

Trends and Discrepancies in Program Completion Rates in a Dual Enrollment Program

by

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## AN ABSTRACT OF THE THESIS OF

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Mark Fermanich

The United States is struggling to improve the educational attainment of high school students in order to meet workforce needs and remain internationally competitive. Fewer than 80% of U.S. students graduate from high school despite 30 years of policy initiatives aimed at improving graduation rates. This study focuses on completion rates within one national network, referred to as Breaking Barriers, which provides dual enrollment programs in over 20 states to students who have or are in danger of dropping out of high school. This student population (high school dropouts) is statistically more likely to be in underrepresented student populations. In this research, underrepresented student populations refer to student groups who have been depicted in the literature as having higher high school dropout rates, including students of color- specifically black, Latino, and Native American students, males, and students with low socioeconomic status. Through applying Astin's Input-Environment-Outcomes (I-E-O Framework) to a logistic regression analysis of program disenrollment, this study seeks to determine what trends and discrepancies may exist in program disenrollment. The analysis finds certain populations, specifically females, white students, and students with higher levels of socioeconomic status have a greater chance of program completion. Program GPA was the only variable which maintained significance at the 1% level, which indicates predictors of disenrollment within Breaking Barriers are comparable to those identified in literature examining high school dropout predictors.

**KEYWORDS:** Education, achievement gap, dual enrollment, dual enrollment programs, underrepresented student populations, I-E-O framework, high school graduation rates, predictors of dual enrollment dropout, predictors of high school dropout

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## INTRODUCTION

Strategies are being evaluated to increase graduation rates, decrease dropout rates, and to generally improve student educational attainment across the United States. In order to address concerns regarding current dropout statistics, initiatives such as the Oregon-based 40-40-20, which establishes the goal of 40% of students achieving a bachelor's degree, 40% receiving an Associates, and 20% graduating from high school by 2025, aim to increase overall educational attainment to meet future workforce needs (North & Jacobs, 2010). Many factors affect graduation rates, and there is likely not any one approach which will drastically improve the current rate of educational attainment at the state or national level. However, an investment in programs focusing on exposing students to college courses and/or career technical education may allow for an increase in overall graduation rates, as well as allow students a jump start in post-secondary studies. In this work, the potential impact of dual enrollment as a method of increasing graduation rates will be examined. Dual enrollment will be defined by Andrews' (2004) description- "students concurrently enrolled and taking classes in high school and college" (416).

Dual enrollment, which has been utilized in each state at some level, allows students the opportunity to earn postsecondary credits while enrolled in high school, and in some cases may decrease students' time to graduation- from both secondary and postsecondary institutions. It has been recognized as a method for underrepresented students to increase their rate of educational attainment (Hugo, 2001; North & Jacobs, 2010). There are several reasons that dual enrollment may be advantageous for traditionally underrepresented students. These include the additional flexibility offered by many dual enrollment programs in which courses may take place at local high schools or Institutions of Higher Education (IHEs) and offer a variety of class meeting times and days. Also, reducing the number of courses students need to complete in the traditional college setting may make the college experience more affordable. Additionally, the academic challenge students may derive from these courses, as well as the potential reduction in time to graduation, may positively influence underrepresented populations (Ganzert, 2012; Hugo, 2001; North & Johnston, 2010).

Although dual enrollment offers additional opportunities to traditionally underrepresented students, program rules can have a disparate impact on this population. Examples of barriers

include a grade point average minimum, a minimum score requirement on a college entrance or placement exam, and the financial cost (NCES, 2013). While these requirements may not be an impediment to students whose parents/guardians have the ability to pay additional fees for student participation in these programs, or for those who have the required minimum scores and GPA, studies show that underrepresented students are less likely to have the financial means and to meet these requirements (Hugo, 2001).

Breaking Barriers<sup>1</sup> is a national network offering dual enrollment opportunities to students who have dropped out of high school or are in danger of doing so. The goal of Breaking Barriers is to increase the high school graduation rates and college enrollment of students who have dropped out of high school or are not on track for an on time graduation. This program was first established in 2000 at a local community college and is now in over 20 states in some capacity. Only students who have or are seriously considering dropping out of high school, qualify for Breaking Barriers' programs. Student participants in the Breaking Barriers program enroll in a term or semester of remedial education courses at the college where the program is located. Following their successful completion of these courses the students enroll in courses on the campus which provide both high school and college credit.

By recruiting only students who were not or are not currently considered successful in the traditional secondary education environment, Breaking Barriers and similar programs have a higher chance of serving populations who statistically complete high school at lower rates. These underrepresented student populations include racial minorities, specifically Native American, Latino, and African American students, students with low socioeconomic status, English Language Learners, and first generation college students and/or high school graduates. These populations may be overlooked as schools and education agencies experience financial shortages, which can lead to the prioritization of students who require less remedial instruction, psychological support, and one-on-one assistance from instructors (Smith Morest & Mechur Karp, 2006).

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<sup>1</sup> This paper uses the pseudonym Breaking Barriers at the request of the organization.

This project intends to provide Breaking Barriers with information that they may be able to use to improve their services, and to contribute to literature on dropout prevention and reengagement. This analysis is driven by the following research questions:

- 1) What indicators (independent variables) significantly predict program disenrollment?
- 2) How do the disenrollment predictors of students within Breaking Barriers compare to high school dropout predictors?
- 3) Are there specific student group(s) more likely to complete the program than others?

Breaking Barriers' data set provides demographic and administrative data on approximately 11,000 students, with new student survey (NSS) data on approximately 5,500 of these students and student satisfaction survey (SSS) data on about 2,000 students. The data ranges from fall of 2004 until spring of 2012. Program status, specifically whether the student disenrolled from the Breaking Barriers' program, will be the dependent variable in this study. Several independent variables are tested through logistic regression, and these variables were selected based on a literature review of common predictors or indicators of dropout. The framework which will be utilized is Alexander Astin's Input-Environment-Outcome model (I-E-O). This framework was chosen based on its ability to compare and combine the influences of demographics and other inputs with student environment in order to better analyze student outcomes.

This program analysis is timely due to the state and national emphasis on education, specifically closing the gap in graduation rates, which requires effective programs to be implemented in order for significant change to occur. Although many studies have found dual enrollment to be effective to a variety of student groups, including at-risk or underrepresented students, there is a gap in literature regarding dual enrollment opportunities and success rates for students who have dropped out of high school, or are in danger of doing so. With the dropout rate nationally being approximately 22% (NCES 2013), this population must be targeted in order for rates of educational attainment to increase across cohorts.

## BACKGROUND

The following section examines information regarding the basic history of collaboration between Institutions of Higher Education (IHEs) and school districts, specifically through the lens of dual enrollment. A brief overview of program statistics, state policies affecting the implementation and the effectiveness of dual enrollment is also discussed.

### **Dual Enrollment Statistics**

According to the National Center for Education Statistics (2013) descriptive study of dual enrollment in the United States, 1,277,100 students used dual enrollment programs to enroll in classes resulting in college credit in the 2010-2011 academic school year. Results also found approximately 83% of students participated in courses taught at a college campus, and 44 % of IHEs and school districts reported the typical pattern for student enrollment was one course for college credit per term or semester. Regarding program requirements, 60% reported a minimum GPA was needed for program participation, 45% required passing a college placement exam, 43% required a minimum score on a chosen standardized test, and 41% requested a letter of recommendation.

### **History of dual enrollment**

Smith Morest & Mechur Karp (2006) discuss the development of close ties and collaboration between community colleges and high schools, and how this collaboration led to programs such as junior college opportunities based out of community colleges in the early 1900s. The start of dual enrollment is not clear, as over the years many states have had school districts develop relationships with IHEs both through and independent of state policy. One of the first programs developed at a state-wide basis started in the 1970s in New York with Middle (or early) College High Schools. This program was characterized as high school students enrolling in courses at community colleges in order to earn college credits, which is how dual enrollment is typically described.

Programs such as these began to gain serious momentum in the late last 10 to 15 years of the 20<sup>th</sup> century, and have continued to evolve. Dual enrollment, Tech Prep, and School-to-Work opportunities continue to gain in popularity. Organizations such as the Bill and Melinda Gates

Foundation have invested in many of these programs and initiatives related to them (Shear, Means, Mitchell, House, Gorges, Joshi, Smerdon, & Shkolnik, 2008). Dual enrollment has been seen by some as an opportunity for a variety of students, not just academically advanced students, who are the population typically targeted for the Advanced Placement (AP) program, and the International Baccalaureate (IB) program (Smith Morest & Mechur Karp 226).

### **State policies**

State policies regarding dual enrollment vary greatly, due to funding availability, as well as the perspectives of the local and/or state-based policy makers. Admission criteria, such as implementing a minimum GPA, restrict the number of students who are able to participate in the program. However, states without these criteria written in policy have still found dual enrollment increases graduation rates (Washington State Board of Community and Technical Colleges, 1991; North & Johnston, 2010).

With the growing popularity of dual enrollment, many states have provided policy environments conducive to student participation, although access across the country has varied. Minnesota, the first state to implement a state-wide policy directly related to a dual enrollment program, created the Postsecondary Enrollment Options in 1985, and Washington State created the Running Start dual enrollment program in 1990 (Smith Morest & Mechur Karp, 2006). According to the Education Commission of the States (2013), all but three states have policies implementing a statewide dual enrollment program. The three states without this are Alaska, New Hampshire and New York.

Although most states have regulated programs, the requirements for program participation and funding differ. Washington's Running Start does not have an established minimum GPA, and school districts and IHEs are responsible for setting eligibility requirements. Washington state legislature recognizes the role of dual enrollment programs in introducing students to college-level work and increasing the number of students pursuing postsecondary education (RCW 28A.600.280, 2009 c 450 § 2). In 2012, Colorado has replaced their previous dual enrollment programs, Postsecondary Enrollment Options and Fast Track with Accelerating Students through Concurrent Enrollment (ASCENT). ASCENT allows students under 21 years

old to participate in a five year program allowing them to acquire a minimum of 12 credit hours of postsecondary credits before they complete the 12<sup>th</sup> grade (cde.state.co.us). Many other states, such as Michigan, California, North Carolina, and Indiana do not have minimum GPA requirements written into state policy, although they may require specific test score minimums depending on the IHE involved and state funding structure.

Not all state policies promote or allow open access to dual enrollment opportunities. Massachusetts' Commonwealth Dual Enrollment Program (CDEP) requires students to have a 3.0 GPA, or "demonstrate potential for academic success," with measures including class rank, strong recommendations from instructors, and improving grades. However, although CDEP funding varies from year to year, and was just restored in 2008 (the original program was established in 1993), participating IHEs are encouraged to prioritize students who are potential STEM majors, are low income, or are first generation high school graduates\college attendees (MASS General Law Ch. 15A § 39). Ohio must offer their Postsecondary Enrollment Options Program (PSEOP) to all high school students who are maintaining a 2.5 (out of 4.0) grade point average, or are otherwise determined to be "in good standing" (O.R.C. § 313.6013) However, Ohio students are not allowed to enroll in courses for college credit if they have not established a cumulative grade point average of 3.0 in the subject material.

## REVIEW OF LITERATURE

This examination of literature will introduce predictors of high school dropout, social effects of graduation rates, the potential impact of dual enrollment in increasing educational attainment, as well as criticisms of dual enrollment. As current literature offers a great deal of information within these topics, particularly dropout predictors and the social effects of increased or decreased graduation rates, included literature will focus primarily on research examining underrepresented and/or at risk students. The dropout predictors examined will be limited to the variables which are examined within Breaking Barriers' data set.

### **Dropout predictors**

Studies examining dropout predictors seek to isolate characteristics, environments, and other measurable variables which may be related to higher rates of dropping out of high school.

Research has found a variety of predictors including specific demographics, student drive, and the influence of educators and parents. The Alliance for Excellent Education's (2010) report analyzes student survey responses regarding their decision to drop out. Overall, the research concluded the decision to drop out is complex, and student responses varied. However, many responses include students' low attendance, a discovered need for extensive remedial work upon entering secondary education, and a lack of engagement. These predictors affect all student cohorts, however extensive literature indicates specific cohorts of students are more likely to drop out at rates higher than state or national averages. Although each student is an individual with specific concerns and situations that can affect their likelihood to succeed in the secondary education environment, it is important to examine current research focused on gaps in educational attainment.

Battin-Pearson, Newcomb, Abott, Hill, Catalano & Hawkins (2000) examine theories of educational attainment related to predictors of dropping out of high school early in high school sophomores. The researchers chose to focus upon sophomores as prior research identifies 10<sup>th</sup> grade as the year with the highest risk for dropout. Battin-Pearson, Newcomb, et al. tested the following factors as dropout predictors: general deviance (deviant behavior and sexual involvement), deviant affiliation (bonding to antisocial peers), school socialization (low school bonding), poor family socialization (low parental education expectations), parents' lack of education, and structural strains (gender: male, ethnicity (African American), and low socio-economic status) with poor academic achievement (GPA, achievement scores) as the mediating variable in relation to likelihood of dropping out. The variables with the highest significance of contributing to poor academic achievement were low school bonding, low parental educational expectations, the gender variable (male), and the ethnicity variable (African American). The only variable that did not influence poor academic achievement significantly was general deviance. Poor academic achievement was found to significantly affect dropout before completing 10<sup>th</sup> grade at the significance level of .001. They conclude dropout prevention should be directed at improving levels of academic achievement, which may offset other variables such as family income level and deviant friendships.

In a similar study, Suh, Suh J., & Houston (2007) apply logistic regression to data from the 1997 National Longitudinal Survey of Youth to identify risk factors linked to dropping out in three student groups: 1) students with low GPAs, 2) students who had been suspended, and 3) those from a low socio-economic status or background. The researchers chose to model these groups due to the abundance of literature citing each as a significant predictor of low educational attainment. Twenty variables were tested ranging from low GPA in eighth grade to optimism about the future. The variables which proved to be significant were the following: GPA in 8<sup>th</sup> grade, suspended students, low socioeconomic status, number of days absent from school, number of household members, highest education attainment of mother was high school or less, student lived with both biological parents, threat of being hurt in school, number of fights at school, behavioral and emotional problems, total numbers of school attended, percentage of peers planning to go to college, first sexual experience occurred at age 15 or below, and optimistic about future.

### **Demographic discrepancies**

Dianda (2008) examined gaps in completion rates between cohorts, and determines an achievement gap exists in secondary graduation rates among specific student cohorts- including certain populations of students of color, first generation college students, English Language Learners (ELLs), and students classified as low income. While there is a great deal of literature focused on gaps in educational attainment between student cohorts, this section will primarily explore current discrepancies by gender, specific racial minority groups, low SES measured through parents' (mothers specifically) low educational attainment, and English Language Learners and non-English Language Learners.

Gaps between males and females in educational attainment are becoming more evident. Ganzert (2012) cites the “non-motivation” of secondary education is cited as leading to lower graduation rates for males. Heckman and LaFontaine (2010) discuss how the growing gender gap in college enrollment can be explained by the decline in high school graduation rates among males. While there is a growing amount of research discussing this gender gap in the postsecondary setting, there is less relevant literature focusing on the disparity between female and male high school graduation rates.

Gaps in gender, while significant, are often not as evident as those between racial/ethnic groups. Consistently, when educators and policy makers discuss gaps in educational attainment, students of color are singled out for significantly lower graduation rates. The specific student racial groups referenced most frequently are African Americans, Latinos, and Native Americans. Orfield, Losen, Wald & Swanson (2004) states that schools with a high percentage of black, Latino, and other minority groups often have less experienced teachers, a narrower course selection, higher student turnover, and an elevated amount of student health and emotional problems. Regarding percentages, Orfield et al. reported that Black students' graduation rates averaged 24.7% lower than Whites, while Hispanics averaged 21.7% below. Native Americans are 23.8% below Whites. The United States Department of Education's (2007) analysis of High School Dropout and Completion Rates illustrated the dropout rate of 16-24 year olds who had not acquired a high school diploma vary from an overall rate of 4.5% for White females to 24.7% for Hispanic Males. Heckman and LaFontaine's (2010) analysis of American secondary graduation rates determines that approximately 65% of blacks and Latinos graduate high school. The rates of non-Hispanic whites are significantly higher than this. Perhaps more significant than this, there was no evidence of the graduation rates of white and minority students becoming more equal.

The impact of parental education attainment is also considered to be influential in determining a student's educational outcomes. Baker and Stevenson (1986) examine the relationship between a mother's educational attainment, which is a heavy factor in family SES as well as child's educational attainment. Forty-one mothers of eighth graders were interviewed, with a variety of educational backgrounds. Mothers who had graduated from college, or achieved an advanced degree, were more likely to enroll their student(s) in college-preparatory courses, even if the students' GPA was low. Also, this group of mothers was more likely to work to prepare their children with low GPAs for high school through tutoring and other direct assistance.

Another population facing additional struggles in the classroom is English Language Learners (ELLs). ELLs face the unique challenge of lacking the needed level of access and

knowledge needed of the English language to feel comfortable in classrooms. Menken (2010) discusses that while graduation rates for most cohorts have risen after the implementation of No Child Left behind (NCLB) standards of assessment and accountability, the graduation rates of ELLs have decreased as testing standards do not account for their specific needs. The stagnation of graduation rates for ELLs is particularly bothersome due to the debates of the last 10-15 years on the need for English-only instruction, and legislation passed in several states, including California's Proposition 227, investing in standardizing this form of instruction for ELLs (CA Secretary of State: Proposition 227).

### **Societal implications of current graduation rates**

Belfield and Levin (2007) examine the economic effects of high school dropouts in California. The researchers discuss the positive consumption externalities acquired from a highly educated society: "Better educated persons pay more in taxes and they alleviate the pressure for government spending on health, crime, and welfare" (2). Other benefits referenced include higher civic engagement, an increase in workers with high levels of human capital, and an increased investment in state production. They claim "A fall in the dropout rate by 30% for one cohort of students in California would yield total fiscal savings to the state/local government of \$1.90 billion; if the dropout rate was halved, the fiscal savings would be \$3.17 billion" (36).

While the societal benefits of higher educational attainment are evident, the educated individual also is rewarded for accomplishing a secondary degree or beyond. In The National Dropout Prevention Center's "Top 5 Reasons to Stay in School," (2013) the center discusses both the externalities produced when more students graduate high school, as well as the internalities of dropping out. The center focuses specifically on increased lifetime income the individual with a secondary degree or beyond is likely to receive. Internalities of not completing high school include increased risk of unemployment (four times higher than those who have completed a Bachelor's degree or higher); higher chance of depending on public assistance, and a statistically higher chance of incarceration.

Although the social benefits of increased graduation rates are extensive, there are costs associated with additional students graduating. Belfield and Levin's (2007) analysis of gradua-

tion rates in California includes a cost benefit analysis of the state providing funding for the additional graduates. They determine that the public costs associated with two additional years of education resulting in high school graduation averages \$3,840 at the federal level, and \$26,840 at the state and local level per student (49). While these upfront costs may be difficult to justify to the public and policy makers, the researchers also determine that each graduating student results in total social gains of \$392,000 (40). These social gains are the result of welfare savings, less crime, lower Medicaid and Medicare payouts, health care savings, and increased tax revenue (p. 12-40).

### **Potential Impact of Dual Enrollment**

Recent research has highlighted the advantages of collaboration between high schools and IHEs. Wetzstein and Sorokin (2002) discuss how opportunities to collaborate, particularly dual enrollment, may add needed revitalization to high schools. They also comment on the benefits of including middle and lower-achieving students in dual enrollment opportunities, as well as high achieving students, who were the traditional targets of these programs. Since dual enrollment is offered through various methods, the effects of these programs on students may vary.

In order to better assess the effects of Dual enrollment programs, several studies of these programs' effectiveness have been undertaken. A study of Washington State's Running Start pilot dual enrollment program in 1990-91) surveyed the 358 students who participated, along with their parents about their plans to enroll in college after finishing high school. Researchers found 80% of the students planned on transferring to a four year IHE, the majority of parents and students found the classes to be more engaging than what the student had experienced in high school, 70% of students and parents reported "optimal" benefit from their experience in Running Starts, and the program allowed for additional contact and communication between the IHEs and the high school districts (Washington State Board of Community and Technical Colleges, 1991).

In a similar study, North and Jacobs (2010) analyzed dual enrolled seniors in the 2007-2008 academic year in Oregon and concluded that 81.4% of dual enrolled students continued onto college, compared to 72.6% of non-dual enrolled students, and 87% returned for their

second year of college, compared to 79.9% average for students who did not participate in dual enrollment (North and Jacobs 2010). Their findings also indicate dual enrollment is gaining in popularity in Oregon. In 2005-2006, 18 institutions were offering a total of 1,668 courses, and in 2007-2008, 21 institutions offered 1,820 courses. This analysis attempts to build on the results of this study through examining how one national program influences program completion rates of a specific population of dual enrolled students- those who have been unsuccessful in the traditional high school setting.

Hofmann and Voloch (2012) analyzed dual enrollment- referred to as College Now- in the City University of New York (CUNY) system in the 2010 academic year and found that a significant proportion of students enrolling as freshmen had participated in dual enrollment programs. They were also more likely than other students to enroll in college soon after graduating from high school. The study found that 29.1% of the students who entered CUNY as freshman had participated in dual enrollment. They also found that 44.3% of College Now participants entered CUNY as students within three months of completing their secondary degree, as opposed to 29.4% of those who did not participate. The majority of students in College Now did enroll in a university (105).

While all student groups may benefit from dual enrollment, there is a growing amount of research supporting the benefits of lower-achieving students participating. Hugo (2001) reaffirms the influence of these programs for specific underrepresented cohorts, who statistically are underrepresented in high school graduation rates: “the dual enrollment program provides an opportunity for minority and first-generation students to learn about colleges and improve their study skills.... (dual enrollment) provides the best kind of outreach available—outreach that offers academic enrichment and inspires students to excel” (72). Dual enrollment programs have shown promise in boosting graduation rates among all students, including those who are currently underrepresented in postsecondary education (North & Jonathon, 2010).

In order to establish the viability of dual enrollment programs for underrepresented students, it is important to consider current successes related to dual enrollment for general student populations. Bailey and Karp (2003) found that dual enrollment programs can be very

advantageous for students who are already planning on attending college. Ganzert (2012) found that high school students who partake in dual/concurrent enrollment are consider themselves to be college-bound. These students often seek out dual enrollment opportunities hoping to acquire college credits that are transferrable, and are considered the “core” courses in universities.

While dual enrollment may inspire underrepresented cohorts to pursue higher education, it is arguably more important for these groups to attain the knowledge and skills required to graduate from high school. Research has found that through exposing students to the college setting, and the increased academic rigor associated with it, may be a driving force in increasing high school graduation rates. Bailey, Hughes & Karp (2002) claim that the benefits of dual enrollment include the first-hand exposure students are given to college-level work, and the credits associated with this work. They also address how most dual enrollment opportunities were originally limited to academically gifted students, and how this inability to participate may hinder the development of average and/or below average performing students. “Offering these students (under-achieving) dual enrollment opportunities—academically rigorous and engaging courses—might promote hard work and high achievement”. Karp & Hughes (2008) outline a variety of policy recommendations for dual/concurrent enrollment programs in California, which include opening student eligibility and ending any polices which disqualify students from participation due to test scores or GPA.

A significant benefit of dual enrollment programs, and potentially other methods of college or career technical education in high school settings, is the ease of transfer students may feel due to the program experience. Hoffman et al. (2009) acknowledge the role of the community college in implementing dual enrollment programs and increasing this ease of transfer. Community colleges- more often than four year institutions- offer the opportunity for high school students to participate in dual enrollment programs on their campus, and many of these colleges include outreach to high schools and their neighboring area within their institution’s mission.

### **Criticisms of dual enrollment**

Although much literature indicates dual enrollment may be a positive predictor of graduation for all cohorts of students (North & Jacobs, 2010), criticisms of dual enrollment also

exist. The most common critiques address student readiness and the “double funding” issue, which occurs when both IHEs and school districts receive per pupil funding. While dual funding can be addressed through state policy, it can create tensions between IHEs and school districts as well as policy makers. Student readiness is a more complex criticism due to the individual nature of preparedness. Both of these critiques will be further addressed below.

High school aged students enrolling in courses for college credits unsurprisingly raises concerns among educators, parents, and students alike. Hofmann and Voloch (2012) discuss dual enrollment as a “liminal space,” where several boundary issues affect the impact and perhaps even quality of the programs. They claim, “Even when high school students meet academic requirements, as is the case with most dual enrollment programs, concerns continue to surface as to participants’ maturity and ability to handle more rigorous assignments, or even the rationale for accelerated learning in the first place” (102). This concern of whether high school students are capable of comprehending and/or benefiting from college courses is logical, especially considering that these courses will likely remain on students’ records. If they enter unprepared, the program experience could negatively affect the student’s chance of acceptance in postsecondary institutions. However, as Hoffman and Voloch claim, dual enrollment programs at IHEs may alleviate some of the concern of underprepared/immature students through carefully articulating goals- and working with high schools to determine course standards and content. Mace (2009) analyzed the academic progress of dual enrolled students compared to traditional college students, and found the dual enrolled students outperformed traditional students.

Concerns with the funding needed to implement dual enrollment programs are also important to address. Hunt (2007) discusses how the partial or full funding of both IHEs and school districts may be an inefficient use of funding. Hunt’s research examines to what extent (if any) dual funding motivates institutions to participate through a study of Florida’s dual enrollment system. Hunt’s findings indicate that differing funding structures between K-12 systems and community colleges complicates equitable funding, as K-12 systems are not paid extra for additional classes taken outside of the traditional school day, and community colleges do not operate on a strict per pupil allowance. Hunt also determines that after school districts and community colleges were funded for dual enrollment, student participation increased. Hunt

concludes that the long term benefits of dual enrollment should not be ignored, although it is indicated funding decisions made to save the state money (through increased educational attainment) rather than strictly encourage student development may be a misdirected use of funds (880).

### **Summary of the Literature**

Current rates of educational attainment vary greatly across this country, noticeably between demographic groups such as racial minorities, students with a low socioeconomic status, and ELLs. Dual enrolled students, including at-risk students, have been found to have higher rates of high school graduation and postsecondary attendance than their peers (Hugo 2001). There are several reasons dual enrollment may increase graduation rates, including a reduced financial commitment from students and exposure to the environment of postsecondary education, specifically relating to academics.

Dual enrollment is capable of increasing graduation rates and college attendance for some students, but it is not the best fit for every student. There will be students who will enroll in dual enrollment courses and find themselves ill prepared for the level of commitment, or in need of additional remedial education. While some researchers have found that this additional challenge inspires students to become more motivated and increase confidence (North & Jonathon, 2010), others question whether high school students have the emotional maturity to succeed in the college environment (Hofmann & Voloch, 2012). Although dual enrollment will not be successful for every student, and it is far from the only solution to current discrepancies in educational attainment, it has been found to increase high school graduation rates in several states (North and Jacobs, 2010; Washington State Board of Community and Technical Colleges, 1991).

### **METHODS**

With data supplied by Breaking Barriers, this research compiles descriptive statistics for the Breaking Barriers program and analyzes previous identified predictors of dropout through a

logistic regression analysis. The following section describes the data set, the included variables, and the quantitative approach utilized.

**Dataset**

Breaking Barriers collects a variety of information regarding student participants. Collected data includes students’ age, gender, race, and program completion status. For approximately half of the sample of approximately 11,500 students, survey responses were gathered regarding student experience prior to Breaking Barriers. These experiences include home life, family/self-participation in financial assistance programs such as free and reduced lunch, and student perceptions of their pre-Breaking Barriers experiences. This survey, referred to as the New Student Survey (NSS), is administered to students within their first two weeks of program participation. After their second term/semester, remaining student participants are emailed the Student Support Survey (SSS), which is intended to assess students’ experiences within Breaking Barriers.

A few of the variables tested within this analysis are derived from data Breaking Barriers collected for administrative purposes, but the majority is based on data from survey responses. The variables from Breaking Barriers’ administrative data are mostly input variables and the information they provide includes gender, age, prior grade point average, and race. Additionally, survey variables regarding income, ELL status, and students’ perceptions of their educational and personal experiences are incorporated. The data ranges from fall of 2004 until spring of 2012 and it does not contain any individually identifiable information.

**Variables**

Variables were chosen based on whether they were supported in literature on dropout predictors (Suh, Suh, & Houston 2004; Battin-Pearson et al 2000) as well as their adherence to the I-E-O model, which will be further explained later in this section. Below is the dependent variable and independent variables I will be testing in an attempt to explain the variation in disenrollment within Breaking Barrier

Table 1: Variable list and description

Variable Name	Sample	Description
disenrolled	full 2008-2009 data set	Dependent variable, binary

gpaatentry_std	1296 observations	GPA upon entering program, continuous (Academic problems)
termcollegegpa	1128 observations	GPA during program, continuous (Academic problems)
hscreditsneededtograd_std	1285 observations	Number of high school credits needed to graduate continuous (Academic problems)
NSS_academicprobs	808 observations	Perception of Academic problems in high school binary (Academic problems)
SSS_academicprobs	284 observations	Perception of Academic problems within, binary (Academic problems)
NSS_attendance	808 observations	Issues with attendance, binary (academic problems)
SSS_engaged_in_education	278 observations	Level of engagement in education within program binary (Student engagement and perception of outside support)
NSS_nobodycared	808 observations	Whether students felt cared about while in traditional high school environment, binary (student engagement and perception of outside support)
SSS_teachers_didn_t_know_me	283 observations	Teachers' level of support and interaction, binary (student engagement and perception of outside support)
ageatentry_std	full 2008-2009 data set	Age at entry to program, discrete (demographic)
White	full 2008-2009 data set	Race, binary (demographic)
Female	full 2008-2009 data set	gender, binary (demographic)
NSS_pub_ass_frl	701 observations	Free & reduced lunch status in high school, binary (demographic)
NSSmothereduc	712 observations	Mother's education status, five binary variables (demographic)
NSS_firstgenerationcollegetrio	805 observations	First generation college student status, binary (demographic)
NSS_englishprobs	808 observations	problems with English language, binary (demographic)

Within the analysis, some variables were transformed into binary or dummy variables, while others were made into numerous binary (dummy) variables representing different degrees within a response. Variables that were made into a single binary variable had a more bimodal distribution. This analysis also contains discrete or categorical variables, such as age at entry, and continuous variables such as GPA at entry.

Since the variables focused around determining how academic problems (perceived or actualized) fall under the main independent variable, I measure whether students chose to complete the NSS and SSS by whether they responded to one specific question. In the NSS this question asks students to rate their level of academic problems in high school as either “not a prob-

lem,” a small problem,” or “a big problem.” In the SSS, student participants are asked to rank how their perceived view of personal academic problems has changed since they have enrolled in Breaking Barriers.

## **Hypotheses**

Three primary research questions will shape this empirical study: 1) what indicators (independent variables) significantly predict program disenrollment? 2) How do disenrollment predictors of student within Breaking Barriers compare to high school dropout predictors? 3) Are there specific group(s) more likely to complete the program than others? These questions aim to address the issue of increasing educational attainment, and compare the literature to the very specific population of high school dropouts and those who are not on track to graduate.

Due to research findings on gaps in academic attainment among racial cohorts, such as those established by Dianda (2008), I hypothesize race will be a significant factor in determining whether a student within the dataset chooses to disenroll from Breaking Barriers, with white students disenrolling at a lesser rate than students who identify as other races. I also believe gender will prove to be significant, with females having a significantly lower chance of disenrollment than males. I believe other fixed inputs such as Mother’s education status, first generation college student status, and free and reduced lunch status may impact a student’s chance of disenrollment, but likely not as significantly as race and gender. I believe the continuous input, problems with English language, will also impact the rate of disenrollment, but less significantly than race and gender. The continuous variable of college GPA by term will likely be the most significant variable in influencing the rate of disenrollment.

Regarding variables related to academic problems and/or rate of achievement, I theorize students’ grade point averages (GPA) upon entering the program will not be significant. All students within Breaking Barriers have dropped out of high school, or are not on track to graduate, which indicates that many of the students were not doing academically well in the high school setting. Due to this, I believe this population will not be significantly affected by the GPA they had while enrolled in traditional high school. I believe the same will be true for the New Student

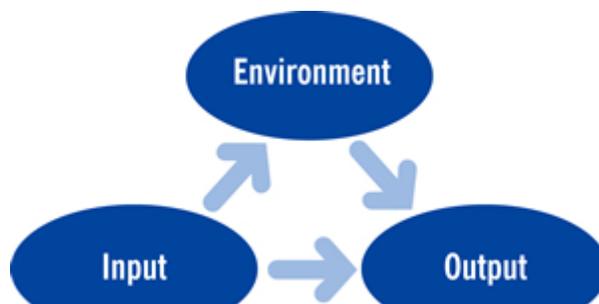
Survey (NSS) measure of academic problems, and the NSS measure for attendance problems. However, I do believe the NSS measure, “Nobody cared,” will be significant.

Regarding academic perception measures within the SSS, I believe students’ level of engagement and students’ perception of how the academic problems (or lack thereof) they experienced at Breaking Barriers relate to the problems they perceived having in high school will significantly influence students’ rate of disenrollment. The SSS measure of “teachers’ level of support,” will influence disenrollment, but not as significantly as level and engagement and academic problems. I believe predictors of dropout within Breaking Barriers will be similar to identified predictors of students dropping out of high school. Since students who are in Breaking Barriers have experienced some form of academic problems in the past, I believe academic problems within Breaking Barriers will be significant in predicting dropout. Academic problems within the program may be more influential in Breaking Barriers as this could be seen by students as sort of a last chance, or last effort, for academic success in secondary education.

### **Theoretical Approach**

Many theoretical frameworks or perspectives are capable of addressing issues of educational attainment. One that proved influential within this research is Alexander Astin’s I-E-O (input, environment, outcome) model, which examines how students’ inputs, or fixed or continuous background information from the past, as well as current environment affects a specific program outcome (Astin, 2012) This model provides an approach focused on individual variables as well as a critical examination of the impact of a student’s environment. Regarding environment, both past and present environments (before and during Breaking Barriers) will be explored through including relevant student survey responses. This allows for an examination of the role of students’ experiences prior to and during their time in Breaking Barriers.

Figure 1, Astin’s I-E-O Source: Astin, 2012



Astin developed the I-E-O framework in order to create a more inclusive assessment model within higher education. He opposed the idea of programs being judged merely on their results or outcomes without careful consideration paid to the characteristics of student participants, as well as environmental factors. Without considering student input- the characteristics such as gender, race, and socioeconomic status, and environment- the experiences and interactions with peers, faculty, program, buildings/location etc., there is not an effective way to measure education impact.

Astin (2012) describes the three categories of his model as follows:

“Outcomes, of course, refers to the “talents” we are trying to develop our education program; inputs refers to those personal qualities the student brings initially to the educational program (including the student’s initial level of developed talent at the time of entry); and the environment refers to the student’s actual experiences during the educational program” (p. 19).

From looking at Astin’s definition, it seems there may be some overlap between inputs and outcomes. Astin claims inputs normally are related to environments and are always related to outcomes. Astin urges researchers to explore the possibility of interaction effects occurring between input and environmental variables, due to how inputs may influence how a student views or performs in an environment. Race, age, ability, socioeconomic status, and gender are among the characteristics/variables he suggests studying for interaction effects with environmental input. These types of input characteristics are referred to as “fixed students attributes” due to their demographic nature.

Analyzing the environment a student is exposed to throughout a program can be complex due to its all-encompassing nature. “The environment encompasses everything that happens to a student during the course of an educational program that may conceivably influence the

outcomes under consideration” (Astin 2012, p. 89). Astin discusses the role of the “self-produced environment,” which are environmental characteristics or variables which can easily overlap with input characteristics. As students’ prior knowledge, background, and the background of family and friends can be rather influential in decision making, it is important to consider the difference between environmental characteristics a student has no ability to control and those which are developed through student choice. Environmental data can be gathered through many sources, although data gathered from student participants is often the most valuable. This data can be gathered from student records, or from student survey or interview responses.

In order to better define the measurement of outcome, it is important to consider whether the result being analyzed is short or long term, cognitive (behavioral outcome) or affective (non-cognitive - traditionally reflects beliefs, values feelings), and whether the measure is behavioral or psychological. This study will measure the cognitive outcome of the decision to complete or disenroll from Breaking Barriers, which is a short term cognitive outcome. It will also measure students’ beliefs and feelings regarding their experiences prior to and during Breaking Barriers. The resulting outcome (disenrollment) is a behavioral measure.

In order for the outcome, or the result of student participation, to be measured appropriately, outcomes- both desired and not, must be defined. Issues often arise in measuring outcomes when stakeholders confuse conceptual outcomes (the value based definition of the desired student outcome), and the outcome measure (the study or method used to determine outcomes) (Astin, 2012). Astin discusses the need to be aware by whose or what perspective we are seeking to determine outcomes. Predominantly, within this research, students’ perspective, derived from survey responses, will be utilized to better understand why a particular program outcome (disenrollment) may occur. The students’ environment (before and during), as well as fixed characteristics (inputs) will be the only variables examined. While assessing outcomes is useful, Astin warns of confusing the results of one outcome measure with assuming the level of program impact. This research does not seek to label specific student inputs as direct indicators of program success in Breaking Barriers. However, it will attempt to better understand how these inputs may correlate with other characteristics and/or environmental factors to better predict disenrollment.

## Data Analysis

For this analysis, I created a binary variable with each student (unit) being assigned a numerical value of 1 if they had disenrolled from Breaking Barriers, and a 0 if they completed the program or fell into 15 different categories depicting a level of Breaking Barriers involvement, e.g. “comp. campus + some foundation classes.” Approximately 70% of the dataset population has disenrolled from Breaking Barriers. Some of these disenrollment categories were “successful” cases of disenrollment, such as a category for students who decided to return to traditional high school, or Job Corps. I chose to utilize logistic regression due to the binary nature of the dependent variable I had selected. With binary dependent variables, utilizing OLS regression violates assumptions five and seven of the Gauss Markov Theorem (errors not containing constant variance and non-normally distributed errors, respectively). Also, OLS regression output is not contained between the values of zero and one, which could lead to nonsensical responses such as a negative chance of something occurring, or predicting an over 100% chance of the dependent variable being realized. (Long & Freese, 2006). I used odds ratios in order to create easy to interpret results.

In an effort to better define the research sample, students beginning the program in the 2008-2009 cohort will be studied. The average length of time to complete Breaking Barriers with a high school degree is 21 months. This time frame includes an initial semester or term of remedial education. The academic years to study were chosen based on the likelihood students would have completed the program, or have decided to disenroll. The earlier years of 2004-2007 were not included because these years did not include survey data and had fewer student participants. Also, as 2004 was Breaking Barriers’ first year, it is safe to assume that program practices have developed and more recent years are more relatable to current program practices. The later years- 2009-2010, 2010-2011, and 2011-2012 were not included as many students were still active in the program as of spring of 2012.

In order to maintain a focus on students who completed or disenrolled from the program for reasons identifiable to themselves or Breaking Barriers, I omitted observations from the variable “exitstatus” which indicated disenrollment for unknown reasons, or those beyond the

control of the student participant. The observations I omitted fell into the following categories: unknown, death, moved out of district, district ended relationship with Breaking Barriers, and two categories associated with medical problems. Removing these categories omitted 1,325 student observations from the dataset. An additional 153 student units were omitted as they were placed in more than one category, at least one of which was omitted. The remaining number of observations for the dataset as a whole was 9,965, and the number of observations for the 2008-2009 academic year cohort was 1,412.

## RESULTS

In the following section descriptive statistics and the results of the regression analysis will be provided and discussed. The descriptive statistics provide basic information on the student participants in Breaking Barriers academic year of 2008-2009, and the student survey responses from the New Student Survey (NSS) and Student Satisfaction Survey (SSS). These three groups: all students who began Breaking Barriers in academic 2008-2009, students from this group who completed the New Student Survey, and the students who completed the Student Satisfaction Survey need to be compared in order to determine if these two subgroups are representative of the larger dataset. I am also interested in comparing the 2008-2009 academic cohort to the dataset as a whole in order to determine if there are significant differences or specific characteristics of students beginning in this academic year compared to others. The logistic regression analysis will examine how or if the previously discussed independent variables significantly contribute to students' decision to disenroll from Breaking Barriers.

### **Descriptive Statistics**

This analysis will focus on students who entered Breaking Barriers in the 2008-2009 academic year. This academic year covers four terms- summer 2008, fall 2008, winter 2009, and spring 2009. The number of students from the 2008-2009 cohort enrolled in each term are 137 in the summer 2008 term, 739 in fall 2008, 326 in winter 2009, and 1,100 students from this cohort were enrolled in Breaking Barriers in Spring 2009.

The table below offers descriptive statistics regarding the dependent variable and independent variables in this analysis.

**Table 2:** Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
disenrolled	1412	0.796	0.403	0	1
ageatentry_std	1412	17.1594	0.8	15	21
White	1412	0.37252	0.483647	0	1
Female	1412	0.5085	0.500105	0	1
gpaatentry_std	1296	16.18	28.474	0	93.15
termcollegegpa	1128	2.11	1.33	0	4
hscreditsneededtograd_std	1285	13.052	5.742	0.611	29
NSS_firstgenerationcollegestudenttrio	805	0.795	0.404	0	1
NSS_englishprobs	808	1.05	0.217	0	1
Academicproblems	808	0.712	0.453	0	1
SSSnoacadprobs	284	0.3662	0.482615	0	1
SSSsmallacadprobs	284	0.55985	0.49728	0	1
SSSbigacadprobs	284	0.07394	0.262141	0	1
Attendanceproblem (NSS)	808	0.787	0.41	0	1
muchmoreengaged_SSS	278	0.51439	0.500694	0	1
moreengaged_SSS	278	0.28058	0.450091	0	1
sameengaged_SSS	278	0.11511	0.319728	0	1
lessengaged_SSS	278	0.08993	0.286595	0	1
notaproblem_nocare_NSS	808	0.56312	0.492631	0	1
somewhat_nocare_NSS	808	0.30322	0.459933	0	1
often_nocare_NSS	808	0.13366	0.340501	0	1
notachallenge_teachers_SSS	283	0.70318	0.457666	0	1
smallchallenge_teachers_SSS	283	0.25442	0.436305	0	1
bigchallenge_teachers_SSS	283	0.0424	0.201863	0	1
Free & Reduced Lunch (NSS)	701	1.934	0.5956	0	1
Mothereduc_nohsgrad	712	0.18961	0.392265	0	1
Mothereduc_hsggrad	712	0.26124	0.439617	0	1
Mothereduc_ts_sc_associates	712	0.38062	0.48588	0	1
Mothereduc_bachelors	712	0.12079	0.326108	0	1
Mothereduc_advanceddeg	712	0.04775	0.213393	0	1

The number of student observations included in the above variables range from 278-1412. 1412 is the number of students in the 2008-2009 academic cohort. The variables with no missing observations are demographic in nature, with the exception of disenrollment from Breaking Barriers. Several of the variables such as “Free & Reduced Lunch,” “Teachers level of support NSS and SSS”, “Engaged in education,” and “NSS\_nobody cared” were made into dummy variables for this analysis.

Since parts of this analysis will examine the effects of variables related to students' survey responses, it is necessary to determine the representativeness of these student respondents to the larger population. The table below lists baseline and academic variables with the means, standard errors, and differences between students who did and did not respond to the NSS and SSS.

**Table 3:** Baseline and academic variables across NSS subsets with p-value differences

Variable	NSS	S.E.	non-respondents	S.E.	P-value differences
Female	0.514	0.018	0.502	0.02	0.657
White	0.339	0.017	0.417	0.02	0.003
ageatentry_std	17.22	0.028	17.078	0.033	0.001
gpaatentry_std	16.96	1.047	15.091	1.205	0.244
hscreditsneededtograd_std	13.14	0.217	12.937	0.237	0.52
termcollegegpa	2.007	0.053	2.263	0.059	0.001

**Table 4:** Baseline and academic variables across SSS subsets with p-value differences

Variable	SSS	S.E.	non-respondents	S.E.	P-values differences
Female	0.606	0.029	0.484	0.015	0.000
White	0.370	0.029	0.373	0.014	0.913
ageatentry_std	17.035	0.048	17.191	0.024	0.003
gpaatentry_std	17.194	1.835	15.913	0.875	0.511
hscreditsneededtograd_std	12.327	0.348	13.232	0.180	0.024
termcollegegpa	2.465	0.081	2.015	0.045	0.000

There are three variables applied to NSS respondents and non-respondents with a difference statistically different than zero. These variables are race (White) at 0.003, age at entry at 0.001, and college GPA at 0.001. Gender (Female), GPA at entry, and high school credits needed to graduate do not have differences statistically different than zero.

SSS respondents and non-respondents share four variables with a difference statistically different than zero. Gender (Female) at 0.000, age at entry at 0.003, high school credits needed to graduate, and college GPA at 0.000. Unlike NSS respondents, race is not significantly different,

although gender is significantly different at the 1% level. Both age at entry and college GPA remain significantly different in both populations, while high school credits needed to graduate and GPA at entry are not significantly different in NSS or SSS respondents and non-respondents.

### **Analysis**

In order to understand the impact of the fixed inputs of race, gender and age at entry, I created a baseline model of these variables. These three were also selected for the baseline model as there are no missing observations from the 2008-2009 academic year cohort (Refer to table 4).

Regarding chances of disenrollment, if a student identifies as female, they are .5841 times as likely to disenroll in relation to males. This indicates females are approximately 42% less likely to dropout than males. Students who identify as white are .5836 times more likely to disenroll, meaning this cohort disenrollment rate is 41.64% lower than non-white cohorts. Each of these variables are significant at the 1% level. Age at entry is insignificant.

The second model (refer to table four) includes variables related to academic problems, including standardized GPA at entry, high school credits needed to graduate, and term college GPA. GPA at entry and high school credits needed to graduate will be regarded as inputs, and term college GPA will be considered an environmental variable. While `gpaatentry_std` and `hscreditsneededtograd_std` lower the number of observations rate to 1296 and 1182 respectively (see appendix A), adding in the additional variable “`termcollegegpa`,” reduces the number of observations to 1012. This is due in part to the number of students who leave the program prior to the point in which a college GPA can be determined, which is the end of their first course of remedial education. Both the gender and race variables’ effects move up significantly towards “1,” indicating a neutral effect, although both lose significance. This effect is similar to studies done by Suh, Suh J., & Houston 2004; Battin-Pearson et al 2000 that find the influence of fixed inputs such as race and gender diminish when variables relating to academic success are introduced. Also, the abrupt change in both significance and the odds ratio indicates the baseline model suffered omitted variable bias.

The effect of high school GPA at entry is insignificant in all models (see Appendix A), although for every unit increase of high school credits needed to graduate, students’ rate of disenrollment increases by 6%. This is significant at the 1% level. In the models in Appendix A.,

age at entry is not significant when GPA at entry and the female and white dummy are controlled for. However, it becomes significant at the 1% level when high school credits needed to graduate is controlled for, and retains the same significance when term college GPA is controlled for. In this model, with each unit increase in age, students rate of disenrollment increases by 31.13%.

The third model (refer to table four) incorporates all NSS responses variables into the previous model.

Table 4: Logistic regression analysis examining predictors of disenrollment

	Model 1 (O.R., R.S.E.)	Model 2 (O.R., R.S.E.)	Model 3 (O.R., R.S.E.)	Model 4 (O.R., R.S.E.)
Disenrolled				
Female	.584*** (0.080)	.800 (.128)	.717 (.191)	.860 (.290)
White	.583*** (.079)	.900 (.144)	.800 (.201)	.864 (.272)
ageatentry	1.413 (.096)	1.311** (.130)	.965 (.149)	1.380 (.273)
gpaatentry		1.000 (.003)	.995 (.004)	1.002 (.005)
hscreditsneededtograd		1.060*** (.017)	.996 (.003)	1.088*** (.0316)
termcollegegpa		.601*** (.043)	.560*** (.065)	.561*** (.080)
Firstgeneration			2.294* (.977)	
Mothereduc_nohsgrad			1.649 (1.181)	
Mothereduc_hsgrad			1.108 (.750)	
Mothereduc_ts_sc_associates			.911 (.579)	
Mothereduc_bachelors			1.678 (.999)	
NoFrl			1.106 (.340)	
Attendanceproblem			.835 (.299)	
noEnglishprobs			1.053 (.743)	

Firstgeneration				2.294*	
				(.977)	
somewhat_nocare_NSS				.730	
				(.208)	
often_nocare_NSS				.736	
				(.283)	
SSSnoacadprobs				.941	
				(.524)	
SSSsmallacadprobs				.919	
				(.484)	
muchmoreengaged_SSS				.971	
				(.522)	
moreengaged_SSS				1.221	
				(.697)	
sameengaged_SSS				2.182	
				(1.517)	
nobodycaredSSS				1.352	
				(.612)	
notachallenge_					
teachers_SSS				.373	
				(.263)	
smallchallenge_					
teachers_SSS				.421	
				(.297)	
N	1412	1012	411	220	

\*Significance level of  $P < .10$

\*\*Significance level of  $P < .05$

\*\*\*Significance level of  $P < .01$

While over 800 students completed parts of the NSS, not all questions were answered by each respondent. If any student is missing a response to even one variable, it is omitted from the analysis. While the missing data could have been imputed, or the data set minimized to specific survey questions, the missing observations were seen to be representative of the population. Appendix B contains models with differing combinations of NSS responses, which provide a useful comparison to this model.

In model three (refer to table four), the NSS variable regarding first generation college student approaches significant at the 5% level with a p-value of 0.051. Students who are first generation college students are 2.29 times as likely to disenroll relative to non-first generation college students. Students' term college GPA is significant at the 1% level with a p-value of

0.000. With each unit increase in term college GPA, students are .56 times more likely to disenroll, meaning that as college GPA increases by one point (on a four point scale), students are approximately 44% less likely to disenroll.

In appendix C model one all NSS and SSS variables are included. Within this model, which only includes 116 students, college GPA remains significant at the 1% level with a p-value of 0.001. With each one unit increase in college GPA (one point on a four point scale) students are .46 times as likely to disenroll (rate of disenrollment decreases by 54.14%). Within this model, each binary variable related to mothers' education (no high school degree, high school degree, some college/ trade school/associates, and bachelor's degree\_ becomes significant at the 1% level with p-values of 0.000. Relative to students whose mothers received an advanced degree, students whose mothers did not graduate from high school are 2.36 times as likely to disenroll, students whose mothers graduated from high school are 1.33 times as likely to disenroll. Students whose mothers completed trade school, some college, or earned an Associate's degree were found to be 2.29 times as likely to disenroll. Surprisingly, students whose mothers completed their Bachelor's degree were 2.23 times as likely to disenroll as students whose mother had an advanced degree. This is surprising because according to the model, students whose mothers graduated from high school were less likely to disenroll than those whose mothers completed their Bachelor's degree, relative to students whose mothers had an advanced degree. Since the odds ratio coefficients associated with mothers' education are all have exponents in their coefficient, this indicates that relative to students whose mothers have advanced degrees, having lesser degrees is almost a perfect predictor of disenrollment. Due to the small number of observations in this model, this finding is likely not representative.

In comparing the models in appendix C (especially C.1) to previous models, drastic changes in p-values and the odds ratio coefficients from model to model indicates both omitted variable bias from the baseline model, as well as the possibility of multicollinearity in the models three and four within table four and the models included in Appendix B and C. The variable no English problems, a NSS question measuring whether or not students perceive themselves as having problems with the English language, was omitted from several models because no observations had identified themselves as having problems with the English language.

Model four in table four omits NSS variables (additional models are in appendix C). Within this model, college GPA and high school credits needed to graduate significantly affect rates of disenrollment. With each one point increase in GPA, a student is .56 times as likely to disenroll (lowers the chances of disenrollment 43.89%) with a p-value of 0.000. With each additional high school credit needed to graduate, a student is 1.087 times as likely to disenroll (increases likelihood by 8.7 %), and this is also significant at the 99% level with a p-value of 0.004.

## DISCUSSION AND POLICY IMPLICATIONS

This discussion will examine the three research questions which shaped this analysis, discuss the limitations of this study, and conclude with policy recommendations. This analysis examined many variables, and this discussion will not address each variable specifically. However, comparing models within the previous section along with those in Appendix A-C should result in a basic understanding of the degree of change in each variable across included models.

### **Research Question One**

The first research question seeks to determine what variables influence a student's decision to disenroll from Breaking Barriers. Within the baseline model, which only controlled for gender, race, and age upon entering Breaking Barriers, both gender and race significantly influenced disenrollment. Age at entry did not influence disenrollment in this model. In Table 5, with the introduction of GPA at entry, high school credits needed to graduate, and college GPA (GPA within the Breaking Barriers program), gender and race lost significance, and students' age at entry became significant. Within this model, and all other models within this analysis, the variable for GPA at entry was insignificant. In appendix A., the baseline model with the introduction of GPA at entry (A.1) does not change the significance of any of the variables within the baseline model. With the introduction of high school credits needed to graduate (without GPA at entry), gender and race remain significant at the 1% level, and age at entry becomes significant at the 1% level. This indicates correlation between the number of high school credits needed to graduate and students' age at entry. In most programs, students tend to complete the Breaking

Barriers program prior to their 22<sup>nd</sup> birthday, so as students near this point, it is important for their needed number of high school credits to be obtainable.

Several input variables proved to be significant in predicting disenrollment in one or more models, but would not necessarily maintain significance across models. Examples of these include age at entry, mothers' education level, and first generation college student status. These fixed inputs significantly affected specific groupings of students, although with the inclusion of other variables measuring student perception of past or current experiences, levels of significance would vary. The education level of students' mothers did not significantly affect disenrollment until environmental variables (SSS questions) were added to the model. At this point, the mothers' education level became significant at the 1% level. However, when the insignificant NSS responses were omitted from the model (Appendix C., C.1), mothers' education level again lost significance. In Appendix B., the first generation college student variable nears significance at the 5% level with attendance problems removed, and reaches significance at the 1% level when free and reduced lunch is also omitted.

Within all models in this analysis, students' term college GPA, or college GPA updated each term, proved to be significant at the 1% level. Upon its introduction, this is the only variable to remain significant across all models. The inclusion of this environmental measure made several input measures (both fixed and continuous) insignificant.

## **Research Question Two**

The second research question seeks to determine whether specific groups have a higher rate of program success within Breaking Barriers. To answer this question, I will first discuss differences in subsets- specifically regarding the population answering the SSS. Since this survey is distributed only to students in their second term, it eliminates any student observations who disenrolled from the program prior to the middle to end of their second term or semester. Although it did not prove to be significant in the models, from looking at table 3, which measures baseline and academic variables across survey subsets, SSS respondents had a slightly higher GPA at entry than any other subset. They also averaged approximately one less credit needed for high school graduation, and averaged 0.4 points higher on college GPA than NSS

respondents and SSS non-respondents, and approximately a 0.2 points higher on college GPA than NSS non-respondents. Also, although gender did not retain significance across models, 60.6% of the students who filled out the SSS were female.

Through running cross tabulations within the dataset specific to the students who began the program in the 2008-2009 academic year, it does become apparent specific cohorts disenroll at a higher rate than others.

Table 5: Cross tabulations of disenrollment rates of fixed inputs

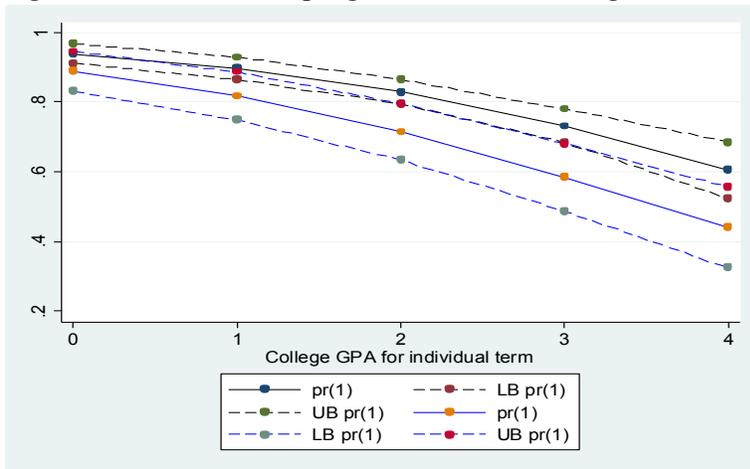
Variable	Disenrolled	Variable	Disenrolled
Female	75.07	Male	84.29
White	73.57	Non-white	83.18
First generation college student	69.7	non-first generation college student	81.72
Mother did not graduate from high school	83.7	Mother has at least a h.s. diploma	77.82
Problems with English language	82.5	No problems with English language	79.17
Free & Reduced lunch	78.9	No free & reduced lunch	76.67

Note: disenrolled value given in percentages

Within this academic year, it is apparent there are gaps in program completion rates among student groups based on fixed inputs. Students not identifying as First Generation College attendees had the lowest rate of disenrollment of the above populations (69.7%), while the highest was males at 84.29%.

In order to see how first generation college student status influenced program GPA, a logistic regression controlling for gender, race, term college GPA, and first generation college student status was ran. The effects of first generation status and college GPA on disenrollment is illustrated in the following graph:

Figure 2: interaction of program GPA and First generation college student status on disenrolled



As can be seen in the above graph, the confidence intervals for first generation status and program or term college GPA overlap until GPA approaches the 3.5-4.0 range. Also, disenrollment ranges from approximately 40-65% among students with the maximum GPA (4.0). This indicates that while GPA is significant, disenrollment rates are still high.

Through this analysis it has become apparent that disenrollment from Breaking Barriers cannot be predicted from solely one variable. However, the above statistics and figure coupled with the previous analysis do reinforce the presence of achievement gaps and indicate certain groups- primarily those with higher college (program) GPAs, socioeconomic status, identify as white, and as female - have a higher rate of program success.

### Research Question Three

The third research question examines whether predictors of disenrollment within Breaking Barriers are similar to predictors of high school dropout identified in the literature. Similar to the research findings of Dianda (2008), Ganzert (2012), and others regarding high school completion rates, gaps in program success exist within cohorts defined regarding gender, race, socioeconomic status, and English language abilities. Also, similar to the research findings of Battin-Pearson, Newcomb, et al (2000), academic achievement within Breaking Barriers proved to be the most significant variable. Suh, Suh J., Houston found 14 variables significant in predicting high school dropout, including GPA, gender, SES, mothers education, and deviance (197-99). Within this study, deviance was not controlled for, and only college or program GPA

proved significant within all models. However, the cross tabulations discussed previously indicate a higher rate of disenrollment based on SES, mothers' education, gender, and race.

### **Summary of results**

Results of this analysis uncovered some expected and some unexpected findings. Through running cross tabulations of student populations based on gender, race, and variables regarding socioeconomic status, it is evident that certain populations have a higher overall completion rate within Breaking Barriers. However, while females may be more likely than males to complete the program, as well as white students compared to students of color, neither of these demographic inputs remained significant when variables regarding academic success in the program and student perception were introduced.

Since term college GPA, or the GPA of students within the program, is the only variable that remained significant at the 1% level in all models, it can be assumed that this has the most significant influence on students success out of the variables included in these models. Previous research on high school dropout predictors indicated the role of GPA, as well as academic success in predicting dropout, or acting as a mediating or intervening variable between inputs and outcomes. While determining the role of fixed incomes can be negligible in comparison to academic progress may seem positive, the reality of approximately 75% of students disenrolling from the program prior to completing high school graduation requirements indicates most students are not progressing academically at the level needed. Also, even among those who are succeeding academically, many are still disenrolling.

### **Limitations**

While this study seeks to contribute to literature regarding dual enrollment, underrepresented populations, and predictors of dropout and/or program success, it is important to acknowledge that this analysis contains several limitations. Through focusing on the student population entering the program in one academic year, this analysis examines students who entered the program at any point from summer term 2008 through spring of 2009. Since a specific start date or term is not being measured, it is impossible to conclude if students who begin at a specific time of year, e.g. summer compared to spring, have a higher rate of success.

Also, while the New Student Survey is intended to be administered to students by their second week in the program, there is some variation in when this survey is administered. This may affect students' perceptions and reporting of questions relating to their previous education experience.

Regarding differences in subsets, as indicated in table three, there are significant differences between subsets. NSS respondents and non-respondents are significantly different regarding race, age at entry, and program GPA. SSS respondents are significantly different than non-respondents regarding gender, age at entry, high school credits needed to graduate, and program or college GPA. This causes concerns regarding the representativeness of these subpopulations to the population of students beginning the program within the 2008-2009 academic year. Schonlau, Soest, Kapteyn & Couper (2006) further discuss the problem of selection bias in survey respondents, specifically web based surveys. While the NSS is intended to be offered during course time, the SSS is sent out over e-mail, which may limit the number of respondents based on out of class computer access. This analysis utilizes Stata for logistic regression, so any student that is missing information for even one variable within a model is dropped from the analysis. This causes concern regarding the reliability of results from a model which is only able to analyze between 100-200 students.

This analysis does not control for delinquency and students' home life (e.g. living alone, single parent household, number of persons within the household). Findings, such as those by Battin-Pearson, Newcomb, et al (2000) indicate deviance and home life as factors in academic problems, which in turn may factor into the decision to drop out. Future studies should include these variables in order to determine if they significantly affect program disenrollment, or are causing omitted variable bias. Another significant limitation is the lack of qualitative information. Survey information can provide a great deal of information- but without open ended questions, responses can seem more absolute, or concrete, than they actually are. Future research regarding this population hopes to include a mixed method approach with a case study design along with interview of 10-15 students.

Finally, a significant limitation of this analysis is that it only indicates disenrollment from this program. While variables identified as dropout predictors are utilized in this analysis,

disenrolling from Breaking Barriers does not necessarily mean a student will not continue with their education through a different program, a traditional high school, or after taking a break. Students who choose to disenroll from Breaking Barriers may still graduate from high school. This analysis is only able to analyze the variables predicting dropout, or an inability to complete this program, and not an inability to complete secondary studies. Information regarding student plans is not uniformly available, and the organization does not follow up with participants after they exit the program.

### **Policy Recommendations**

Because this analysis examines one organization, and subsets of one cohort of students within it, it is difficult to make broad policy recommendations. However, as the demographic composition of students who choose to disenroll from Breaking Barriers is similar to that of high school dropouts- specifically regarding higher rates of males, students of color, and low income students, recommendations benefiting those cohorts may be applicable to Breaking Barriers' students. Since academic progress through program (college) GPA was the clearest indicator of disenrollment, increasing academic achievement within at-risk and underrepresented cohorts needs to occur. This reinforces the findings of Battin-Pearson, Newcomb, et al (2000) who found academic problems to be the mediating variable in the decision to dropout, and recommended for supports to be placed in schools in the form of more extensive academic programs to better prepare students. Hugo (2001) and North and Johnson (2010) have championed dual enrollment as an academic program method of inspiring underperforming students, however what about before students become "underperforming?"

In order to minimize variations in educational attainment, better preparing students through standardizing core curriculum may be advantageous. The Common Core Standards, which have been adopted in 45 states, seek to better define English language and mathematics core curriculum and requirements ([commoncorestandards.org](http://commoncorestandards.org)). Since the standards are still relatively new, and most states have implemented them in the last three years- it is uncertain whether they will cause significant change. Better defining expectations and requirements of students and standardizing core requirements may possibly result in less variation in primary or core learning functions from region to region, or even school to school.

Early education is also an area where further exposure may benefit underrepresented students. Currie (2001) discusses the benefits of the early education program, Head Start, specifically regarding underrepresented students. She claims that in terms of a cost benefit analysis, funding the program pays for itself in terms of increased educational attainment (213-14). In a study regarding whether the benefits of early education programs last past the time of the program, Currie and Thomas (1997) analyzed whether the results of Head Start benefited students years later. They found, on average, all students benefited from the program initially, but white students were more likely to be continuing to benefit from the program years later. They deduced this may relate to the statistically likelihood of non-white students being more likely to live in “sustained poverty” (48-49). While programs such as Head Start may affect more advantaged cohorts more, this does not mean disadvantaged students do not benefit. Considering extreme poverty as an input, students receiving benefit from the program at any point may actually be a positive program outcome.

## CONCLUSION

As we continue to strive towards increased educational attainment within the United States, questions regarding the effectiveness of dual enrollment and other career/college preparatory programs will continue to be asked. While student achievement in programs serving at risk populations is often lower than similar programs serving high-performing students, program outcomes do not necessarily reflect what students obtained from the experience. Students who disenroll from Breaking Barriers and similar programs may go on to complete their high school degree elsewhere, or may not. Since this analysis looks only at the program outcomes of this particular dual enrollment program, and not whether or not students ever graduated from high school, it is not a reliable predictor of students’ future educational attainment.

While this analysis is primarily focused on educational outcomes, it also aims to address the larger question of public versus private sector provision. How much and what do we owe to students- specifically those who have not been successful in the traditional schooling setting? Although it may seem obvious that we owe each child a quality public education, how can we

control for their fixed inputs which may obstruct their ability to receive this quality education? While this analysis is not representative of all students who have dropped out or are in danger of doing so, it does indicate gaps in educational attainment exists even within groups composed only of students who have not been successful in the traditional setting. These gaps indicate additional supports need to be provided to underrepresented and at-risk students. While other social services besides education participate in aiding at-risk students and their families, strong foundations established through early childhood education, the spread of the common core standards, and a further emphasis on academic programs serving underrepresented students may be capable of reducing the current achievement gap.

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