SSS participants. During the 13 year, Rutgers SSS participants did show some growth, but it was not consistent (see Figure 2). However, federal guidelines set goals for each program to maintain a 50% graduation rate. The Rutgers SSS program had a mean of a 56.2% graduation rate (*SD* .053) across all cohort years. Overall, the authors noted that when assessing the SSS program's success, it was more useful that each university assesses its program by itself rather than making a comparison to programs from other universities. This, as a result, would yield useful information for the institutions and for the SSS program.

Figure 2

1980-1992 RSSSP Entering Freshman Cohort Graduation Rates

FRESHMAN COHORT YEAR	RSSSP COHORT GRADUATION RATE	LIVINGSTON COLLEGE COHORT GRADUATION RATE	PROGRAM/COLLEGE DIFFERENCE
1992	52.2	65.9	−13.7
1991	57.4	65.8	−8.4
1990	62.1	66.4	−4.3
1989	62.0	66.7	−4.7
1988	66.3	67.3	−1.0
1987	56.7	69.7	−13.0
1986	52.3	62.8	−10.5
1985	56.4	58.4	−2.0
1984	46.9	59.0	−12.1
1983	56.2	58.5	−2.3
1982	47.8	52.2	−4.4
1981	59.1	47.8	+11.3
1980	55.7	47.4	+8.3
Total/Mean	56.2	60.6	−4.4
Standard Deviation	5.3	7.2	

Source: Compiled from data retrieved by the authors from the RSSSP student database, Rutgers University Information Management System (IMS).

Taking another approach, Glennie, Dalton, and Knapp (2015) examined the effectiveness of pre-college access programs, such as GEAR UP, Talent Search, and Upward Bound. The authors believed that although pre-college access programs have been evaluated continuously, few studies examine two main components of pre-college access programs: post-secondary educational entry and success. As such, Glennie et al. (2015) examined how disadvantaged students enroll and persist in post-secondary education. However, there are still a host of factors that contribute to the disproportionately low rate of high school students finishing high school, applying for college, entering college, and completing college, among disadvantaged student groups. The results of that study provided a critical evaluation of pre-college access programs' effectiveness from a perspective that had not been examined (Glennie et al., 2015). The authors explained that a major barrier in an effective evaluation is the inability of this program to obtain information from its former participants.

Data used for Glennie and her colleagues' (2015) study were obtained from the NCES Educational Longitudinal Study (ELS), a longitudinal national survey of high school students from 10th grade through the first two years of college. Several different variables were used to tease out the influence of programs on participating students' persistence and success. These variables were divided into major categories, including academic preparation variables, college preparation variables, college attendance variables, financial aid offerings, and coursework semester-by-semester offering. Program participants and non-participants were compared across these variables, and the results were mixed. On major outcome variables such as standardized and college entry test scores, participants scored only slightly better. However, regarding being informed

about the processes involved in accessing post-secondary education, program participants were more informed. Overall, pre-college program advocates were recommended to focus more on enduring success upon entering college rather than only the entry preparation.

Expanding Pre-college Programs

Harvey (2008) advocated for the importance of pre-collegiate programs and their impact on disadvantaged students, stating that "these programs can motivate and inspire students to pursue high academic achievement, and they help to establish a sense within these young people for whom attending college is an attainable goal, regardless of one's present social or financial circumstances" (p. 972). The K-12 system is limited in providing the resources and support needed to advance disadvantaged students. These students face barriers that are beyond K-12 schools' scope and pedagogical reach—such students are predisposed to challenges that stem from a history of inequity and injustice. Colleges and universities establish programs that can serve as a bridge between K-12 and post-secondary education.

Understanding the politics of access, Harvey (2008) believed the key to a successful student program was the endorsement of the institution's highest executives, contending that college officials and university presidents can better serve disadvantaged students by supporting pre-college initiatives and efforts. Programs that are facilitated by university leadership will be financially sustainable and endorsed by other units within the university. According to Harvey (2008), access programs are in jeopardy, as policymakers question the effectiveness of college prep programs, such as TRIO programs. In 2006, there was a motion to eliminate TRIO programs (Engle, 2007);

opponents of such access programs argued that their outcomes did not warrant the financial resources that federal government allocated to them when the federal government's fiscal budget was limited.

There are some very important questions about who would be best to take on the responsibilities of developing and facilitating pre-college programs for students of disadvantaged backgrounds. Harvey's (2008) research helps answer such questions. It is important to note that Harvey's research focused on and drew a conclusion for just one group of underserved students, specifically Blacks males. Nevertheless, his research demonstrates the importance of higher education institutions in pre-college intervention programs for the general population of underserved students. College and universities are "uniquely positioned to build a bridge between post-secondary institutions and their local K-12 communities by facilitating commitment at the presidents' and chancellors' level" (Harvey, 2008, p.977). The expansion of pre-college programs is indeed crucial; however, it is essential that the appropriate administrative forces spearhead expansion efforts. College and university presidents must be intentional in providing access to disadvantaged students and assume responsibility for their enrollment, as they are better positioned than K-12 administrators to address the needs of such populations of students.

Past Program Evaluation

There have been multiple studies since 1965 that have evaluated the effects of pre-college outreach programs on various outcomes. However, such research is predominantly conceptual, assessing the effectiveness of pre-college programs by looking into certain program components and characteristics that allow for positive outcomes

(King, 2009; Oesterreich, 2000; Pietre & Pietre, 2009; Swail & Perna, 2002; Tierney, 2002; Walsh, 2000).

Tierney's (2002) overall suggestion for producing ideal outcomes was adding families and parents in the organization of outreach programs. In most cases, when designing a pre-college program, the students are asked to abandon certain customs and approaches tied to their cultural norms. One cultural norm is the involvement of the parent. Similarly, Swail and Perna (2002) found that parents served as motivation and prompted students to get involved. Tierney stated that this was because parents offered cultural capital; in other words, soft skills are being reinforced daily.

Swail and Perna (2002) emphasized that we can only determine program effectiveness to the extent that it addresses its target population's needs. Their research examined the disparity between major racial/ethnic groups in terms of college enrollment and the likelihood to attend selective colleges. Finally, King (2009) took a conceptual approach to study the effectiveness of pre-college programs in addressing the gap in college enrollment and academic achievement across student groups. She found that programs that should foster equality had programmatic biases that caused barriers to access college beyond the student. King found that the programs failed to acknowledge participants' differences and unique needs; instead, the programs used "deficit-based terms like disadvantaged and at-risk that define and label potential participants as deficient in background experience, resources, and social knowledge" (p.12). Such labels were the eligibility criteria and a stigma that also promote college access program staff to view students and their parents "as passive recipients of information." She contended that the existing practices in college access programs can be improved by "uncovering and

challenging personal and institutional biases that serve to reproduce the underrepresentation of certain groups in higher education" (p. 12).

Despite the development of the conceptual models described above, primary research on pre-collegiate programs is still lacking. Moreover, not only are empirical studies scarce, the results of empirical studies are often mixed, and the robustness of the evaluation process is often questionable (Coleman, 2011). Alhaddab and Aquino (2017) researched the effectiveness of pre-college programs and minorities' access to college, specifically examining the Talent Search program. They found that there is a strong relationship between participating in pre-college outreach programs and college attendance. However, another component of their research using binomial logistic and multiple regression found that program participants had a lower probability of persisting to their sophomore year and a lower probability of obtaining a cumulative GPA of 3.0 or higher in their first year, compared to non-program participants.

Research on the effectiveness of pre-college programs is also limited in assessing the impact of pre-college programs on enrollment into selective colleges. Such programs are usually labeled as helping disadvantaged students be accepted into college more generally, such that the “acceptance” is usually considered as an acceptance into any college. However, acceptance into selective or specific colleges is often not studied, even though *which* school they are accepted into can make a world of difference. College selectivity is generally understood as the quality of an institution, measured by the teacher-to-student ratio, institutional rating, tuition costs, academic expenditures per student, 2-year vs. 4-year colleges, and private vs. public, to name a few indicators. Research evaluating pre-college programs usually assesses enrollment and acceptance

through a myopic lens, which is simply the entry to any college or institution of higher learning, no matter the quality. Cabrera, Nora, Terenzini, Pascarella, and Hagedorn (1999) demonstrated the importance of college selectivity, finding an impact on occupational status and income. This impact is commonly found for institutions at the highest-level quality (e.g., Ivy League schools).

Background Information on Outcome Variables for Student Success

The outcome (dependent) variables for my study derive from my theoretical framework. Drawing from Perna and Thomas (2008) and Hossler and Gallagher's College Choice Model (1987), I chose three dependent variables that could capture the impact of pre-college programs. As mentioned in the previous sections, success can be measured by various means. And thus, we can evaluate the effectiveness of TRIO pre-college outreach programs for disadvantaged students by comparing the success of program participants to comparable non-participants. The TRIO outreach programs serve students in the early stages of the educational journey. On the basis of the program descriptions, TRIO programs target two transitional points in Perna and Thomas's (2008) longitudinal journey for student success: Transition 1: College Readiness and Transition 2: College Enrollment (reference Table 2). According to Perna and Thomas (2008), college readiness has two indicators – educational aspirations and academic preparation. College Enrollment is the transitional point with college access and college choice as indicators.

For the purpose of my study, three success indicators were used to select the dependent variables for this study. The dependent variables selected were used to determine and quantify the effectiveness of pre-college programs. The first dependent

variable assessed educational aspiration. Part of the pre-college program's objective is to increase college attendance among disadvantaged students by impressing upon them the importance of college education, having them attend college tours, attending college activity, and other programming that would allow underprivileged students to picture themselves in college and to capitalize on the benefits of college credentials. According to Hossler and Gallagher (1987), this aspiration is referred to as *predisposition*. The predisposition stage is where students develop college aspirations and expectations.

The second dependent variable assessed college preparation. In addition to inspiring the students to go to college, TRIO programs are tasked with helping students gather information about college, learning and preparing for college entry exams requirements, and building learning strategies needed to persist and succeed in college. College preparedness is conceptualized into two major concepts: informational preparedness and academic self-efficacy. One the one hand, informational preparedness is concerned with having gathered critical college entrance information. On the other hand, academic self-efficacy concerned developing the attitude and skills (e.g. studying and test taking skills, time management, etc.) to maintain the necessary academic rigor needed to enter and succeed in college. College preparation is captured in Hossler and Gallagher's (1987) *search* stage. In the *search* stage, students gain knowledge about and preparation for college: college culture and academic programs, college entrance requirements and test, and financial aid availability. The final dependent variable assessed college access. For the purpose of my study, college access was operationalized in terms of enrollment, whether student enrolled in college or not. The ultimate goal of

TRIO programs is to help disadvantaged students break barriers to enter college. College enrollment is the final stage of Hossler and Gallagher's College Choice Model (1987).

In summary, in the present study, TRIO outreach programs were evaluated statistically on three success indicators: educational aspirations, college preparation, and college access. I tested whether such programs were effective in these areas, to find out whether these federally funded educational opportunity programs continue to be warranted.

Literature on Predictor Variables

Research continues to show that multiple factors influence student success. These factors can be student background factors, including student socioeconomic status (SES), race/ethnicity, gender, prior achievement, parent highest educational attainment, parent composition, and number of risk factors. These factors are regarded as very influential indicators of student success. The present section focuses specifically on student background demographic characteristics that served as the control variables for the analysis in the present study. Hossler and Gallagher's (1987) model on college choice emphasizes the impact of entry characteristics or student background characteristics on student outcomes.

Socioeconomic Background

A person's social class has a significant impact on their achievement and attainment. Paulsen and John (2002) asserted that the stratification of social classes, the haves, and have-nots, becomes indicative of a "symbolic wealth that is transmitted from upper- and middle- class parents to their children that sustain class status…via access to linguistic structures, school-related information, social network, and educational

credentials" (p. 196). Similarly, parents' educational experience or lack thereof shapes expectations and, in turn, their children's educational aspirations. Students of low SES background simply aspire to complete high school and maybe get a job straight out of high school, whereas for students from high SES backgrounds, a four-year college education is a standard, and graduate degrees are the goals (Walpole, 2003).

Examining the effect of social class on a student's sense of belongingness, Ostrove and Long (2007) found that SES has a direct impact on a student's ability to adjust to college. Students of first-generation college families typically attend less selective colleges. They spend more time working than engaging in extracurricular activities, such as clubs and other involvements that would create an institutional fit and affinity. However, students from high SES backgrounds do not need to worry about finances; they have the opportunity to integrate into the social systems of their universities and spend time engaging in the institutional environment. Ostrove and Long (2007), studying the social and academic adjustment to college, found that social class is strongly related to a student's sense of belonging. It was reported in their study that 33% of the variance in social adjustment was explained by a composite of SES indicators (family income, parents' education, and parents' occupation). Moreover, 24 % of the variance in academic adjustment was explained by self-identity.

Terenzini, Cabrera, and Bernal (2001), drawing from their college choice theory, asserted that a desire to attend college is a factor of parental encouragement and support. Other factors included parental savings, SES, parental collegiate experiences, high school academic resources, and student ability. Furthermore, Terenzini and his colleagues found low-SES students had fewer conversations with their parents about educational

aspirations and goals (2001). According to Walpole (1998), fewer conversations about college preparation, readiness, and choosing colleges, essentially diminished the expectation and, in turn, potential efforts to finish college and enter graduate school.

Students' socioeconomic background affects their pathway to college. Goldrick-Rab's (2006) research concluded that multi-institutional attendance is common among modern-day students, but the pathways differed depending on family background. Social-class differences were found in the number of colleges a student attended. Students from homes where parents went to college and had higher incomes would change schools but still finish their four-year degree on time. However, this was not the case for students with fewer financial resources and poor high school preparation.

Race and Ethnicity

In the 21st century, race and ethnicity are fundamental components of personal identity, perception, and ultimately, productivity (Hochschild & Shen, 2014). When students are asked what racial group they identify with, a myriad of responses present. Some will say that there is only one race, which is the human race. Others instead specify an ethnic or cultural group. Race and ethnicity are different from one another. Race is "a social construction that ascribes advantageous or disadvantageous characteristics to groups of people based on phenotypes characteristics," whereas ethnicity "primarily refers to membership in groups sharing common social, cultural, and historical heritage" (Kuh et al., 2006, p. 495).

Although most scholars would agree that the concept of race has no biological premise nor morality, decency, and intellectual support, the conceptualization of race is continuously transformed by public discourse. Depending on a student's racial/ethnic

identification, social-political implications can have a historical undertone of oppression, privilege, or anything in between. African Americans, Latinos, and Native Americans come from a long history of segregation, discrimination, and inequitable educational opportunities. In order to understand the gap in achievement in terms of race/ethnicity, or the disparate educational outcome between Black students and White students, or between Latino students and White students, education must be viewed from another perspective.

When education is viewed through the lens of race and ethnicity, unequal public education systems and discrimination become evident. Firstly, the racial difference in standardized testing is striking. Steele and Aronson (1995) conducted a study to determine the impact of stereotypes on Black students' test performance. They found that the stereotypes Blacks endures influence their capacity to achieve because they disrupt enough to derail these students' intellectual performance. However, some Black students overcome the barrier by believing in themselves and dispelling other thoughts and perceptions.

Similarly, Buchman, Condron, and Roscigno (2010) found certain racial groups were subjected to bias and test-related inequalities because of individuals' inability to engage in Scholastic Aptitude Test (SAT) preparation. Whereas students of certain racial backgrounds are exposed to more rigorous SAT preparation, minority students face inadequate preparation for testing. Buchman and her colleagues provided a deeper understanding of the lack of achievement of minority student groups and their lack of preparedness.

Racial and ethnic differences also exist in educational aspirations. Qian and Blair (1999) found that racial identification affects educational progress. There is a desire for educational attainment among minority groups, especially African Americans; however, too often there is a lack of opportunities to experience good schools, quality teachers, and a rigorous curriculum. Consequently, Qian and Blair (1999) found that racial minority groups aspired to go to college and attend a 4-year college, but no follow-through was the main drawback. Hurtado and Carter (1997) came to the same conclusion; their study showed that students' expectation for degree attainment was not observed in their college choice behaviors. For example, 50% of Black and Latino students who desired to attend college never applied to college during high school years, as compared to their counterparts. Only 20% of their White counterparts did not apply to college. This failure to follow-through is a function of race/ethnicity, income, and perceived ability.

Finally, racial and ethnic differences are found in learning. In the study of Lundberg and Shriner (2004), faculty-student interaction varied by student race/ethnicity; however, "frequent interaction with faculty members are strong predictors of learning in all racial groups" (p. 559). Across the board, all racial groups feel more comfortable disclosing information to a member of their race or ethnicity. However, in this same study, Black students were particularly apprehensive about interacting with White faculty members because of fear that people from their same racial group would have a negative perception of them. Other researchers have found consistent findings. Suarez-Balcazar and her colleagues (2003) found that students of color perceived that they experienced more differential and stereotypical treatment in situations with peers and faculty than did students of any other racial group. Cabrera et al. (1999) argued that in general, minority

students who experienced prejudice in the institutional climate did not commit to the institution.

In summary, race and ethnicity have historically played a role in the social systems of the United States. School systems notwithstanding, research supports implications that race and ethnicity inherently influence student experiences in school. However, controlling for these variables in the present study was an attempt to acknowledge these effects but not to allow them to be factored into the program effect analyses.

Gender

Student success is also influenced by gender. Gender differences and their impact on educational outcomes have always existed. In the US, before the 1970s, girls were considered the underachievers, and research was dedicated to understanding such gender differences in achievement. However, since the 1980s, boys' academic performance has lagged in many subjects that have typically been male-dominated. Gender differences exist in many areas of education and the learning process that lends itself to disproportionate student outcomes. These areas include learning style, self-efficacy, teacher gender, access, and persistence, to name a few.

First, student outcome is contingent on students' self-efficacy or confidence in their ability to succeed, and on their ability to self-regulate strategies to supplement their learning. In other words, the achievement is determined by students' belief in themselves; however, it is also determined by students' ability to make study plans, to keep track of their progress in school, and to strategize and set goals for success. Pajares (2002) found that girls have higher confidence than boys in setting goals and executing them. More

specifically, he found that "girls express greater confidence in their capability to use strategies such as finishing homework assignments on time, studying when there are other things to do, remembering information presented in class and textbooks, and participating in class discussions" (Pajares, 2002, p. 118).

However, these truths about the influence of self-efficacy on educational outcomes do not remain true across subjects. There are still some subjects that remain one-gender dominant regardless of self-efficacy scores. Girls have been found to be consistently confident in their ability to write, although their self-efficacy levels have been lower than boys. Branom (2013) found that boys have a higher self-belief and expectancy in their math performance and also in their impending higher-level math courses than girls. Moreover, researchers have found that these gender differences in student outcomes regarding self-efficacy derive from gender role stereotypes and long-standing in history. In media and politics, there are some areas of study and professionalism that are male-dominated in their display to society. Although women are graduating from high school and entering college at a greater rate than in the past, women are still underrepresented in STEM subject areas and are less motivated to enter these areas of study (Bettinger & Long, 2005; Carrell, Page, & West, 2010; Meece, Glienka & Burg, 2006).

Similarly, gender differences in student outcomes also influence access to, persistence in, and completion of higher education. Access and persistence are factors of both academics and engagement. In terms of academics, female students were found to enter college with the predisposition to succeed (Riegle-Crumb, 2010). Conger and Long (2010) posited that females enroll and succeed in college at a higher rate than male

students because they came from high school with higher GPAs, credits earned, and persistence. Prior achievement, or lack thereof, explains why male students fall behind females in educational outcomes. Female students also tend to participate in non-academic activities, whereas male students do not. Conger and Long (2010) found that female students fared better in college performance because they focused not only on academics but also on non-academic involvements, such as clubs and other student organization groups.

The teacher's gender also makes a difference in student outcomes. Dee (2007) brought fascinating insight into educational research on the gender gap. He studied gender in terms of gender interaction between students and teachers. He found significant effects on educational outcomes. Student achievement declined when given a teacher of the opposite gender. Dee (2007) found that boys tend to be more disruptive than girls in classes taught by women, and this behavioral issue has perpetuated a lag in achievement, but that a year of being taught by a male teacher was found to be sufficient to close the gender gap. However, it is important to note that Bettinger and Long (2005) and Carrell and her colleagues (2010) found that teacher gender had a minimal effect on male students. However, they found that a teacher's gender significantly mattered when female students had a higher ability. Both found that a teachers' gender mattered in terms of female student performance when female teachers taught high-performing female students.

In the present study, gender was controlled to gauge the effect of a specific independent variable – pre-college outreach programs. The discussion in the literature

makes a good argument for paying attention to student gender in research about student outcomes. Thus, in considering the control variables for my study, gender was selected.

Prior Achievement

Prior achievement is commonly distinguished as a factor that impacts success, but it also helps determine if a student will participate in pre-collegiate programs. Swail and Perna (2002) conducted a survey of outreach programs. Improving academic skills has been one of the main objectives of outreach programs. Thus, students from disadvantaged backgrounds enroll in these programs because they provide such academic support. Similarly, Pitre, Johnson, and Pitre (2006) found that academic achievement is a factor in college choice and aspirations. Participating in pre-college prep programs is an avenue to provide academic support where efforts of secondary education are limited (Swail & Perna, 2002).

Parent Highest Educational Attainment

Parent highest educational attainment is a covariate that is captured in literature on parental involvement, cultural capital, and success. Educational background is critical in how parents view the benefits of school and thus, how they communicate to their children the value of an education. Pritchard and Wilson (2003) found that parents' educational attainment significantly corelated to student college GPA. In a study on student success and parents who never attended college, Brown and Burkhardt (1999), found that there was an indirect relationship, what they called mitigating factors. Brown and Burkhardt (1999) reported that students whose parents never went to college had lower income and high school GPA than students whose parent/s had attended college. They also concluded that first generation in college students were "less likely to enroll in

transfer level credits" (p. 20). Similarly, Rosa (2006) maintained that educational opportunities are associated with one's understanding financial aid information. Low-income students perceived that school is too expensive-- thus, not for them. Parents' higher educational background was positively associated with financial aid awareness and encouraged higher educational attainment.

Number of Risk Factors

The final variable selected in the present study was Number of Academic Risk Factors. This variable is a composite variables that captured information identified by the literature: (1) comes from a single-parent household; (2) has two parents without a high school diploma; (3) has a sibling who has dropped out of school; (4) has changed schools two or more times (excluding changes resulting from school promotions); (5) has repeated at least one grade; and (6) comes from a household with an income below the federal threshold for poverty. According to Winborne and Dardaine-Ragguet, (1993), students associated with those risk factors, or at-risk students, are said to be failed by the US education system both systematically and historically. The researchers concluded that effective resources are needed, which usually consist of "counseling personnel, transitional programs, and alternative classroom structures" (p. 140). Similarly, Scheel, Madabhushi, and Backhaus (2009) found these students also lack the motivation to continue with school intervention programs with counselors; programs that are needed to address the unique needs of this student population. The risk factors identified earlier are excellent indicators of students who need and would participate in pre-college programs.

CHAPTER III

METHODOLOGY

My study was conducted to determine if there is a significant difference in educational outcomes between students who participated in pre-college outreach programs and students who did not participate. The effectiveness of Talent Search (TS), Upward Bound (UB), and GEAR UP was evaluated by examining their effect on student success, specifically the success of disadvantaged students. As discussed in the literature review, empirical studies evaluating the effectiveness of pre-college programs have usually been limited in their ability to obtain information from former participants, in their access to funding, and in accessing longitudinal data. Therefore, comprehensive public data of the Educational Longitudinal Survey of 2002 (ELS:2002) were used (NCES, 2002) in the present study. The propensity score matching technique was used because imbalances usually occur with observational datasets, such as the ELS:2002 dataset.

The Study Sample

The ELS: 2002 survey was issued to 16,197 students all across the country. The exact geographical location of these students were not disclosed, however, the locations of the high schools were provided by regions of the United States—18% were from the Northeast, 25% from the Midwest, 36% from the South, and 21% from the West. Of the students who responded to the survey, 499 students indicated that they participated in college preparation programs for disadvantaged students; and 9,792 indicated that they did not. The 499 students responded "yes" to the question: "*Talent Search, Upward Bound, and GEAR Up are programs that help economically disadvantaged high school*

students to prepare for entering and succeeding in college. At any time during high school, have you participated in these programs or a similar program?" Answering yes to this question grouped students across all three outreach programs, rather than isolating participants to a particular outreach program. The question was appropriate for identifying the treatment group because all outreach programs share a common goal of addressing the needs of disadvantaged students as they attempt to transition to college.

Table 3
Participated in College Preparation Program for Disadvantaged Students-- Sex and Race

Variables		No	Yes	Total
	Total*	9,792	499	16,197
		60.5%	3.1%	100.0%
Sex-composite				
Male		49.9%	42.3%	49.5%
Female		50.1%	57.7%	50.5%
	Total	100.0%	100.0%	100.0%
Students' race/ethnicity-composite				
Amer. Indian/Alaska Native, non-Hispanic		0.7%	2.0%	0.7%
Asian, Hawaii/Pac. Islander, non-Hispanic		9.6%	14.7%	9.9%
Black or African American, non-Hispanic		10.5%	30.8%	11.5%
Hispanic		12.4%	17.8%	12.6%
Other		4.4%	5.8%	4.5%
White non-Hispanic		62.5%	29.0%	60.8%
	Total	100%	100%	100.0%

**Data were collected from 16,179 surveys; 36.5% of the data were missing due to inapplicability of the question, nonresponses, and missing values.*

Approximately 58% of the students who attended pre-college preparation programs were females. The dominant race/ethnicity groups of the sample were non-Hispanic Black, or African American, 30%; non-Hispanic White, 29%; and Hispanic, 18%.

Table 4

Participated in College Preparation Program for Disadvantaged --School SES and Parent Composition

Characteristics	No	Yes	Total
School SES			
0-5 percent	36.8%	12.3%	35.7%
6-10 percent	9.8%	6.7%	9.7%
11-20 percent	16.3%	12.7%	16.2%
21-30 percent	12.1%	16.8%	12.3%
31-50 percent	13.6%	24.2%	14.2%
51-75 percent	7.2%	14.9%	7.6%
76-100 percent	4.0%	12.3%	4.4%
	100%	100%	100%
Family composition			
Mother and father	64.7%	51.7%	64.0%
Mother and male guardian	10.8%	12.7%	10.9%
Father and female guardian	2.7%	3.4%	2.7%
Two guardians	1.3%	1.8%	1.3%
Mother only	15.9%	25.4%	16.4%
Father only	2.9%	2.0%	2.8%
Female guardian only	0.9%	2.4%	0.9%
Male guardian only	0.2%		0.2%
Lives with student less than half time	0.7%	0.6%	0.7%
Total	100%	100%	100%

Most of the students who participated in pre-college programs came from high schools with a higher percentage of 10th graders in school receiving free or reduced-price lunches. In other words, students who participated in the college prep programs came from schools with student bodies consisting of families with larger household sizes and less income, making them eligible for free or reduced lunch. Moreover, the percentages refer to students' socioeconomic status and the impact of that status on achievement, school resources, and learning quality.

Additionally, about 50% of the students who participated in these outreach programs came from non-traditional family compositions. An average of 16% of the entire ELS:2002 population lived in a single-mother household. However, 25% of the students who participated in college preparation programs were from single mother-households, which is generally considered to include some of the neediest students. These statistics are consistent with the literature cited previously that noted that disadvantaged students face many barriers in accessing and succeeding in higher education.

Dataset

The ELS:2002 is a nationally representative survey that tracks a cohort of 10th grade students through their secondary and post-secondary years. The survey was completed by the students, thus was a self-report survey. Nevertheless, the survey and survey questions were specifically designed to capture the students' access to and success in education beyond high school. The ELS:2002 surveyed more than 15,000 students from 750 schools. According to the NCES (n.d), the goal of ELS:2002 was policy-oriented in that the survey is designed to capture specific information to lead to research examining policy issues related to post-high school transition: equity, access, and choice; school effectiveness; and parental and community involvement, to name a few. The purpose of the survey was stated as follows:

> ELS:2002 will serve the development and evaluation of educational policy at all governmental levels and inform decision-makers, educational practitioners, and parents about the changes in the operation of the educational system over time, and the effects over time that elements of the system have on the lives of the individuals who pass through it. (NCES, n.d., para. 1)

The main focus of all these studies has been the transition of American youth from secondary schooling to subsequent education and work roles (NCES, n.d.). ELS:2002 has a unique longitudinal design and is rich in data, which made the dataset a good source for the present study.

Table 5

ELS:2002 Data Collection Phases

Base Year (2002)	First Follow-up (2004)	High School Transcripts (2005)	Second Follow-up (2006)	Third Follow-up (2012)	Post-secondary Transcripts (2013)
10th Grade Sophomore	12th Grade Senior	9th – 12th Grades	2 Years in College	4 Years After College	College Grades

There were multiple waves of data collection. The Base Year (2002) survey data were collected during students' sophomore year of high school, at which point students were 15-16 years old. Two years later (2004), during their senior year, a follow-up survey was administered; however, some students did not complete the survey because they dropped out, transferred to other schools, or completed high school early and opted not to complete the survey. The second follow-up (2006) captured the students' data another two years later, with some students progressing into college and others taking alternate routes, such as employment, no college enrollment, or the GED pathway. Additional follow-ups were conducted 6 years after students' sophomore year to capture student data after the college years, including employment, family, and community information. High school transcripts collected in 2004 and college transcripts collected in 2012 included grades; coursework; and standardized test scores that students attempted in

in high school (e.g., ACT/SAT, as well as cognitive exam administered through the ELS:2002 survey).

Propensity Score Matching For ELS:2002 Data

The ELS:2002 dataset has a large sample size and followed students 6-10 years after their 10th grade year of high school (Fraenkel, Wallen, & Hyun, 2011). Approximately 3% of the surveyed population were participants of pre-college programs. However, the problem that participation presents is selection bias (Bai, 2011). In the ELS:2002 dataset, participants of these pre-college programs self-selected into the TRIO programs. The problem with self-selection is that the individuals who self-select into a program are very likely to have notable characteristic differences (e.g., income, parental education) from those who choose not to participate (Pan & Bai, 2015). In the ideal research design, an experimental study, the entire population would have the same baseline characteristics, and the researcher would randomly assign an individual into a treatment or control group (Dehejia & Wahba, 2002; Lingle, 2009).

In an observational study, such as the current one, the researcher does not have control over the treatment assignment mechanism. To draw conclusive causal inferences, the groups of program participants (treatment group) and non-participants (control group) must be adjusted to remove preexisting imbalances in baseline characteristics (Lingle, 2009) that could impact the outcomes. In other words, to be able to accurately draw comparisons between students who participated in pre-college programs and those who did not participate, the model should control for certain confounding variables (Bai, 2011). When confounding variables are controlled, this reduces or eliminates the selection bias that challenges observational studies. The methodological approach used to

reduce bias in estimating treatment effects is statistical matching, Propensity Score Matching (PSM).

Research Design and Approach

According to Becker and Ichino (2002), PSM is widely used in evaluation literature and for intervention evaluation. The technique allows one to draw inferences about the effects of treatment on a subject while considering common issues inherent to large, non-randomized, and observational datasets (e.g., missing data; Graham & Hoffer, 2000) and addresses the influence or confoundedness of covariates. Thus, when determining the causal effect of pre-college outreach programs on student academic outcomes, PSM is the ideal approach.

The study used PSM, a non-experimental quantitative research design, for two reasons. First, few quantitative studies evaluating the effect of pre-college outreach programs on student outcomes exist. The literature on the effect of pre-college outreach programs on student outcomes is mostly conceptual and theoretical. Researchers and scholars are more prescriptive and speak to the components needed in developing an effective pre-college program; however, more research is needed to test these programs quantitatively. Second, non-experimental observational data is used because program participation cannot be randomly assigned (Belli, 2009).

Research Hypotheses

1. There are significant preexisting differences in the variables of high school students who do and do not participate in pre-college outreach programs.

2. After matching the variables of participants and non-participants, the effects of the program participation can be examined without much bias caused by other variables.
3. After matching, the participants of pre-college outreach programs show higher educational aspiration than non-participants.
4. After matching, the participants of pre-college outreach programs show higher college preparedness than non-participants.
5. After matching, the participants of pre-college outreach programs show higher college access than non-participants.

Variables and Measures

Several variables provided crucial information needed for analyses in my study. Three dependent variables were used to analyze educational outcomes in the studied sample: Educational Aspiration, College Preparedness, and College Access. The following section contains a description of all the major variables included in this study.

Dependent Variables

Educational Aspiration

Educational Aspirations was the first major dependent variable. It was a continuous variable. Students were asked, "*How far in school respondent thinks [they] will get?"* The question is labeled F1S42 in the dataset and the responses were re-coded for the present study as: 1 = "Less than high school graduation"; 2 = "GED or other equivalency only" and "High school graduation only"; 3 = "Attend or complete 2-year college/school"; 3 = "Attend college, 4-year degree incomplete"; 5 = "Graduate from

college"; 6 = "Obtain master's degree or equivalent" and "Obtain PhD, MD, or other advanced degree." All negative values were treated as missing.

Table 6

Educational Aspiration Variable in ELS:2002

Educational Aspiration	Label	Coding
How far in school respondent thinks [they] will get	*F1S42*	1= Less than high school 2= Graduate high School or GED only 3=Attend or complete a 2 year college 4=Attend college four year degree incomplete 5=Graduate college 6=Obtain master's degree or equivalent 7=Obtain PhD, MD or other advanced degree

College Preparedness

College Preparedness is the second major dependent variable, which breaks down to two types of preparedness--information preparedness and academic self-efficacy. Information preparedness is a continuous variable made up of three survey statements that were either agreed to or denied by students. The three statements concern preparing for college by gathering information: *Has gone to college search guides for entrance information* (F1S48J): *yes* responses were coded as "1" and *no* coded as "0." *Has gone to college representatives for entrance information* (F1S48H): *yes* responses were coded as "1" and *no* coded as "0." *Has gone to college publications/websites for entrance information* (F1S48I): *yes* responses were coded as "1" and *no* coded as "0.

Academic self-efficacy was a continuous variable made up of 4 survey statements that were either agreed to or denied by students. The 4 statements concern preparing for college by developing learning strategies and skills: *Puts forth best effort when studying*

(BYS89V); *Works as hard as possible when studies* (BYS89J); *Keeps studying even if material is difficult* (BYS89O); and *Can get no bad grades if decides to* (BYS89N). The original responses for these questions were dichotomized for the purpose of this study. Responses to survey questions with the response of "Almost never" and "Sometimes" were recoded as "no" or "0"; and responses "Almost always" and "Often" were recoded "yes" or "1".

Table 7

College Preparedness Variable in ELS:2002

College Preparedness		Labels	Coding
Informational Preparedness	Has gone to college search guides for entrance information	F1S48J	0= “No” 1= “Yes” (dichotomized)
	Has gone to college representatives for entrance information	F1S48H	0= “No” 1= “Yes”
	Has gone to college publications/websites for entrance information	F1S48I	0= “No” 1= “Yes” (dichotomized)
Academic Self-efficacy	When studying, I put forth my best effort	BYS89V	0= “No” 1= “Yes” (dichotomized)
	When I sit myself down to learn something really hard, I can learn it	BYS89J	0= “No” 1= “Yes” (dichotomized)
	If I decide not to get any bad grades, I can really do it	BYS89N	0= “No” 1= “Yes” (dichotomized)
	When studying, I keep working even if the material is difficult	BYS89O	0= “No” 1= “Yes” (dichotomized)

College Access

College Access was another major dependent variable. It was a categorical variable that measures how soon after high school students enrolled in post-secondary. In the dataset, the variable is labeled F3PSTIMING. F3PSTIMING indicates the timing of the respondent's first post-secondary enrollment by comparing their high school completion date (F3HSCPDR) to the date the respondent began attending their first-attended post-secondary institution (F3PS1START). F3PSTIMING distinguishes between "delayed" and "immediate" attendance in the same manner as was done in the second follow-up variable F2RTYPE; that is, respondents were coded as having "immediate" post-secondary attendance if their post-secondary attendance began by October of their high school completion/exit year (if their high school completion/exit date was between January and July), or by the following February (if their high school completion/exit date was after July). Respondents were coded as having "delayed" post-secondary attendance if their post-secondary attendance did not begin by October of their high school completion/exit year (if their high school completion/exit date was between January and July), or by the following February (if their high school completion/exit date was after July).

For this study, I recoded the college access variable to show two alternatives: Enrolled and Not enrolled. *No post-secondary enrollment* responses were recorded as "0." And all other responses, *Delayed post-secondary enrollment* and *Immediate post-secondary enrollment,* were recoded to “1”.

Table 8
College Access Variable in ELS:2002 Data

College Access	Labels	Coding
Post-secondary enrollment	F3PSTIMING	0 = Not Enrolled 1= Enrolled

Independent Variables

Pre-college Outreach Programs

This variable was the major independent variable of the study and served as the treatment group as well. It is a dichotomous variable, with program participants coded as "1" and non-participants coded as "0." Students were asked, "*Talent Search, Upward Bound, and GEAR Up are programs that help economically disadvantaged high school students to prepare for entering and succeeding in college. At any time during high school, have you participated in these programs or a similar program? Yes or No.*

Table 9
Pre-college Outreach Programs in ELS:2002--Major Independent Variable

Major independent Variable	Label	Coding
Participated in college preparation program for disadvantaged	F1S23	0= "No" 1= "Yes"

Other Control Variables (Covariates)

Covariates are variables that can confound the effects of the treatment. Covariates were selected following the theoretical frameworks that guided my study. Hossler and

Gallagher's (1987) model on access and choice referred to pre-treatment characteristics as entry characteristics that must be considered when evaluating student success. Thus, for the present study, covariates were: SES, prior achievement, sex, parent composition, race, parent highest educational attainment, and the number of academic risk factors. Socioeconomic status was a continuous variable determined by five sub-variables: father/guardian education level, mother/guardian education level, family income, father's occupation, and mother's occupation. Prior achievement had two continuous variables: math quartile and reading quartile. Sex was coded 0 = male and 1= female. Parent Composition was recoded to reflect two groups: 0 = households with two parents, and 1 = other parents representing households with other parental makeup. Race and ethnicity were recorded as dummy variables: BlackDummy (Black =1; Other races than Black=0) and HispanicDummy (Hispanic =1; Other ethnicities than Hispanic =0). Parent highest educational attainment was continuous coded 1= Less than high school, 2= Graduate high School or GED only, 3 = Attend or complete a 2 year college, 4=Attend college 4 year degree incomplete, 5=Graduate college, 6=Obtain master's degree or equivalent, 7=Obtain PhD, MD or other advanced degree. Finally, the number of academic risk factors was a continuous variable that included whether the sample member: (1) comes from a single-parent household; (2) has two parents without a high school diploma; (3) has a sibling who has dropped out of school; (4) has changed schools two or more times (excluding changes due to school promotions); (5) has repeated at least one grade; and (6) comes from a household with an income below the federal threshold for poverty.

Table 10
Information on Covariates in ELS

Independent Variable	Labels	Coding
SES Quartile	BYSES1	Continuous
Math Quartile	BYTXMQU	Continuous
Reading Quartile	BYTXRQU	Continuous
Sex	BYSEX	0= "No" 1= "Yes"
Parent Composition	BYFCOMP	0 = two Parent 1 = others
Black	BLACK	0= "No" 1= "Yes"
Hispanic	HISPANIC	0= "No" 1= "Yes"
Parents' highest level of education	BYPARED	1= Less than high school 2= Graduate high School or GED only 3 = Attend or complete a 2 = year college 4=Attend college four year degree incomplete 5=Graduate college 6=Obtain master's degree or equivalent 7=Obtain PhD, MD or other advanced degree
Number of academic risk factors in 10th grade	BYRISKFC	0= Zero risk factor 1= One risk factor 2= Two risk factor 3= Three risk factor 2= Two risk factor 4= Four risk factor 5=Five or six risk factor

Research Procedures

Propensity Score Matching

A propensity score is a conditional probability of receiving treatment depending on pretreatment covariates (Lingle, 2009); these scores are used to assign people into groups. The process of propensity examination includes the selection of a method, the selection of the covariates, and then balancing the treatment and the control groups (Becker & Ichino, 2002; Lingle, 2009). There are four types of propensity score

methodologies: matching, stratification, covariate adjustment, and weighing in determining treatments. Matching was the method used in this study, as it yields the most valid response. When conducting evaluation studies with preexisting data, is it sometimes challenging to isolate the effect of the treatment—in this case, the effect of pre-college programs on student success measures. Thus, for the purpose of my study, pretreatment characteristics were statistically controlled. The controlled characteristics included SES, prior achievement (math and reading quartile), gender, race/ethnicity, parent composition, parent highest educational attainment, and the number of academic risk factors. The selection of covariates was based on prior research on pre-college program evaluations and theories of student success barriers.

Research Analysis

To analyze the effect of TRIO pre-college outreach programs on student educational outcomes, procedures were devised accordingly. First, a series of *t*-tests were conducted to examine the difference between participants and non-participants of the pre-college programs with regard to each of dependent (Education Aspiration, College Preparedness, and College Access) and independent variables used for the *t*-tests. Chi-square tests were used to understand the relationship between the categorical variables Gender and Race. Second, propensity scores were calculated using the 1:1 matching technique of propensity score matching to create two groups that were equivalent concerning background characteristics. After propensity scores were calculated, *t*-test and Chi-square tests were run for a second time. Lastly, the differences between program participants and non-participants in educational outcomes were analyzed again to gauge

program effectiveness. To measure Educational Aspiration and College preparedness, regression was used, and College Access was analyzed using logistic regression.

SPSS Data

The ELS:2002 data were retrieved from the Education Data Analysis Tool (EDAT) on the NCES website. The independent and dependent variables were cleaned and treated for missing responses. Where applicable, categorical variables were recoded to dummy variables. In addition to the data for all students, two separate SPSS datasets were also created: one included everyone, and the other contained only disadvantaged students.

CHAPTER IV

RESULTS

A quantitative approach was used for this study. This study adds to the literature on pre-college outreach program evaluation. This chapter presents and reports the findings of the study. This chapter is divided into three major sections concerning preliminary analysis before matching, preliminary analysis after matching, and statistical analysis. The preliminary analysis is a presentation of descriptive statistics before and after applying the propensity score matching and interpretation. The preliminary analysis focuses on the nine covariates that were selected based on their influence to impact the decision to participate or not in the pre-college programs of this study. The statistical analysis section is composed of the results of the five research questions that guided this study.

Preliminary Analysis Before Matching and Interpretation

Table 11 presents the descriptive statistics for the quartile and continuous variables of the study. It includes data from all students who participated in the Educational Longitudinal study of 2002 after removing missing cases. A couple of key outcomes highlight the analysis. The mean of the socioeconomic status quartile of all students who were surveyed is 2.57, with a standard deviation of 1.132. The mean of math and reading quartiles were 2.57 and 2.55 respectively, with a standard deviation of 1.108 and 1.113, respectively. The mean of parents' highest level of education was 4.50. Finally, the number of risk factors in the 10^{th} grade ranged from 0 - 5; the mean of all survey participants was .99 with a standard deviation of 1.099. In other words, the majority of students in our data showed a comparatively low level of risk factors.

Table 11

Descriptive Statistics of Continuous Variables for All ELS:2002 Participants

	N	Minimum	Maximum	Mean	Std. Deviation
SES Quartile	15244	1	4	2.57	1.132
Mathematics Quartile	15892	1	4	2.57	1.108
Reading Quartile	15892	1	4	2.55	1.113
Parents' highest level of education	15321	1	8	4.50	2.092
Number of academic risk factors in 10th grade	11966	0	5	.99	1.099

Table 12 presents the frequencies and percentages of the categorical variables in this study. Approximately half of the students were female (51%), and the other half were male (49%). The majority of the participants (59%) came from homes with two parents. In terms of racial and ethnic backgrounds, a large portion of the students (66%) were White, and approximately 28% were from minority groups (Hispanic, 15%, and Blacks, 13%).

Table 12

Frequencies and Percentages of Categorical Variables for All ELS:2002 Participants

			Frequency	Percent
Sex	Male		8090	49.9
	Female		8107	50.1
		Total	16197	100.0
White			9034	66.0
Black			2168	16.0
Hispanic			2433	18.0
		Total	13635	100.0
Parental Composition		Two Parents	9100	59.4
		Others	6225	40.6
		Total	15325	100.0

Tables 13 and 14 present the descriptive statistics for the program participants. The results show that the SES, math and reading scores, and parents' highest level of education were similar to those of all students who took the survey. All continuous variables in the sample also maintained a similar mean as the survey population. However, the number of academic risk factors indicates that the students who participated in the pre-college programs had a greater level of risk than all students in the data (mean =1.26, *SD* = 1.084). There were some more differences noted between the program participants and all students. Whereas 59% of all students came from families with two parents, 51% of program participants came from two-parent households. Similarly, 51% of all students were female, while 57% of the program participants were female. The majority of population were White 66 %), and about 33% of all students were Black (16 %) and Hispanic (18 %). On the other hand, about only 37% program participants were White, and 63% were Black (40.0%), and Hispanic (23%).

Table 13
Descriptive Statistics of Continuous Variables for Pre-College Program Participants

	N	Minimum	Maximum	Mean	Std. Deviation
SES Quartile	497	1	4	2.15	1.076
Mathematics Quartile	497	1	4	2.30	1.065
Reading Quartile	497	1	4	2.36	1.119
Parents' highest level of education	497	1	8	4.07	2.083
Number of academic risk factors in 10th grade	376	0	4	1.26	1.084

Table 14

Descriptive Statistics for All Pre-College Program Participants--Categorical Variables

		Frequency	Percent
Sex	Male	210	42.1
	Female	289	57.9
	Total	499	100.0
White		144	37.0
Black		154	40.0
Hispanic		88	23.0
	Total	386	100.0
Parental Composition	Two Parents	257	51.7
	Others	240	48.3
	Total	497	100.0

Preliminary Analysis After Matching and Interpretation

Using a propensity score matching (PSM) technique, the study prepared a new dataset in which program participants and non-program participants were matched to have similar backgrounds and thus have a similar probability of participating in the pre-college outreach programs. After applying the PSM to the ELS:2002 data, the total number of students in the new dataset was reduced from approximately 18,000 to 870 participants. In the new dataset, half of the students were program participants, and the other half were non-participants matched by the study's nine covariates, as discussed in Chapter 2.

Tables 15 and 16 are the descriptive statistics of the covariates of the study. Not surprisingly, the data is reflective of the statistics of the original sample. In the matched data, the female students participated in pre-college programs at a higher rate than male students. After Whites, Blacks and Hispanics remained the prevalent race/ethnicity in the matched sample. Surprisingly, looking at only program participants in the matched dataset, two-parent homes were about 7% higher than in the unmatched sample.

Table 15

Descriptive Statistics After Matching--Continuous Variables

	N	Minimum	Maximum	Mean	Std. Deviation
SES Quartile	873	1	4	2.43	1.120
Mathematics Quartile	873	1	4	2.57	1.101
Reading Quartile	873	1	4	2.55	1.123
Parents' highest level of education	873	1	8	4.36	2.079
Number of academic risk factors in 10^{th} grade	752	0	5	1.00	1.084

Table 16

Descriptive Statistics After Matching--Categorical Variables

		Frequency	Percent
Sex	Male	399	45.6
	Female	476	54.4
	Total	875	100.0
White		419	47.9
Black		170	19.4
Hispanic		118	13.5
	Total	875	100.0
Parent Composition	Two Parents	510	58.4
	Others	363	41.6
	Total	873	100.0

Statistical Analysis and Interpretation

Null Hypothesis #1:

The first research hypothesis of this study was that there are significant preexisting differences in the demographic variables of disadvantaged high school students who do and do not participate in pre-college outreach programs. Independent sample *t*-tests for all nine covariates were conducted to compare the means of the program participants and non-participants. The results of the independent sample *t*-tests

are summarized in Tables 17 and 18 that report group statistics and Independent *t*-test *F* statistics for all nine covariates before matching.

The independent sample *t*-test requires the assumption of homogeneity of variance or a valid Levene's test. In conducting the analysis, I found that the Levene's test of six covariates violated the assumption. This meant that in looking at the independent sample *t*-test results, I did not assume equal variances. And I conducted a chi-square analysis for categorical variables; the results are in Tables 19 thru 24.

Additionally, a bivariate correlation analysis was employed to determine the relationship between the selected covariates and program participation. Table 25 is the summary and interpretation of the bivariate correlation results before matching.

Independent Sample t–test_ Before Results

Co-variate 1: SES Quartile. An independent sample *t*-test was conducted to compare the SES Quartile of program pre-college outreach program participants and non-participants before matching. The null hypothesis was rejected as there was a significant difference in the SES Quartile variable. Students who did not participate in the pre-college programs (M=2.72, SD=1.112, N=9759) were from households of far higher SES Quartiles than those students who participated (M=2.15, SD=1.076, N=497), $t(551) = 11.347$, $p<.001$.

Co-variate 2: Math Quartile. An independent sample *t*-test was conducted to compare the *Math Quartile* of pre-college outreach program participants and non-participants before matching. The null hypothesis was rejected as there was a significant difference in *math quartile*. Students who did not participate in the pre-college programs

(M=2.76, SD=1.074, *N*=9759) scored in higher math quartiles than those students who participated (*M*=2.3, *SD*=1.065, *N*=497), *t*(10269) = 9.359, *p*<.001.

Co-variate 3: Reading Quartile. An independent sample *t*-test was conducted to compare the *reading quartile* of program pre-college outreach program participants and non-participants before matching. The null hypothesis was rejected as there was a significant difference in *reading quartile*. Students who did not participate in the pre-college programs (*M*=2.73, *SD*=1.089, *N*=9759) scored in higher reading quartiles than those students who participated (*M*=2.36, *SD*=1.119, *N*=497), *t*(10269) = 7.264, *p*<.001.

Co-variate 4: Sex. A chi-square test of independence was performed to examine the relation between pre-college outreach program participants and sex. The relation between these variables was significant, χ^2 (1, *N* = 10201) = 11.748, *p* <.001 (See Tables 19-20). Male students were less likely to participate in pre-college outreach programs than were female students.

Co-variate 5: Parent Composition. A chi-square test of independence was performed to examine the relation between pre-college outreach program participants and parent composition. The relation between these variables was significant, χ^2 (1, *N* = 10260) = 34.508, *p* <.001 (See Tables 21-22). Students from two parent households were less likely to participate in pre-college outreach programs than were students for other parent compositions.

Co-variate 6-7: Race/Ethnicity. A corresponding chi-square test was conducted to compare the relation between pre-college outreach program participants and race/ethnicity (White, Black, and Hispanic). As shown in Tables 23-24, chi-square analyses revealed significant differences in the number of female program participants

and male program participants, χ^2 (3, N = 9757) = 289.480, p <.001. Black and Hispanic students enrolled in pre-college programs at a substantially higher rate did than White students.

C**o-variate 8: Parents' highest level of education.** An independent sample *t*-test was conducted to compare the *parents' highest level of education* of pre-college outreach program participants and non-participants before matching. The null hypothesis was rejected as there was a significant difference in *parents' highest level of education*. Students who did not participate in the pre-college programs (*M*=4.69, *SD*=2.054, *N*=9763) had a higher parent level of education than those students who participated (*M*=4.07, *SD*=2.083, *N*=497), *t*(10258) = 6.620, *p*<.001.

Co-variate 9: Number of academic risk factors in 10th grade. An independent sample *t*-test was conducted to compare the *number of academic risk factors in the 10th grade* of program pre-college outreach program participants and non-participants before matching. The null hypothesis was rejected as there was a significant difference in number of academic risk factors. Students who did not participate in the pre-college programs (*M*=0.8, *SD*=0.973, *N*=7989) had a fewer number of academic risk factors in 10th grade than those students who participated (*M*=1.26, *SD*=1.084, *N*=376), *t*(403) = -8.174, *p*<.001.

Table 17

Sample t-tests Group Statistics--Before Matching

	Participated in a college preparation program for disadvantaged	*N*	Mean	Std. Deviation
SES Quartiles	No	9759	2.72	1.112
	Yes	497	2.15	1.076
Math Quartile	No	9774	2.76	1.074
	Yes	497	2.3	1.065
Reading Quartile	No	9774	2.73	1.089
	Yes	497	2.36	1.119
Sex	No	9792	0.5005	0.50003
	Yes	499	0.5792	0.49419
Parent Composition	No	9763	0.3533	0.47801
	Yes	497	0.4829	0.50021
Black	No	9792	0.1051	0.30668
	Yes	499	0.3086	0.46239
Hispanic	No	9792	0.1235	0.32899
	Yes	499	0.1764	0.3815
Parents' highest level of education	No	9763	4.69	2.054
	Yes	497	4.07	2.083
Number of academic risk factors in 10th grade	No	7989	0.8	0.973
	Yes	376	1.26	1.084

Table 18
Independent Sample t*-tests for Study Covariates--Before Matching*

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean Difference	Std. Error Difference
SES Quartile	Equal variances assumed	6.461	.011	11.347	551.287	.000	.562	.050
Math Quartile	Equal variances not assumed	.011	.918	9.359	10269	.000	.462	.049
Reading Quartile	Equal variances not assumed	3.299	.069	7.264	10269	.000	.364	.050
Sex	Equal variances assumed	251.457	.000	-3.466	551.241	.001	-.07865	.02269
Parent Composition	Equal variances assumed	45.525	.000	-5.647	543.129	.000	-.12962	.02295
Black	Equal variances assumed	471.572	.000	-9.724	520.565	.000	-.20353	.02093
Hispanic	Equal variances assumed	42.438	.000	-3.040	536.421	.002	-.05288	.01740
Parents' highest level of education	Equal variances not assumed	.180	.672	6.620	10258	.000	.626	.095
Number of academic risk factors in 10th grade	Equal variances assumed	17.249	.000	-8.174	403.951	.000	-.465	.057

Table 19

*Participated in a College Preparation Program for Disadvantaged * Sex Crosstabulation--Before Matching*

		Sex		
		male	female	Total
Participated in a college preparation program for disadvantaged	No	4891	4901	9792
	Yes	210	289	499
Total		5101	5190	10291

Table 20

Chi-Square Tests for Sex--Before Matching

	Value	*Df*	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.748[a]	1	.001
Continuity Correction[s]	11.436	1	.001
Likelihood Ratio	11.800	1	.001
Fisher's Exact Test			
Linear-by-Linear Association	11.747	1	.001
N of Valid Cases	10291		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 247.34.

b. Computed only for a 2x2 table

Table 21

*Participated in the College Preparation Program for Disadvantaged * Parent Composition --Before Matching Crosstabulation*

		Parent Composition		
		two parents	others	Total
Participated in a college preparation program for disadvantaged	No	6314	3449	9763
	Yes	257	240	497
Total		6571	3689	10260

Table 22

Chi-Square Tests for Parent Composition--Before Matching

	Value	*df*	Asymptotic Significance (2-sided)
Pearson Chi-Square	34.508[a]	1	.000
Continuity Correction	33.948	1	.000
Likelihood Ratio	33.292	1	.000
Fisher's Exact Test			
Linear-by-Linear Association	34.505	1	.000
N of Valid Cases	10260		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 178.70.

Table 23

*Participated in the College Preparation Program for Disadvantaged * Race Crosstabulation*

		Race			
		Black	Hispanic	White	Total
Participated in a college preparation program for disadvantaged	No	1029	1209	6111	9297
	Yes	154	88	144	460
Total		1183	1297	6255	8735

Table 24

Chi-Square Tests for Race--Before Matching

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	289.480[a]	3	.000
Likelihood Ratio	247.840	3	.000
Linear-by-Linear Association	219.466	1	.000
N of Valid Cases	9757		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 48.18.

Bivariate Correlation Analysis _ Before Matching

Bivariate Correlation analyses were conducted to assess the relationship between this study's covariates and pre-college program participation (Table 25). All nine variables showed significant correlations with the college pre-program participation--meaning, all nine variables were significant associated with participation of pre-college programs.

Both SES quartile and math quartile variables had a negative correlation to pre-college program participation. This indicated that the lower SES quartile levels was correlated with pre-college program participation (r = -.108, n = 10291, p = .000). Moreover, the lower scores in math levels was correlated with the pre-college program participation. (r = -.092, n = 10271, p = .000).

There was a negative correlation between the reading quartile and the pre-college program (r = -.071, n = 10271, p = .000). Therefore, there was a negative correlation between the two variables, indicating lower reading quartile level correlate with a higher level of pre-college program participation.

There was a positive correlation between sex and the pre-college program (r = .034, n = 10291, p = 0.001), showing that more female students participated in the pre-college program than male students.

There was a positive correlation between Parent Composition and the pre-college program with r = .058, n = 10260, p = .000. Overall, there was a weak, positive correlation between the two-parent households and the pre-college program.

In terms of race/ethnicity, there was a positive correlation with pre-college program participation. Both Black and Hispanics with r = .137, n = 10291, p = .000; r =

.034, n = 10260, and p = 0.001 respectively. In other words, Black and Hispanic students tended to participate more in the pre-college program compared to White students. A post hoc analysis revealed that Black students attended these outreach programs more than Hispanic students.

Whereas there was a negative correlation between the parents' highest level of education and the pre-college program (r = -.65, n = 10260, p = .000), indicating that the higher levels of parents' highest education were associated with less participation in the pre-college programs, there was, understandably, a positive correlation between the academic risk factors and the pre-college program (r = .098, n = 8365, p = .000). Therefore, this analysis showed that a student with a higher number of risk factors tended to participate in the pre-college program.

Table 25

Covariate Correlations Results--Before Matching

		Participated in a college preparation program for disadvantaged	SES Quartiles	Math Quartile	Reading Quartile	Sex	Parent Composition	Black	Hispanic	Parents' highest level of education	Number of academic risk factors in 10th grade
Participated in a college preparation program for disadvantaged	Pearson Cor.	1	-.108**	-.092**	-.071**	.034**	.058**	.137**	.034**	-.065**	.098**
	Sig. (2-tailed)		.000	.000	.000	.001	.000	.000	.001	.000	.000
	N	10291	10256	10271	10271	10291	10260	10291	10291	10260	8365
SES Quartiles	Pearson Cor.	-.108**	1	.387**	.384**	-.020*	-.222**	-.126**	-.209**	.783**	-.417**
	Sig. (2-tailed)	.000		.000	.000	.016	.000	.000	.000	.000	.000
	N	10256	15244	15244	15244	15244	15244	15244	15244	15244	11902
Math Quartile	Pearson Cor.	-.092**	.387**	1	.705**	-.048**	-.210**	-.244**	-.197**	.322**	-.357**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	10271	15244	15892	15892	15892	15244	15892	15892	15244	11902
Reading Quartile	Pearson Cor.	-.071**	.384**	.705**	1	.065**	-.186**	-.204**	-.183**	.321**	-.329**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	10271	15244	15892	15892	15892	15244	15892	15892	15244	11902
Sex	Pearson Cor.	.034**	-.020*	-.048**	.065**	1	.007	.002	.002	-.008	-.005
	Sig. (2-tailed)	.001	.016	.000	.000		.388	.751	.751	.309	.575
	N	10291	15244	15892	15892	16197	15325	16197	16197	15321	11966

Table 25 continued..

Covariate Correlations Results--Before Matching

		Participated in a college preparation program for disadvantaged	SES Quartiles	Math Quartile	Reading Quartile	Sex	Parent Composition	Black	Hispanic	Parents' highest level of education	Number of academic risk factors in 10th grade
Parent Composition	Pearson Cor.	.058**	-.222**	-.210**	-.186**	.007	1	.216**	.039**	-.109**	.488**
	Sig. (2-tailed)	.000	.000	.000	.000	.388		.000	.000	.000	.000
	N	10260	15244	15244	15244	15325	15325	15325	15325	15321	11966
Black	Pearson Cor.	.137**	-.126**	-.244**	-.204**	.002	.216**	1	-.165**	-.049**	.210**
	Sig. (2-tailed)	.000	.000	.000	.000	.751	.000		.000	.000	.000
	N	10291	15244	15892	15892	16197	15325	16197	16197	15321	11966
Hispanic	Pearson Cor.	.034**	-.209**	-.197**	-.183**	.002	.039**	-.165**	1	-.182**	.175**
	Sig. (2-tailed)	.001	.000	.000	.000	.751	.000	.000		.000	.000
	N	10291	15244	15892	15892	16197	15325	16197	16197	15321	11966
Parents' highest level of education	Pearson Cor.	-.065**	.783**	.322**	.321**	-.008	-.109**	-.049**	-.182**	1	-.291**
	Sig. (2-tailed)	.000	.000	.000	.000	.309	.000	.000	.000		.000
	N	10260	15244	15244	15244	15321	15321	15321	15321	15321	11962
Number of academic risk factors in 10th grade	Pearson Cor.	.098**	-.417**	-.357**	-.329**	-.005	.488**	.210**	.175**	-.291**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.575	.000	.000	.000	.000	
	N	8365	11902	11902	11902	11966	11966	11966	11966	11962	11966

**. Correlation is significant at the 0.01 level (2-tailed).

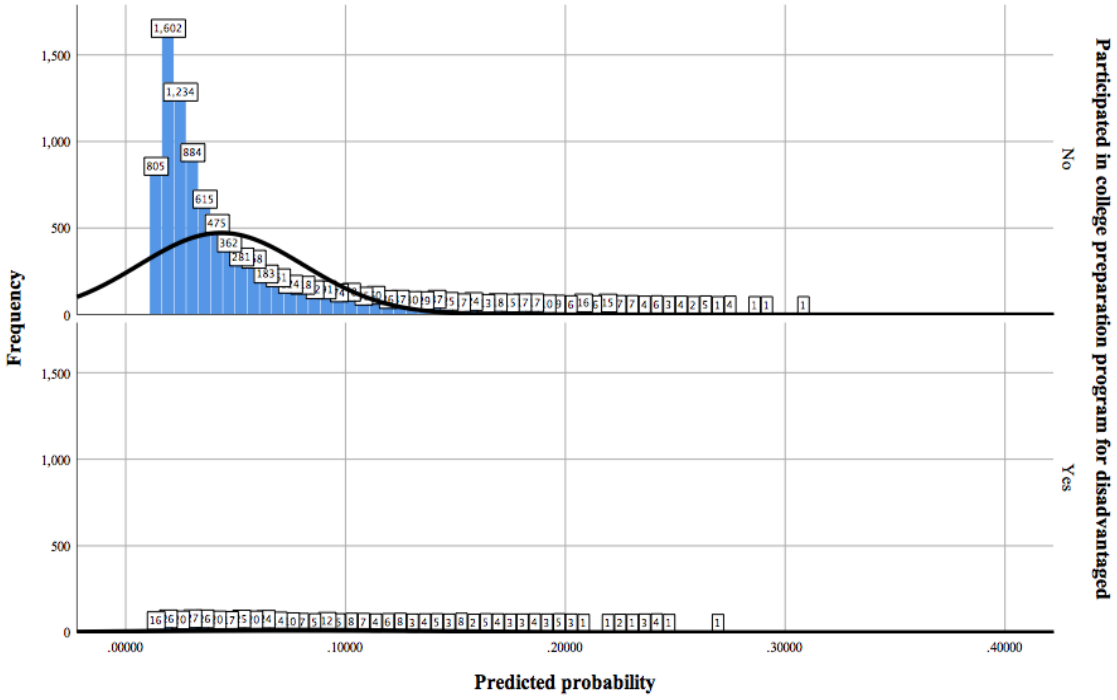
*. Correlation is significant at the 0.05 level (2-tailed).

Null Hypothesis #2:

The second research hypothesis for this study was: after matching the variables of participants and non-participants, the effects of the program participation can be examined without much bias caused by other variables. To address this hypothesis, I applied a propensity score matching (PSM) technique and first compared the probabilities of the program participation of the two groups, as presented in Figure 1. As shown in the figure, the two groups were conspicuously different. The figure indicates the distributions of the probability of participating in the pre-college program.

Figure 3

Propensity Score Distribution_ Pre-PSM

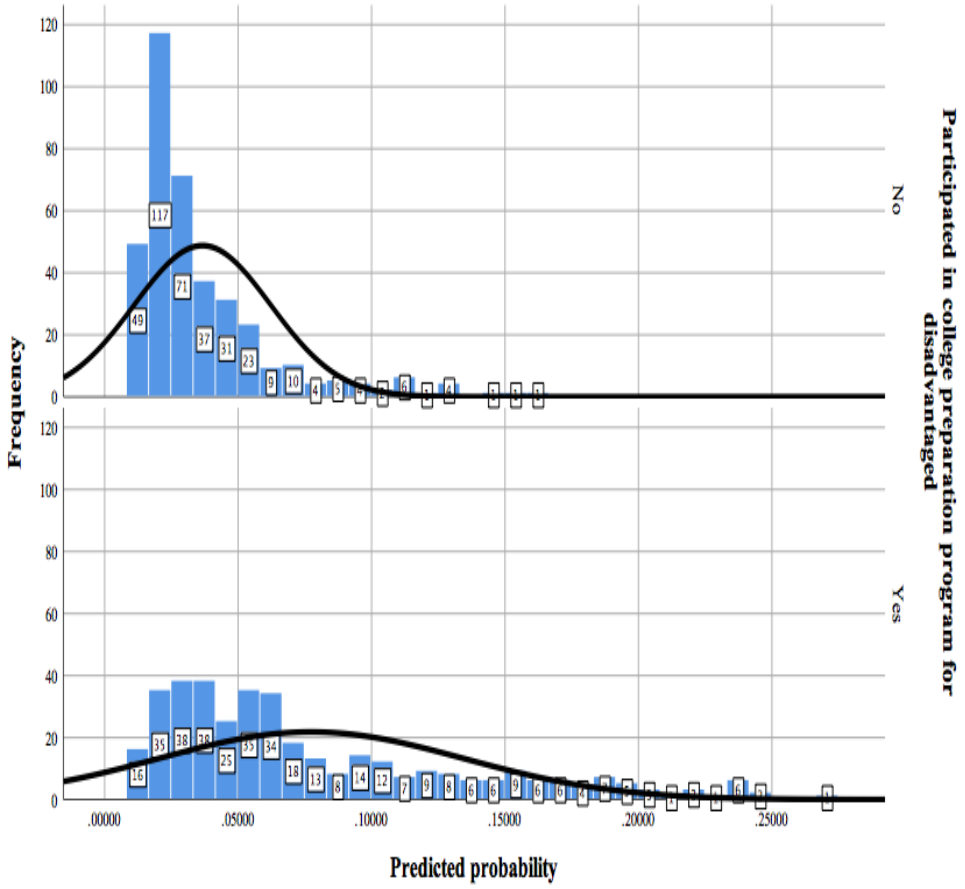


In the next analysis, I conducted a propensity score matching technique to my original dataset, attempting to produce a new dataset where the covariates were approximately the same for both the treatment (participants in a pre-college program) and

control (non-participants in a pre-college program) groups. This technique is meant to remove biases or differences between treatment and control groups by matching the covariates. In this study, I employed a PSM analysis to match the nine covariates for the participants and non-participant groups. However, the quality of the Matching was not ideal. Ideally, after conducting PMS, the covariates "should be balanced, and no statistical differences should exist" (Rojewski, Lee, & Gemici, 2010). Using the *t*-test to check for significant differences, I found that there still remained significant differences in the covariates between the treatment and control groups. Figure 4.2 presents histograms that depict the probabilities of the two groups to participate in the program. The differences in the probabilities became similar through the matching technique, although the matching was not the desired quality for this study.

Figure 4

Propensity Score Distribution_ Post PS



After the PSM analysis, I conducted all post-matching tests required to address null hypothesis # 2. The following sections include the results of the independent *t*-tests with mean statistics (Tables 26-27), chi-square analyses (Tables 28-33), and covariates correlation results (Table 34). These results were reviewed, comparing before and after matching data.

Independent Sample *t*–test and Chi-Square Results_ After Matching Results

Co-*variate 1: SES Quartile*

An independent sample *t*-test was conducted to compare the SES quartile of program pre-college outreach program participants and non-participants after matching. The null hypothesis was rejected as there was still a significant difference in SES quartile. Students who did not participate in the pre-college programs (*M*=2.81, *SD*=1.112, *N*=376) were from households of far higher SES Quartiles than those students who participated (*M*=2.15, *SD*=1.076, *N*=497), *t*(871) = 8.901, *p*<001.

Co-variate 2: Math Quartile

An independent sample *t*-test was conducted to compare math quartile of pre-college outreach program participants and non-participants after matching. The null hypothesis was rejected as there was still a significant difference in *math quartile*. Students who did not participate in the pre-college programs (*M*=2.92, *SD*=1.074, *N*=376) scored in higher math quartiles than those students who participated (*M*=2.3, *SD*=1.065, *N*=497), *t*(871) = 8.514, *p*<001.

Co-variate 3: Reading Quartile

An independent sample *t*-test was conducted to compare reading quartile of pre-college outreach program participants and non-participants after matching. The null hypothesis was rejected as there was still a significant difference in *reading quartile*. Students who did not participate in the pre-college programs (*M*=2.81, *SD*=1.089, *N*=376) scored in higher reading quartiles than those students who participated (*M*=2.36, *SD*=1.119, *N*=497), *t*(822) = 5.958, p<001.

Co-variate 4: Sex

A chi-square test of independence was performed to examine the relation between pre-college outreach program participants and sex. The relation between these variables was significant, χ^2 (1, N = 875) = 5.786, p <.05 (See table 28-29). After applying the propensity score technique, male students were more likely to participate as pre-college outreach program participants than were female students.

Co-variate 5: Parent Composition

A chi-square test of independence was performed to examine the relation between pre-college outreach program participants and parent composition. The relation between these variables was significant, χ^2 (1, N = 873) = 21.382, p <.001 (See Tables 30-31). Even after applying PSM, the greater majority of program participants were from two parent households.

Co-variate 6,7: Race/Ethnicity

A corresponding chi-square test compared the relation between pre-college outreach program participants and race/ethnicity (White, Black, and Hispanic). As shown in Tables 32-33, chi-square analyses revealed significant differences between race/ethnicity and program participants, χ^2 (3, N =820) = 182.854, p <.001. Even after PSM, a majority of Black and Hispanic students participated in the pre-college prep program, which suggests which students are most in need of the program.

Co-variate 8: Parents' Highest Level of Education

An independent sample *t*-test was conducted to compare the *Parents' highest level of education* of program pre-college outreach program participants and non-participants after matching. The null hypothesis was rejected as there was still a significant difference in *Parents' highest level of education*. Students who did not participate in the pre-college

programs (M=4.74, *SD*=2.054, *N*=376) had a higher level of parent education than those students who participated (*M*=4.07, *SD*=2.083, *N*=497), *t*(871) = 4.762, *p*<001.

Co-variate 9: Number of academic risk factors in 10th grade

An independent sample *t*-test was conducted to compare the *number of academic risk factors in 10th grade* of pre-college outreach program participants and non-participants after matching. The null hypothesis was rejected as there was still a significant difference in the number of academic risk factors. Students who did not participate in the pre-college programs (*M*=0.79, *SD*=0.973, *N*=376) had a fewer number of academic risk factors in 10th grade than those students who participated (*M*=1.26, *SD*=1.084, *N*=376), *t*(750) = -6.823, *p*<001

Table 26

Sample t-test Group Statistics--Before and After Matching

	Before Matching				After Matching			
	Participated in college preparation program for disadvantaged	*N*	Mean	Std. Deviation	Participated in college preparation program for disadvantaged	*N*	Mean	Std. Deviation
SES Quartile	No	9759	2.72	1.112	No	376	2.81	1.112
	Yes	497	2.15	1.076	Yes	497	2.15	1.076
Math Quartile	No	9774	2.76	1.074	No	376	2.92	1.074
	Yes	497	2.3	1.065	Yes	497	2.3	1.065
Reading Quartile	No	9774	2.73	1.089	No	376	2.81	1.089
	Yes	497	2.36	1.119	Yes	497	2.36	1.119
Sex	No	9792	0.501	0.50003	No	376	0.497	0.50003
	Yes	499	0.579	0.49419	Yes	499	0.579	0.49419
Parent Composition	No	9763	0.353	0.47801	No	376	0.327	0.47801
	Yes	497	0.483	0.50021	Yes	497	0.483	0.50021
Black	No	9792	0.105	0.30668	No	376	0.043	0.30668
	Yes	499	0.309	0.46239	Yes	499	0.309	0.46239
Hispanic	No	9792	0.124	0.32899	No	376	0.08	0.32899
	Yes	499	0.176	0.3815	Yes	499	0.176	0.3815
Parents' highest level of education	No	9763	4.69	2.054	No	376	4.74	2.054
	Yes	497	4.07	2.083	Yes	497	4.07	2.083
Number of academic risk factors in 10th grade	No	7989	0.8	0.973	No	376	0.74	0.973
	Yes	376	1.26	1.084	Yes	376	1.26	1.084

Table 27

Independent Sample t-tests for Study Covariates--Before and After Matching

	PSM *t*-test for Equality of Means					Post PSM *t*-test for Equality of Means				
	t	*df*	*p*	*M*	*SD*	*t*	*df*	*p*	*M*	*SD*
SES Quartile	11.347	551.287	.000	.562	.050	8.901	871	.000	.653	.073
Math Quartile	9.359	10269	.000	.462	.049	8.514	871	.000	.616	.072
Reading Quartile	7.264	10269	.000	0.364	0.05	5.958	822.133	.000	0.446	0.075
Sex	-3.466	551.241	.001	-0.07865	0.02269	-2.406	802.168	.016	-0.08182	0.034
Parent Composition	-5.647	543.129	.000	-0.12962	0.02295	-4.717	831.61	.000	-0.15577	0.03302
Black	-9.724	520.565	.000	-0.20353	0.02093	-11.48	721.014	.000	-0.26606	0.02318
Hispanic	-3.04	536.421	.002	-0.05288	0.0174	-4.374	870.235	.000	-0.09657	0.02208
Parents' highest level of education	6.62	10258	.000	.626	.095	4.762	871	.000	.668	.140
Number of academic risk factors in 10th grade	-8.174	403.951	.000	-.465	.057	-6.823	750	.000	-.524	.077

Table 28

*Participated in College Preparation Program for Disadvantaged * Sex Crosstabulation--Before and After Matching*

		Before Matching Sex			After Matching Sex		
		male	female	Total	male	female	Total
Participated in college preparation program for disadvantaged	No	4891	4901	9792	189	187	376
	Yes	210	289	499	210	289	499
Total		5101	5190	10291	399	476	875

Table 29

*Chi-Square Tests * Sex--Before and After Matching*

	Before Matching			After Matching		
	Sex			Sex		
	Value	*df*	Asymptotic Significance (2-sided)	Value	*df*	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.748[a]	1	.001	5.786[b]	1	.016
Continuity Correction[s]	11.436	1	.001	5.461	1	.019
Likelihood Ratio	11.800	1	.001	5.786	1	.016
Fisher's Exact Test						
Linear-by-Linear Association	11.747	1	.001	5.780	1	.016
N of Valid Cases	10291			875		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 247.34.

b. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 171.46.

c. Computed only for a 2x2 table

Table 30

*Participated in a College Preparation Program for Disadvantaged * Parental Composition Crosstabulation--Before and After Matching*

		Before Matching *Parental Composition*			After Matching *Parental Composition*		
		two parents	others	Total	two parents	others	Total
Participated in college preparation program for disadvantaged	No	6314	3449	9763	253	123	376
	Yes	257	240	497	257	240	497
Total		6571	3689	10260	510	363	873

Table 31

*Chi-Square Tests * Parental Composition--Before and After Matching*

	Before Matching			After Matching		
	Parental Composition			*Parental Composition*		
	Value	*df*	Asymptotic Significance (2-sided)	Value	*df*	Asymptotic Significance (2-sided)
Pearson Chi-Square	34.508[a]	1	.000	21.382[b]	1	.000
Continuity Correction[s]	33.948	1	.000	20.746	1	.000
Likelihood Ratio	33.292	1	.000	21.599	1	.000
Fisher's Exact Test						
Linear-by-Linear Association	34.505	1	.000	21.357	1	.000
N of Valid Cases	10260			873		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 178.70.

b. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 156.34.

c. Computed only for a 2x2 table

Table 32

*Participated in College Preparation Program for Disadvantaged * RACE Crosstabulation--Before and After Matching*

		Before Matching Race/Ethnicity				After Matching Race/Ethnicity			
		Black	Hispanic	White	Total	Black	Hispanic	White	Total
Participated in college preparation program for disadvantaged	No	1029	1209	6111	8349	16	30	275	321
	Yes	154	88	144	386	154	88	144	386
Total		1183	1297	6255	8735	170	118	419	707

Table 33

*Chi-Square Tests * Race--Before and After Matching*

	Before Matching *RaceEthnicity*			After Matching *Race/Ethnicity*		
	Value	*df*	Asymptotic Significance (2-sided)	Value	*df*	Asymptotic Significance (2-sided)
Pearson Chi-Square	289.480[a]	3	.000	182.854[b]	3	.000
Likelihood Ratio	247.840	3	.000	199.834	3	.000
Linear-by-Linear Association	219.466	1	.000	144.841	1	.000
N of Valid Cases	9757			820		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 48.18.

b. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 156.34.

Bivariate Correlation Analysis_ After Matching

Bivariate Correlation analyses were conducted to assess the relationship between this study's covariate and pre-college program participation (Table 34). All nine-variables showed significant correlations with the college pre-program participation. This means that all nine variables were significant associated with participation in pre-college programs. The main difference between the before matching and after matching results is that of the Sex variable that had a significance level of less than .001 before matching and less than .005 after matching.

After matching, SES quartile, and parent education levels, math quartile, and reading qualities each had a negative correlation to pre-college program participation. This indicated that the lower the SES quartile levels, parents' education, and math and reading scores were correlated with greater participation in the pre-college programs. Number of academic risk factors had a positive correlation between the academic risk factors and the pre-college program participation after matching (r = .242, n = 752, p = .000). Therefore, students with a higher number of risk factors tended to participate in the pre-college program more than students with a lower number of risk factors.

With regards to categorical variables, sex, race/ethnicity, each had a positive correlation with program participants. After matching, the correlation coefficients became bigger with lower p levels. In other words, students who participated in pre-college programs were more likely to be female students of Black or Hispanic descent as compared to non-participants.

Table 34

Covariate Correlations Results--Before and After Matching

		Program Participants_Before Matching	Program Participants_After Matching
Participated in college preparation program for disadvantaged	*p*	1	1
	Sig.		
	N	10291	875
SES Quartile	*p*	-.108**	-.289**
	Sig.	0	0
	N	10256	873
Math Quartile	*p*	-.092**	-.277**
	Sig.	0	0
	N	10271	873
Reading Quartile	*p*	-.071**	-.197**
	Sig.	0	0
	N	10271	873
Sex	*p*	.034**	.081*
	Sig.	.001	.016
	N	10291	875
Parent Composition	*p*	.058**	.157**
	Sig.	0	0
	N	10260	873
Black	*p*	.137**	.333**
	Sig.	0	0
	N	10291	875
Hispanic	*p*	.034**	.140**
	Sig.	.001	0
	N	10291	875
Parents' highest level of education	*p*	-.065**	-.159**
	Sig.	0	0
	N	10260	873
Number of academic risk factors in 10th grade	*p*	.098**	.242**
	Sig.	0	0
	N	8365	752

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Null Hypothesis #3:

The third research hypothesis for this study was that after matching, the participants of pre-college outreach programs show higher educational aspiration than non-participants. To test this hypothesis, a regression analysis was conducted, and the results are presented in the following section.

Educational Aspiration _ Regression Before Matching

A regression analysis was conducted to examine the relationship between pre-college outreach program participation and educational aspiration before matching. Tables 35-44 summarize the descriptive statistics and analysis results. Table 36 shows that educational aspiration levels were significantly correlated with program participants' educational aspirations and other predictors.

Table 37 is the regression model summary. The results include the *R*, R^2, Adjusted *R*, and standard error of estimates. The second block was used. The linear regression model with all nine predictors produced $R^2 = .254$, $F(9, 7797) = 294.624$, $p < .000$. The effect of pre-college outreach program participation using nine predictors accounts for 25 % of the variance in educational aspiration (R^2=.254) with its *F* value of 294.624 (p<.000). The *F* value of 294.624 (p<.000) associated with the regression matches from the ANOVA (see Table 38). As the significance value is less than p =.05, we can say that the regression model reveals that program participation significantly predicts education aspiration. In other words, education aspiration was significantly higher for students who participated in pre-college programs.

Table 39, the regression coefficients, displays the intercept (constant) that indicates the average pre-college outreach program participation (3.662). The analysis

shows that the number of academic risk factors in 10th Grade did not significantly predict educational aspiration levels (B = .000, $t(7806) = -.014$, ns). However, all other predicators significantly predicted educational aspiration levels: SES quartile (B = .091, $t(7806) = 5.317$, $p < .000$); math quartile (B = .240, $t(7806) = 17.100$, $p < .000$); reading quartile (B = .153, t(7806) = 10.989, $p < .000$); sex (B = .143, $t(7806) = 14.435$, $p < .000$); parent composition (B = -.045, $t(7806) = -4.015$, $p < .000$); Black (B = .119, $t(7806) = 11.343$, $p < .000$); Hispanic (B = .059, $t(7806) = 5.720$, $p < .000$); and, parents' highest level of education (B = .153, $t(7806) = 9.485$, $p < .000$).

Table 35

Educational Aspiration: Regression Descriptive Statistics--Before Matching

	Mean	Std. Deviation	*N*
How far in school respondent thinks they will get (Aspiration Variable)	6.16	1.383	7807
SES Quartile	2.78	1.105	7807
Math Quartile	2.84	1.058	7807
Reading Quartile	2.82	1.071	7807
Sex	.5106	.49992	7807
Parent Composition	.3319	.47092	7807
Black	.1008	.30109	7807
Hispanic	.1209	.32605	7807
Parents' highest level of education	4.80	2.029	7807
Number of academic risk factors in 10th grade	.79	.971	7807
Participated in college preparation program for disadvantaged	.05	.208	7807

Table 36

Educational Aspiration: Regression Correlations__ Before Matching

		How far in school respondent thinks will get (Aspiration Variable)	SES Quartile	Math Quartile	Reading Quartile	Sex	Parent Composition	Black	Hispanic	Parents' highest level of education	Number of academic risk factors in 10th grade	Participated in college preparation program for disadvantaged
Pearson Correlation	How far in school respondent thinks will get (Aspiration Variable)	1.000	.333	.389	.385	.132	-.123	.008	-.079	.335	-.176	-.006
	SES Quartile	.333	1.000	.373	.378	-.043	-.220	-.117	-.221	.789	-.378	-.113
	Math Quartile	.389	.373	1.000	.690	-.056	-.178	-.224	-.200	.323	-.300	-.086
	Reading Quartile	.385	.378	.690	1.000	.057	-.164	-.184	-.179	.327	-.284	-.063
	Sex	.132	-.043	-.056	.057	1.000	.015	.013	.014	-.031	.001	.037
	Parent Composition	-.123	-.220	-.178	-.164	.015	1.000	.185	.058	-.120	.491	.057
	Black	.008	-.117	-.224	-.184	.013	.185	1.000	-.124	-.048	.191	.143
	Hispanic	-.079	-.221	-.200	-.179	.014	.058	-.124	1.000	-.182	.174	.039
	Parents' highest level of education	.335	.789	.323	.327	-.031	-.120	-.048	-.182	1.000	-.255	-.074
	Number of academic risk factors in 10th grade	-.176	-.378	-.300	-.284	.001	.491	.191	.174	-.255	1.000	.099
	Participated in college preparation program for disadvantaged	-.006	-.113	-.086	-.063	.037	.057	.143	.039	-.074	.099	1.000

Table 36 continues

Educational Aspiration: Regression Correlations_Before Matching

		How far in school respondent thinks will get (Aspiration Variable)	SES Quartile	Math Quartile	Reading Quartile	Sex	Parent Composition	Black	Hispanic	Parents' highest level of education	Number of academic risk factors in 10th grade	Participated in college preparation program for disadvantaged
Sig. (1-tailed)	How far in school respondent thinks will get (Aspiration Variable)	.	.000	.000	.000	.000	.000	.228	.000	.000	.000	.291
	SES Quartile	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Math Quartile	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000
	Reading Quartile	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000
	Sex	.000	.000	.000	.000	.	.096	.127	.105	.003	.476	.000
	Parent Composition	.000	.000	.000	.000	.096	.	.000	.000	.000	.000	.000
	Black	.228	.000	.000	.000	.127	.000	.	.000	.000	.000	.000
	Hispanic	.000	.000	.000	.000	.105	.000	.000	.	.000	.000	.000
	Parents' highest level of education	.000	.000	.000	.000	.003	.000	.000	.000	.	.000	.000
	Number of academic risk factors in 10th grade	.000	.000	.000	.000	.476	.000	.000	.000	.000	.	.000
	Participated in college preparation program for disadvantaged	.291	.000	.000	.000	.000	.000	.000	.000	.000	.000	.

Table 36 continues

Educational Aspiration: Regression Correlations_Before Matching

		How far in school respondent thinks will get (Aspiration Variable)	SES Quartile	Math Quartile	Reading Quartile	Sex	Parent Composition	Black	Hispanic	Parents' highest level of education	Number of academic risk factors in 10th grade	Participated in college preparation program for disadvantaged
N	How far in school respondent thinks will get (Aspiration Variable)	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	SES Quartile	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	Math Quartile	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	Reading Quartile	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	Sex	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	Parent Composition	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	Black	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	Hispanic	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	Parents' highest level of education	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	Number of academic risk factors in 10th grade	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807
	Participated in college preparation program for disadvantaged	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807	7807

Table 37

Educational Aspiration Model Summary-- Before Matching

					Change Statistics				
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	*R* Square Change	*F* Change	*df*1	*df*2	Sig. *F* Change
1	.504[a]	.254	.253	1.195	.254	294.624	9	7797	.000
2	.504[b]	.254	.253	1.195	.001	5.648	1	7796	.018

a. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, Hispanic, Black, Parents' highest level of education, Reading quartile (1=low), two parents, Mathematics quartile (1=low), Quartile coding of SES2 variable

b. Predictors: a and Participated in college preparation program for disadvantaged

Table 38

Educational Aspiration: ANOVA[a]_Before Matching

Model		Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	3787.402	9	420.822	294.624	.000[b]
	Residual	11136.763	7797	1.428		
	Total	14924.165	7806			
2	Regression	3795.465	10	379.546	265.884	.000[c]
	Residual	11128.700	7796	1.427		
	Total	14924.165	7806			

a. Dependent Variable: How far in school respondent thinks they will get

b. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, hispanic, black, Parents' highest level of education, Reading quartile (1=low), two parents, Mathematics quartile (1=low), Quartile coding of SES2 variable

c. b and Participated in college preparation program for disadvantaged

Table 39

Educational Aspiration: Coefficients – Before Matching

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	B	*t*	Sig.
1	(Constant)	3.662	.061		59.558	.000
	SES Quartile	.111	.021	.089	5.194	.000
	Math Quartile	.313	.018	.240	17.056	.000
	Reading Quartile	.198	.018	.153	11.018	.000
	Sex	.397	.027	.144	14.509	.000
	Parent Composition	-.134	.033	-.046	-4.032	.000
	Black	.560	.048	.122	11.714	.000
	Hispanic	.254	.044	.060	5.787	.000
	Parents' highest level of education	.104	.011	.153	9.518	.000
	Number of academic risk factors in 10th grade	.001	.017	.001	.068	.946
2	Participated in college preparation program for disadvantaged	3.652	.062		59.282	.000
	SES Quartile	.114	.021	.091	5.317	.000
	Math Quartile	.314	.018	.240	17.100	.000
	Reading Quartile	.197	.018	.153	10.989	.000
	Sex	.395	.027	.143	14.435	.000
	Parent Composition	-.134	.033	-.045	-4.015	.000
	Black	.546	.048	.119	11.343	.000
	Hispanic	.251	.044	.059	5.720	.000
	Parents' highest level of education	.104	.011	.153	9.485	.000
	Number of academic risk factors in 10th grade	.000	.017	.000	-.014	.989
	Participated in college preparation program for disadvantaged	.158	.066	.024	2.376	.018

Educational Aspiration_Regression After Matching

Regression analyses were conducted to examine the relationship between pre-college outreach program participation and educational aspiration after matching. Tables 40-44 summarize the descriptive statistics and analysis results. Table 41 is a correlation matrix after matching. In the third column, we see that most but not all predictors are significantly correlated with educational aspiration levels. More specifically, the table shows that educational aspiration levels are not significantly associated with program participants and other predictors. The effect of the program participation is not significantly associated with educational aspiration after matching (r= .009, p = .408) nor before matching (r= -.006, p = .291).

Table 42 is the model summary table after matching. Model 1 shows that after matching the nine predictors accounted for 24.2% of the variance of students' educational aspiration levels. Model 1 has predictive utility because the ANOVA table (Table 43) shows that the model was significant. Model 2 included the program participant predictor, which produced an R^2 Change = .002, $F(1, 693) = 1.445$, $p > .000$. The effect of pre-college program participation after controlling for nine predictors accounts for .02 % of the variance in educational aspiration levels but the change in R squared was not statistically significant. Thus, I was not able to reject the null hypothesis.

The coefficient table in Table 44 shows that five variables were not a significant predictor of educational aspiration levels: SES Quartile (B= .055, $t(703) = .765$, $p >$ .000); parent composition (B = -.063, $t(703) = -.527$, $p > .000$); Hispanic (B = .236, $t(703)$ = 1.508, $p > .000$); parents' highest level of education (B = .060, $t(703) = 1.644$, $p >$ .000); and the number of academic risk factors in 10th grade (B = -.046, $t(703) = -.791$, p

> .000). However, all other predicators significantly predicted educational aspiration levels: math quartile (B = .385, $t(703) = 6.072$, $p < .000$); reading quartile (B = .234, $t(703) = 3.922$, $p < .000$); sex (B = .522, $t(703) = 5.290$, $p < .000$); and Black (B = .819, $t(703) = 5.318$, $p < .000$).

Table 40

Educational Aspiration: Regression Descriptive Statistics--After Matching

	Mean	Std. Deviation	*N*
How far in school respondent thinks will get (Aspiration Variable)	6.11	1.458	704
SES Quartile	2.52	1.134	704
Math Quartile	2.68	1.084	704
Reading Quartile	2.67	1.104	704
Sex	.5483	.49802	704
Parent Composition	.3906	.48824	704
Black	.1690	.37505	704
Hispanic	.1321	.33884	704
Parents' highest level of education	4.45	2.085	704
Number of academic risk factors in 10th grade	.97	1.070	704
Participated in college preparation program for disadvantaged	.50	.500	704

Table 41

Educational Aspiration: Regression Correlations__ After Matching

		How far in school respondent thinks will get (Aspiration Variable)	SES Quartile	Math Quartile	Reading Quartile	Sex	Parent Composition	Black	Hispanic	Parents' highest level of education	Number of academic risk factors in 10th grade	Participated in college preparation program for disadvantaged
Pearson Correlation	How far in school respondent thinks will get (Aspiration Variable)	1.000	.204	.360	.364	.168	-.074	.080	-.099	.224	-.154	.009
	SES Quartile	.204	1.000	.328	.307	-.111	-.225	-.126	-.216	.759	-.414	-.282
	Math Quartile	.360	.328	1.000	.665	-.072	-.229	-.292	-.227	.272	-.324	-.244
	Reading Quartile	.364	.307	.665	1.000	.039	-.191	-.219	-.161	.271	-.301	-.149
	Sex	.168	-.111	-.072	.039	1.000	.036	.044	.009	-.059	.006	.097
	Parent Composition	-.074	-.225	-.229	-.191	.036	1.000	.307	.083	-.081	.530	.131
	Black	.080	-.126	-.292	-.219	.044	.307	1.000	-.176	-.016	.256	.345
	Hispanic	-.099	-.216	-.227	-.161	.009	.083	-.176	1.000	-.161	.183	.138
	Parents' highest level of education	.224	.759	.272	.271	-.059	-.081	-.016	-.161	1.000	-.244	-.164
	Number of academic risk factors in 10th grade	-.154	-.414	-.324	-.301	.006	.530	.256	.183	-.244	1.000	.243
	Participated in college preparation program for disadvantaged	.009	-.282	-.244	-.149	.097	.131	.345	.138	-.164	.243	1.000

Table 41

Educational Aspiration: Regression Correlations__ After Matching

		How far in school respondent thinks will get (Aspiration Variable)	SES Quartile	Math Quartile	Reading Quartile	Sex	Parent Composition	Black	Hispanic	Parents' highest level of education	Number of academic risk factors in 10th grade	Participated in college preparation program for disadvantaged
Pearson Correlation	How far in school respondent thinks will get (Aspiration Variable)	1.000	.204	.360	.364	.168	-.074	.080	-.099	.224	-.154	.009
	SES Quartile	.204	1.000	.328	.307	-.111	-.225	-.126	-.216	.759	-.414	-.282
	Math Quartile	.360	.328	1.000	.665	-.072	-.229	-.292	-.227	.272	-.324	-.244
	Reading Quartile	.364	.307	.665	1.000	.039	-.191	-.219	-.161	.271	-.301	-.149
	Sex	.168	-.111	-.072	.039	1.000	.036	.044	.009	-.059	.006	.097
	Parent Composition	-.074	-.225	-.229	-.191	.036	1.000	.307	.083	-.081	.530	.131
	Black	.080	-.126	-.292	-.219	.044	.307	1.000	-.176	-.016	.256	.345
	Hispanic	-.099	-.216	-.227	-.161	.009	.083	-.176	1.000	-.161	.183	.138
	Parents' highest level of education	.224	.759	.272	.271	-.059	-.081	-.016	-.161	1.000	-.244	-.164
	Number of academic risk factors in 10th grade	-.154	-.414	-.324	-.301	.006	.530	.256	.183	-.244	1.000	.243
	Participated in college preparation program for disadvantaged	.009	-.282	-.244	-.149	.097	.131	.345	.138	-.164	.243	1.000

Table 41 continues...

Educational Aspiration: Regression Correlations After Matching

		How far in school respondent thinks will get (Aspiration Variable)	SES Quartile	Math Quartile	Reading Quartile	Sex	Parent Composition	Black	Hispanic	Parents' highest level of education	Number of academic risk factors in 10th grade	Participated in college preparation program for disadvantaged
N	How far in school respondent thinks will get (Aspiration Variable)	704	704	704	704	704	704	704	704	704	704	704
	SES Quartile	704	704	704	704	704	704	704	704	704	704	704
	Math Quartile	704	704	704	704	704	704	704	704	704	704	704
	Reading Quartile	704	704	704	704	704	704	704	704	704	704	704
	Sex	704	704	704	704	704	704	704	704	704	704	704
	Parent Composition	704	704	704	704	704	704	704	704	704	704	704
	Black	704	704	704	704	704	704	704	704	704	704	704
	Hispanic	704	704	704	704	704	704	704	704	704	704	704
	Parents' highest level of education	704	704	704	704	704	704	704	704	704	704	704
	Number of academic risk factors in 10th grade	704	704	704	704	704	704	704	704	704	704	704
	Participated in college preparation program for disadvantaged	704	704	704	704	704	704	704	704	704	704	704

Table 42

Educational Aspiration: Model Summary--After Matching

					Change Statistics				
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	*R* Square Change	*F* Change	*df*1	*df*2	Sig. *F* Change
1	.492[a]	.242	.233	1.277	.242	24.683	9	694	.000
2	.494[b]	.244	.233	1.277	.002	1.445	1	693	.230

a. Predictors: (Constant), number of academic risk factors in 10th grade, dsex, hispanic, Parents' highest level of education, black, Reading quartile (1=low), twoparents, Mathematics quartile (1=low), Quartile coding of SES2 variable

b. Predictors: and Participated in college preparation program for disadvantaged

Table 43

Educational Aspiration: ANOVA[a]--After Matching

Model		Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	362.299	9	40.255	24.683	.000[b]
	Residual	1131.836	694	1.631		
	Total	1494.135	703			
2	Regression	364.654	10	36.465	22.374	.000[c]
	Residual	1129.481	693	1.630		
	Total	1494.135	703			

a. Dependent Variable: How far in school respondent thinks will get

b. Predictors: (Constant), number of academic risk factors in 10th grade, dsex, Hispanic, Parents' highest level of education, black, Reading quartile (1=low), twoparents, Mathematics quartile (1=low), Quartile coding of SES2 variable

c. Predictors: b and Participated in college preparation program for disadvantaged

Table 44

Educational Aspiration: Coefficients After Matching

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	B	*t*	Sig.
1	(Constant)	3.672	.222		16.516	.000
	SES Quartile	.043	.071	.033	.598	.550
	Math Quartile	.380	.063	.283	6.001	.000
	Reading Quartile	.238	.060	.180	3.992	.000
	Sex	.529	.098	.181	5.369	.000
	Parent Composition	-.074	.119	-.025	-.624	.533
	Black	.876	.146	.225	5.991	.000
	Hispanic	.262	.155	.061	1.696	.090
	Parents' highest level of education	.061	.036	.088	1.689	.092
	Number of academic risk factors in 10th grade	-.041	.058	-.030	-.697	.486
2	(Constant)	3.597	.231		15.581	.000
	SES Quartile	.055	.072	.043	.765	.445
	Math Quartile	.385	.063	.287	6.072	.000
	Reading Quartile	.234	.060	.178	3.922	.000
	Sex	.522	.099	.178	5.290	.000
	Parent Composition	-.063	.120	-.021	-.527	.599
	Black	.819	.154	.211	5.318	.000
	Hispanic	.236	.156	.055	1.508	.132
	Parents' highest level of education	.060	.036	.085	1.644	.101
	Number of academic risk factors in 10th grade	-.046	.058	-.034	-.791	.429
	Participated in college preparation program for disadvantaged	.130	.109	.045	1.202	.230

Null Hypothesis #4

The fourth research hypothesis for this study was that, after matching, the participants of pre-college outreach programs show higher college preparedness than non-participants. For this research question, seven preparedness variables were reduced into two factorial dimensions using principal component analysis with varimax rotation. The reduction helped reduced the number of variables in the regression model.

The two dimensions were conceptualized as: Informational Preparedness, and Academic Self-efficacy. Factor 1 was labeled informational preparedness, which contains three items: (a) Has gone to college search guides for entrance information; (b) Has gone to college representatives for entrance information; and (c) Has gone to college publications/websites for entrance information. The informational preparedness variables capture a student's preparedness for college in terms of seeking the appropriate information in preparation for college. Factor one explained a total variance of 54.35% before matching and improved slightly after matching, explaining 56.70% of the variance (see Table 45).

The academic self-efficacy variable was made up of four items: (a) Can get no bad grades if decides; (b) Keeps studying even if material is difficult; (c) Works as hard as possible when studies; and (d) Puts forth best effort when studying. The academic self-efficacy variable captures preparedness in terms of a student's ability to determine and push through with regard to academic persistence, which will be needed in preparing for entry tests, maintaining a competitive high school GPA, and keeping up with the rigor of college level work. Factoring also improved in its explanation of variance. Before

matching, a total percent variance of 66.19% was explained by academic self-efficacy, and after matching, it explained 66.27% of the variance (see Table 45).

After the factorial analyses were conducted, regression analyses were conducted. All analyses were performed using data from before and after the application of the propensity matching technique. The regression analyses were conducted to examine the relationship between pre-college outreach program participation and higher college preparedness before and after matching.

Table 45

College Preparedness Variables: Factor Analysis Before and After Matching

	Before Matching Loadings		After Matching Loadings	
	Factor 1: Informational Preparedness	Factor 2: Academic Self-efficacy	Factor 1: Informational Preparedness	Factor 2: Academic Self-efficacy
Has gone to college search guides for entrance information	.729		.714	
Has gone to college representatives for entrance information	.686		.729	
Has gone to college publications/websites for entrance information	.793		.812	
Can get no bad grades if decides		.710		.711
Keeps studying even if material is difficult		.852		.872
Works as hard as possible when studies		.838		.842
Puts forth best effort when studying		.846		.822
Eigenvalue	1.630	2.646	1.701	2.651
% of Total Variance	54.346	66.158	56.697	66.265

Informational Preparedness _ Regression Before Matching

A regression analysis was conducted to examine the relationship between pre-college outreach program participation and informational preparedness before matching. Tables 46-50 summarize the descriptive statistics and analysis results. Table 46 provides basic descriptive statistics for the independent and dependent variables.

Table 47 shows that the program participants' informational preparedness was not significantly associated with program participation (r=.010, p = >.05). Similarly, the Black variable was not associated with informational preparedness, either (r=-.002 p > .05). However, in terms of all other predictor variables, there were multiple statistically significant correlations: SES quartile (r=.212, p < .001); math quartile (r=2.92 p < .001); reading quartile (r=.327, p < .001); sex (r=.118, p < .001); parent composition (r= -.084, p < .001); Hispanic (r=-.108, p < .001); parents' highest level of education (r=-.197, p <.001); and the number of academic risk factors in 10th grade (r=-.135, p <.001).

Table 48 is the regression model summary. The results include the R, R^2, Adjusted R, and standard error of estimates. The second block was used to examine the effect of program participation. The linear regression model with all nine predictors produced R^2 = .146, F(9, 7836) = 148.799, p < .000. The effect of pre-college outreach program participation after controlling for the effects of seven predictors accounted for 14.7 % of the variance in informational preparedness (R^2=.147) with its F value of 148.799 (p<.000).

The F value of 135.050 (p<.000) associated with the regression matches that from the ANOVA (see Table 49). As the significance value is less than p =.05, we can say that the regression model significantly predicts informational preparedness. There was significant change in R^2 of .001 (p = .000). In other words, program participation, after the other effects were accounted for, had a 01% increase in the explained variance of informational preparedness. All in all, we can say that informational preparedness was significantly higher for students who participated in pre-college programs.

Table 50 is an analysis that shows that three variables did not significantly predict informational preparedness levels: parent composition (B = -.045, $t(7845) = -1.794$, $p > .05$, Hispanic (B = .-.028, $t(7845) = -.834$, $p > .05$), and the number of academic risk factors in 10th grade (B = -.008, $t(7845) = -.612$, $p > .05$). However, all other predicators significantly predicted informational preparedness levels: SES quartile (B = . 054, $t(7845) = 3.321$, $p < .000$); math quartile (B = . 132, $t(7845) = 9.388$, $p < .000$); reading quartile (B = . 183, $t(7845) = 13.425$, $p < .000$); sex (B = . 246, $t(7845) = 11.781$, $p < .000$); Black (B = . 249, $t(7845) = 6.819$, $p < .000$); and, parents' highest level of education (B = . 024, $t(7845) = 2.890$, $p < .000$).

Informational Preparedness _ Regression After Matching

A regression analysis was conducted to examine the relationship between pre-college outreach program participation and informational preparedness after matching. Tables 46-51 also summarize the descriptive statistics and analysis results. Table 46 provides basic descriptive statistics for the independent and dependent variables after matching.

Table 47 also shows that after matching program participants, in terms of informational preparedness, are still not significantly correlated ($r = .008$, p >.05). Moreover, after matching, more predictor variables were not correlated to informational preparedness: parent composition ($r = -.019$, $p > .05$) and the number of academic risk factors ($r = -.059$, $p > .05$) variable were not associated with the dependent variable. However, with all other predictor variables, there was a statistically significant correlation: SES quartile ($r = .108$, $p < .05$); math quartile ($r = 276$ $p < .001$); reading

quartile (r=.287, p < .001); sex (r=.131, p < .001); Black (r= .076, p <.05); Hispanic (r= -.086, p < .05); and parents' highest level of education (r=-.138, p <.001).

Table 48 is also the regression model summary for after matching results. The results include the R, R^2, Adjusted R, and standard error of estimates. The second block was used to examine the effect of program participation. Similarly after matching, the linear regression model with all nine predictors produced R^2 = .146, $F(9, 693) = 3.953$, p < .000. The effect of pre-college outreach program participation using nine predictors accounts for the same amount of variance after matching (14.7 %). The F value of 3.613 (p<.000) associated with the regression matches that from the ANOVA (see Table 49). There was non-significant change in R^2 of .001 (p > .05). Unlike the before-matching results, program participation, predictors withheld, caused a .01% change in informational preparedness that is not significant.

As shown in Table 51, the analysis shows that a great number of variables after matching did not significantly predict informational preparedness levels: SES quartile (B= .009, $t(538) = .002$, p > .05); parent composition (B = -.008, $t(538) = -.093$, p > .05); Hispanic (B = .072, $t(538) = .644$, p > .05); the number of academic risk factors in 10th grade (B = .026, $t(538) = -.606$, p > .05), and parents' highest level of education (B = . 028, $t(538) = 1.063$, p > .05). However, four other predicators significantly predicted informational preparedness levels: math quartile scores (B = .206, $t(538) = 4.485$, p < .000), reading quartile (B = . 152, $t(538) = 3.504$, p < .000), sex (B = . 272, $t(538) = 3.825$, p < .000), and Black (B= . 439, $t(538) = 3.948$, p < .000).

Table 46

Informational Preparedness: Regression Descriptive Statistics--Before and After Matching

	Before Matching			*After Matching*		
	Mean	Std. Deviation	*N*	Mean	Std. Deviation	*N*
Informational Preparedness	.0424828	.98732642	7846	.0262383	.98630269	703
SES Quartile	2.80	1.099	7846	2.54	1.128	703
Math Quartile	2.85	1.054	7846	2.69	1.082	703
Reading Quartile	2.83	1.066	7846	2.69	1.100	703
Sex	.5205	.49961	7846	.5562	.49719	703
Parent Composition	.3325	.47115	7846	.3940	.48899	703
Black	.1021	.30279	7846	.1693	.37526	703
Hispanic	.1243	.32991	7846	.1323	.33905	703
Parents' highest level of education	4.83	2.023	7846	4.46	2.074	703
Number of academic risk factors in 10th grade	.79	.962	7846	.96	1.057	703
Participated in college preparation program for disadvantaged	.05	.208	7846	.50	.500	703

Table 47
Informational Preparedness: Regression Correlations--Before and After Matching

		Before Matching	After Matching
Informational Preparedness	*p*	1.000	1.000
	Sig.		
	N	7846	703
SES Quartile	*p*	.212**	.108*
	Sig.	.000	.002
	N	7846	703
Math Quartile	*p*	.292**	.276**
	Sig.	.000	.000
	N	7846	703
Reading Quartile	*p*	.327**	.287**
	Sig.	.000	.000
	N	7846	703
Sex	*p*	.118**	.131
	Sig.	.000	.000**
	N	7846	703
Parent Composition	*p*	-.084**	-.019
	Sig.	.000	.312
	N	7846	703
Black	*p*	-.002	.076*
	Sig.	.445	.022
	N	7846	703
Hispanic	*p*	.-.108**	-.086*
	Sig.	.001	.011
	N	7846	703
Parents' highest level of education	*p*	.197**	.138**
	Sig.	.000	.000
	N	7846	703
Number of academic risk factors in 10th grade	*p*	-.135**	-.059
	Sig.	.000	.059
	N	7846	703
Participated in college preparation program for disadvantaged	*p*	.010	.008
	Sig.	.186	.413
	N	7846	703

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 48

Informational Preparedness: Model Summary--Before and After Matching

	Before Matching									After Matching									
Model	*R*	*R* Sq.	Adj. *R* Sq.	SEE	Change Statistics					Model	*R*	*R* Sq.	Adj. *R* Sq.	SEE	Change Statistics				
					R Sq. Change	*F* Change	*df*1	*df*2	Sig. *F* Change						*R* Sq. Change	*F* Change	*df*1	*df*2	Sig. *F* Change
1	.382[a]	.146	.145	.9129	.146	148.8	9	7836	.000	1	.382[a]	.146	.135	.9173	.146	13.185	9	693	.000
2	.383[b]	.147	.146	.9124	.001	9.8	1	7835	.002	2	.383[b]	.147	.134	.9177	.001	.262	1	692	.609

a. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, hispanic, black, Parents' highest level of education, Reading quartile (1=low), , Mathematics quartile (1=low), Quartile coding of SES2 variable

b. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, hispanic, black, Parents' highest level of education, Reading quartile (1=low), , Mathematics quartile (1=low), Quartile coding of SES2 variable, Participated in college preparation program for disadvantaged

Table 49

Informational Preparedness: ANOVA[a] --Before and After Matching

	Before Matching						After Matching					
	Model	Sum of Squares	*df*	Mean Square	*F*	Sig.	Model	Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	1116.199	9	124.022	148.799	.000[b]	Regression	34.401	9	3.822	3.953	.000[b]
	Residual	6531.212	7836	.833			Residual	511.577	529	.967		
	Total	7647.412	7845				Total	545.978	538			
2	Regression	1124.365	10	112.437	135.050	.000[c]	Regression	34.968	10	3.497	3.613	.000[c]
	Residual	6523.046	7835	.833			Residual	511.010	528	.968		
	Total	7647.412	7845				Total	545.978	538			

a. Dependent Variable: Informational Preparedness

b. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, hispanic, black, Parents' highest level of education, Reading quartile (1=low), twoparents, Mathematics quartile (1=low), Quartile coding of SES2 variable

c. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, hispanic, black, Parents' highest level of education, Reading quartile (1=low), twoparents, Mathematics quartile (1=low), Quartile coding of SES2 variable, Participated in college preparation program for disadvantaged

Table 50

Informational Preparedness: Coefficients __ Before Matching

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
		B	Std. Error	β		
1	(Constant)	-1.244	.048		-25.927	.000
	SES Quartile	.051	.016	.057	3.154	.002
	Math Quartile	.131	.014	.140	9.341	.000
	Reading Quartile	.184	.014	.198	13.453	.000
	Sex	.248	.021	.125	11.864	.000
	Parent Composition	-.045	.025	-.022	-1.791	.073
	Black	.263	.036	.081	7.221	.000
	Hispanic	-.025	.033	-.008	-.749	.454
	Parents' highest level of education	.024	.008	.050	2.922	.003
	Number of academic risk factors in 10th grade	-.007	.013	-.007	-.514	.607
2	(Constant)	-1.254	.048		-26.095	.000
	SES Quartile	.054	.016	.060	3.321	.001
	Math Quartile	.132	.014	.141	9.388	.000
	Reading Quartile	.183	.014	.198	13.425	.000
	Sex	.246	.021	.124	11.781	.000
	Parent Composition	-.045	.025	-.022	-1.794	.073
	Black	.249	.037	.076	6.819	.000
	Hispanic	-.028	.033	-.009	-.834	.405
	Parents' highest level of education	.024	.008	.049	2.890	.004
	Number of academic risk factors in 10th grade	-.008	.013	-.008	-.612	.541
	Participated in college preparation program for disadvantaged	.158	.050	.033	3.132	.002

a. Dependent Variable: Informational Preparedness

Table 51

Informational Preparedness: Coefficients[a] _ After Matching

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
		B	Std. Error	ß		
1	(Constant)	-1.318	.164		-8.058	.000
	SES Quartile	-.004	.052	-.005	-.081	.936
	Math Quartile	.205	.046	.225	4.467	.000
	Reading Quartile	.153	.043	.171	3.529	.000
	Sex	.274	.071	.138	3.856	.000
	Parent Composition	-.011	.087	-.005	-.123	.902
	Black	.456	.106	.173	4.294	.000
	Hispanic	.081	.111	.028	.731	.465
	Parents' highest level of education	.029	.027	.061	1.088	.277
	Number of academic risk factors in 10th grade	.027	.043	.029	.645	.519
2		-1.341	.170		-7.890	.000
	SES Quartile	9.156E-005	.053	.000	.002	.999
	Math Quartile	.206	.046	.226	4.485	.000
	Reading Quartile	.152	.043	.170	3.504	.000
	Sex	.272	.071	.137	3.825	.000
	Parent Composition	-.008	.087	-.004	-.093	.926
	Black	.439	.111	.167	3.948	.000
	Hispanic	.072	.112	.025	.644	.520
	Parents' highest level of education	.028	.027	.059	1.063	.288
	Number of academic risk factors in 10th grade	.026	.043	.028	.606	.544
	Participated in college preparation program for disadvantaged	.040	.078	.020	.512	.609

a. Dependent Variable: Informational Preparedness b

Academic Self-efficacy _ Regression Before Matching

A regression analysis was conducted to examine the relationship between pre-college outreach program participation and academic self-efficacy before matching. Summaries of the descriptive statistics and analysis results are in Tables 52-57.

Table 52 provides basic descriptive statistics for the independent and dependent variables. Table 53 shows that program participants' academic self-efficacy is not significantly correlated with program participation (r= .012, p = >.05). Similarly, Black was the only predictor variable before matching that was not correlated to academic self-efficacy (r= .021. p > .05). However, all other predictor variables showed significant associations with program participation. with a statistically significant correlation: SES quartile (r=.113, p < .001); math quartile (r=.180, p < .001); reading quartile (r=.179, p < .001); sex (r=.087, p < .001); parent composition (r= -.072, p < .001); Hispanic (r=-.023, p < .001); parents' highest level of education (r=-.106, p <.001); and the number of academic risk factors in 10th grade (r=-.055, p <.001).

Table 54 is the regression model summary. The results include the R, R^2, Adjusted R, and standard error of estimates. The second block was used to examine the effect of program participation. The linear regression model with all nine predictors produced R^2 = .061, $F(9, 5939) = 42.816$, p < .000. The effect of pre-college outreach program participation using nine predictors accounts for 6.1 % of the variance in academic self-efficacy (R^2=.061) with its F value of 42.816 (p<.000). The F value of 38.783 (p<.000) associated with the regression matches that from the ANOVA (see Table 55). As the significance value is less than p =.05, we can say that the regression model significantly predicts academic self-efficacy. There was no significant change in R^2. Thus, program

participation, predictors withheld, did not predict a change in academic self-efficacy level.

Table 56, the regression coefficients, displays the intercept (constant) that indicates the average pre-college outreach program participation (-.800). The analysis shows that two variables did not significantly predict academic self-efficacy levels: the number of academic risk factors in 10th grade (B = .025, $t(5939) = 1.533$, $p > .05$) and parents' highest level of education (B = .011, $t(5939) = 1.103$, $p > .05$). However, all other predicators significantly predicted academic self-efficacy levels: SES quartile (B = 2.048, $t(5939) = 3.321$, $p < .05$); Math Quartile (B = .127, $t(5939) = 7.622$, $p < .000$); reading quartile (B = .077, $t(5939) = 4.774$, $p < .000$); sex (B = .185, $t(5939) = 7.395$, $p < .000$); Black (B = . 265, $t(5939) = 5.529$, $p < .000$); Hispanic (B = .249, $t(5939) = 6.049$, $p <.05$), and parent composition (B= -.115, $t(5939) = -3.773$, $p < .05$).

Academic Self-efficacy _ Regression After Matching

Another regression analysis was conducted after applying propensity score matching. The intentions with this analysis were the same as that of the original, to examine the relationship between pre-college outreach program participation and academic self-efficacy. New summaries of the descriptive statistics and analysis results are in Tables 52-57.

Basic descriptive statistics for the independent and dependent variables are in Table 52. Table 53 shows that program participants' academic self-efficacy was not significantly correlated with program participation (r=.041, p = >.05) even after matching. Similarly, except for math and reading quartile scores, none of the other covariates, were correlated to academic self-efficacy: SES quartile (r=.034, p >.05); sex

(*r*=.025, *p* >.05); parent composition (*r*= -.057, *p* >.05); Black (*r*=.023, *p*>.05); Hispanic (*r*=-.037, *p* >.05); parents' highest level of education (*r*=-.058, *p* >.05); and the number of academic risk factors in 10th grade (*r*=-.024, *p* >.05). As indicated above, there was a statistically significant correlation between math and reading quartile score and academic self-efficacy, respectively (r = .171, *p* < .001 and *r* = .195, *p* <.001).

Table 54 is the regression model summary. The results include the *R*, R^2, Adjusted *R*, and standard error of estimates. The second block was used to examine the effect of program participation. The linear regression model with all nine predictors produced R^2 = .063, *F*(9, 538) = 3.953, *p* < .000. The effect of pre-college outreach program participation using nine predictors accounted for 6.3 % of the variance in Academic Self-efficacy (R^2=.063) with its *F* value of 3.953 (*p*<0.001). The *F* value of 3.613 (*p*<0.001) associated with the regression matches from the ANOVA (see Table 55). There was non-significant change in R^2 of .001 (*p* > .05). Unlike the before-matching results, program participation, predictors withheld, caused a .01% change in Academic Self-efficacy that is not significant.

Table 57 presents the results of after matching. After matching, five more variables out of nine variables did not significantly predict academic self-efficacy levels: SES quartile (B = -.55, *t*(538) = -.730, p < .05); sex (B = .53, t(538) = .602, p < .000); parent composition (B = -.138, *t*(538) = -1.307, *p* < .05); Black (B = . 273, *t*(538) = 1.898, *p* < .000); the number of academic risk factors in 10th grade (B = .053, *t*(538) = 1.001, *p* < .000), and parents' highest level of education (B = .025, *t*(538) = .744, *p* > .05). However, all other predicators significantly predicted academic self-efficacy levels:

Math Quartile (B = .130, $t(538) = 2.278$, $p < .000$), reading quartile (B = .135, $t(538) = 2.588$, $p < .000$), and Hispanic (B = .277, $t(538) = 1.961$, $p < .05$).

Table 52

Academic Self-efficacy: Regression Descriptive Statistics--Before and After Matching

	Before Matching			*After Matching*		
	Mean	Std. Deviation	*N*	Mean	Std. Deviation	*N*
Academic Self-efficacy	.0891221	.98110470	5940	.0317454	1.00738763	539
SES Quartile	2.82	1.090	5940	2.52	1.126	539
Math Quartile	2.89	1.049	5940	2.73	1.083	539
Reading Quartile	2.87	1.065	5940	2.71	1.106	539
Sex	.5271	.49931	5940	.5584	.49703	539
Parent Composition	.3269	.46913	5940	.3840	.48682	539
Black	.0810	.27282	5940	.1466	.35400	539
Hispanic	.1098	.31262	5940	.1187	.32378	539
Parents' highest level of education	4.85	2.012	5940	4.43	2.055	539
Number of academic risk factors in 10th grade	.73	.922	5940	.91	1.048	539
Participated in college preparation program for disadvantaged	.04	.198	5940	.45	.498	539

Table 53

Academic Self-efficacy Regression Correlations--Before and After Matching

		Before Matching	After Matching
Academic Self-efficacy	*p*	1.000	1.000
	Sig.		
	N	5940	539
SES Quartile	*p*	.113**	.034
	Sig.	.000	.218
	N	5940	539
Math Quartile	*p*	.180**	.171**
	Sig.	.000	.000
	N	5940	539
Reading Quartile	*p*	.179**	.195**
	Sig.	.000	.000
	N	5940	539
Sex	*p*	.087**	.025
	Sig.	.000	.283
	N	5940	539
Parent Composition	*p*	-.072**	-.057
	Sig.	.000	.094
	N	5940	539
Black	*p*	.021	.023
	Sig.	.052	.295
	N	5940	539
Hispanic	*p*	.023*	.037
	Sig.	.039	.199
	N	5940	539
Parents' highest level of education	*p*	.106**	.058
	Sig.	.000	.091
	N	5940	539
Number of academic risk factors in 10th grade	*p*	-.055**	-.024
	Sig.	.000	.287
	N	5940	539
Participated in college preparation program for disadvantaged	*p*	.012	.041
	Sig.	.187	.171
	N	5940	539

Correlation is significant at the 0.01 level (**) and 0.05 level (*) (2-tailed).

Table 54

Academic Self-efficacy: Model Summary--Before and After Matching

Before Matching										After Matching									
Model	*R*	*R* Sq.	Adj.*R* Sq.	SEE	Change Statistics					Model	*R*	*R* Sq.	Adj. *R* Sq.	SEE	Change Statistics				
					R Sq. Change	*F* Change	*df*1	*df*2	Sig. *F* Change						*R* Sq. Change	*F* Change	*df*1	*df*2	Sig. *F* Change
1	.247[a]	.061	.060	.952	.061	42.816	9	5930	.000	1	.251[a]	.063	.047	.983	.063	3.953	9	529	.000
2	.248[b]	.061	.060	.951	.000	2.395	1	5929	.122	2	.253[b]	.064	.046	.984	.001	.586	1	528	.444

a. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, hispanic, black, Parents' highest level of education, Reading quartile (1=lowMathematics quartile (1=low), Quartile coding of SES2 variable

b. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, hispanic, black, Parents' highest level of education, Reading quartile (1=low), t, Mathematics quartile (1=low), Quartile coding of SES2 variable, Participated in college preparation program for disadvantaged

Table 55

Academic Self-efficacy: ANOVA[a]--Before and After Matching

		Before Matching							After Matching				
	Model	Sum of Squares	*df*	Mean Square	*F*	Sig.		Model	Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	348.815	9	38.757	42.816	.000[b]	1	Regression	34.401	9	3.822	3.953	.000[b]
	Residual	5367.868	5930	.905				Residual	511.577	529	.967		
	Total	5716.682	5939					Total	545.978	538			
2	Regression	350.982	10	35.098	38.783	.000[c]	2	Regression	34.968	10	3.497	3.613	.000[c]
	Residual	5365.700	5929	.905				Residual	511.010	528	.968		
	Total	5716.682	5939					Total	545.978	538			

a. Dependent Variable: Academic Self-efficacy

b. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, hispanic, black, Parents' highest level of education, Reading quartile (1=low), , Mathematics quartile (1=low), Quartile coding of SES2 variable

c. Predictors: (Constant), Number of academic risk factors in 10th grade, dsex, hispanic, black, Parents' highest level of education, Reading quartile (1=low), Mathematics quartile (1=low), Quartile coding of SES2 variable, Participated in college preparation program for disadvantaged

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Table 56

Academic Self-efficacy: Coefficients--Before Matching

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
		B	Std. Error	β		
1	(Constant)	-.793	.056		-14.049	.000
	SES Quartile	.038	.020	.043	1.952	.051
	Math Quartile	.127	.017	.135	7.601	.000
	Reading Quartile	.078	.016	.084	4.790	.000
	Sex	.186	.025	.095	7.440	.000
	Parent Composition	-.115	.031	-.055	-3.779	.000
	Black	.275	.048	.077	5.790	.000
	Hispanic	.251	.041	.080	6.097	.000
	Parents' highest level of education	.011	.010	.023	1.119	.263
	Number of academic risk factors in 10th grade	.026	.016	.025	1.589	.112
2		-.800	.057		-14.128	.000
	SES Quartile	.040	.020	.045	2.048	.041
	Math Quartile	.127	.017	.136	7.622	.000
	Reading Quartile	.077	.016	.084	4.774	.000
	Sex	.185	.025	.094	7.395	.000
	Parent Composition	-.115	.031	-.055	-3.773	.000
	Black	.265	.048	.074	5.529	.000
	Hispanic	.249	.041	.079	6.049	.000
	Parents' highest level of education	.011	.010	.023	1.103	.270
	Number of academic risk factors in 10th grade	.025	.016	.024	1.533	.125
	Participated in college preparation program for disadvantaged	.099	.064	.020	1.547	.122

a. Dependent Variable: Academic Self-efficacy

Table 57

Academic Self-efficacy: Coefficients--After Matching

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
		B	Std. Error	β		
1	(Constant)	-.768	.200		-3.848	.000
	SES Quartile	-.058	.067	-.065	-.868	.386
	Math Quartile	.129	.057	.138	2.261	.024
	Reading Quartile	.137	.052	.150	2.620	.009
	Sex	.059	.087	.029	.671	.502
	Parent Composition	-.142	.105	-.068	-1.346	.179
	Black	.311	.135	.109	2.298	.022
	Hispanic	.296	.139	.095	2.130	.034
	Parents' highest level of education	.026	.034	.053	.756	.450
	Number of academic risk factors in 10th grade	.056	.053	.058	1.054	.293
2	(Constant)	-.809	.207		-3.914	.000
	SES Quartile	-.050	.068	-.055	-.730	.466
	Math Quartile	.130	.057	.140	2.278	.023
	Reading Quartile	.135	.052	.148	2.588	.010
	Sex	.053	.088	.026	.602	.547
	Parent Composition	-.138	.105	-.067	-1.307	.192
	Black	.273	.144	.096	1.898	.058
	Hispanic	.277	.141	.089	1.961	.050
	Parents' highest level of education	.025	.034	.052	.744	.457
	Number of academic risk factors in 10th grade	.053	.053	.055	1.001	.317
	Participated in college preparation program for disadvantaged	.075	.099	.037	.765	.444

a. Dependent Variable: Academic Self-efficacy

Null Hypothesis #5

The fifth research hypothesis for this study was that, after matching, the participants of pre-college outreach programs show higher college access than non-participants. To test this hypothesis, binary logistic regression analyses were conducted. Binary logistic regression was used to explain the relationship between college enrollment (not enrolled in college vs. enrolled in college) and participation in pre-college preparation programs.

The results of this analysis are two-fold: first, the results will be presented pre-propensity matching, and then the results will be shown after the PSM technique was applied. Each section of the results has models: Block 0, 1, 2. Block 0 is the probability in general of enrolling in college after college without regard for demographic background and prep programs. Block 1 looks at the odds of enrolling in college, given demographic background. Finally, Block 2 looks at the odds of enrolling in college, given demographic background, and participation in college prep programs.

Access Variable _ Logistic Regression Before Matching

This first section presents the results prior to propensity matching. The Block 0 model reflects the odds of enrolling in college with no predictors. Table 58 shows that 92.1% the ELS dataset enrolled in college. The odds of enrolling in college was 11.582 (see Table 59). Based on Table 60, all eight of the predictors, SES, math quartile scores, reading quartile scores, sex, parent composition, Hispanic, parents' highest level of education, and number of academic risk factors in 10th grade, were expected to improve the fit of the model.

Table 58

Access Variable: Block 0 Classification Table--Before Matching

Observed			Predicted Access		
			Not College Enrolled	College Enrolled	Percentage Correct
Step 0	Access	Not College Enrolled	0	558	.0
		College Enrolled	0	6463	100.0
	Overall Percentage				92.1

a. The cut value is .500

Table 59

Access Variable: Block 0 Variables in the Equation--Before Matching

		B	S.E.	Wald	*df*	Sig.	Exp(B)
Step 0	Constant	2.449	.044	3081.915	1	.000	11.582

Table 60

Access Variable: Block 0 Variables not in the Equation--Before Matching

			Score	*df*	Sig.
Step 0	Variables	SES Quartile	391.663	1	.000
		Math Quartile	429.607	1	.000
		Reading Quartile	430.924	1	.000
		Sex	34.132	1	.000
		Parent Composition	102.113	1	.000
		Black	.045	1	.831
		Hispanic	17.332	1	.000
		Parents' highest level of education	376.287	1	.000
		Number of academic risk factors in 10th grade	196.240	1	.000
	Overall Statistics		795.769	9	.000

The Block 1 model corresponds to a model that uses nine predictor variables to predict the odds of college enrollment. The chi-square value was 808.045 ($p < .001$). This told me that the fit of this nine-predictor model is assessed by evaluating whether the goodness of fit for this model is significantly better than the fit for the null model or Block 0 model (see Table 61). In other words, the addition of the nine predictors made the model better, improving the odds of predicting enrollment in college. As shown in the Classification table results (Table 63), with the addition of the nine predictors, an overall 92.2 % of students enrolled in college, which is again significantly higher than the null model.

The -2 Log Likelihood was 3088.433 (see Table 62). The Cox & Snell *R*-Square (Cox & Snell pseudo *R*-Square) was .109, and Nagelkerke pseudo R-Square was .255. The model accounts for about 25% of the variance (see Table 62).

Based on the Variables in Equation results (Table 64), all predictors, except the number of academic risk factors, significantly predicted the likelihood of enrolling in college (p = .000).

Table 61

Access Variable: Block 1 Model Summary--Before Matching

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	3088.433[a]	.109	.255

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 62

Access Variable: Block 1 Omnibus Tests of Model Coefficients-- Before Matching

		Chi-square	*df*	Sig.
Step 1	Step	808.045	9	.000
	Block	808.045	9	.000
	Model	808.045	9	.000

Table 63

Access Variable: Block 1 Classification Table--Before Matching

			Predicted Access		
	Observed		No College Enrollment	College Enrolled	Percentage Correct
Step 1	Access	No College Enrollment	34	524	6.1
		Colleged Enrolled	27	6436	99.6
	Overall Percentage				92.2

a. The cut value is .500

Table 64

Access Variable: Block 1 Variables in the Equation--Before Matching

		B	S.E.	Wald	Sig.	Exp(B)
Step 1[a]	SES Quartile	.257	.072	12.638	.000	1.294
	Math Quartile	.515	.064	64.687	.000	1.674
	Reading Quartile	.340	.063	29.331	.000	1.405
	Sex	.698	.098	50.388	.000	2.010
	Parent Composition	-.559	.108	26.808	.000	.572
	Black	.978	.166	34.872	.000	2.658
	Hispanic	.604	.137	19.511	.000	1.830
	Parents' highest level of education	.249	.038	43.728	.000	1.283
	Number of academic risk factors in 10th grade	-.060	.049	1.483	.223	.942
	Constant	-1.480	.197	56.549	.000	.228

Note. *df* =1

a. Variable(s) entered on step 1: SES Quartile, Math Quartile, Reading Quartile, Sex, Parent Composition, Black, Hispanic, Parents' highest level of education, number of academic risk factors in 10th grade.

The Block 2 model results are presented in Tables 65 - 68. Block 2 captures the specific impact of the college prep program participation on college enrollment. As would be expected, the fit of the model did not improve according to R^2. The Cox & Snell *R*-Square remained .109 as well as the Nagelkerke pseudo R-Square of .255. Before propensity scoring matching the data was unbalanced and expected to confound any potential impact of the program participation. In the previous model, the overall correctness was 92.2 %, with the addition of the program participation predictor, the model prediction remained nearly the same at 92.2 %, accurate (see Table 67). As you can see in Table 68, both participating in college preparation programs for disadvantaged students, and number of academic risk factors in 10th grade, do not contribute to the model. Both predictors have a p-value that is greater than .05.

Table 65

Access Variable: Block 2 Omnibus Tests of Model Coefficients--Before Matching

		Chi-square	*df*	Sig.
Step 1	Step	.598	1	.439
	Block	.598	1	.439
	Model	808.643	10	.000

Table 66

Access Variable: Block 2 Model Summary--Before Matching

Step	-2 Log likelihood	Cox & Snell *R* Square	Nagelkerke *R* Square
1	3087.834a	.109	.255

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 67

Access Variable: Block 2 Classification Table--Before Matching

			Predicted Access		
	Observed		Not College Enrolled	College Enrolled	Percentage Correct
Step 1	Access	Not College Enrolled	35	523	6.3
		College Enrolled	25	6438	99.6
	Overall Percentage				92.2

a. The cut value is .500

Table 68

Access Variable: Block 2 Variables in the Equation--Before Matching

		B	S.E.	Wald	Sig.	Exp(B)
Step 1[a]	SES Quartile	.259	.072	12.782	.000	1.296
	replace	.515	.064	64.685	.000	1.674
	Reading Quartile	.341	.063	29.521	.000	1.407
	Sex	.697	.098	50.189	.000	2.008
	Parent Composition	-.560	.108	26.866	.000	.571
	Black	.964	.166	33.544	.000	2.622
	Hispanic	.602	.137	19.375	.000	1.826
	Parents' highest level of education	.249	.038	43.774	.000	1.283
	Number of academic risk factors in 10th grade	-.061	.049	1.523	.217	.941
	Participated in college preparation program for disadvantaged	.160	.210	.582	.445	1.174
	Constant	-1.492	.197	57.103	.000	.225

Note. *df* = 1

a.Variable(s) entered in step 1: Participated in college preparation program for disadvantaged.

Access Variable _ Logistic Regression After Matching

This final section presents the binary logistic regression results after propensity matching. The Block 0 model reflects the odds of enrolling in college with no predictors after PSM. Prior to PSM, 7021 cases were included in the analysis. However, after PSM,

632 cases were included in the analysis. According to Table 69, given this null model, 90% of the cases can be predicted correctly. The odds of enrolling in college is 9.032 (see Table 70). Based on Table 71, only 6 of the predictors, sex, Math Quartile, Reading Quartile, parent composition, parents' highest level of education, and number of academic risk factors in 10th grade, were expected to improve the fit of the model.

Table 69

Access Variable: Block 0 Classification Tabl-- After Matching

Observed			Predicted Access: Not College Enrolled	Predicted Access: College Enrolled	Percentage Correct
Step 0	Access	Not College Enrolled	0	63	.0
		College Enrolled	0	569	100.0
	Overall Percentage				90.0

a. The cut value is .500

Table 70

Access Variable: Block 0 Variables in the Equation--After Matching

		B	S.E.	Wald	*df*	Sig.	Exp(B)
Step 0	Constant	2.201	.133	274.711	1	.000	9.032

Table 71

Access Variable: Block 0 Variables not in the Equation--After Matching

			Score	*df*	Sig.
Step 0	Variables	SES Quartile	21.194	1	.000
		Math Quartile	34.996	1	.000
		Reading Quartile	61.837	1	.000
		Sex	3.210	1	.073
		Parent Composition	17.766	1	.000
		Black	.204	1	.652
		Hispanic	.012	1	.914
		Parents' highest level of education	20.267	1	.000
		Number of academic risk factors in 10th grade	14.827	1	.000
	Overall Statistics		88.675	88.675	9

As in the pre-PSM analysis, the Block 1 model corresponds to a model that uses nine predictor variables to predict the odds of college enrollment. The chi-square value is 91.065 ($p < .001$). This tells me that the fit of this nine-predictor model is assessed by evaluating whether the goodness of fit for this model is significantly better than the fit for the null model or Block 0 model (see Table 72). In other words, the addition of the nine predictors made the model better, improving the odds of predicting enrollment in college. As shown in the Classification table results (Table 74), with the addition of the nine predictors, an overall 90.2 % of students will be predicted to enroll in college, which is again significantly higher than the null model.

The -2 Log Likelihood was 318.960[a] (see Table 73). The Cox & Snell *R*-Square (Cox & Snell pseudo R-Square) was .134, and Nagelkerke pseudo R-Square was .281. The model accounted for about 28% of the variance (see Table 62).

Based on the Variables in Equation results (Table 75), only four predictors, reading quartile, parent composition, Black, and Hispanic, significantly predicted the likelihood of enrolling in college (p = .000).

Table 72

Access Variable: Block 1 Omnibus Tests of Model Coefficients--After Matching

		Chi-square	*df*	Sig.
Step 1	Step	91.065	9	.000
	Block	91.065	9	.000
	Model	91.065	9	.000

Table 73

Access Variable: Block 1 Model Summary--After Matching

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	318.960[a]	.134	.281

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 74

Access Variable: Block 1 Classification Table--After Matching

			Predicted Access		
	Observed		No College Enrollment	Colleged Enrolled	Percentage Correct
Step 1	Access	No College Enrollment	6	57	9.5
		Colleged Enrolled	5	564	99.1
	Overall Percentage				90.2

a. The cut value is .500

Table 75

Access Variable: Block 1 Variables in the Equation--After Matching

		B	S.E.	Wald	*df*	Sig.	Exp(B)
Step 1[a]	SES Quartile	.264	.209	1.608	1	.205	1.303
	Math Quartile	.217	.186	1.365	1	.243	1.242
	Reading Quartile	.879	.203	18.854	1	.000	2.410
	Sex	.475	.302	2.483	1	.115	1.609
	Parent Composition	-.935	.333	7.873	1	.005	.393
	Black	1.031	.416	6.135	1	.013	2.805
	Hispanic	.984	.448	4.813	1	.028	2.674
	Parents' highest level of education	.098	.103	.911	1	.340	1.103
	Number of academic risk factors in 10th grade	.033	.149	.049	1	.824	1.034
	Constant	-1.314	.626	4.405	1	.036	.269

a. Variable(s) entered on step 1: SES Quartile, Math Quartile, Reading Quartile, Sex, Parent Composition Black, Hispanic, Parents' highest level of education, number of academic risk factors in 10th grade.

The Block 2 model results are presented in Tables 72 - 75. Block 2 captures the specific impact of the college prep program participation on college enrollment. The fit of the model did improve, according to R^2, The Cox & Snell R-square was .138, and the Nagelkerke pseudo R-square was .288. After the propensity scoring matching, the balance of the dataset did improve, and this is reflected in the improvement in the logistic regression results. The data were unbalanced and therefore expected to confound the potential impact of program participation. In the previous model, the overall correctness was 90.2 %, with the addition of the program participation predictor, the model prediction increased to 90.7% accuracy (see Table 78). The percent increased by .05%. As you can see in Table 79, Reading Quartile, Hispanic, and Parent Composition did contribute to the model with a *p*-value that is less than .05.

Table 76

Access Variable: Block 2 Omnibus Tests of Model Coefficients--After Matching

		Chi-square	*df*	Sig.
Step 1	Step	2.568	1	.109
	Block	2.568	1	.109
	Model	93.633	10	.000

Table 77

Access Variable: Block 2 Model Summary--After Matching

Step	-2 Log likelihood	Cox & Snell *R* Square	Nagelkerke *R* Square
1	316.392[a]	.138	.288

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 78

Access Variable: Block 2 Classification Table--After Matching

			Predicted Access		
	Observed		Not College Enrolled	College Enrolled	Percentage Correct
Step 1	Access	Not College Enrolled	8	55	12.7
		College Enrolled	4	565	99.3
	Overall Percentage				90.7

a. The cut value is .500

Table 79

Access Variable: Block 2 Variables in the Equation--After Matching

		B	S.E.	Wald	Sig.	Exp(B)
Step 1[a]	SES Quartile	.310	.212	2.152	.142	1.364
	Math Quartile	.259	.186	1.933	.164	1.296
	Reading Quartile	.882	.201	19.283	.000	2.416
	Sex	.497	.302	2.704	.100	1.644
	Parent Composition	-.934	.336	7.721	.005	.393
	Black	.823	.440	3.494	.062	2.277
	Hispanic	.906	.456	3.950	.047	2.474
	Parents' highest level of education	.092	.104	.793	.373	1.097
	Number of academic risk factors in 10th grade	.022	.150	.021	.884	1.022
	Participated in college preparation program for disadvantaged	.530	.333	2.537	.111	1.700
	Constant	-1.710	.677	6.384	.012	.181

Note. *df* =1

a.Variable(s) entered in step 1: Participated in college preparation program for disadvantaged.

CHAPTER V

DISCUSSION

The primary purpose of this study was to examine the effect of pre-college outreach programs (also known as college preparation programs or precollegiate programs) for disadvantaged students on three student success measures: educational aspiration, college preparedness, and college access.

Discussions of Research Hypotheses

Five research hypotheses were proposed to gauge the impact of pre-college outreach program participation on Black and Hispanic students' and disadvantaged students' educational outcomes. A key component of my analyses was applying the propensity score matching technique to treat the imbalance in the dataset by matching the demographic variables. The first two research hypotheses addressed the imbalance of the data that could potentially distort understanding pre-college program effectiveness. The first research hypothesis concerned the relationship between the demographic variables of those students who participated in pre-college outreach programs and those who did not participate, prior to the propensity score matching.

The second research hypothesis concerned the quality of the propensity score matching technique by determining the relationship between the demographic variables in the post-matching dataset. The matching was not perfect, as there were still some imbalance among the demographic variables after matching. However, due to the matching technique, the data were better positioned to assess program participation impact.

The final three major research hypotheses were answered using the pre-matched and matched data to show the matches' quality. The third research hypothesis assessed the impact of program participation on higher education aspiration. The fourth research hypotheses evaluated the impact of program participation on higher education preparedness. Finally, the fifth research hypotheses assessed the impact of program participation on college access.

Research Hypothesis #1

There are significant preexisting differences in the variables of high school students who do and do not participate in pre-college outreach programs

Examining the effectiveness of the pre-college program was not an easy task because the program effects for students who from the effects of confounding variables. Before applying propensity matching technique (PSM) to treat confoundedness, independent sample *t*-tests (Table 18) and chi-square analyses were conducted to examine selected differences between participants and non-participants. These tests were used to determine if there were already pre-existing demographic differences between program participants and non-participants. Significant differences between the two groups were found amongst all the selected demographic variables. As summarized in Table 17, compared to their non-participant counterparts, those students who participated in pre-college programs: (a) Were more likely to be from impoverished families; (b) Were more likely to have lower academic achievement in math; (c) Were more likely to be female; (d) Were less likely to live with two parents; (e) Were more likely to be Black or Hispanic; (f) Were more likely to have parents with low levels of educational attainment; and (g) Were more likely to have a high percentage of risk factors in 10th

grade. These significant differences for students who the background characteristics that hinder students from disadvantaged backgrounds. These differences or influencers are what made the dataset unbalanced and what needed to be controlled to better gauge the unique impact of the outreach programs.

Again, the stark *t*-test results were obtained before matching. Analysis of the effectiveness of the pre-college programs was initially impossible because of the imbalance of the dataset due to the students' background characteristics. Aforementioned in the method chapter of this dissertation, PSM was needed because it is an adjustment technique that makes dissimilar data statistically comparable. In other words, the demographic information or background characteristics had to become comparable when adjusted so that there was no significant difference between the demographic covariates of the students who participated in the program and those who did not.

Research Hypothesis #2

After matching the variables of participants and non-participants, the effects of the program participation can be examined without much bias caused by other variables.

After applying PSM techniques, the quality of the matches was not ideal. The covariates were not approximately the same for both the treatment and control groups, and imbalance among the variables still existed. However, although the covariates were not entirely balanced, the improvements as a result of the matching were substantial. I noted that the differences were reduced, although not removed completely. When Figures 3 and 4 were compared, it was clear that Figure 4 reduced the group differences markedly. The two histograms of PSM scores before matching (Figure 3) show that the two groups were much different, indicating that the two groups differed in their

covariates or their demographic backgrounds. After matching, the histograms in Figure 4 show how the two groups became similar after selecting group members of the two groups through the PSM technique. That is, PSM created a new database in which participants and non-participants were similarly matched in their demographic backgrounds. As summarized in Table 34, after matching, the significance levels of Pearson correlations of the covariates become pronounced with program participation.

Research Hypothesis #3

After matching, the participants of pre-college outreach programs show higher educational aspiration than non-participants.

According to Hossler and Gallagher (1987), the first stage of the College Choice Model is the predisposition stage. This stage is where students are determining if they will continue education beyond high school. This stage is where students are developing college aspirations and expectations. The first way I sought to evaluate the pre-college prep program's effectiveness was in terms of educational aspiration. Multiple regression was used to assess the impact of program participation on educational aspiration. In this study, educational aspiration was understood to be how far the students believed that they would get in school.

Using the pre-matched data, I rejected the null hypothesis. In other words, students who participated in the pre-college preparation program had significantly higher educational aspirations than those who did not participate. The ANOVA results that assess the impact of the overall model have a p-value < .05 (F = 265.884). The ANOVA analysis examined the impact of all independent variables, the nine covariates, and program participation. The R-Square Change value parceled out the unique impact of the

last independent variable, which was program participation. Before matching, program participation significantly explained .01% ($p < 001$) the variance in educational aspiration. In other words, demographic variables notwithstanding, students who participated in pre-college outreach programs had higher educational aspirations than students who did not participate.

Similarly, after matching, the overall model demonstrated that program participation has a statistically significant impact on educational aspiration (See Table 42). However, with regard to program participation's unique contribution, it did not significantly change concerning educational aspiration. To address the third research hypothesis, after matching, educational aspiration was not higher for program participants than for non-participants. These results can be explained in terms capturing all covariates, that is all variables that can influence program participation or student success. In other words, were all variables that can impact program participation identified? One variable that was found in the literature that can be developed more in future research was pre-existing aspiration or motivation. For instance, Domina (2009) found that outreach programs positively impact program participants; however, he argued that these programs target students who are already motivated to learn and desire to succeed, only superficially addressing the issues of disadvantaged students (p.147). As a result of such targeting, he found that for students who are usually modest. However, he contended that the program efforts are impactful and are a step in the right direction.

Research Hypothesis #4

After matching, the participants of pre-college outreach programs show higher college preparedness than non-participants.

According to my theoretical framework, the second stage in Hossler and Gallagher's College Choice (1987) is Search. As discussed in Chapter 2, in this stage students gain knowledge about colleges: college culture and academic programs, college entrance requirements, and financial aid availability. As knowledge is being gained, students are prompted to make preparations for college entrance requirements.

In the present study, pre-college prep programs were evaluated to determine their ability to guide students through this search stage. I wanted to look at how the programs affected college readiness and preparedness in gathering critical information and gauging students' ability to maintain the necessary academic rigor to be successful in college. College preparedness was conceptualized into two major concepts: Informational preparedness and academic self-efficacy. One the one hand, informational preparedness concerned having gathered critical college entrance information. Informational preparedness was made up of three variables: (a) Has gone to college search guides for entrance information; (b) Has gone to college representatives for entrance information; and (c) Has gone to college publications/websites for entrance information. On the other hand, academic self-efficacy concerned knowing and developing the necessary academic rigor needed for college. Four variables were used to creates this variable: (a) Can get no bad grades if decides; (b) Keeps studying even if the material is difficult; (c) Works as hard as possible when studies; and (d) Puts forth best effort when studying.

The overall model for the informational preparedness analysis, models before and after matching, was statistically significant. This result means that program participation, also taking into consideration all covariates, impacted informational preparedness. However, in addressing my specific research hypotheses, program participation did not uniquely cause a statistical difference in informational preparedness after matching. Similarly, participation in the pre-college program did not significantly impact academic self-efficacy either. These results about academic self-efficacy were the same both before and after matching.

In summary, participants in pre-college programs did not have higher college preparedness than non-participants. The lack of significant difference regarding program participants' college preparedness maybe because the three outreach programs that were grouped together for my analysis reached students at different timeframes and have different program structures. Although all three federal outreach programs target disadvantaged students, one program, particularly Talent Search, serves students as early as the 6th grade. Meaning that program participants' services and support are different given the age range of students they are serving. Other programs, like GEAR UP, serve students starting in 7th grade. In addition, GEAR UP's program has a cohort style where participants stay with the same group of students from 7th grade through 12th grade. These slight differences in the programs can have an impact on the results of my study.

Research Hypothesis #5

After matching, the participants of pre-college outreach programs show higher college access than non-participants.

The final stage in Hossler and Gallagher's College Choice Model (1987) is choice. This is the stage of the model where students use the information that they have gathered to select an institution and complete the enrollment process. Students' ability to gather information from various sources and reconcile this information is critical in the college application and enrollment process. My last research hypothesis posited that program participation positively impacts college access as measured by college enrollment. Logistic regression was used to determine program impact on participants' college access. Before matching, program participation did not impact college access.

However, after matching, program participation causes a .5% increase in college enrollment. In summary, after applying the Propensity Score Matching Technique, the participants of pre-college outreach programs showed higher college access than non-participants.

Limitations of Research

There are several notable limitations to this study. First, the ideal methodology approach for causal inference is randomization. Random assignment to the treatment (i.e., the pre-college programs) would have addressed all of the pretreatment characteristics that would potentially confound the effect of the treatment. This could be done by randomly assigning students to treatment and control groups. However, this study used pre-existing data, which rendered this researcher unable to assign students to the treatment group (i.e., the pre-college programs) or the control group.

Secondly, when you are using the matching method, cases will be lost. In addition to cases being lost, the dataset had multiple missing cases, which is often an issue with pre-existing data. Also, researchers are tasked with finding all possible covariates, which can be cumbersome. Finally, the database did not have information on other disadvantaged student types, such as students with disabilities, students who are homeless children and youths, and students who are in foster care or are aging out of the foster care system.

Future Research

After conducting this study, I developed some suggestions and recommendations for future studies. With regard to research, I recommend evaluating program effectiveness on other student success indicators. As mentioned in the literature review, the education system is evolving, and as such, the barriers that challenge disadvantaged students and what is needed to support them should evolve as well. Thus, it is possible that new college success indicators or outcomes need to be developed. Furthermore, success measures vary across student groups and across pre-college programs that focus on specific student groups (Perna & Thomas, 2006). I measured success in terms of aspiration, preparedness, and access. However, program effectiveness can also be evaluated from various transitional points in a student's educational journey.

I suggest looking at these points and other critical success measures in future research. In my study, pre-college outreach program participation only provided a modest impact on college enrollment. It should be noted, however, that student success should be studied more broadly because there are other routes to student success than immediately enrolling in higher education after graduating high school. Future research

can reconceptualize higher education enrollment in terms of (a) delayed enrollment, (b) post-secondary trade school enrollment, or (c) intentional time off from post-secondary school. Looking at the social-emotional aspect of student development and success, it is important to note that not all students need to go to a 4-year college or go to college right away. In the literature, one study disaggregated enrollment and looked at enrollment 2-year college trade programs versus 4-year college enrollment (Goldrick-Rab, 2010).

Based on the results, I found that there can be better ways to evaluate these programs. For future research, we may want to focus in on the more in-depth small-scale research. In the ELS:2002 survey, across 750 schools, 3% of the population participated in pre-college outreach programs, and the other 97% were non-participants. I wonder how many students participated in these programs within individual schools. I believe there is an opportunity to look at student success at a smaller scale. Within the literature, most of the program evaluations were undertaken with large-scale datasets, including my study; it is now time for researchers to look at other ways to assess these programs' effectiveness. Looking at in-depth, small-scale datasets would be ideal for capturing the impact of pre-college outreach programs.

Additionally, future research should look at when the population should be studied. The ELS:2020 survey looked at students in their 10th-grade year and asked students if they participated in pre-college outreach programs during their high school year. In essence, the survey question would have allowed researchers to capture program participants' impact during the 9th and 10th year of high school. However, by 10th-grade, the literature indicates changing a student's aspiration or other success variables becomes very difficult. By looking at these pre-college programs during a few years of high school

only, it may be too late developmentally to make and see any changes in the students' outcomes. I would suggest that researchers focus on looking at how programs impact students and their development earlier in the academic journey. The literature already indicates that academic success has some direct correlations with how students behave in elementary and their ability to make it to high school and go to college.

Further, future research should compare the student success outcomes of outreach programs supported by federal programs against those programs supported by colleges and institutions. Research indicates that colleges and universities should take part in bridging the educational opportunity gap. They are uniquely positioned to help students transition to higher education. Understanding the politics of access, Harvey (2008) believed the key to a successful student program was the institution's highest executives' endorsement, contending that college officials and university presidents can better serve disadvantaged students by supporting pre-college initiatives and efforts. I recommend that research be conducted to find out if programs that are facilitated by university leadership will indeed be financially sustainable and endorsed by other units within the university, as posited by Harvey.

Similarly, again with regards to practice, I would recommend research concerning adding and developing programmatic components that can strengthen pre-college outreach programs and, thus, their outcomes. We have to also look at the design of the programs. Just by providing these programs does not necessarily ensure success. For instance, future research should address possible programmatic biases in programs that render the program ineffective. Something interesting in the literature review was that programs that advocated fostering equality had programmatic biases that actually erected

barriers to student access to college (King, 2019). King found that the programs failed to acknowledge participants' differences and unique needs; instead, the programs used "deficit-based terms like disadvantaged and at-risk that define and label potential participants as deficient in background experience, resources, and social knowledge" (p.12). I further believe that future research should look at the expectations of staff members, program participants' relatability to staff, and programs' pedagogical approaches to determine if different elements impede the programs' effectiveness and thus impede program participants' success.

Another programmatic component that researcher should consider, in terms of practice, is exploring how to enhance the involvement of parents. The literature has noted that parental involvement is also a valuable component of pre-collegiate initiatives and efforts, as parents are positioned to provide the necessary push that can reinforce successful outcomes. Tierney (2002), a key researcher on disadvantaged students and the cultural factors that impact this student population's access to and success in college, stressed that one of the crucial components in developing pre-collegiate programming is parental involvement. The parents' capital, including cultural, intellectual, and financial forms of capital and their emotional support, are foundational to collegiate access and success.

Tierney (2002) reviewed and distilled the literature on familial/parental interventions and found that to engage pre-college students from disadvantaged and varying cultural backgrounds, understanding their family dynamic and cultural context is needed. Tierney observed that a "majority of the research consistently found that students performed better and had higher levels of motivation when they were raised in homes

characterized by supportive and demanding parents who were involved in schools and who encouraged and expected academic success" (p. 591). Although this familial context is ideal, it is not the reality for far too many disadvantaged students. Pre-collegiate efforts require an environment where students are motivated and held to high expectations. According to Tierney, a review of relevant literature indicated that the degree of and methodology for parental involvement varied from program to program. However, it is important to know that obstacles will present themselves, such as language barriers, parents' educational level, institutional policies, and other barriers that disincentivized parental involvement. These barriers can be found within the family dynamic and within the institutional parameters. More research must be done to find better ways for pre-college outreach programs to break through these barriers.

With regard to research concerning policy, I would suggest that policymakers take a new approach to evaluating program effectiveness and success. Studies like mine with these types of results have funding repercussions. Empirical studies commonly compare program participants to non-participants. The outcomes of these studies often determine effectiveness, funding, and reauthorization. Policymakers should consider research that evaluates program participants' outcomes in terms of, for example, national averages rather than that of other students in the same higher education institutions.

Similarly, I recommend looking at research that reviews program participants' outcomes in terms of year to year progress and improvement. Any improvement can be indicators of student success and program effectiveness. Thomas et al. (1998) found that although Rutgers SSS program participants had lower graduate rates than non-participants, they still had a mean of a 56.2% graduation rate (SD .053) across all cohort

years, which was above the national average. Fortunately, during that time, the Department of Education (DOE) assessed the program's success and sets criteria primarily based on their participants' graduation rates being a minimum of 50%.

Conclusion

We have reached a critical period not only in U.S. history but in global history. There is a movement that emphasizes the fact that Black lives matter. This revolutionary movement has transcended race, culture, and geographical lines. It is a movement that highlights the underrepresented, the minorities, and those who all too often get left behind. Moreover, this movement denounces injustices that are occurring in various spheres, whether it be legally, in policy development, political representation, access to education or the lack thereof, to name a few. My study was a response to one of life's injustices, disparities in educational opportunities. Obtaining a college education matters.

Education remains paramount to the betterment of individuals' lives, community, and society. Research continues to show the positive impact of a college education in terms of socioeconomics, positioning in the labor market, personal enrichment, less youth violence and imprisonment, developing knowledgeable and healthy citizens, and minimizing the need for public assistance. Renewed attention and urgency should be seen in addressing the educational opportunity gap amongst minorities in our society. Although progress may be seen in the level of college enrollment in the US, we should continue to examine the disparities between certain demographic groups. Specific questions should be asked: Who really has access to higher education? What practices will it take for all students, regardless of their secondary school's physical location and regardless of race/ethnicity, to get a quality education? What are the present barriers

preventing all students from getting a quality education and how might they be overcome?

Pre-college outreach programs come in all shapes and sizes. Although it is a challenge to isolate and quantify their effectiveness, it is too evident that the quality of education is not equitably distributed. It is also apparent that more effective initiatives, policies, and programs, are needed to supplement our education system. My preliminary analysis does show that the students who participated in pre-college programs were from families of lower socioeconomic backgrounds, minority racial groups, non-two parent homes, and parents with limited education. Pre-college preparation programs that they turn to for help uniquely face a problem that challenges the reauthorization of federal funding and challenges their existence in general. That problem is quantifying their impact on the lives of the students that they serve. This challenge, simply put, is providing sufficient evidence of their effectiveness.

My study further reiterates the mixed results of other research using large datasets, but I was able to add to the literature and suggest new areas for future research. In my opinion, these results predominantly derive from the conceptualization of success, when programs participants are studied, and the dataset used to evaluate pre-college outreach programs. The ELS:2002 surveyed more than 15,000 students from 750 schools, over 12 years. The survey is rich in data; however, for this study, roughly 3% of the population (499 students) participated in a college preparation program for disadvantaged students, which is only during their 9th and 10th-grade high school year. Given what is known about the challenges of first-generation college students, it is unfortunate that so few of them got supplementary help; this help may not have even been received early

enough to make notable changes in their success. A low level of program participants compared to non-participants in a population makes it difficult to show meaningful quantitative results that provide sufficient support for increasing funding for the programs.

Challenges and limited analysis do not take away from the problem at hand. There exists disparity in educational opportunities, and our duty to those individuals is to alleviate it. The result of this study is relevant for the current discourse on the effectiveness of pre-college programs and aid the efforts of practitioners, researchers, policymakers, and educationalists looking to close the educational opportunity gap in their sphere of influence.

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Deus, N. (2018, May). "Is Exploration a Temporary or Enduring State? Exploring the experience of FTIC in Exploratory Studies Programs at FIU." Presentation at the meeting of the Florida Academic Advising Association (FLACADA), Florida International University, Miami, FL.

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