Assessment of the

Ronald E. McNair Post-Baccalaureate Achievement Program

at Iowa State University

by

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Glossary of SYMBOLS, TERMS, VARIABLES, and RESPONSES

SYMBOLS

TRIO: A federal education outreach program that began with three programs and thus titled TRIO.

REMPAP: The Ronald E. McNair Post-Baccalaureate Achievement Program, also called the McNair Program.

CGPA: Cumulative Grade Point Average

OIR: Office of Institutional Research, at ISU

TERMS

REMPAP (Ronald E. McNair Post-Baccalaureate Achievement Program) Scholars:

Student participants of the REMPAP TRIO program at Iowa State University in Ames, Iowa.

REMPAP Qualifications:

There are four qualifications for the REMPAP. One, the student must satisfy the citizenship component; this portion is automatically attained through citizenship or registered person requirements. Second, the institution of higher education must participate in the educational Ronald E. McNair Post-Baccalaureate Program, authorized by The Higher Education Act of 1965. Third, the student must be a low-income and first generation college student, a member of a listed group that is underrepresented in graduate education, or a member of the groups found to be statistically underrepresented in certain academic disciplines. Finally, the student cannot be currently enrolled in doctoral study.

Control Students:

Control students meet the REMPAP TRIO program requirements but are not participating in the REMPAP TRIO program. In this assessment, the control sample is also referred to as the non-participatory group of students.

Discrete Variable:

A random variable that can assume a countable number of values. A dummy variable is a special case of the discrete variable, with only two possible outcomes. In this assessment, the status of female, first generation, Iowa residency, and direct from high school entrance are considered discrete variables.

Continuous Variable:

Random variable that can assume infinite values in an interval. In this assessment, the ACT score is considered a continuous variable.

Probit Modeling:

The Probit statistical modeling estimates the probability of falling into a particular category. Furthermore, Probit modeling developed when ordinary least squares (OLS) regression was shown in Collett, 1991 and Agresti, 1990 to be inadequate when the dependent variable is discrete. Thus, Probit modeling is more appropriate in the case of a response that is a binary or ordinal discrete variable.

Ordinary Least Squares Modeling:

This statistical method estimates the mean response of a population. Using one or more factors, OLS approximates the best predictors to minimize the difference between the actual and predicted responses. Regression is a form of OLS modeling and the SAS Regression procedure is a general-purpose procedure with simple modeling. There are other SAS procedures that perform regressions but PROC REG is the simplest.

Treatment Measures:

These are the qualitative benefits of the REMPAP and are only assessed to participants of the program, illustrated by the Participant variable. This REMPAP treatment variable only assumes one of two values. Zero corresponds to the Iowa State University control group and one corresponds to the REMPAP ISU participation. Additionally, REMPAP Participation has two components: Program Requirements and REMPAP Financial Assistance. Consequently, this assessment attempts to measure the composite participation effects—

composed of target opportunities and an undergraduate stipend—on the likelihood of success in graduate education for minority or poor first generation students.

VARIABLES

Federal Qualifiers:

1. Minimum cumulative Grade Point Average guideline ≥ 2.75
2. Semester Credit hours = 56

Demographics: Either/Or:

1. Either: Minority: One = Yes, I am an Iowa State University student that has Black American, Hispanic, or American Indian / Alaskan or "Approved Other" racial/ethnic background, or
2. First Generation Student: One = Yes, I am the first college student from my family and I am a low-income student.

Covariate Qualitative Controls:

1. Female: One = Yes, I am a female.
2. Iowa Resident: One = Yes, I am an in-state student, from Iowa.

Covariate Quantitative Controls:

1. ACT: The standardized test scores submitted to ISU for the ISU students participating in this assessment. When only the SAT is reported, scores are converted to ACT equivalent scores.
2. Direct High School Entrant: One is marked if the date of admission and high school date difference is ≤ 2 years.

RESPONSES

ISU Qualitative Response:

Degree: Student earned a degree from Iowa State University given sufficient time from admission (3 years) to attain the degree.

ISU Quantitative Responses:

1. Time to Graduation = Comparing those with a degree, how long did it take to attain the degree?
2. Average Number of Credits = Comparing those with a degree, what was the average cumulative credit hours per semester through to the graduation?
3. Final Cumulative Grade Point Average = Comparing all of the subjects, what was the last reported CGPA?
4. Change in Cumulative Grade Point Average = Comparing all of the subjects, what was the change in CGPA? Again, the change in CGPA is the difference between the initial CGPA earned during the first sophomore semester and the final, not necessarily senior, cumulative grade point average.

Continuation to Graduate School Outcome:

One goal of REMPAP is to improve the enrollment of specifically qualified students in doctoral programs. There is no distinction made between graduate and professional schools during this assessment. Federal guidelines for REMPAP emphasize raising minority enrollment in graduate school over professional schools such as medical and law school.

ABSTRACT

This assessment evaluates the Ronald E. McNair Post-Baccalaureate Program at Iowa State University. The program is a federal outreach initiative intended to prepare well performing low-income first generation college students and well performing underrepresented students who may be women, ethnic minority, or disabled for graduate doctoral education. Academic success is measured by the attainment of the degree, the time to graduation, the average number of credits carried through to graduation, the continuation to graduate school, the final cumulative grade point average, and the change in the cumulative grade point averages. The assessment compares Iowa State University students that chose to participate in the program and students that qualified for the program but chose not to participate. This assessment indicates that the Ronald E. McNair Post-Baccalaureate Program at ISU does not affect the attainment of an undergraduate degree, the time to graduation, the average number of credits carried and the cumulative grade point average. Despite this, the Ronald E. McNair Post-Baccalaureate Program at ISU does statistically affect the continuation to graduate school. Interestingly, the program effect on the participants that do not satisfy the federal minimum cumulative grade point average guideline is not different from the effect on those program participants that do satisfy the federal grade minimum. Thus, participation in the Ronald E. McNair Post-Baccalaureate Program at Iowa State University effectively increases the likelihood of continuation to graduate education for well-performing students.

Chapter 1.0 INTRODUCTION

Minorities in Higher Education

For centuries, access to the American higher education system has been unequal for women and ethnic minorities. From slavery to separate but equal, the American system of higher education has slowly been revised to offer more opportunity for the qualified minority student. Attempting to push the envelope beyond the times of *Brown v. the Board of Education, Topeka, Kansas* (1954), the United States Congress has funded initiatives targeting minorities in higher education. One example is the TRIO education initiative, a federal outreach program composed of eight separate education programs. One particular TRIO program is called the Ronald E. McNair Post-Baccalaureate Achievement Program (REMPAP), or McNair Program. Determining the success of REMPAP is necessary to satisfy the federal grant requirements. Consequently, the following assessment was developed to critically analyze the success of REMPAP. The assessment specifically compares TRIO REMPAP participants with similarly qualified but non-participatory students. This statistical approach is important for a true measure of the success of the REMPAP at Iowa State University in Ames, Iowa.

Historical Development of the TRIO Program

The TRIO Program was an educational outreach initiative originally composed of three programs established during the Civil Rights Movement of the 1960s in the United States. Due to the political success of the original three programs, TRIO was later expanded to include eight programs to assist the educational progress of disadvantaged students. Currently all eight TRIO initiatives are still being implemented nationwide. Each program

has a specific population target and program objective. The Ronald E. McNair Post – Baccalaureate Achievement Program is part of this historical educational program.

Two acts of Congress originally established the educational initiative. The Educational Opportunity Act of 1964 set-up the first program called Upward Bound. Offering basic college instruction, Upward Bound strives to prepare its participants for postgraduate education. The main congressional act that implemented seven of the eight educational programs was the Higher Education Act, henceforth referred to as Higher Education Act. A second program entitled Talent Search began with the 1965 passage of the Higher Education Act. This program currently targets post-elementary low-income and first-generation college students before they attend college. Talent Search offers counseling, information on college admission, and information on financial aid to these qualified students.

Succeeding reauthorization of the Higher Education Act implemented the remaining educational programs. In 1968, the third original program was established. Special Services for Disadvantaged Students, eventually renamed Student Support Services, continues to provide tutoring and counseling during college. In 1968, Upward Bound was reassigned from Educational Opportunity to Higher Education. With the end of the 1960's, three outreach programs were combined under the name TRIO for a compilation of the historical educational initiatives. Five additional TRIO programs have been established since the original three programs.

The additional five educational programs are still recognized under the TRIO Program title. The fourth TRIO outreach program implemented is named Educational Opportunity Centers. The unchanged original purpose of the Centers is to assist low-income workers in

selecting a college with a suitable financial aid package. An expansion of Upward Bound TRIO Program resulted in the development of two more TRIO programs named Upward Bound Math Science and Veteran Upward Bound. Both programs offer remedial skill development ranging from English and science to computer technology. The main difference between these two programs is found in their target population. Upward Bound Math Science targets the civilian population of low-income students whereas the Veteran Upward Bound focuses on the military personnel population.

The second most recent TRIO Program developed is the Ronald E. McNair Post-Baccalaureate Achievement Program. This program provides services designed for minority or low-income first generation college students to prepare for doctoral study that leads to college teaching. Research opportunities, mentoring, tutoring, and seminars are some of the services the McNair Program provides to its participants. The most recent TRIO program developed thus far is entitled the TRIO Dissemination Partnership program. As the name suggests, this program concentrates on the national availability and success of all TRIO programs. Specifically, institutions and agencies are given incentives to initiate TRIO programs and activities.

Distinguishable Features of the TRIO Program

The TRIO educational initiative continues to exist in the United States. TRIO maintains goals to overcome social discrimination in the American education system and to create educational opportunity for Americans but especially for first generation students with good performance records. The TRIO initiative specifically has eleven features distinguishing the TRIO programs from other counseling educational initiatives.

There are two important concepts of particular importance with the TRIO Program. First, TRIO is based on performance. Specifically, institutions implementing the TRIO program are required to satisfy the clearly defined quantitative objectives. Directors of the TRIO Programs are responsible for these measurable performance objectives if funding is to be continued. Due to the performance feature of TRIO Programs, the initiative is philosophically viewed as a permanent part of student financial aid. This requirement has resulted in a semi-stable TRIO administrative presence. Second, TRIO targets first-generation students. This specific definition of the eligible target population emphasizes the effect of non-financial barriers on educational opportunity and success. Furthermore, TRIO Programs attempt to fulfill the knowledge gap first-generation students have because their parents lack college experience.

In addition to these two key concepts, TRIO Programs can be distinguished from other educational initiatives because of the following nine distinguishing concepts:

1. *One-on-One*: By working with the students, TRIO professionals enjoy the added benefit of developing a personal relationship with participants.
2. *Built on Relationships*: Part of the effect from individualized counseling is the opportunity to build relationships with the students. This benefit is especially helpful in creating a positive climate that encourages participants.
3. *Focus on Early Intervention*: Two TRIO Programs, Upward Bound and Talent Search, target students before they leave high school. By reaching the students early, the respective programs encourage thousands of students to succeed in college.

4. *Committed to Tough Cases*: TRIO programs target poor and disadvantaged students. The programs strive to help students that lack financial resources and family support, a population that has previously received little support.

5. *Consistent and Intense*: TRIO professionals make every effort to serve and assist students. Some counselors meet students during the summer or visit students at home in order to meet the particular needs of each student.

6. *Comprehensive and Cultural*: TRIO counselors offer more to TRIO participants than traditional college counselors do. For instance, TRIO participants are encouraged to attend cultural events, receive tutoring or admission applications or participate in supplemental instruction.

7. *Based on Reality*: Many TRIO professionals come from low-income, one-parent families where neither parent attended college. Consequently, the professionals can easily relate to the obstacles in front of the TRIO participants.

8. *Based on Community*: The funding of each TRIO program is based on an assessment of the needs of the community.

9. *Non-Bureaucratic*: TRIO programs are direct grant programs. Therefore, there is no large bureaucracy when dealing with TRIO. In fact, there are fewer TRIO employees in 1996 than there were 1976.

The two essential concepts as well as the nine features distinguish the TRIO Programs from traditional counseling programs.

Political Significance of the TRIO Programs

It has been over thirty years since the first TRIO Program was established. Consequently, TRIO has earned the political respect and gained political power to persevere during periods of uncertainty. The Programs are legally secure and do not have to suffer through the policy changes of administrations. The TRIO Programs have earned the advantage of being institutionalized and stable.

New counseling programs and the consequential funding debates have led to smaller national funding increases for the TRIO Programs. Currently, the strength of TRIO has been tested by competition between non-TRIO program and TRIO program funds crisis. Advocates for the TRIO programs are discouraged by the creation and funding of new programs that duplicate the TRIO initiative. Specifically, the GEAR UP program, a program created by Pennsylvania Democrat Representative Chaka Fattah, has two of its three components duplicating TRIO Program components. While the $645-million TRIO budget is substantially greater than the $35-million GEAR UP plan, GEAR UP has received new monies to total $200-million.

Proposals are being considered to administer the new copycat educational initiatives through the historical TRIO Student Support Services Program. The advocates of these new initiatives have tried to gain funding by categorizing their new programs within the established TRIO infrastructure. Thus by including the new (unproven) educational initiatives with TRIO Programs, the new programs have a better chance of receiving federal monies. The funding of the new programs within TRIO draws on the TRIO budget. The result is fewer resources for the established TRIO Program. Despite the large budget for the

TRIO Program, the funding can assist only about five percent of the eligible population. Consequently, if successfully included in TRIO Program funding, the new duplicate programs will draw limited funding from an established educational policy initiative.

The political strength of TRIO Programs is shifting. The new Republican Congress has changed the political arena for TRIO by removing the Democratic leadership and support. With fewer personnel to research and support the TRIO initiative, the expansion of the initiative is slowing. Nevertheless, the TRIO Program has been maintained through congressional re-authorizations of Higher Education Act and its funding debates. Yet, with the current situation with demonstration programs and sharing funding, quantification of TRIO performance will be vital for future funding requests.

Biography of Ronald E. McNair

One of the many established TRIO Programs is the Ronald E. McNair Post-Baccalaureate Achievement Program. The namesake of the program is Challenger Astronaut Ronald Erwin McNair. Ronald E. McNair was a determined African-American that grew up in a poor community in the southern United States. McNair overcame poverty and excelled in many activities. Ronald E. McNair was particularly successful in his academic life. He graduated magna cum laude from North Carolina A&T State University earning a Bachelor of Science Degree in physics. Five years later, he earned his Doctor of Philosophy in laser physics from Massachusetts Institute of Technology. He was twenty-six years old at the completion of his doctorate.

Dr. McNair became a respected leader in his field. He received three honorary doctorate degrees and many fellowships and commendations for his expertise. Some of his distinctions

include being a Presidential Scholar, Ford Foundation Fellow, National Fellowship Fund Fellow, and Distinguished National Scientist. Due to the national recognition Dr. McNair earned, NASA selected him to be an astronaut on the shuttle Challenger.

The 1986 explosion of the shuttle Challenger took the life of this brilliant man. Months later, leaders of the United States developed and funded the Ronald E. McNair Post-Baccalaureate Achievement Program. The authors and supporters of the new TRIO Program hoped to encourage other young scholars with backgrounds similar to Dr. McNair to enroll in graduate study. Consequently, the new TRIO program focused on low-income, first-generation college students. With the addition of this new TRIO Program, members of Congress hope to preserve and encourage the high standard of achievement that Dr. Ronald Erwin McNair represented.

Ronald E. McNair Post-Baccalaureate Achievement Program

The Ronald E. McNair Post-Baccalaureate Achievement Program has become a national program in the United States. As of April 2002, 156 institutions have established the program. Well-known institutions in forty states, the District of Columbia and Puerto Rico have implemented the program. This education initiative is established in a variety of institutions ranging from public state universities to private schools to historically black colleges to Ivy-League universities. The purpose of REMPAP is to increase the number of minority doctorate holders. The target population is limited to low-income, first-generation college students or students from groups underrepresented in graduate study. Specifically, Congress has specified that two-thirds of the participants must be both low-income and first-

generation college students. Key components of the REMPAP include the mentoring from faculty, summer internships, financial support and research opportunities.

Literature Review

According to the Biennial Evaluation Report for Fiscal Year September 1993 through September 1994, REMPAP had no planned studies scheduled. The TRIO Program initiative is characterized by a performance analysis component. In fact, Government Performance and Result Act is one legislative act passed in 1993 that requires periodical reports to Congress. Specifically, the performance indicators for the REMPAP are:

1. McNair participants will complete undergraduate programs at rates higher than comparable non-participants will.
2. McNair participants will enroll in programs of study at the graduate level at rates higher than comparable non-participants will.
3. McNair participants will earn doctorate degrees in various disciplines, including the fields of mathematics and science, at rates higher than comparable non-participants do.

Despite this performance review requirement, the national body of literature specifically addressing REMPAP is sparse. At this time, the 156 institutions with McNair programs on site need to begin analyzing the performance of REMPAP scholars in accordance with the federal requirements.

A useful paper examines the REMPAP at Rutgers, the university for the state of New Jersey[1]. According to Earl Thomas, the author, the continuation rate of the REMPAP at

Rutgers is very encouraging. Specifically, "twenty-four of the 26 REMPAP Scholars who completed the program and earned their baccalaureate degrees were admitted to graduate school and 23 of the 26 program graduates, or 88 percent, were enrolled in graduate school as of September, 1994 (page 25)." Surely, a portion of the strength of the Rutgers REMPAP program may be attributed to the supportive academic environment. "Rutgers has a strong commitment to educating first-generation-college and minority youth and ranks as one of the country's top institutions in the successful recruitment, admission, and graduation of minority students. The University is committed to increasing its enrollment of minority graduate students as well. Rutgers faculty, moreover, have demonstrated a commitment to serving low-income, first-generation, and minority students (page 1)." The actual statistical effect of the culture at Rutgers is not specifically measured in the descriptive assessment of its REMPAP.

Moreover, the Rutgers paper lacks critical components of a well-designed assessment. The Rutgers analysis did not include a control group in which to anchor the measurement of success. It would seem logical that REMPAP participants would indeed be more likely to continue on to graduate school since REMPAP is targeting that population. The variables of interest are confounded in the paper because of this selection bias. The area of interest should have been compared to REMPAP-qualified students that also had the option of continuing their education. Also, what constituted "demonstrated a commitment?" What exactly were the recruitment, admission, and graduation rates and trends at the Rutgers location? Consequently, the environmental assessment could have been improved with quantitative review of the baseline statistics at Rutgers. These adjustments would have

positively affected the design of the study and consequently improved the validity of the Rutgers study.

The Iowa State University student environment has being continuously evaluated and has resulted in conflicting evaluations. For example, one attitudinal survey, conducted and reported by Elaine Walker, investigates several qualitative factors affecting the retention and graduation rates of black students at Iowa State University[2]. Walker interviewed ninety-five out of 125 black freshmen admitted in 1984. She included descriptive comparisons as well as Chi Square analysis of categorical variables of interest. Using degree attainment as her measure of success, Walker's conclusions included that: black Iowa State University females were more successful than black ISU males, out-of-state students were more successful than were Iowa residents, and students with higher ACT scores were more successful than students with lower ACT scores. The Office of Institutional Research (OIR) completed a an institutional student profile for June 1987 that considers similar cohorts for ISU student retention and graduation rates. The specific area of contention involved the residency success rate. According to the OIR, "Iowa resident students are more likely to persist and graduate from ISU than students from other states (page 1)[3]." Additionally, the OIR profile cites ACT composite scores of incoming freshman to be the best predictor of success at ISU. Walker's study suggests that for black freshmen, the best indicator for success is a mixture of ACT scores, high school ranking, and grade point averages. Such discrepancies could be expected, since methodologies, target population, and the timing of studies differed.

Other research results from both of these studies can be generalized. First, retention and graduation rates for ethnic minorities and men are lower than rates for whites and females.

Second students with higher ACT scores were more likely to continue and graduate from ISU. Interestingly enough, the OIR study found that ISU women are twice as likely to graduate in four years than ISU men are.

The Walker study takes these results further by addressing qualitative factors contributing to the success or lack of success at ISU. Based on her telephone interview with the study subjects, Walker's statistical analysis includes multiple categorical factors of influence such as family relations, participation and leadership duties with campus organizations and activities, faculty and staff interactions, housing arrangements and race relations. Most of the specific recommendations for ISU made by Walker describe the TRIO initiatives in general and the REMPAP specifically. Next are six statements linking Walker's recommendations to TRIO and REMPAP. First, institutional commitment to retaining and graduating black students is a TRIO and REMPAP objective. Second, providing institutional support systems is a TRIO objective. Third, developing outreach programs obviously aligns with TRIO and REMPAP objectives. Fourth, immediately mentoring black freshmen is one of the many concepts within the TRIO initiatives. Fifth more black professors is a direct goal of REMPAP. Finally, increased funding for the Office of Minority Student Affairs is not directly associated to TRIO or REMPAP. Interestingly enough, the Walker study was completed in 1992 and ISU became a REMPAP institution three years later in 1995.

No specific evaluation that is available to the public has been done at Iowa State University addressing a quantitative study of TRIO Programs generally or the REMPAP specifically. Issues of ISU student retention and graduation, however, have been investigated as well as the qualitative success of the ISU Ronald E. McNair Post-Baccalaureate

Achievement Program. There is a need to fill the body of knowledge concerning the REMPAP at Iowa State University. This assessment attempts to investigate the quantitative measurements of criteria associated with REMPAP. The focus of this assessment is to study the paths students take after completing undergraduate study at ISU. Originally, the assessment was unable to directly access the data necessary to evaluate graduate school attendance for the subjects. Consequently, a major portion of this assessment studies reliable measures of success regarding undergraduate preparation for graduate school. Finally, however, data on continuation to graduate school was obtained to assess the graduate school patterns for former ISU subjects that have already earned their degrees. Thus, although the bulk of the measures of success were necessarily drawn to the success of the subjects during undergraduate schooling, one evaluation of graduate school outcome is measured. Nonetheless, the conclusions are specific to the ISU location in Ames, Iowa.

Iowa State University

In January of 2001, Iowa State University was an institutional participant of four TRIO Programs. Dr. Jane Agyman administers the Upward Bound, Talent Search, and the Student Support Services TRIO programs. Dr. George A. Jackson administers the McNair Program.

With the receipt of a grant in the fall of 1995, ISU implemented REMPAP to increase the number of students from low-income and minority families successfully completing graduate study. The original director of REMPAP at ISU was Dr. Jackson and he was still the director of REMPAP at ISU on May 2002. Dr. Jackson's budget for the ISU REMPAP has increased from $190,000 in the 1995 school year to $228,700 in the 2000 school year. The REMPAP is of political and educational interest because it is primarily a post-

baccalaureate preparation program for low-income first generation students at Iowa State University.

Assessment

This assessment studies the success of REMPAP at Iowa State University. Specifically the interest is students participating in the program compared with students that qualified to participate but did not actually participate. The continuation rate of REMPAP at ISU will be analyzed for a comparative success rate. Ultimately the question at hand is this: Does REMPAP encourage retention of minority students in higher education to further pursue graduate study leading to college teaching?

Endnotes

[1] Thomas, Earl Preston. (1994). Taking the First Steps toward Graduate Education: A Report on the Ronald E. McNair Post-Baccalaureate Achievement Program. October. U.S. New Jersey.

[2] Walker, Elaine Patterson. (1992). Factors that contribute to black students retention and graduation at Iowa State University. Iowa State University Dissertation; Ames, Iowa.

[3] Bergmann, Robert C. (1998). Student retention and graduation rates: 1986-1996 entering students. Office of Institutional Research. August 28. Ames, Iowa.

Chapter 2.0 METHODOLOGY

Assessment Objectives

One goal of this assessment is to provide a template for future quantitative analyses of other collegiate Ronald E. McNair Post-Baccalaureate Achievement Program. Secondly, this assessment should explore expanding the initiatives for REMPAP to Iowa State University and the U.S. Congress. More importantly, this study—within a well-design statistical framework—will assess the success of REMPAP at the Iowa State University location.

Sample

There are four groups of students studied in this assessment. Two of the four groups are of students that have graduated or left Iowa State University. One group is composed of participants in REMPAP that have graduated or left the college while a second group is composed of qualified non-participants that have graduated or left the college. The remaining two groups are of students that are still enrolled as undergraduates at ISU. The third group is composed of current undergraduate REMPAP scholars and the fourth is composed of qualified undergraduate non-participation ISU students.

The population of REMPAP scholars consists of every student that enrolled in the TRIO REMPAP program at Iowa State University. The REMPAP treatment sample, however, only evaluates the REMPAP scholars from the 1995 initiation of REMPAP at Ames, Iowa to Spring 2001; this treatment sample is further restricted by data collection errors. The identification data for this treatment group is obtained through the REMPAP Office at ISU. The treatment sample can be divided into two subject groups—REMPAP students still at ISU

and REMPAP students no longer at ISU. Similarly, there are two control groups. These control subjects were randomly drawn from a database of students that fulfill the REMPAP qualifications but did not select to participate with REMPAP at ISU from the Fall Semester of 1995 until the Spring 2001 semester. To ensure a sufficient comparison sample, the control group is approximately 4.4 times larger than the treatment group. Specifically the entire database consisted of 450 subjects. The entire sample is also subdivided according to measures of success.

Measures of Success

The goal of REMPAP is to increase the number of doctorates earned by under-represented student groups. Success at graduate school is predicated on completion of a degree and academic success at the undergraduate level. Thus, this assessment also analyses several measures of undergraduate success to assess the effect of REMPAP. Does the REMPAP student have a higher probability of earning a degree than the control group? How long did it take to earn that degree? How many credits, on average, were taken during the period of earning the degree? How do REMPAP scholars compare regarding final cumulative grade point average? In addition, relative to an initial cumulative grade point average, how does REMPAP affect the change in cumulative grade point average? Finally, do REMPAP participants continue on to pursue graduate education more than the control group? The names of the six measures of success are DEGREE, TIME, CREDITS, FINAL GPA, CHANGE IN GPA and GRADUATE.

Due to data limitations, analyses of the different measures of success require different subsets of the sample. The DEGREE sample addresses the question: Does the student have a

degree from ISU, given sufficient time to earn the degree? This sample only contains observations of subjects having sufficient time to have earned a degree from ISU. The "sufficient" time is set at three years from the time of sophomore status attainment. By which time a student has earned thirty or more semester credit hours. This DEGREE sub-sample excludes subjects that have insufficient time to have completed a degree. The subjects with less than three years since sophomore status are omitted from this sample.

The TIME sub-sample is a subset of the DEGREE sub-sample; it is the sub-group from the DEGREE sample, composed only of the group from the DEGREE sub-sample that actually earned a degree from ISU. The TIME sub-sample is used to address how long it took a student to earn a degree. In addition, how many credits on average were taken each semester in order to complete the degree is also compared. Thirdly, the outcome measure of success is analyzed using this sample, to evaluate the continuation to graduate school.

The last measures of success use cumulative grade point average measures. FINAL GPA compares the final cumulative grade point averages of REMPAP and non-REMPAP students. The CHANGE GPA makes the comparison of the difference in cumulative grade point averages, from last recorded CGPA to initial CGPA at thirty semester credit hours. Due to the nature of grades, all subjects had observations for these two success measures. Consequently, the observations for the grade point average samples include the same observations and the same subjects as the central, ENTIRE Sample.

Variables

The next listing names the variables used in the assessment. These factors of interest were chosen from a larger database from two departments at ISU.

ACT: The standardized test scores submitted by the subject to ISU. When only the SAT is reported, scores are converted to ACT equivalent scores.

Female: This categorical variable is marked one if the subject is self-identified as female.

First Generation Student: This categorical variable is marked one if the subject is self-identified as the first person in her or his family to attend college.

Iowa Resident: This categorical variable is marked one for Iowa residency.

Direct High School Entrant: This categorical variable is marked one if the time between the date of the high school graduation and the date of admission to ISU is two years or less.

REMPAP Participant: This categorical variable is marked one if the student self-selected into REMPAP after qualifying under the federal guidelines; and zero if not self-selected into the program despite qualifying characteristics.

Grouped Variables as Sets

The statistical method used in this assessment builds by adding sets of Covariate control variables to the model. The first set, ACT, includes one control for ability--the standardized ACT test scores. SET2 consists of more demographic variables: Female and First Generation Student. SET3 consists of miscellaneous factors, such as Iowa Residency and Direct High School Entrant.

Table 1 Variables as SETS

SET	1	2	3
Variable 1	ACT	Female	Iowa Residency
Variable 2		First Generation Student	Direct High School Entrant

Two Levels of Analysis: Overall and Qualified

It was discovered after descriptive statistics of the samples were completed, that the REMPAP treatment students did not entirely satisfy the federal guidelines, especially concerning the minimum grade point average. This discretionary enrollment into Iowa State University REMPAP introduces a multi-level analysis of the program. Initially the assessment only analyzed all of the samples by participatory grouping and success measurements, without additional blocking. After the descriptive analysis, it was determined that a second level of analysis was necessary. The *Overall Level* signifies the overall level of analysis by participation but does not separate the subjects according to the satisfaction of the federal minimum grade point average. The second level of analysis, referred to as the *Qualified Level* separates the subjects into two additional groups. Subjects that do not meet the minimum federal grade point average guideline are assigned into the Q=0 group. Subjects that do meet the federal grade point average minimum are assigned into the Q=1 group. Accordingly, there are CONTROL subjects that do not meet the federal grade point average minimum and there are CONTROL subjects that do. Similarly, there are REMPAP participants that do not meet the federal grade point average minimum and there are those that do.

Chapter 3.0 STATISTICAL MODELING

Planning the Study

The effect of participating in REMPAP is the primary interest of this assessment. Since participating in REMPAP is not an assigned characteristic, this assessment is considered a post-test comparison rather than an experiment. Furthermore, the subjects in the treatment group self-selected their participation with REMPAP and, thus, are not randomly assigned into the program. That is, each REMPAP participant wanted to be involved with REMPAP, presumably because he or she expected to benefit from the program. This fact suggests that selection bias may cloud the difference in outcomes between the REMPAP treatment and control group.

The fact that the study is an assessment simplified the three basic decisions necessary to plan a good study. First, the inquiry "What condition does the assessment target for study?" was answered with "The success of REMPAP, and exogenous variables, at ISU." Secondly, "What measurements would I make to study the condition of interest?" directed me to six measures of success. The six measurements taken to study the success of REMPAP and exogenous variables follow. One, successfully earning a degree. Two, successfully maintaining, or shortening, the time to earning that degree. Three, successfully maintaining the typical number of credits per semester. Four, successfully continuing through graduate school. Five, successfully improving the cumulative grade point average. In addition, six, successfully improving the change in grade point average. Finally, the last question regarding experimental units of the study is defined by the program's design: the subjects are students at Iowa State University during the Fall Semester of 1995 up until the

Spring Semester of 2001. These students had to satisfy the REMPAP qualifications for Iowa State University. Specifically ethnic minority and first-generation students are targeted subjects of the REMPAP at ISU.

Sampling

The criteria for sampling are initially set according to the federal guidelines. Following is a list of the federal guidelines for participation in REMPAP.

1) at least a junior status, or 56 semester credits, and

2) at least a 2.75 cumulative grade point average, and

3) first generation student with low income status, or

4) ethnic minority student in the academic program of study.

It is important to note that the third and fourth federal guidelines are *not both* necessary; instead, a low-income first generation student or a minority student in the program of study is the minimum and not necessarily a low-income first generation minority student. In addition, all participants must be citizens or permanent residents of the United States. Thus, the treatment sample group students are not randomly assigned. Rather the students that satisfy the federal criteria and have a desire to participate in REMPAP are in the treatment sample group.

The control sample was created using a stratified random sampling technique. First, the criteria for REMPAP qualification are determined and, initially, held constant. Then the treatment group is analyzed to assess its compliance with the federal guidelines. The same REMPAP qualifications are applied to non-participation student pool, thereby limiting the

population from which a control group may be drawn. The control group was drawn to match the characteristics of treatment group in terms of ethnicity, first-generation status and GPA.

With the statistical randomization, the control group numbers are established. Using the identification codes for the control group, the data corresponding to each subject is drawn from two ISU offices. The entire REMPAP group of students are 97.5% minority, 30.0% first-generation, 52.5% female, 43.8% Iowa residents, and 80% direct entrants from high school. The REMPAP group also can be statistically described as having an ACT mean of 22 and a mean age of 21. Comparatively, the subjects of the control group are less minority (40.8%), more first-generation (50.8%), slightly less female (48.9%), more Iowa residents (72%), and less direct entrants from high school (77.6%). The control group also can be statistically described with a higher ACT mean (24) and a slightly higher mean age (21.5).

The descriptive statistical analysis of the REMPAP scholars revealed that the administrators in charge of REMPAP at ISU did not strictly enforce the federal grade point requirement. Fifty-six percent of the REMPAP scholars studied met the federal grade point requirement. Some students in the treatment group earned final grades below the federal minimum. To account for this enrollment discrepancy, the grade criterion was stratified. The grade point average for control pool students extended to a final CGPA of 1.76 from 2.75. Thus, three grade strata were determined and Table 2 illustrates the grade strata for both sample groups. These three groups are the foundation of the control pool. Using a statistical package, and including these grade strata, control group students are randomly

selected within the other federal guidelines. Thus, there were three mini randomizations per grade strata for the control group selection.

Table 2 Final Sophomore CGPA Levels

Grades: Three-Strata
1.76 - 2.49
2.50 - 2.74
2.75 - 4.00

Thus, the six measures of success are modified to reflect the distortion. A group dummy variable QUALIFIED was set equal to one if the student met the strict 2.75 final CGPA federal minimum; and zero otherwise. The following Table 3 illustrates the frequency of guideline compliance according to grouping. Again, those subjects that do meet the federal cumulative grade point average minimum are reported under the QUALIFIED group equal to one, and have CGPA equal to or greater than 2.75.

Table 3 Qualified Level Analysis: Frequency of scholars

	REMPAP Group		CONTROL Group	
QUALIFIED	Frequency	Percent	Frequency	Percent
CGPA < 2.75	43	53.75	183	49.46
CGPA ≥ 2.75	37	46.25	187	50.54

Consequently, the federal grade point average guideline now introduces a separate tier of success—analysis according to *Qualified* level. Does satisfying the federal grade point average affect the success of REMPAP scholars? Do REMPAP scholars that do not

satisfy the federal grade point average benefit from REMPAP participation? These policy questions will be statistically analyzed in conjunction with six overall measures of success.

The six measures of success are DEGREE, TIME, CREDITS, GRADUATE, FINAL GPA, and CHANGE IN GPA. That is, does the student have a degree? How long did it take to earn the degree? How many credits, on average, were taken during the period of earning the degree? What is the probability of continuing on to graduate school? What is the final cumulative grade point average? In addition, finally, using the sophomore initial cumulative grade point average and the last recorded cumulative grade point average, what is the change in cumulative grade point average?

Model Development

The main variable of interest throughout the analyses is Participant, a dummy variable that equals one if the student is in REMPAP. Therefore, the first variable of the model is Participant. Next, the students' ACT score is added as a control for ability. Two other sets of variables are also added in turn. SET2 contains demographic measures including Female and First-Generation Student. SET3 includes indicators of whether the student is an Iowa resident (Iowa Resident variable) and whether she or he came direct from high school (Direct High School Entrant). The Table 4 illustrates the models by numbers and included variables. Thus, Model1 only includes the REMPAP Participant variable whereas the final all-inclusive Model8 includes REMPAP Participation, ACT scores, gender, first-generation status, Iowa residency, and Direct from high school entrance.

Table 4 Model Numbering

MODELS, Numbered with variables:
MODEL 1 = Participant
MODEL 2 = Participant + ACT +
MODEL 3 = Participant + Female + First Generation student
MODEL 4 = Participant + Iowa Resident + Direct High School entrant
MODEL 5 = Participant + ACT + Female + First Generation student
MODEL 6 = Participant + ACT + Iowa Resident + Direct High School entrant
MODEL 7 = Participant + Female + First Generation student + Iowa Resident + Direct High School entrant
MODEL 8 = Participant + ACT + Female + First Generation student + Iowa Resident + Direct High School entrant

Variable Rationales

There were numerous qualitative and quantitative data variables to select for the model development. Ability and environment effects needed to be controlled for, within reason. Additionally the limitations on the actual data available were evaluated. There were three possible variables to use for ability: Rank in High School, SAT, and ACT. The SAT scores were converted to ACT scores according to a qualified conversion chart (refer to Appendix C). The rank in high school data was tainted because the ranking order had been

reversed during the decade of this assessment. The reliability of the rankings was questionable and thus the data was not used to quantify ability. As a direct result, only ACT was used as a descriptor of ability. This estimation should be a quality estimator, according to previous ability studies, institutional and otherwise.

The other four variables were carefully selected after a general determination of usefulness, observations, and correlation comparisons. This assessment only controls for two personal characteristics. These demographics include first generation student and gender status. A correlation matrix illustrated the high relationship between minority status and first generation student. Using this relationship, minority status was not included in this set to avoid multi-colliniarity. Female was included for gender comparisons within education. Another demographic factor is age. This characteristic is controlled, albeit indirectly, in SET3 with the Direct from High School variable.

The last two factors controlled in this assessment through SET3 are only for informational interests. The success of students based on Iowa residency or the failure of students based on enrollment to college immediately after high school will be useful for mentoring programs and coaching relationships. New outreach programs can be modeled to give graduating high school seniors relevant experience before they enroll in college and to attract more students that are non-traditional once they have gained enriching experience.

Statistical Modeling

There are two statistical models utilized in this assessment. The least used model is the SAS Probit procedure. This model was applied only to the DEGREE Sample for Degree analysis and to the TIME Sample for Graduate analysis. Probit analysis is necessary due to

the type of data that is assessed for these two analyses. The categorical nature of the DEGREE and GRADUATE measures of success require a different type of analysis than that of a measure of success that is continuous. In particular, ordinary least squares cannot be used for these two measures of success because the analyses are subject to heterogeneity in the errors, this bias the estimated standard errors.

The remaining analyses are done using the simplest SAS Regression called PROC REG, which models ordinary least squares (OLS). The OLS is the simplest regression but is appropriate for continuous dependent variables. All four of the remaining success measures are continuous endogenous variables modeling one continuous and five dichotomous variables. The PROC REG SAS procedure is preferred over the other seven regression models in SAS because of its simplicity. PROC REG requires no specific model selection. In stead, a complete model is fit to the data according to the specified model.

Next, four important statistical concepts inherent in the statistical design should be addressed. First, replication of observations is an important concept to consider in the design of any statistical evaluation. Replication is the repetition of observations at exactly the same conditions and treatment levels. Unfortunately, this concept is not evident in the assessment because of the non-experimental nature of the assessment. Thus, repetition of observations is the best compromise for this assessment concerning this statistical concept.

Control of the environment is a second critical statistical concept. It is necessary to minimize systematic but unplanned variability, such as confounding and bias, that are not random and which increase in magnitude. From Model 1 of this assessment, the model development builds to a more controlled Model 8. That is, participation in REMPAP, ability,

gender, first-generation status, Iowa residency, and direct from high school entrance are all controlled in the final, all-inclusive model. Additionally the progression of control is completed in an ad hoc manner, adding participation first, then variable SET2 and then SET3, according to the combinations outlined in Table 4.

The randomization of the control group is a third critical statistical component. That is, randomization helps change unplanned but systematic variability into random chance error. This random chance error is preferable because it sums to zero rather than builds up. Lastly, a normal distribution is assumed for the distribution of the error terms. All analyses are sufficiently large enough to look like a normal distribution.

Descriptive Statistics

The sample for this assessment is analyzed according to the measures of success. It is important to remember that there are three slightly different observation sets. To begin, the total number of experimental subjects in REMPAP is eighty. There are three hundred and seventy control subjects. The mean and the standard deviation for the sample and sub-sets of this assessment are illustrated in Table 5. The means for the exogenous variables do not differ statistically when comparing the qualified to the not qualified, supporting the comparative analysis of the two groups.

Sample statistics by groups are evaluated across the entire sample and illustrated in Figure 1 and Figure 2 at the end of this chapter. It is critical to note that the ENTIRE sample of REMPAP subjects can be described as mostly minorities directly entering ISU from high school. The evident contrast follows with the CONTROL subjects that can be described as mostly Iowa residents direct from high school. Nevertheless, the provided for control group

was randomly selected using a stratified sampling computer statistical program and its representative nature was set according to the random sampling statistical program called STATA.

Table 5 Sample Means and Standard Deviations

ENDOGENOUS MEASURES	Overall Mean (Standard Deviation)	Non-Qualified Mean (Standard Deviation)	Qualified Mean (Standard Deviation)
DEGREE[a]	0.89 (0.31)	0.88 (0.33)	0.91 (0.29)
TIME[b]	4.83 (1.41)	4.88 (1.46)	4.79 (1.37)
Average CREDITS[c]	26.42 (6.80)	25.66 (6.55)	27.03 (6.96)
GRADUATE[d]	0.86 (0.35)	0.89 (031)	0.84 (0.37)
Final CGPA[e]	2.94 (0.47)	2.91 (0.48)	2.96 (0.47)
Change in CGPA[f]	0.11 (0.34)	0.09 (0.33)	0.12 (0.36)
EXOGENOUS VARIABLES	**Overall Mean** (Standard Deviation)	**Non-Qualified Mean** (Standard Deviation)	**Qualified Mean** (Standard Deviation)
Participation	0.18 (0.38)	0.19 (0.39)	0.17 (0.37)
ACT score	23.66 (4.29)	23.44 (4.27)	23.89 (4.32)
Female	0.50 (0.50)	0.45 (0.50)	0.54 (0.50)
First Generation	0.47 (0.50)	0.45 (0.50)	0.49 (0.50)
Iowa Resident	0.67 (0.47)	0.63 (0.48)	0.70 (0.46)
Direct High School	0.78 (0.41)	0.78 (0.41)	0.78 (0.42)

[a] Means calculated using the Degree Sub-Set
[b, c, d] Means calculated using the Time Sub-Set
[c, f] Means calculated using the Entire Sample

Next, delving deeper, the observations for the DEGREE Sample are descriptively compared. Moreover, only subjects that have had sufficient time to earn the degree are compared. These simple statistics are illustrated in Figure 3 and Figure 4, using two hundred and ninety-nine observations of which sixty-eight observations are from the REMPAP group. Again, these figures are at the end of the chapter. Thus as the sample becomes progressively more restrictive, from an entire assessment to a degree restriction, it is expected that the representative nature of the control group further diminishes. Again, the DEGREE REMPAP treatment group can generally be described as mostly minorities directly entering Iowa State University from high school whereas residents of Iowa directly entering from high school describes the DEGREE CONTROL group.

Finally, the subjects having successfully earned an Iowa State University degree are evaluated for the time it took to earn the degree, with Figure 5 and Figure 6 at the end of the chapter. This analysis uses the TIME sample set totaling two hundred and five observations with a REMPAP treatment group of sixty-two. For the third consecutive descriptive comparison, the REMPAP treatment group is composed mostly of minority students directly entering ISU after high school. Again, the control group is mostly Iowa residents directly entering from high school.

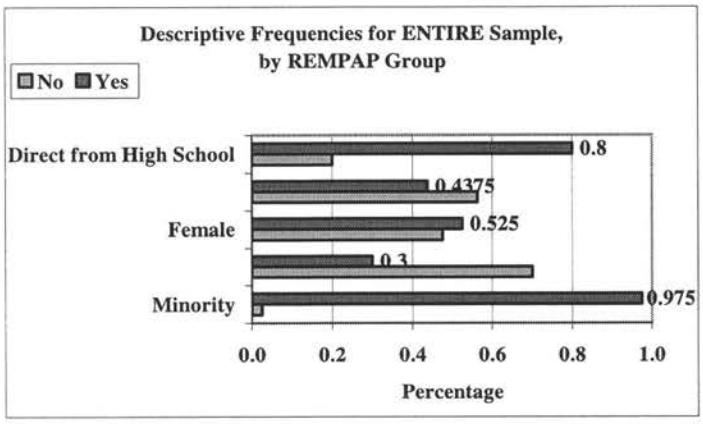

Figure 1 Descriptive Frequencies of the Entire Sample, by REMPAP Group

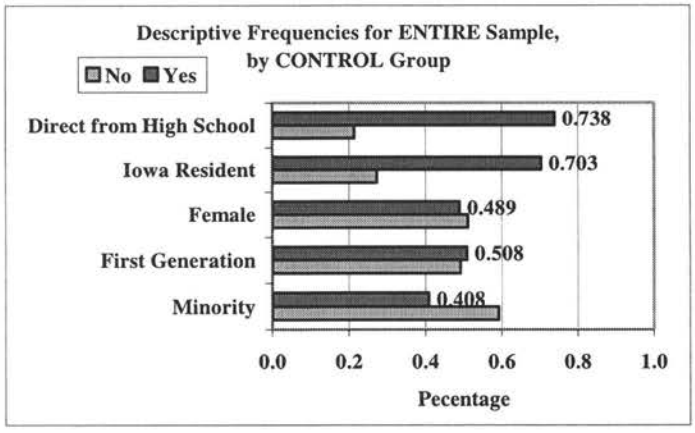

Figure 2 Descriptive Frequencies of the Entire Sample, by CONTROL Group

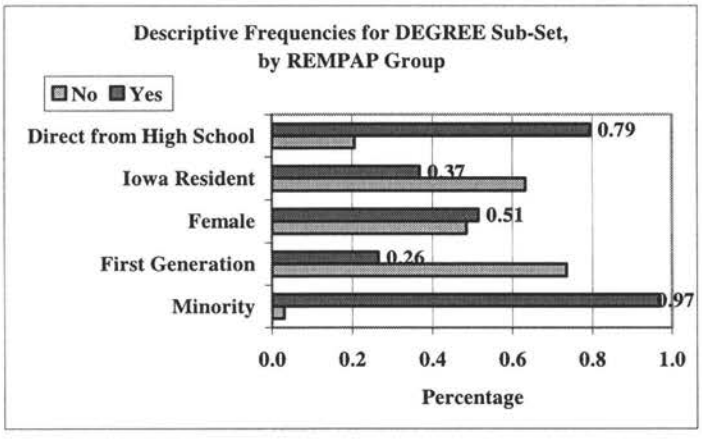

Figure 3 Descriptive Frequencies of the DEGREE Sub-Set, by REMPAP Group

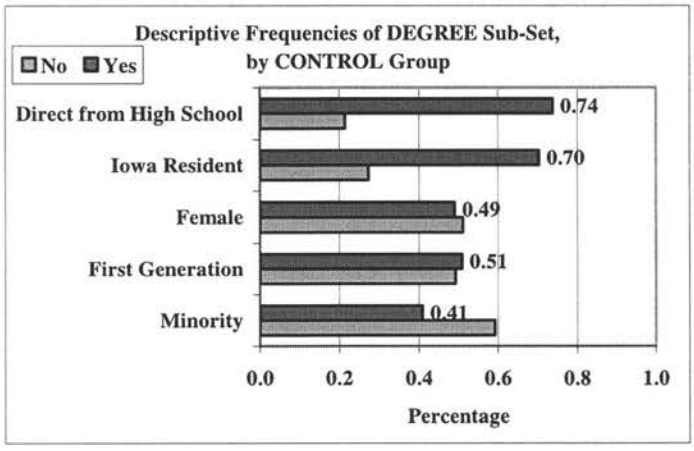

Figure 4 Descriptive Frequencies of the DEGREE Sub-Set, by CONTROL Group

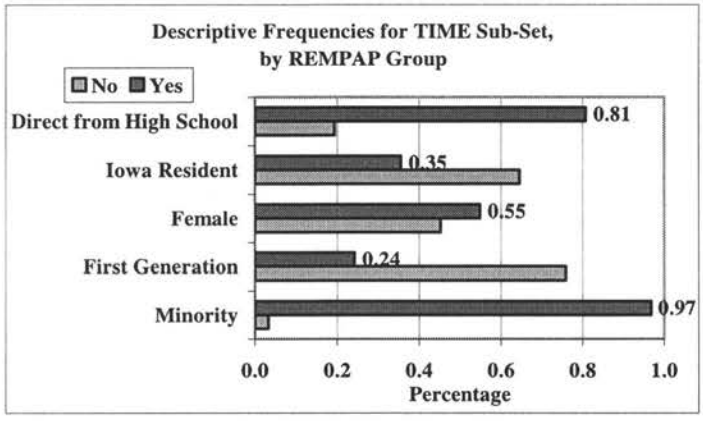

Figure 5 Descriptive Frequencies of TIME Sub-Set, by REMPAP Group

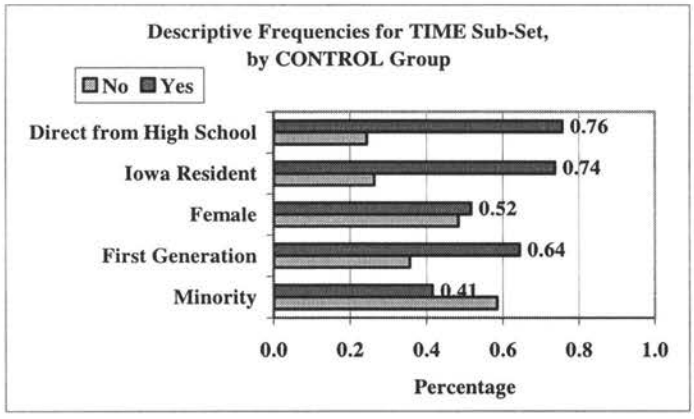

Figure 6 Descriptive Frequencies of TIME Sub-Set, by CONTROL Group

Chapter 4.0 RESULTS

This next section discusses the statistical results of the SAS analyses. The coefficient on the Participant treatment variable is of primary interest. Nevertheless, the other effects are briefly discussed, and these additional effects are presented in Appendix C Tables.

What factors affect the subjects' attainment of an Iowa State University degree?

The REMPAP participation effects from the SAS Proit analyses regarding the success of the subjects in earning a degree are shown in Table 6. Participating in the program has no significant effects on probability of attaining a degree. In other words, implementing the Probit analysis on the Degree Sample shows no statistically significant differences in graduation rates even after controlling for the treatment. Furthermore, even after separating out the REMPAP students according to compliance with the federal CGPA minimum, no significantly different changes in graduation rates are observed.

Two variables yield statistical effects on the attainment of a degree. Specifically, ACT (a qualitative Covariate control) and First Generation Students (a demographic factor) are two exogenous variables of statistical importance. The ACT variable effect is always positive and significant to the 90^{th} percentile or better. Consequently, Iowa State University students in this assessment earning higher ACT scores have an increased likelihood of earning a degree.

ACT is statistically significant at the 95^{th} percentile for students overall. When separated into the Qualified levels, the student satisfying the federal 2.75 CGPA minimum statistically has a higher probability of successfully earning a degree (0.10). While lacking

Table 6 Probit Analysis of DEGREE Sub-set: Does REMPAP affect earning a degree from ISU?

Model	Observations Overall Estimate (p-value)	Observations Not CGPA Qualified (p-value)	Observations CGPA Qualified (p-value)
Model1	299 0.14 (0.57)	137 0.34 (0.39)	162 -0.06 (0.86)
Model2	273 0.23 (0.35)	129 0.42 (0.29)	144 0.05 (0.87)
Model3	299 0.046 (0.86)	137 0.23 (0.57)	162 -0.12 (0.72)
Model4	299 0.053 (0.84)	137 0.28 0.50)	162 -0.14 (0.67)
Model5	273 0.14 (0.59)	129 0.33 (0.42)	144 -0.03 (0.93)
Model6	273 0.14 (0.60)	129 0.38 (0.38)	144 -0.05 (0.89)
Model7	299 0.001 (0.999)	137 0.21 (0.64)	162 -0.15 (0.67)
Model8	273 0.10 (0.71)	129 0.33 (0.46)	144 -0.06 (0.87)

positive statistical significance, there is no negative effect on the student not complying with the federal CGPA minimum. Simultaneously, the student not complying with the federal grade minimum does not benefit with a higher likelihood of graduation.

Turning the analysis to the second statistically significant variable, First Generation Student, the conclusions are not as optimistic. Instead, being a first generation student in this assessment decreases the likelihood of earning a degree by approximately 40% (0.07) in the overall analysis Model 5. There is no effect, positive or negative, from first generation status when the sample is analyzed according to the federal CGPA compliance levels.

Regardless of the statistical effects of the Covariate controls, the REMPAP effects on attainment of the degree are not statistically significant. Even after analyzing the sample according to federal CGPA guideline, REMPAP does not significantly change the undergraduate graduation rates.

What factors affect the subjects' time to graduation from Iowa State University?

Looking at Table 7, the REMPAP Participant coefficient is only statistically significant when not controlling for other factors. The coefficient implies that in REMPAP, shortened the stay by an estimate of about 135 days (-0.37 with a p-value of 0.07). Once other controls are added, the REMPAP effect drops in magnitude and is never significantly different from zero.

Three other variables of interest are statistically significant in the time to graduation analyses. Gender appears to have a significant effect on time to graduation. Women have decreased time to graduation by about 6.8 months (-0.57 with p-value of 0.001). In the Qualified sample analysis, there are statistically significant, negative effects for females on time to graduation. Furthermore, the females not satisfying the federal grade minimum still experienced shorter times to graduation of about 5.5 months (-0.46 with p-value of 0.05).

Table 7 Regression TIME Sample Analysis: Does REMPAP affect the time to graduation from ISU?

Model	Observations Overall Estimate (p-value)	Observations Not CGPA Qualified (p-value)	Observations CGPA Qualified (p-value)
Model1	299 -0.37 (0.07)	118 -0.29 (0.33)	147 -0.41 (0.15)
Model2	239 -0.20 (0.27)	108 -0.23 (0.47)	131 -0.13 (0.52)
Model3	265 -0.29 (0.17)	118 -0.19 (0.52)	147 -0.40 (0.19)
Model4	265 -0.32 (0.14)	118 -0.19 (0.54)	147 -0.38 (0.22)
Model5	239 -0.21 (0.25)	108 -0.15 (0.63)	131 -0.29 (0.19)
Model6	239 -0.16 (0.41)	108 -0.13 (0.70)	131 -0.06 (0.80)
Model7	265 -0.26 (0.24)	118 -0.11 (0.72)	147 -0.37 (0.25)
Model8	239 -0.16 (0.40)	108 -0.07 (0.84)	131 -0.17 (0.46)

Those females satisfying the federal grade minimum lessened their stay by 7.2 months (-0.65 with a p-value of 0.01). This significant gender effect reoccurs in Model3, Model5, Model7,

and Model8 with Female status significantly lessening the time to graduation for students overall, and for students that both satisfy and do not satisfy the federal CGPA minimum.

Two additional variables affect the time to graduation for the students satisfying the federal grade point average minimum. That is, for this qualified group, First Generation student status lessens the time to graduation whereas Iowa Resident status increases the time to graduation. These effects are not as strong as the female effect. That is, only two models suggest that first generation student status decreases the time to graduation between 4.7 and 6.5 months (-0.39 and –0.54 with p-values of 0.06 and 0.01 respectively). The final model, Model8, suggests a statistically significant Iowa residency effect. Students residing in Iowa are taking 4.72 months longer (0.39 with p-value of 0.10) to graduate. Again, these two very different variable effects are suggested only for the group of students that satisfy the federal CGPA minimum.

In sum, participating in REMPAP is shown only once to statistically affect the time it takes REMPAP scholars to graduate. Participating in REMPAP is minimally beneficial, shortening the stay by an estimate of slightly more than one semester. Again, this result is weak, lacking repetition, with only one observed significant model effect.

What factors affect the average number of credits carried during time to graduation?

This measure of success is generated from the total number of credits carried divided by the total time (in years) it took the subject to graduate from ISU with a degree. Table 8 presents the results of the participatory effect from the SAS regression. In an overall analysis, one model reported REMPAP participation effects. From Model 1, REMPAP students carried 1.74 (0.08) more credits on average than the control group.

Table 8 Regression TIME Sample Analysis: Does REMPAP affect the average number of credits carried during time to graduation at ISU?

Model	Observations Overall Estimate (p-value)	Observations Not CGPA Qualified (p-value)	Observations CGPA Qualified (p-value)
Model1	290 1.74 (0.08)	147 1.42 (0.33)	143 1.77 (0.19)
Model2	259 1.19 (0.21)	135 0.51 (0.72)	124 1.40 (0.28)
Model3	290 1.62 (0.12)	147 1.13 (0.45)	143 1.95 (0.19)
Model4	289 1.54 (0.14)	146 1.27 (0.41)	143 1.48 (0.32)
Model5	259 1.26 (0.21)	135 0.13 (0.93)	124 2.12 (0.13)
Model6	258 1.21 (0.23)	134 0.32 (0.83)	124 1.33 (0.35)
Model7	289 1.44 (0.18)	146 1.06 (0.50)	143 1.66 (0.29)
Model8	158 1.23 (0.24)	134 0.098 (0.95)	124 1.78 (0.23)

The Qualified Level Analysis did not suggest federal CGPA compliance effects. More specifically, the satisfaction of the federal CGPA minimum appears not to have statistically

influenced either qualified group. Rather, only one model in this analysis is significant at the 90 percentile. This model, however, is not significant after other controls are added.

There is only one exogenous variable that reported statistically significant effects on average number of credits carried through to graduation. Again, the Female demographic variable is statistically significant, suggesting an increase in the credits carried by females. That is, females carried 1.42 (0.09) more credits on average than males in this sample, but only according to the overall level of analysis.

Regardless of the other effects, REMPAP participation is statistically significant within this analysis of credits for only one model. That is, according to an overall analysis and without repetition, REMPAP scholars are shown to carry statistically more credits on average than the control group. When separated into Federal CGPA qualification groups, there where no additional effects from REMPAP participation.

What factors affect continuance onto graduate school for these Iowa State University subjects?

The continuance to graduate school outcome needs to be assessed to fully comprehend the effect REMPAP has on successfully increasing the number of under-represented students in graduate school. Table 9 summarizes the SAS results for the analysis of graduate school participation. The sample for this analysis includes only students that have graduated. Federal guidelines for REMPAP suggest only including non-professional doctorates as a successful graduate school outcome. This federal rule ignores the medical, legal, and other professional degrees. Furthermore, the ISU data source for this sample provided composite graduate data. That is, the measure is composed of all graduate school successes, regardless of profession or academics.

Table 9 Probit TIME Sample Analysis: Does the REMPAP Affect Continuance to Graduate School at ISU?

Model	Observations Overall Estimate (p-value)	Not CGPA Qualified (p-value)	Observations CGPA Qualified (p-value)
Model1	265 0.70 (0.0008)	118 0.91* (0.01)	147 0.62* (0.02)
Model2	239 0.74 (0.0006)	110 0.90* (0.01)	129 0.68* (0.02)
Model3	265 0.63 (0.005)	118 0.90* (0.02)	147 0.55* (0.07)
Model4	265 0.56 (0.01)	118 0.78* (0.04)	147 0.43* (0.13)
Model5	239 0.65 (0.005)	110 0.86* (0.03)	129 0.58* (0.06)
Model6	239 0.64 (0.0006)	110 0.78* (0.04)	129 0.54* (0.07)
Model7	265 0.53 (0.02)	118 0.08* (0.06)	147 0.45* (0.15)
Model8	239 0.59 (0.01)	110 0.73* (0.07)	129 0.51* (0.11)

*Note: The non-qualified significant effects are not statistically different from the qualified significant effects.

The overall analysis of the graduate school data reveals that general REMPAP participation is very important to the continuance to graduate school for the samples. It is

interesting that there are statistically significant relationships shown for the students that did not meet the federal CGPA as well as for those in compliance. That is, overall, REMPAP students not within the federal CGPA qualifications are 73% more likely (0.07) to 91% more likely (0.01) to continue on to graduate school. Students that do comply with the federal CGPA minimum have a lower probability of 54% (0.07) to 68% (0.02) associated with continuing on to graduate school.

In addition to the REMPAP ISU effects, three other variables of interest are statistically significant. Iowa resident and Direct from high school entrant both statistically effect graduate school continuance. These two Covariate effects are not repeated within the model development. Thus the Iowa resident status statistically worsens the likelihood of continuing on to graduate school but only is observed once in the overall Model 7 analysis (-0.39 with p-value of 0.08) and is not significantly different from zero otherwise. Being a direct high school entrant also statistically worsens the probability of continuance according to Model4 of the Non-Qualified analysis (-0.65 with p-value of 0.07). But, again, after controlling for the other Covariate effects, the magnitude of this effect is decreased and does not differ significantly from zero during the rest of the model developments for either analyses level.

Females, however, experience a higher likelihood of going on to graduate school that is repeated in three models. For females that do not comply with the federal CGPA minimum, Model7 indicates a 0.66 higher probability of graduating (0.10). Still, within this analysis level, the positive relationship is weakened after controlling for other combinations of the Covariate and treatment variables. Considering the qualified level of analysis

however, offers slightly more repetition of the positive statistical relationship. In Model5 and Model8, females are 0.47 and 0.50, respectively, more likely to continue to graduate school (0.09 and 0.08, respectively).

Looking back at only the REMPAP participation effects, this model development indicates the highest number of statistically significant participation effects of the six measures of success. Furthermore, in the overall analyses, all eight models indicate that REMPAP participants are statistically more likely, from 53 percent to 91 percent depending on the level of analyses, to continue to graduate school. Policy implications are suggested when considering the Qualified level analyses. The participants in REMPAP that did not satisfy the grade guideline are more likely to successfully continue on to graduate school when compared to other REMPAP scholars that did comply with the federal guideline. Consequently, the program director at ISU might be justified in the leniency placed on the federal CGPA criterion.

What factors affect the final cumulative grade point average of the Iowa State University subjects?

The next two measures of success are generated from the CGPA data on all the subjects in the assessment. The final CGPA is the last recorded C GPA for the student. The change in GPA is the difference between the last recorded CGPA and the initial CGPA recorded at the time sophomore status, or thirty semester credits, is attained. Table 10 lists the SAS regression results from an analysis of all subjects in the assessment.

This analysis suggests the most number of statistically significant participation effects, second only to the outcome measure analyses. Yet, the Participation effect is not

statistically significant in Model1. As the Covariate controls are added to the model, the statistical significance improves to better than the 90th percentile for Model 8.

Table 10 Regression ENTIRE Sample Analysis: Does REMPAP affect the final cumulative GPA at ISU?

Model	Observations Overall Estimate (p-value)	Observations Not CGPA Qualified (p-value)	Observations CGPA Qualified (p-value)
Model1	258 0.013 (0.82)	134 -0.04 (0.65)	124 0.05 (0.53)
Model2	238 0.09 (0.10)	123 0.06 (0.51)	115 0.11 (0.13)
Model3	235 0.04 (0.52)	121 -0.03 (0.74)	114 0.10 (0.21)
Model4	248 0.03 (0.61)	126 -0.03 (0.75)	122 0.07 (0.40)
Model5	222 0.11 (0.04)	115 0.07 (0.44)	107 0.15 (0.04)
Model6	235 0.10 (0.09)	120 0.05 (0.59)	115 0.13 (0.09)
Model7	234 0.05 (0.38)	120 -0.02 (0.84)	114 0.10 (0.20)
Model8	221 0.11 (0.06)	114 0.05 (0.55)	107 0.15 (0.05)

The REMPAP participation benefits the REMPAP treatment group overall. When considering the Qualified analyses, REMPAP participation effects those students that satisfy the federal CGPA minimum. Statistically significant effects are not apparent for the group of students that do not satisfy the federal grade minimum.

The strongest REMPAP participation effect, as measured by both the magnitude of the estimate and by the best p-value, is suggested in Model5 of this success measure analysis. Here, overall, the model suggests a 0.11 higher final CGPA (0.04) reported for REMPAP participants than the control group. Perhaps more important, extending the analysis, REMPAP students satisfying the federal grade minimum benefit the most, suggesting a 0.15 higher final CGPA (0.04). No REMPAP participation effects are suggested for the group not satisfying the federal grade minimum.

Looking to the exogenous effects from ACT, First Generation, Female, and Direct High School suggests statistically significant effects on the final CGPA. ACT and First Generation Student seem to suggest a positive effect regardless of the level of analysis. The ACT effects consistently indicate a 0.05 higher final CGPA effect, for the overall and both qualified levels of analyses, at better than the 99^{th} percentile of significance. The ACT effect is indicated in Model2, Model 5, Model 6, and Model 8 for this measure of success.

Similarly, first generation student status also suggests positive statistical effects on the final CGPA. First generation students not satisfying the federal CGPA minimum still earned 0.13 or 0.15 percentage points higher final CPAs (0.05 or 0.03). An effect of 0.17 percentage point's higher (0.01) or better final CGPA was reported for first generation

students that did satisfy the federal grade minimum. Overall the first generation student still benefits in this analysis with a 0.13 percentage points higher (0.004) final CGPA.

Female students satisfying the federal CGPA minimum have final CGPAs that are 0.11 percentage points higher (0.07). This effect is only observed twice under Model 5 and Model 8 for this measure of success.

The last variable of interest with a statistically significant effect on final CGPA is the Direct from High School variable. This effect is only seen in Model 8 for this analysis. Interestingly enough the students attending ISU directly from high school seem to experience lower final CGPA of about 0.87 percentage points (0.1035) compared with the "non-traditional" student that waits more than two years after high school graduation before enrolling at ISU.

Again, this measure of success suggests the second highest number of statistically significant effects for REMPAP participation. Overall, REMPAP scholars reported higher final CGPA and the significant effect repeats in four models within this analysis. Specific REMPAP effects, however, are not statistically significant for the group of students that do not satisfy the federal grade minimum. Only Qualified REMPAP students suggest an effect on the final CGPA.

What factors affect the change in GPA of the Iowa State University subjects?

Using the sophomore cumulative grade point average as the initial GPA and the last recorded GPA as the final, the change in GPA is the difference between the final GPA and the initial GPA. The last recorded CGPA poses a possible bias within this success measure. Still, the SAS REMPAP Participation effects are presented in Table 11. Similar to the final

CGPA measure of success, the entire sample of students is analyzed for the change in CGPA. Referring to Table 11, there are no statistically significant REMPAP Participation effects for this measure of success, regardless of analysis level.

Table 11 Regression ENTIRE Sample Analysis: Does REMPAP affect the change in GPA at ISU?

Model	Observations Overall Estimate (p-value)	Observations Not CGPA Qualified (p-value)	Observations CGPA Qualified (p-value)
Model1	450 0.03 (0.48)	226 0.06 (0.32)	224 0.009 (0.89)
Model2	389 0.01 (0.80)	199 0.03 (0.60)	190 -0.01 (0.92)
Model3	365 0.03 (0.48)	185 0.06 (0.32)	180 0.01 (0.91)
Model4	424 0.03 (0.51)	209 0.021 (0.74)	215 0.03 (0.62)
Model5	320 0.01 (0.74)	167 0.04 (0.58)	153 0.001 (0.98)
Model6	375 0.03 (0.51)	190 -0.016 (0.81)	184 -0.004 (0.95)
Model7	363 0.03 (0.51)	183 0.02 (0.71)	180 0.03 (0.58)
Model8	319 -0.004 (0.92)	166 -0.01 (0.84)	153 -0.003 (0.96)

Expanding the analysis to include all the exogenous variables emphasizes three statistically significant variables: ACT, Direct from High School, and Iowa Residency. Students with higher ACT scores experience negative, significant effects in the overall analysis level as well as both qualified levels of analyses. In Model 8, the ACT variable effect suggests a change in CGPA of -0.013 (0.001). The negative sign refers to a larger initial CGPA than final CGPA. This negative ACT effect is repeated across the Qualified level of analyses as well. This seems sensible to assume that better students start off with higher CGPAs, but due to the natural progression of course work, classes are more challenging and thus the grades are not as good overall.

Thus, if ability is consistently and accurately measured by an ACT composite score, students of this assessment--regardless of their compliance with the federal grade minimum--benefit from better ACT scores. It is surprising, then, to notice that the ACT negative effect for students that do not satisfy the federal grade minimum is not very different from the effect for students that do satisfy the guideline. This is, for Model8, the subjects not in compliance experience a statistically significant change in CGPA of -0.01 (0.01) while those complying with federal CGPA minimums experience a similar change in CGPA of -0.01 but at a slightly lower level of significance (0.04). Since both effects are negative are of the same magnitude, this suggests that the initial CGPA tends to be larger than the final CGPA for both qualified groups. A similar pattern for the ACT variable effect is seen in the four ACT models: Model 2 Model 5, Model 6, and Model 8.

The direct entrants from high school suggest negative significant effects on the change in CGPA. Overall, the direct entrant experiences a change in CGPA of -0.08 (0.05)

as observed in Model 6 and Model 8. The statistically significant effects for direct entrants that do not comply with the federal grade minimum are more negative by 0.02 but with the same level of significance. Again, both significant effects are negative indicating larger initial CGPA compared to final CGPA. This suggests that students complying with the federal CGPA minimum do not experience statistically significant effects from directly entering after high school.

Finally, for this change in CGPA measure of success, being a resident of Iowa seems to be statistically significant for only one group: those students that do not comply with the federal grade minimum. The largest effect, in magnitude and in statistical significance, is suggested from SAS Model 8. For this group of students, Model 8 suggests statistically significant effects in the change in CGPA of –0.11(0.04). Consequently, Iowa residents seem to start ISU with sophomore CGPAs that are higher than their last reported CGPA. This effect is weak, however, with the lack of repetition.

When considering only the REMPAP effects, there are no indications of statistically significant relationships for the change in CGPA measure of success. Rather, the statistical effects are observed only for the controls.

Chapter 5.0 CONCLUSION

Objectives

One objective of this study is to provide a template for future quantitative analysis of other collegiate REMPAP. The statistical design, particularly the control group design, is one unique feature of this REMPAP ISU assessment. A second objective of this assessment is to quantify the success of REMPAP at Iowa State University. Table 13 summarizes the statistical results of this assessment. Finally, the results from this assessment will be used to assess the potential for expanding funding initiatives of the REMPAP at ISU in Ames, Iowa.

Control Group Design

This assessment of REMPAP is unique in its statistical design because it includes a randomly selected control group of similarly qualified ISU students that did not participate in REMPAP. Although the treatment group is tainted with selection bias, the control sample is of a statistically randomized group. The literature review for this TRIO program did not suggest any other similar study on REMPAP with a control group base that has been completed. The "significant" effects of the experimental group are useless without a benchmark to gauge the strength of the effect. Moreover, knowing that REMPAP students are earning higher final cumulative GPAs is meaningless until a baseline is established with a control group comparison suggesting that the REMPAP participation effect on final cumulative GPAs is higher relative to the control group of similar students. Consequently, future quantitative analyses on REMPAP should consider including at least one control group to bolster the interpretation of the statistical results, regardless of the measures of success.

Assumptions

In addition to the unique control group feature, this assessment makes three main assumptions. First, one must assume that the methodology, particularly the measures of success, is valid. Specifically, the undergraduate degree, as well as good undergraduate grades, is necessary for admittance to graduate school. A student is less likely to apply for graduate school if she or he takes twenty years just for the undergraduate degree. It follows that taking at least the average number of semester credit hours each semester is necessary to complete the undergraduate degree in a timely manner. Further statistical design and analysis may extend the knowledge gained from analyzing REMPAP at ISU.

A second general assumption carried throughout this assessment is one of *ceteris paribus.* A Latin terminology commonly used in economics, *ceteris paribus* means "other things being equal." Thus, the assessment assumes other potential criteria affecting the factors studied are held constant throughout the assessment. This second assumption lends credibility to this assessment. It includes possible random error within the Treatment Measure for REMPAP participants and mentors, the college environment for each subject—especially the variables mentioned in the Walker study—and the self-reported student information as reported to the Office of Admission and Registrar's Office of ISU. Consequently, a more complex control design may be developed to gain more knowledge of the REMPAP ISU treatment effect that includes official financial aid data on low-income students.

The main assumption made for this assessment is that there are no unobserved factors that cause confounding in the analysis. Specifically, selection bias is restricted due to the

design of the assessment. It would seem from the change in cumulative GPA analysis that there may still be some selection error from the selection process. Yet, the federal cumulative GPA minimum suggests that this preferential selection is more than okay—it is a highly recommended. Furthermore, by randomizing the control group, the selection bias for that group is converted into random error and measurable. There is no randomization of the experimental group because of the small numbers of REMPAP participants at the ISU location. Thus, the probability of confounding is present. One must assume, to maintain the validity of the results of this assessment, that there are no unobserved factors that cause ISU students to choose REMPAP and that are correlated with REMPAP measures of success.

Future Research

It is suggested that the filing of the Free Application for Federal Student Aid be used to establish low-income compliance for REMPAP. To date the TRIO Program also has specific requirements on income that varies according to family size. This is a critical component of the REMPAP treatment composite variable. The TRIO Program requirement defines low-income as not exceeding 150% of the poverty level. Table 12 lists the maximum taxable income per family size. The values equal 150% of the poverty level as determined by the U.S. Department of Higher Education and Human Services in the 2002 issue of the *Federal Register.* The filing of the Free Application for Federal Student Aid or the self-identification of family income levels can be used to as a measure to study the financial impact of the REMPAP stipend as compared with other financial assistance.

Additionally, it is possible that the REMPAP at Iowa State University in Ames, Iowa is more successful than the program at different locations throughout the United States.

Future inquiries may be made into studying REMPAP participation success across the institutions of higher learning that have executed the federal program for a similar period.

Table 12 Federal TRIO Programs 2002 Annual Low Income Levels

Size of Family Unit	48 Contiguous States D.C., and Outlying Jurisdictions	Alaska	Hawaii
1	$13,290	$16,620	$15,300
2	$17,910	$22,395	$20,610
3	$22,530	$28,170	$25,920
4	$27,150	$33,945	$31,230
5	$31,770	$39,720	$36,540
6	$36,390	$45,495	$41,850
7	$41,010	$51,270	$47,160
8	$45,630	$57,045	$52,470
For each additional family member, add	$4,620	$5,775	$5,310

Finally, it would also be interesting to compare programs at different stages of implementation. This future assessment could fashion a statistical design to study the effect of time, financial support, office support, and community support on the success of REMPAP.

Summary of Results: Quantifying the Success of the Ronald E. McNair Post-Baccalaureate Achievement Program

In spite of the assumptions made for this assessment, statistically significant effects on the five measures of success and the one outcome measure have been suggested and summarized in Table 13. The table shows the number of times the specified control

coefficient is statistically significant for each of the five measures of success and the one outcome measure. Additionally, the letter "P" followed by one star means that the effect

Table 13 What factors of interest affect the measures of success?

MEASURE	VARIABLE Level	REMPAP Participation	ACT Scores	Female	First Generation	Iowa Resident	Direct HS Entrant
Degree	Overall	0	2P**	0	1N*	0	0
	Qualified=0	0	0	0	0	0	0
	Qualified=1	0	1P*	0	0	0	0
Time	Overall	1N*	0	4N***	0	0	0
	Qualified=0	0	0	2N*,2N**	0	0	0
	Qualified=1	0	0	2N*,2N***	1N*, 1N***	1P*	0
Average	Overall	1P*	0	1P*	0	0	0
Credits	Qualified=0	0	0	0	0	0	0
	Qualified=1	0	0	0	0	0	0
Graduate	Overall	1P**, 7P***	0	0	0	0	0
School	Qualified=0	1P*	0	1P*	0	0	1N*
	Qualified=1	3P**, 4P**	0	2P*	0	1N**	0
Final	Overall	3P*, 1P**	4P***	0	4P***	0	1N*
Cumulative	Qualified=0	0	4P***	0	2P**	0	0
GPA	Qualified=1	1P*, 2P**	4P***	2P*	4P***	0	0
Change	Overall	0	4N***	0	0	0	1N*, 1N**
in GPA	Qualified=0	0	3N**, 1N***	0	0	1N*, 1N**	2N**
	Qualified=1	0	4N**	0	0	0	0

#P Number of times of the significant positive coefficient effect

#N Number of times of the significant negative coefficient effect

* Statistically significant at the 10% level

** Statistically significant at the 5% level

*** Statistically significant at the 1% level

is positive and statistically significant at the 90th percentile whereas the letter "N" followed by one star means that the effect is negative and statistically significant at the 90th percentile. Two stars after the letter signifies significance at the 95th percentile and three stars after the letter signifies significance at the 99th percentile. Despite some statistically significant

effects, most of the control effects are not significant. Of those effects that are statistically different, most of the impact is lost when controls are added.

Recommendation for Future Initiatives

This assessment has shown the REMPAP effect at ISU is statistically strong. Overall, participating in REMPAP increases the outcome probability of continuing to graduate study. The program is especially statistically effective for continuation for Qualified REMPAP students. Meanwhile there are no statistically significant REMPAP effects for non-qualified REMPAP students. Consequently, REMPAP successfully executes an important action step to increasing the number of under-represented students with doctoral degrees. That is, by increasing the number of qualified under-represented students in graduate school, REMPAP increases the likelihood of more minorities in doctoral programs. Thus, it is important to emphasize that within the Qualified level of analysis, only REMPAP scholars that did satisfy the federal CGPA minimum are successful at continuing on to graduate school. Regardless, all the REMPAP effects in the overall model analysis developed for this outcome success measure are statistically significant.

The program, therefore, has successfully achieved one of its important strategic goals: it has statistically improved the number of underrepresented graduate students. The program has been critical in encouraging minority and first-generation students at ISU to pursue graduate education. Consequently, because of the success in statistically continuing more underrepresented students into graduate study, it is logical to continue and to expand the Ronald E. McNair Post-Baccalaureate Achievement Program at the Ames location.

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Appendix A: CONVERSION TABLE

SAT Min	SAT MAX	ACT SCORE
1580	1600	36
1530	1570	35
1500	1520	34
1450	1490	33
1400	1440	32
1360	1390	31
1320	1350	30
1280	1310	29
1240	1270	28
1200	1230	27
1170	1190	26
1130	1160	25
1090	1120	24
1050	1080	23
1010	1040	22
970	1000	21
930	960	20
890	920	19
850	880	18
810	840	17
760	800	16
710	750	15
660	700	14
620	650	13
570	610	12
520	560	11
470	510	10
430	460	9
400	420	8

Source: Concordance Between ACT Composite and SAT I - Re-centered Total Score

Appendix B: LEGEND TO TABLES

RANGE for RESPONSES

1) Degree (Yes/No)
2) Time to Graduation (3+)
3) Average Credits Carried (20+)
4) Continuance to Graduate School (Yes/No)
5) Final CGPA (1.00+)
6) Change in CGPA (0.00+)

Range for VARIABLES

1) Participant (0,1)
2) ACT [0, 36]
3) Female (0,1)
4) First Generation (0,1)
5) Iowa Residency (0,1)
6) Direct from High School Entrant (0,1)

MODELS, Numbered with variables:

MODEL 1 = Participant

MODEL 2 = Participant + ACT +

MODEL 3 = Participant + Female + First Generation student

MODEL 4 = Participant + Iowa Resident + Direct High School entrant

MODEL 5 = Participant + ACT + Female + First Generation student

MODEL 6 = Participant + ACT + Iowa Resident + Direct High School entrant

MODEL 7 = Participant + Female + First Generation student + Iowa Resident + Direct High School entrant

MODEL 8 = Participant + ACT + Female + First Generation student + Iowa Resident + Direct High School entrant

Appendix C: TABLE 1a

DEGREE Sample Analysis: What Factors Affect Earning a Degree from Iowa State University?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	0.14 (0.57)	0.23 (0.35)	0.05 (0.86)	0.05 (0.84)	0.14 (0.59)	0.14 (0.60)	0.001 (0.999)	0.1 (0.71)
ACT		0.04 (0.13)			0.05 (0.05)	0.04 (0.11)		0.05 (0.05)
Female			0.18 (0.37)		0.25 (0.22)		0.19 (0.33)	0.28 (0.18)
First Generation			-0.29 (0.18)		-0.4 (0.07)		-0.24 (0.28)	-0.36 (0.13)
Iowa Residency				-0.23 (0.32)		-0.27 (0.25)	-0.16 (0.49)	-0.17 (0.48)
Direct HS Entrant				0.12 (0.59)		0.15 (0.51)	0.14 (0.54)	0.19 (0.42)
Number of observations	299	247	299	299	247	247	299	247
Log Likelihood	-101.56	-97.19	-100.20	-100.88	-94.77	-96.24	-99.75	-94.16

Appendix C: TABLE 1b

DEGREE Sample Analysis: For Non-Qualified Iowa State University Students, What Factors Affect Earning a Degree?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	0.34 (0.39)	0.42 (0.29)	0.23 (0.57)	0.28 (0.50)	0.33 (0.42)	0.38 (0.38)	0.21 (0.64)	0.34 (0.46)
ACT		0.03 (0.39)			0.04 (0.27)	0.03 (0.39)		0.04 (0.24)
Female			0.04 (0.89)		0.13 (0.66)		0.08 (0.77)	0.19 (0.51)
First Generation			-0.41 (0.16)		-0.46 (0.14)		-0.43 (0.16)	-0.50 (0.12)
Iowa Residency				-0.22 (0.47)		-0.23 (0.47)	-0.18 (0.58)	-0.19 (0.57)
Direct HS Entrant				0.32 (0.29)		0.38 (0.23)	0.38 (0.23)	0.48 (0.15)
Number of Observations	137	121	137	137	121	121	137	129
Log Likelihood	-51.24	-51.90	-52.06	-50.04	-50.23-	-51.00	-48.80	

Appendix C: TABLE 1c

DEGREE Sample Analysis: For Qualified Iowa State University Students, What Factors Affect Earning a Degree?

MODEL *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	-0.06 (0.86)	0.05 (0.87)	-0.12 (0.72)	-0.14 (0.67)	-0.03 (0.93)	-0.05 (0.89)	-0.15 (0.67)	-0.06 (0.87)
ACT		0.05 (0.17)			0.07 (0.11)	0.06 (0.14)		0.07 (0.10)
Female			0.36 (0.22)		0.41 (0.17)		0.35 (0.23)	0.41 (0.18)
First Generation			-0.17 (0.60)		-0.35 (0.29)		-0.07 (0.85)	-0.24 (0.53)
Iowa Residency				-0.30 (0.38)		-0.41 (0.26)	-0.24 (0.53)	-0.27 (0.52)
Direct HS Entrant				-0.09 (0.80)		-0.07 (0.84)	-0.04 (0.91)	-0.03 (0.94)
Number of Observations	162	126	162	162	126	126	162	126
Log Likelihood	-47.64	-44.95	-*46.64	-47.22	-43.31	-44.28	-46.43	-43.10

Appendix C: TABLE 2a

TIME Sample Analysis: What factors Affect Time to Graduation?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	-0.37 (0.07)	-0.20 (0.27)	-0.29 (0.17)	-0.32 (0.14)	-0.21 (0.25)	-0.16 (0.41)	-0.26 (0.24)	-0.16 (0.40)
ACT		0.01 (0.51)			0.01 (0.56)	0.01 (0.55)		0.01 (0.57)
Female			-0.57 (0.001)		-0.39 (0.01)		-0.57 (0.001)	-0.39 (0.01)
First Generation			0.14 (0.43)		-0.08 (0.63)		0.10 (0.58)	-0.15 (0.39)
Iowa Residency				0.12 (0.52)		0.12 (0.49)	0.13 (0.53)	0.21 (0.25)
Direct HS Entrant				0.10 (0.63)		0.14 (0.44)	0.02 (0.93)	0.09 (0.63)
Number of Observations	265	239	265	265	239	239	265	239
r^2	0.0122	0.0077	0.055	0.0147	0.0361	0.0122	0.0565	0.0425

Appendix C: TABLE 2b

TIME Sample Analysis: For Non-Qualified Iowa State University Students, What factors Affect Time to Graduation?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	-0.29 (0.33)	-0.23 (0.47)	-0.19 (0.52)	-0.19 (0.54)	-0.15 (0.63)	-0.13 (0.70)	-0.11 (0.72)	-0.07 (0.84)
ACT		0.02 (0.40)			0.02 (0.51)	0.03 (0.39)		0.02 (0.49)
Female			-0.46 (0.05)		-0.47 (0.06)		-0.49 (0.04)	-0.48 (0.06)
First Generation			0.31 (0.19)		0.28 (0.28)		0.25 (0.31)	0.20 (0.45)
Iowa Residency				0.18 (0.49)		0.14 (0.61)	0.20 (0.44)	0.18 (0.52)
Direct HS Entrant				0.22 (0.45)		0.31 (0.32)	0.15 (0.59)	0.23 (0.46)
Number of Observations r^2	118 0.0081	110 0.0134	118 0.0556	118 0.0179	110 0.0536	110 0.0255	118 0.0632	110 0.0627

Appendix C: TABLE 2c

TIME Sample Analysis: For Qualified Iowa State University Students, What factors Affect Time to Graduation?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	-0.41 (0.15)	-0.13 (0.52)	-0.40 (0.19)	-0.38 (0.22)	-0.29 (0.19)	-0.06 (0.80)	-0.37 (0.25)	-0.17 (0.46)
ACT		-0.003 (0.89)			0.0002 (0.99)	-0.005 (0.84)		0.0005 (0.98)
Female			-0.65 (0.01)		-0.31 (0.09)		-0.66 (0.01)	-0.31 (0.10)
First Generation			-0.02 (0.93)		-0.39 (0.06)		-0.04 (0.88)	-0.54 (0.01)
Iowa Residency				0.08 (0.79)		0.17 (0.44)	0.05 (0.89)	0.39 (0.10)
Direct HS Entrant				0.02 (0.94)		-0.01 (0.97)	-0.11 (0.71)	-0.09 (0.69)
Number of Observations	147	129	147	147	129	129	147	129
r^2	0.0145	0.0034	0.0609	0.015	0.0599	0.0083	0.062	0.0787

Appendix C: TABLE 3a

TIME Sample Analysis: What Factors Affect the Average Credits Carried through Graduation?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	1.74 (0.08)	1.19 (0.21)	1.62 (0.12)	1.54 (0.14)	1.26 (0.21)	1.21 (0.23)	1.44 (0.18)	1.23 (0.24)
ACT		0.03 (0.80)			0.03 (0.80)	0.02 (0.81)		0.02 (0.81)
Female			1.34 (0.11)		0.50 (0.54)		1.42 (0.09)	0.55 (0.51)
First Generation			-0.19 (0.83)		0.24 (0.78)		-0.03 (0.97)	0.25 (0.79)
Iowa Residency				-0.46 0.62)		0.09 (0.92)	-0.54 (0.58)	-0.05 (0.96)
Direct HS Entrant				0.31 (0.75)		0.33 (0.74)	0.51 (0.61)	0.40 (0.68)
Number of Observations	265	239	265	265	239	239	265	239
r^2	0.0117	0.0067	0.0216	0.013	0.0087	0.0073	0.0237	0.0095

Appendix C: TABLE 3b

TIME Sample Analysis: For Non-Qualified Iowa State University Students, What Factors Affect The Average Credits Carried Through Graduation?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	1.42 (0.33)	0.51 (0.72)	1.13 (0.45)	1.27 (0.41)	0.13 (0.93)	0.32 (0.83)	1.06 (0.50)	0.1 (0.95)
ACT		-0.06 (0.66)			-0.04 (0.77)	-0.06 (0.66)		-0.04 (0.77)
Female			0.58 (0.62)		0.49 (0.67)		0.69 (0.56)	0.5 (0.67)
First Generation			-1.02 (0.39)		-1.4 (0.24)		-0.96 (0.44)	-1.37 (0.27)
Iowa Residency				-0.62 (0.62)		-0.37 (0.76)	-0.49 (0.71)	-0.09 (0.94)
Direct HS Entrant				0.53 (0.70)		-0.3 (0.83)	0.69 (0.62)	-0.05 (0.97)
Number of Observations	118	110	118	118	110	110	118	110
Log Likelihoods	0.0082	0.0036	0.0168	0.0115	0.018	0.0049	0.02	0.0181

Appendix C: TABLE 3c

TIME Sample Analysis: For Qualified Iowa State University Students, What Factors Affect the Average Credits Carried through Graduation?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	1.77 (0.19)	1.4 (0.28)	1.95 (0.19)	1.48 (0.32)	2.12 (0.13)	1.33 (0.35)	1.66 (0.29)	1.78 (0.23)
ACT		0.12 (0.41)			0.1 (0.51)	0.11 (0.44)		0.09 (0.53)
Female			1.88 (0.12)		0.45 (0.70)		1.92 (0.12)	0.54 (0.65)
First Generation			0.48 (0.72)		1.73 (0.17)		0.77 (0.59)	2.04 (0.15)
Iowa Residency				-0.63 (0.65)		0.15 (0.91)	-0.8 (0.60)	-0.72 (0.63)
Direct HS Entrant				0.14 (0.92)		0.78 (0.58)	0.54 (0.71)	0.96 (0.50)
Number of Observations	147	129	147	147	129	129	147	129
Log Likelihoods	0.0118	0.0139	0.0297	0.0133	0.03	0.0165	0.0327	0.0357

Appendix C: TABLE 4a

TIME Sample Analysis: What Factors Affect Continuation to Graduate School?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	0.70 (<0.001)	0.74 (<0.001)	0.63 (0.005)	0.56 (0.01)	0.65 (0.005)	0.64 (0.006)	0.53 (0.02)	0.59 (0.01)
ACT		0.009 (0.72)			0.01 (0.57)	0.01 (0.66)		0.02 (0.54)
Female			0.24 (0.24)		0.33 (0.12)		0.25 (0.22)	0.34 (0.12)
First Generation			-0.16 (0.45)		-0.26 (0.25)		-0.04 (0.86)	-0.18 (0.45)
Iowa Residency				-0.38 (0.07)		-0.25 (0.26)	-0.39 (0.08)	-0.21 (0.38)
Direct HS Entrant				-0.15 (0.51)		-0.13 (0.59)	-0.12 (0.61)	-0.08 (0.75)
Number of Observations	267	215	267	267	215	215	267	215
Log Likelihoods	-101.95	-94.09	-100.96	-100.10	-92.24	-93.31	-99.31	-91.79

Appendix C: TABLE 4b

TIME Sample Analysis: For Non-Qualified Iowa State University Students, What Factors Affect Continuation to Graduate School?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	0.44 (0.22)	0.47 (0.21)	0.33 (0.38)	0.09 (0.83)	0.32 (0.41)	0.17 (0.69)	0.24 -0.53	0.13 (0.75)
ACT		-0.002 (0.95)			0.01 (0.81)	0.004 (0.92)		0.01 (0.79)
Female			-0.04 (0.91)		0.08 (0.81)		0.66 (0.10)	0.08 (0.81)
First Generation			-0.39 (0.25)		-0.56 (0.13)		-0.43 (0.31)	-0.41 (0.29)
Iowa Residency				-0.50 (0.16)		-0.38 (0.30)	-0.38 (0.37)	-0.27 (0.48)
Direct HS Entrant				-0.65 (0.07)		-0.05 (0.92)	-0.56 (0.14)	-0.50 (0.19)
Number of Observations	119	103	119	119	103	103	119	103
Log Likelihoods	-28.63	-26.87	-28.61	-28.61	-26.59	-26.67	-28.6	-26.38

Appendix C: TABLE 4c

TIME Sample Analysis: For Qualified Iowa State University Students, What Factors Affect Continuation to Graduate School?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	0.80 (0.002)	0.85 (0.002)	0.78 (0.009)	0.63 (0.03)	0.82 (0.0007	0.74 (0.02)	0.69 (0.0.03)	0.73 (0.02)
ACT		0.02 (0.62)			0.02 (0.56)	0.02 (0.60)		0.02 (0.58)
Female			0.39 (0.14)		0.47 (0.09)		0.09 (0.73)	0.50 (0.08)
First Generation			-0.02 (0.94)		-0.07 (0.82)		0.06 (0.83)	0.03 (0.94)
Iowa Residency				-0.35 (0.21)		-0.22 (0.47)	-0.56 (0.05)	-0.23 (0.49)
Direct HS Entrant				0.12 (0.71)		0.07 (0.83)	-0.13 (0.64)	0.20 (0.57)
Number of Observations	148	112	148	148	112	112	148	112
Log Likelihoods	-69.69	-63.71	-67.88	-65.09	-60.7	-61.19	-64.21	-59.42

Appendix C: TABLE 5a

Entire Sample Analysis: What Factors Affect the Final Cumulative Grade Point Average?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	0.01 (0.82)	0.09 (0.10)	0.04 (0.52)	0.03 (0.61)	0.11 (0.04)	0.10 (0.09)	0.05 (0.38)	0.11 (0.06)
ACT		0.05 (< 0.0001)			0.05 (<0.0001)	0.05 (<0.0001)		0.05 (<0.0001)
Female			0.02 (0.64)		0.06 (0.14)		0.03 (0.48)	0.06 (0.19)
First Generation			0.13 (0.004)		0.14 (0.001)		0.16 (0.001)	0.15 (0.002)
Iowa Residency				0.03 (0.60)		0.04 (0.44)	-0.02 (0.70)	-0.01 (0.84)
Direct HS Entrant				-0.06 (0.29)		-0.09 (0.10)	-0.04 (0.42)	-0.07 (0.16)
Number of Observations	438	387	438	413	387	373	413	373
r^2	0.0001	0.1898	0.0198	0.0038	0.2168	0.19	0.0319	0.2163

Appendix C: TABLE 5b

Entire Sample Analysis: For Non-Qualified Iowa State University Students, What Factors Affect the Final Cumulative Grade Point Average?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	-0.04 (0.65)	0.06 (0.51)	-0.03 (0.74)	-0.03 (0.75)	0.07 (0.44)	0.05 (0.59)	-0.02 (0.84)	0.05 (0.55)
ACT		0.05 (<0.0001)			0.05 (<0.0001)	0.05 (0.0001)		0.04 (<0.0001)
Female			-0.01 (0.85)		0.03 (0.66)		-0.02 (0.77)	0.01 (0.88)
First Generation			0.09 (0.20)		0.09 (0.14)		0.15 (0.03)	0.13 (0.05)
Iowa Residency				-0.02 (0.80)		-0.01 (0.91)	-0.05 (0.49)	-0.04 (0.59)
Direct HS Entrant				-0.04 (0.62)		-0.08 (0.29)	-0.04 (0.65)	-0.08 (0.28)
Number of Observations	218	196	218	202	196	188	202	188
r^2	0.001	0.1832	0.0087	0.0017	0.1942	0.1819	0.0245	0.1991

Appendix C: TABLE 5c

Entire Sample Analysis: For Qualified Iowa State University Students, What Factors Affect the Final Cumulative Grade Point Average?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	0.05 (0.53)	0.11 (0.13)	0.1 (0.21)	0.07 (0.40)	0.16 (0.04)	0.13 (0.09)	0.1 (0.20)	0.15 (0.05)
ACT		0.05 (<0.0001)			0.05 (<0.0001)	0.05 (<0.0001)		0.05 (<0.0001)
Female			0.06 (0.32)		0.11 (0.07)		0.09 (0.18)	0.11 (0.07)
First Generation			0.19 (0.003)		0.19 (0.002)		0.18 (0.01)	0.17 (0.01)
Iowa Residency				0.06 (0.41)		0.07 (0.29)	0.003 (0.96)	0.01 (0.87)
Direct HS Entrant				-0.09 (0.27)		-0.1 (0.18)	-0.06 (0.45)	-0.7 (0.37)
Number of Observations r^2	220 0.0018	191 0.1982	220 0.044	211 0.0111	196 0.2513	185 0.2012	211 0.0511	185 0.2431

Appendix C: TABLE 6a

Entire Sample Analysis: What Factors Affect the Change in Cumulative Grade Point Average?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	0.03 (0.48)	0.01 (0.80)	0.03 (0.48)	0.03 (0.51)	0.01 (0.74)	-0.01 (0.88)	0.03 (0.47)	-0.0004 (0.92)
ACT		-0.01 (0.002)			-0.01 (0.002)	-0.01 (0.001)		-0.01 (0.001)
Female			0.01 (0.69)		0.02 (0.56)		0.02 (0.51)	0.01 (0.72)
First Generation			0.002 (0.96)		0.02 (0.47)		0.02 (0.52)	0.03 (0.35)
Iowa Residency				-0.03 (0.37)		-0.04 (0.31)	-0.04 (0.31)	-0.05 (0.21)
Direct HS Entrant				-0.06 (0.13)		-0.08 (0.05)	-0.05 (0.17)	-0.08 (0.06)
Number of Observations r^2	450 0.0011	389 0.0256	450 0.0015	424 0.0087	389 0.0279	375 0.0397	424 0.0107	375 0.0424

Appendix C: TABLE 6b

Entire Sample Analysis: For Non-Qualified Iowa State University Students, What Factors Affect the Change in Cumulative Grade Point Average?

MODELS *COEFFICIENTS*	**1** Estimate (P-value)	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Participant	0.06 (0.32)	0.03 (0.60)	0.06 (0.32)	0.02 (0.74)	0.04 (0.58)	-0.02 (0.81)	0.02 (0.71)	-0.01 (0.84)
ACT		-0.01 (0.03)			-0.01 (0.03)	-0.01 (0.02)		-0.1 (0.01)
Female			0.005 (0.91)		-0.001 (0.99)		0.003 (0.95)	0.0003 (0.995)
First Generation			0.01 (0.88)		0.02 (0.71)		0.02 (0.60)	0.05 (0.28)
Iowa Residency				-0.07 (0.13)		-0.1 (0.060	-0.08 (0.11)	-0.11 (0.04)
Direct HS Entrant				-0.08 (0.11)		-0.11 (0.05)	-0.08 (0.12)	-0.11 (0.05)
Number of Observations r^2	226 0.0044	198 0.0292	226 0.0046	209 0.0268	198 0.0299	190 0.0684	209 0.0282	190 0.0744

Appendix C: TABLE 6c

Entire Sample Analysis: For Qualified Iowa State University Students, What Factors Affect the Change in Cumulative Grade Point Average?

MODELS	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
COEFFICIENTS	Estimate (P-value)							
Participant	0.01 (0.89)	-0.01 (0.92)	0.01 (0.91)	0.03 (0.62)	0.001 (0.98)	-0.004 (0.95)	0.03 (0.58)	-0.003 (0.96)
ACT		-0.01 (0.04)			-0.01 (0.04)	-0.01 (0.03)		-0.01 (0.04)
Female			0.02 (0.69)		0.04 (0.37)		0.05 (0.31)	0.03 (0.54)
First Generation			-0.004 (0.94)		0.04 (0.47)		0.02 (0.73)	0.01 (0.89)
Iowa Residency				0.02 (0.75)		0.03 (0.60)	0.01 (0.78)	0.03 (0.65)
Direct HS Entrant				-0.02 (0.67)		-0.04 (0.49)	-0.02 (0.78)	-0.04 (0.55)
Number of Observations	224	191	224	215	191	185	215	185
r^2	0.0001	0.0232	0.0008	0.0022	0.0298	0.0293	0.0076	0.0314