A Comparative Analysis of Success by Project Level Characteristics in the Upward Bound Program

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(Abstract)

Data gathered by Mathematica Policy Research, Inc., contractor for the Department of Education were used to analyze successful project level characteristics of the Upward Bound program. Mathematica Policy Research, Inc. provided two data files for this study: a student data file and a grantees data file. The first data file includes information from a nationally representative sample of students who applied to the Upward Bound program between 1992 and 1994 and were assigned to either the Upward Bound group or a control group. The second data file included information from a random sample of Upward Bound project grantees.

Both the student and grantees data files were used to create a design to determine Upward Bound project level characteristics that highly correlated to student success. The project level characteristics that were examined included project setting (location, size and host institution), academic characteristics (student-staff ratio, course offerings during the summer and academic year, and the number of years a project has been in operation) and student characteristics (gender, race/ethnicity and employment). The student success measures used in this study included grade point average, total high school credits earned, Advanced Placement credits earned, high school dropout status and graduation status.

Findings from this study suggest that Upward Bound projects with lower student to staff ratios and fewer academic year course offerings have students earning more high school credits and more student graduating from high school.

In addition to academic characteristics, ethnicity seem to be related to the success of projects. When compared across project settings, projects from two-year rural colleges and four-year public suburban colleges have the most successful students.

DEDICATION

Dedicated

to

my wonderful

family and friends

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CHAPTER 1
INTRODUCTION

Individuals with college degrees have higher income and lower unemployment rates than individuals without college degrees (Gladieux & Swail, 2000). In fact, it is estimated that a 1992 high school graduate with a college diploma will earn $600,000 more over a lifetime than one with only a high school degree (U.S. Department of Commerce, 1993). Empirical data support that educational level is strongly related to occupational attainment (Fitzgerald, 1985). Historically, individuals from low-income families are less likely to attend college than are individuals from wealthier families (Gladieux & Swail, 2000). As part of the War on Poverty initiative, President Lyndon B. Johnson signed the Economic Opportunity Act in 1964. The legislation gave rise to the Office of Economic Opportunity and its Special Programs for Students from Disadvantaged Backgrounds. The first program initiative was the Upward Bound program, created to help disadvantaged students prepare for college (McElroy, 1998). Two other programs were launched, the Student Support Services and Talent Search initiative, thus, giving rise to the name “TRIO” given to refer to these three programs (Blake, 1998). The Upward Bound program is part of a long-term national effort to help disadvantaged students pursue and complete a postsecondary education (Myers & Moore, 1997).

College administrators, civic leaders and politicians have expressed growing concerns that the number of African Americans who have applied to colleges has decreased. Major reasons for the drop in applications and acceptance are due to increased tuition costs, the number of minority households below the poverty level, a deemphasis on affirmative action, and continued differences between African American and white high school students’ academic preparation and performance (Oliver & Rowland, 1987).

Based on longitudinal studies of high school seniors by the U.S. Department of Education, students who finish college are the ones who are best

prepared to enter the workforce (U.S. Department of Education, NCES, 1997). Regardless of ethnicity, income or financial aid, students who are prepared are more likely to succeed. Success in post-secondary education is influenced by several factors, including prior schooling and academic achievement, the rigor of courses taken in secondary school, cultural and family motivation, attitudes and awareness of opportunities. The ability to pay gives the student access to college, but being well prepared is key to success (Gladieux & Swail, 2000).

Currently, there are 772 Upward Bound projects serving approximately 56,564 students nationwide (www.ed.gov/offices/OPE/HEP/recentfunding.html). The program targets students with financial need who are potentially first generation college students. At least two-thirds of each project's participants must be from households that have low income (under 150 percent poverty level) and in which neither parents has graduated from college. The other one-third must be either from low-income households or potential first generation college students. Other requirements for participating in the program include being between the ages of 13 and 19, having completed the 8th grade and having a need for academic support to successfully pursue a program of postsecondary education. In addition to these requirements, Upward Bound participants are selected on the basis of recommendations from teachers, counselors and social agencies (Myers & Schirm, 1999).

Typically, the Upward Bound program is targeted to students at the beginning of their high school year (generally in the 9th grade) and continues to support the students until they enter college. About 90% of the Upward Bound participants enter Upward Bound during the 9th or 10th grade. Of that group, about 35% remain in the program until high school graduation (Myers & Moore, 1997).

About 60% of the participants are black, 20% are white and 12% are Hispanic and 8% other. Girls outnumber boys in the program. Girls comprised about 60% and boys about 40% of the participants in the Upward Bound program. Over three-quarters of the project participants meet both the low-income and the first-generation requirement. In most cases, the other

participants have met at least one of the requirements. The proportion of low-income, first-generation students, and both low-income and first-generation students may vary slightly from project to project (Myers & Moore, 1997).

The project level characteristics of the Upward Bound program also vary from project to project. The projects may have differences in setting aspects such as host type, location and the size of project. In addition, there may be academic characteristic differences such as course offerings during the summer and academic year, student-staff ratio, and the number of years that project has been in operation.

Most Upward Bound projects are hosted by a two-year or four-year college institution. Upward Bound projects vary in location, as they may be located in rural, suburban communities, small, medium or large cities. The Upward Bound projects usually serve between 61 to 99 students; however, about one-fifth serve fewer than 60 students and another one-fifth serves more than 100 students. The bulk of the projects in the Upward Bound program have been in operation for more than 10 years. In fact, more than half of the projects have been in operation for more than 20 years. The average student-staff ratio is 15 or 16 to 1 during the academic year and 4 or 5 to 1 during the summer. However, the average is different from project to project. Though almost all projects provide a six-week summer enrichment program for their students, the length of the academic year-round program varies among projects. The number of course offerings among the projects also varies considerably. Most provide a highly structured curriculum with electives and major academic disciplines including English, math and science. In addition, nonacademic courses such as physical education and speech are provided. About 80% offer at least one computer course and 66% offer at least one social science course. The course offerings of the projects vary more considerably during the academic year, where one-fifth of the projects offered no courses. In these projects, tutoring, counseling and other services are provided instead of formal course offerings (Myers & Moore, 1997).

Research studies have indicated that when student academic achievement is examined, whether measured by standardized achievement scores, course credits earned, graduation or college enrollment, several factors account for variance in student success, where success is defined differently across studies (U.S. Department of Education, NCES, 1997). Most studies include SES (socioeconomic status), ethnicity, gender, IQ (Intelligence Quotient), and parent's level of education as major factors that account for student success. Of these factors, most studies show that SES, ethnicity and gender, by far, account for most of the explained variance in student success (Meyinsee and Tashakkori, 1994).

The Upward Bound population is typically much more homogenous than the general school population, particularly in terms of ethnicity, SES and parent's level of education. Therefore, differences in academic success for this group are more likely to be explained by project differences than student differences. When considering projects with students of similar ethnicity and SES background, what characteristics make one project more successful than the other? Fashola and Slavin (1998) suggested that it would be interesting to compare the academic achievement of Upward Bound students at two-year institutions to those that attended four-year institutions. They argued that community colleges, many of which are two-year institutions, often have funding problems. This may result in fewer services and not providing the six-week summer program. A closer look at the projects, particularly the academic and project setting characteristics, should help explain additional variance in student success.

Based on studies of effective schools, research indicates that several school-based characteristics are related to student success (Horn and Chen 1998). These include smaller class size, longer school days, and incorporating a diverse curriculum that includes technology courses. In addition, how long the school has been in operation is also an indicator of an effective school. Studies relating each of these variables to school success will be detailed in Chapter Two. Because operations in the Upward Bound projects are similar to the

schools, school-based characteristics that are related to student success should apply to the Upward Bound program.

Given that project settings may vary by the type of host institution (2 year or 4 year college), location (rural, suburban community, small, medium and large cities) and the size of the program (small, medium and large), it is reasonable to expect that there would be differences in the project academic characteristics among these individual projects. The following questions will be addressed:

- How do academic characteristics (student-staff ratio, course offerings and years project in operation) differ by project setting?
- How does student success (grade point average, course credits earned, Advanced Placement credits earned, drop out status and graduation status) differ by the project setting?
- What is the relationship between the project setting and the student characteristics?

National data gathered by Mathematica Policy Research, Inc., contractor for the Department of Education to evaluate the Upward Bound program, were used to answer these questions and test hypotheses in this study. The data include two follow-up studies that were done for the 1995 summer session, 1995-1996 academic year and the 1996 summer session. In its study, Mathematica Policy Research, Inc. used a nationally representative sample of students who applied to the Upward Bound program between 1992 and 1994 and were assigned to either the Upward Bound group or a control group. All students completed an initial baseline questionnaire before they were assigned to a group. The baseline questionnaire included information about their family backgrounds, and the students' own attitudes, expectations, and school experiences. In addition to the student baseline questionnaire, Upward Bound grantees were given a questionnaire on project operations and staffing for the 1992-1993 year. Questionnaires for the student participants and project grantees were collected through the Horizons' National Study of Upward Bound, done by Mathematica Policy Research, Inc. (Myers & Schirm, 1999).

The data collected by Mathematica Policy Research, Inc. can be examined to determine the patterns of academic characteristics, student characteristics and student success across different project settings. Given the goals of Upward Bound, success could be defined as staying in the program, graduating from high school and attending college. However, due to the nature of the data provided by Mathematica Policy Research, Inc., grade point average, course credits earned, Advanced Placement credits earned and high school graduation were used to determine success. High school dropout was also used to determine success in the Upward Bound projects. Projects with fewer students dropping out of high school are considered more successful.

Chapter Two will provide a detailed literature review of the Upward Bound program, studies on effective characteristics of schools and programs, and factors affecting student success. Chapter Three will provide details about the methodology and analyses that were done for this study. Results of the data analyses will be presented in Chapter Four. Chapter Five will provide a discussion of the findings and present conclusions.

CHAPTER 2
REVIEW OF LITERATURE

This chapter will provide an overview of the literature related to the history, development and current status of the Upward Bound Program. In addition, a literature review of recent studies on class size, instructional time and student characteristics will follow.

Upward Bound Program

The Upward Bound program has been in existence for over 30 years to help economically disadvantaged students prepare for college. In the early 1960's, several well-publicized studies focused attention on the poor academic preparation and low educational attainment of low-income youths. As a result of these concerns, the creation of major federal education programs began as part of the War on Poverty (Myers & Schirm, 1999). In 1964, Congress passed and President Lyndon B. Johnson signed the Economic Opportunity Act. The legislation gave rise to the Office of Economic Opportunity and its Special Programs for Students from Disadvantaged Backgrounds, also known as the nation's TRIO (McElroy, 1998). The name TRIO stands for the three federal programs: Upward Bound, Talent Search and Special Service for Disadvantaged Students. The goal of Talent Search was to provide counseling and information service for low-income, college bound students. Special Service for Disadvantaged Students was directed to nontraditional college students, providing them with programs such as counseling, remediation, and cultural enrichment (Hixson, 1982). The first TRIO initiative was the Upward Bound program, created to help disadvantaged students prepare for college. With the passage of the Economic Opportunity Act, the launching of 18 pilot Upward Bound programs was authorized (McElroy, 1998). With the initiation of the other two programs, the Student Support Services and Talent Search initiative, the "TRIO" name was developed (Blake, 1998). By 1968, the original TRIO programs had been created. Also in 1968, Upward Bound was switched out of

the Office of Economic Opportunity and into the Office of Higher Education (Wolanin, 1996).

Program Description

The Upward Bound program is part of a long-term national effort to help disadvantaged students prepare for a postsecondary education by providing them the skills and motivation necessary for success. In other words, the program aims to help disadvantaged youth to graduate from high school, enter a postsecondary institution and complete their degrees. The initial goal of Upward Bound was to assist disadvantaged students complete high school and enroll in college. The goals of Upward Bound later included assisting students to successfully complete their college program. The strategy of Upward Bound is to select a group of economically disadvantaged high school students with academic need and engage them in a comprehensive, multi-year program of academic assistance, counseling, mentoring and cultural enrichment (Myers & Moore, 1997). Once enrolled in the Upward Bound program, students receive academic assistance, tutorials, and mentoring after-school and on Saturdays during the academic year. Other services provided to students include instruction in study skills, academic or personal counseling, tutorial services, informational sessions with respect to financial assistance in college and career explorations. Many Upward Bound projects help students prepare for the Scholastic Aptitude Tests (SAT) and help students with college applications (Fashola & Slavin, 1998). In addition, during the summer, students participate in a residential program at a postsecondary institution, allowing the student to simulate the college experience. These residential programs are usually eight weeks long. During this time, students attend classes in academic buildings, live in residential halls, and enjoy the amenities that the campus has to offer (Myers & Moore, 1997).

Current Programs and Funding

For the fiscal year 2001, there were 772 Upward Bound projects in operation throughout the United States (www.trioprograms.org). Together, these Upward Bound projects were serving approximately 56,564 students nationwide. In terms of financial allocation, the Upward Bound program is the second largest federal program in the Department of Education budget. Only the Student Financial Aid program is larger. In 1999, the Upward Bound funding was $220,500,637 and in the year 2000, the Upward Bound funding was $249,650,137. The average award for each project was $323,381 (www.ed.gov/offices/OPE/HEP/trio/upbound.html).

Selection of Upward Bound Participants

The program targets students with financial need who are potentially first generation college students (Myers & Schirm, 1999). First generation students are individuals who are the first in their families to attend a postsecondary institution. Often this includes individuals with parents who may have attended college, but who have no college degrees of any kind. According to the Congressional Legislation set forth for Upward Bound, at least two-thirds of each project's participants must be from households that are low income (under 150 percent poverty level) and in which neither parents has graduated from college. The rest of the participants must meet at least one of the criteria (Balz & Esten, 1998). See Table 2.1 for income requirement to participate in the Upward Bound program (www.ed.gov/offices/OPE/HEP/trio/incomelevels.html).

Table 2.1: Federal TRIO Programs 2000 Annual Low Income Levels[a]

Size of Family Unit	48 Contiguous States, including D.C.	Alaska	Hawaii
1	$12,525	$15,645	$14,385
2	$16,875	$21,090	$19,395
3	$21,225	$26,535	$24,405
4	$25,575	$31,980	$29,415
5	$29,925	$37,425	$34,425
6	$34,275	$42,870	$39,435
7	$38,625	$48,315	$44,445
8	$42,975	$53,760	$49,455

[a]The poverty guidelines were published by the U.S. Department of Health and Human Services in the Federal Register, Vol.65, No. 31, February 15, 2000, pp. 7555-7557.

Other requirements for participating in the program include being between the ages of 13 and 19, having completed the 8th grade and having a need for academic support to successfully pursue a program of postsecondary education. In addition to these requirements, Upward Bound participants are selected on the basis of recommendations from teachers, counselors and social agencies. Students with educational and/or emotional problems are usually screened out of the program. That is, students with prior history of disciplinary problems or low academic motivation are usually not accepted to the program. Most students who are accepted in the Upward Bound program generally have a "C" average (Myers & Schirm, 1999).

Recruitment of student participants for the Upward Bound program takes place primarily at their high schools. These high schools are also known as "target schools." Principals, teachers and guidance counselors identify and nominate potential candidates for the Upward Bound program. Typically, the Upward Bound program is targeted to students at the beginning of their high school year (generally in the 9th grade) and continues to support the students until they enter college. About 90 percent of the students enter Upward Bound during the 9th or 10th grade. Of that group, about 35 percent remain in the program until high school graduation (Myers & Moore, 1997).

A large part of the Upward Bound program is to provide students with remediation and enrichment through instruction in reading, writing, math, and other core subject areas. Within the past 20 years, the academic drive of Upward Bound instruction has intensified greatly. For many of the Upward Bound projects, students are required to complete at least six courses each year, usually comprising of reading, writing, math, and science. Eighty percent of the projects require students to complete at least six courses. Since the last major evaluation of the Upward Bound program by Research Triangle Institute in 1979, many of the Upward Bound projects have made academic enrichment, rather than remediation as their primary instructional objective. In fact, more than 66% of the projects focus on instruction rather than on remediation. Regardless of the instructional objective, all Upward Bound projects must provide instruction in

math (through pre-calculus), laboratory science, foreign language, literature and composition (Myers & Moore, 1997).

Students in Upward Bound attend, on average, 274 sessions. Of the 274 sessions, about 179 sessions are devoted to academic and the other 95 sessions are devoted to nonacademic, such as counseling, SAT preparation, and skills development. Two-thirds of these sessions take place in the summer, while the rest are during the academic year (www.ed.gov/offices/OUS/eval/higher/upward3.html). In total, students spend, on average, 433 hours over the full year in the Upward Bound program (http://nces.ed.gov/pubs/96230.html).

Oversight of the Upward Bound Program

The National Evaluation of Upward Bound contracted to Mathematica Policy Research, Inc. is the largest national study of its kind, documenting the program's current operations and providing an assessment of the program's effectiveness. The last major study of the Upward Bound Program sponsored by the federal government was in mid-1970's conducted by Research Triangle Institute (RTI). Between 1973 and 1978, the RTI study revealed important issues regarding various areas of operation in the Upward Bound Program. These issues included policies for recruitment and selection, sustaining student participation in the program, academic instruction provided to the students, and assistance in the student transition process from high school to college (Myers and Moore, 1997). The National Evaluation of Upward Bound performed by Research Triangle Institute and Mathematica Policy Research, Inc., deals with the public policy component of the program. The study provides politicians and individuals in the public policy field with the needed information to develop policies regarding the Upward Bound program. This includes federal appropriations and funding, policies and regulations, program operations and eligibility (Bergeron, 2001).

In addition to the National Studies of Upward Bound, there is also the oversight component of the program, which is the responsibility of The

Department of Education, Office of Federal TRIO Programs. The major component of the oversight process consists of monitoring of projects for grant renewals. To be eligible for grant renewals, individual projects must submit an application provided by the Department of Education (application form 645.31). Based on the application, a project may earn a total possible score of 100 points. In addition, preexisting projects may earn an additional 15 points for prior experience, resulting in a total possible score of 115 points. The more points a project earns, the higher the likelihood of receiving funding. The applications submitted are examined by a peer review board, consisting of nonfederal employees. These individuals may include teachers, college professors, community members and other stakeholders that may have a vested interest in the program (Bergeron, 2001).

Usually, grants provided for individual projects are good for up to four or five years. In addition to overseeing the grant renewal process, the Department of Education, Office of Federal TRIO Programs is also responsible for reviewing individual student data of Upward Bound participants, and examining the paper reports provided by the grantees. Other responsibilities of the department include providing technical support, program monitoring, grant distributions and logistic management for the Upward Bound projects (Bergeron, 2001).

Program offices for the Upward Bound Program administer the individual projects by allocating money to the individual projects, monitoring their performance and also making sure projects are running smoothly. Site visits are limited due to inadequate human resources. Ideally, site visits by the Department of Education should occur at least once during the grant period, though this does not occur in all projects (Bergeron, 2001).

Class Size and Instructional Time

The following section will provide an overview of literature on successful school characteristics including class size and instructional time.

Class Size

Class size is the pupil/teacher ratio in a classroom. In the 1993-94 school year, the average class size for public school teachers was significantly larger than for private school teachers (www.nces.ed.gov). The average class size for teachers in the public elementary schools was 24 students, compared to 22 students in private schools. The difference was even larger in the secondary level, where public schools averaged 24 students and private schools averaged 19 students. Teachers from public schools with a high minority enrollment (20 percent or more) had larger class sizes than teachers with low minority enrollment (www.nces.ed.gov).

The controversy over class size has been an on going educational and political issue. In fact, the issue of class size has been debated for centuries. Class size has been traced back to the Babylonian Talmud, where the maximum size of each bible class was specified to 25 students (Finn and Achilles, 1999).

Many studies have been done on the reduction of class sizes in the American public schools (Achilles, 1997, Bordon and Burton, 1999, Viadero, 1995, and Goettler-Sopko, 1990). Proponents of class reduction argue that smaller class sizes allow teachers to individualize instruction, spend more time with the students and allow teachers to improve discipline. With small classes, teachers will have more energy, interest and have greater opportunities to provide more care and attention to their students. Classroom management is more effective in smaller classes, allowing teachers to spend time with each student and keep better track of their progress. Furthermore, smaller classes will provide teachers with greater opportunities to provide a wide variety of instructional strategies, techniques and implement learning activities that can only be applied to small classes. Smaller classes will also increase the morales of teachers, which in turn would improve their classroom instruction (Bennett, 1987). Achilles (1997) also echoed the positive benefits for having smaller class sizes. Arguing for reducing class size, Achilles suggested that smaller classes allows improved classroom conditions that promote opportunities for students to participate, learn, and achieve socially and academically.

However, opponents to class reduction argued that reducing student to teacher ratio does not necessarily improve classroom instruction. Furthermore, they suggested that reducing classes to the optimal size would drain funds that can be used in other ways to improve instruction such as providing schools better facilities, computers and newer equipment, investing in technology and attracting quality teachers (Jones and Gilman, 1993).

In a classic meta-analysis study of class size on student achievement, the Far West Laboratory for Educational Research and Development demonstrated the positive relationship between reduced class size and student achievement. The studies examined by the Far West Laboratory for Educational Research and Development were dated back to 1900 and included more than 900,000 students. Based on 80 studies and over 700 comparisons of achievement for small and large classes, results show that as class size increases, student achievement decreases. In contrast, when the class size falls below 20 students per teacher, student achievement increases. Although class size affects all subject areas, reading and math achievement are most affected by size. Also, the relationship between class size and student achievement is stronger in the secondary level (Glass and Smith, 1978).

In another study (Goettler-Sopko 1990), class size was measured with respect to reading achievement. With the use of effective teaching techniques, reducing the class size will improve academic achievement. In particular, smaller class sizes seem to result in higher achievement among economically disadvantaged students. In addition, students with lower academic ability also do better in smaller classes. Small class sizes not only improve academic achievement, but also improve student attitudes.

A study from the San Juan Unified School District indicated that the reduction in the numbers of students in freshmen English classes resulted in significant academic gains and that students earned better grades. The sample in the study included 1,924 students and used the CTBS/4 achievement test results, student grades, and both student and teacher surveys. As a result of class reduction, the median CTBS/4 Reading Comprehension Scores for the 9th

graders increased from 67 to 73. Also, there were 3% fewer D's and F's and an increase of 5% in A's and B's. In addition, there were indications that student involvement increased (Housden, 1992).

Finn and Achilles' (1990) findings indicate significant benefit to students in reduced-sized classes in both reading and math. Students who were in smaller classes for two years benefited in terms of improved performance on standardized reading and math tests and also the passing rates for curriculum-based tests. Furthermore, Finn and Achilles provided evidence in their studies that minority students benefit from smaller class environment, particularly when using curriculum-based tests as the learning criteria. For example, in the SAT reading scale, small-class advantage for white students is 8.6 points, compared to 16.7 points for minority students.

Even though class size in the Upward Bound projects is discussed in the context of secondary education, the research study on Project STAR is worth mentioning. Project STAR (Student Teacher Achievement Ratio) is a four-year longitudinal study conducted in Tennessee of class size reduction on student achievement in the early elementary grades. In the Project STAR study, a total of 2,837 student records from different class sizes were analyzed. The purpose of the study was to prove to legislatures that students perform better in smaller class sizes. Results from Project STAR indicated that small classes benefit all students, especially minority students and hard to teach students. Having small classes also benefited both parents and teachers, allowing closer interaction with the students. In addition, students in smaller classes were less likely to be held back than students from larger classes. The study provided data showing STAR students performed better on all evaluation measures (Achilles, 1998).

More than 6,000 students in 329 classrooms participated in the first year of Project STAR. These students represented 79 schools and 46 districts. Students in the study were randomly placed in either a small class or a regular class. The small classes consisted of 13 to 17 students. Regular classes consisted of 22 to 26 students. These regular sized classes may have a full-time teacher aide assigned to the participating school. The children in the study were

kept in the experimental conditions for four years, from kindergarten through the third grade. Students were then followed up from the fourth grade through the seventh grade. Students in small classes were compared with students from the regular classes. The groups were compared based on both norm-referenced and criterion-referenced achievement tests that were administered at the end of the school year. The Stanford Achievement Test (SAT) battery was administered to students from kindergarten to third grade annually. The Comprehensive Tests of Basic Skills were administered to students in subsequent grades, starting with grade four through the seventh grade. The cross-section analyses of achievement were analyzed using nested ANOVA and MANOVA models. The researchers found that smaller classes improved teaching conditions, improved student learning behaviors, improved student performance during and after the experimental years, resulted in fewer classroom disruptions and discipline problems, and fewer student retentions (Finn and Achilles, 1999).

Project STAR was the largest and longest experimental study on the effects of small class sizes on students learning and development. The project eventually became a two-phased study. The first phase studied the gains of children in smaller class sizes. Although statistically significant gains in student achievement were found by the end of Project STAR, researchers launched a second study to determine if the documented gains from Project STAR would last. This project became known as the Lasting Benefit Study (Viadero, 1995). The objective of this project was to track students who participated in Project STAR during the early grades (from kindergarten to third grade) and their return to normal size classes beginning in the fourth grade. The Lasting Benefit Study compared academic achievement of fourth-grade students based on the Tennessee Comprehensive Assessment Program (TCAP) test battery. Results from the Lasting Benefit Study showed that students who were in smaller classes from kindergarten to third grade continued to outscore their peers who had been in the larger classes. The benefits were not only observed in reading and math, but students who were in smaller classes also outscored their peers in social studies, science and other subjects (Viadero,1995).

In another study of Project STAR, Bain and Jacobs (1990) found that class size is a significant factor in achievement of kindergarten students. This particular study also used the Stanford Achievement Test (SAT) to measure academic achievement of students in their subsequent grades. The smaller kindergarten classes in this study resulted in higher achievement among almost all students. In particular, students of low socioeconomic status benefit the most from smaller classes.

Not all studies indicate a positive relationship between class size and achievement. Borden and Burton (1999) examined class sizes in introductory college courses including Finite Mathematics and Introduction to Sociology at Indiana University-Purdue University from 1992 to 1997. Analyses were conducted to determine class size cutoff points and student performance in these college introductory courses. The students' performances in these courses were compared across different size sections, controlling for student background characteristics. Analyses were conducted to compare student academic achievement in large and small sections. Students from small and large classes were compared based on their course grade and whether they enrolled in a subsequent course. Results indicated that section size had a very modest effect on student's grades and course completion rates. In fact, there was no direct effect on subsequent course taking due to the size of the course section. Data analyses also suggested, though there is negative impact of larger courses among lower ability students, the impact was minimal and not consistent across courses. Although this study contradicts the results of the STAR project and suggested that class size has minimal effects on student achievement, this is based on college students taking college level courses. Class size seems to have a greater impact on students in elementary education than on college students.

A study by Hallinan and Sorensen (1985) found that classes where teachers employed whole-class instruction, class size has no significant effect on instruction. The study included 347 college students, comparing 12 sections; 6 classified as small and 6 classified as large. Students in larger classes that

employ whole-class instruction perform equally well to students who are in smaller classes that employ whole-class instruction.

Based on the literature review of class size, there are some conflicting findings on the effect of class size on student achievement. However, the majority of the studies involving students in the primary/elementary level (grades kindergarten through six) indicate that younger students are more affected by class size. In contrast, studies involving college students taking college level courses suggest that college students are less affected by class size. There is still controversy, particularly in the primary/elementary level, over the benefits of reducing the student to teacher ratio and the cost that impinges on this type education reform.

Instructional Time

Since the 19th century, the amount of time students spend in class has remained relatively the same. Most schools adopt the six-hour day and the nine-month calendar, the same schedule that was made to accommodate farm life many years ago. Students generally do not attend school during the three summer months. According to Symond, several studies have shown that the summer break is actually harmful for many minority and lower income students. It is during that time that students are least engaged in educational experiences. In fact, most of the gap between low-income students and high-income students is attributed to summer vacations. Students who are deficient in their grade level should spend more time in school. Unfortunately, cost is a significant factor for not extending the school year for students who need it. Furthermore, the idea of extending school through the summer has not been very well received by teachers, parents and students. Evidence has shown that more hours in the classroom per day can be beneficial for students who are below grade level and who need remediation (Symonds, 2001).

Brekke (1990) argues the need to improve instruction by increasing instructional time to year round. Contrary to popular beliefs, Brekke suggested that the nine-month school calendar and the summer break scheduled in the

American public schools are not deeply embedded in the educational system. In fact, the school schedule has changed through time, responding to the needs of the nation. A problem with lengthening the school year is that states do not provide funding. One possible solution is to continue school year round, but, adding three or four shorter vacation periods throughout the year, instead of one long summer break.

Student Characteristics and Academic Success

Much research has been done on the relationship of academic success to student characteristics. SES (socioeconomic status), ethnicity, gender, parent's education and employment are among student characteristics that have been studied with relation to academic success.

Socioeconomic Status

Numerous studies have shown that there are statistically significant correlations between socioeconomic status and aspirations towards academic achievement, standardized test scores, high school graduation, and college enrollment. Children from a family of lower socioeconomic status are more likely to drop out of high school and are less likely to attend college than students from high socioeconomic status families (Erkstom, Goertz, Pollack and Rock 1986). In addition, these children are more likely to lack basic academic skills and are more likely to have repeated a class. Children from low socioeconomic status families have an increased likelihood of being employed while in school, which often affects their education. This is especially harmful if the number of hours per week becomes excessive, which would negatively affect academic success (National Commission on Children, 1991).

According to the Department of Education (1999), students from low-income families are more likely to drop out of high school or not attend college than students from high-income families. Many of these students who are not successful in school are predominantly children from low-income families, living in underdeveloped urban areas or in sparsely populated rural areas, and who

have attended ineffective elementary and secondary schools. Students from low-income families who do enter college generally attend institutions that are less financed, and their graduation rate is significantly lower than their more advantaged counterparts (www.ed.gov/offices/OPE/AgenProj/report/theme1a.htlm).

Low-income students are generally less prepared for college success than high-income students. In 1992, only 21 percent of students coming from families with incomes of less than $25,000 were highly qualified for admission to a 4-year college. In contrast, 56% of students coming from families with incomes above $75,000 were highly qualified for admission to a 4-year college (www.ed.gov/offices/OPE/AgenProj/report/theme1a.htlm).

According to data from the National Center for Education Statistics (NCES 1999), students from low-income families are less likely to enroll in college by October after completing high school than are students from high-income families. In 1996, only 49 percent of the students from low-income families enrolled in college compared to 78 percent of the students from high-income families (see Table 2.2).

Table 2.2: College Enrollment by Income in October after Completing High School[a]

Year	Low-Income (bottom 20%)	Middle-Income (60% in between)	High-Income (top 20%)
1976	39	41	63
1986	34	49	71
1996	49	63	78

[a]Source: U.S. Department of Commerce, Bureaus of the Census, Current Population Survey, October (1976, 1986, 1996)

Students from low-income families are more likely to attend less competitive colleges than students from high-income families. Because many minority students, particularly blacks, come from low-income families, they tend to attend less selective college institutions. Hearn (1985) conducted a study to determine whether minority, female, and low-income students are disproportionately attending less selective and lower-cost colleges and universities. In the study, data from 1,608 students from the High School and Beyond survey of graduating seniors in the class of 1980 were used. Results showed that students from low-income families and blacks were more likely to attend less selective colleges. Low-income students are also more likely to attend low-cost colleges and universities. Although blacks attended less selective colleges, there was no statistically significant correlation for blacks attending low-cost institutions.

Other studies also show the importance of SES in predicting student achievement. A study by Meyinsee and Tashakkori (1994) asked whether 8th graders' performance in standardized math tests could be predicted from a variety of variables, including SES, gender and race. Using data from the National Education Longitudinal Study of Eighth graders (NELS: 88), a sample of 9,000 students from the data set were selected for the study. They found that socioeconomic status in 8th grade was the best predictor of math performance in high school.

Mortenson and Wu (1990) conducted a study to determine the educational attainment of young adults from different family income background, also using the 1980 High School and Beyond data files. They found that the rate of baccalaureate degree attainment on time for individuals from family incomes of less than $7000 per year in 1980 were about 20.8% compared to 46.2 percent for individuals from families with an annual income of at least $38,000 a year. Regardless of ethnicity or gender, there is a strong relationship between family income and graduating from high school on time (that is, graduating from high school by the time the person is 18-24 years of age).

Race/Ethnicity

Students from an ethnic minority background have a higher dropout rate than white students. Blacks and Hispanics have lower grades than white students (Erkstom, Goertz, Pollack and Rock, 1986). The relationship could be mediated by socioeconomic status, because blacks and Hispanics often come from low-income households. Minority children are more likely to live in poor households, often with single-parent families. Their parents tend to have a below average educational level and come from lower quality schools. Ethnic children are also prone to encounter discrimination and prejudices at school. The value systems of the families of these ethnic children may also conflict with the American culture (National Commission on Children, 1991).

Based on research of ethnic minority students, language barrier is often a contributor to poor performance. That is, students whose first language is not English tend to have lower achievement. This is due to several possible reasons. Most prominent is perhaps because ethnic students are hesitant about talking in the classrooms and participating in class. These students are less likely to ask questions or seek clarification. Parents of these students are usually not fluent English speakers themselves and therefore, can only provide very limited assistance to their children (National Commission on Children, 1991).

With respect to academic achievement, a significant gap still exists between white and black students. When comparing reading performance by race, white students score significantly higher than black students at all age levels. Based on 1996 data from NCES, white students scored on average 29 points higher than black students at age 17 (see Table 2.3).

Evidence of the achievement gap among minority students is shown in the SAT (Scholastic Assessment Test) where white students scored significantly better than black and Hispanic students in both the verbal and mathematical sections. During the 1997-1998 school year, white students averaged 526 in the verbal section and 528 in the math section. In comparison, black students averaged 434 in the verbal section and 426 in the math section. Hispanic

students average 461 in the verbal section and 466 in the math section (see Table 2.4).

NCES also compared high school drop out rates between whites and other minority groups. Based on 1998 data, black students are almost twice as likely to drop out of high school than are white students. Hispanic students are more than three times as likely to drop out of high school than are white students (see Table 2.5).

Table 2.3: Average Reading Performance (Scaled Score)[a]

	White			Black		
	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17
1992	218	266	297	185	238	261
1994	218	265	296	185	234	266
1996	220	267	294	190	236	265

[a]The reading performance scale has a range from 0 to 500.
Source: U.S. Department of Education, National Center for Education Statistics, (1997, revised in 1998) NAEP 1996 Trends in Academic Progress (NCES 97-98)

Table 2.4: Scholastic Assessment Test Averages by Ethnicity[a]

	Ethnicity		
	White	Black	Hispanic
	SAT-Verbal		
1986-87	524	428	464
1996-97	526	434	466
1997-98	526	434	461
	SAT-Mathematical		
1986-87	514	411	462
1996-97	526	423	468
1997-98	528	426	466

[a]Possible scores on each part of the SAT range from 200 to 800.Source: U.S. Department of Education, National Center for Education Statistics, Digest of Education Statistics, 1999, Table 134, page 148.

Table 2.5: Percent of High School Dropouts among Persons 16 to 24 Years Old by Ethnicity 1994-1998[a]

	Ethnicity		
	White	Black	Hispanic
1994	7.7	12.6	30.0
1995	8.6	12.1	30.0
1996	7.3	13.0	29.4
1997	7.6	13.4	29.3
1998	7.7	13.8	29.5

[a]Source: U.S. Department of Education, National Center for Education Statistics, Digest of Education Statistics, 1999, Table 108, page 127.

Other studies that compared students by race indicated that white students outperform black students in all subject areas. Capraro and Capraro (2000) conducted a study of 180 students from the National Educational Longitudinal Study of Eighth Graders (NELS: 88) to determine whether 8th graders' performance on standardized mathematics tests could be predicted from a variety of variables, including gender, race, socioeconomic status and previous grades in mathematics. They found differences among racial and ethnic groups. And even though white students outperformed both Hispanic and black students, the largest gap was between white and black students.

Dulaney and Banks (1994) looked at the racial and gender gaps in academic achievement by studying students in North Carolina's Wake County Public School System. They compared the End-of Grade (EOG) test scores among groups by race/ethnicity, income, and gender. They found that black students scored much lower than white students. More than half of the black students scored in the Levels I and II (lower scores) on the 1993 EOG. In comparison, only 20% of the white students scored in the Levels I and II of that same test. Socioeconomic status also correlated with scores on the EOG, where students from high-income families tended to do better than students from low-income families. The study also found that black students were more likely than white students to come from low-income, single-parent household families. However, even when socioeconomic status was controlled for, there were still statistically significant gaps between blacks and whites in their test scores.

Not all studies suggested that ethnicity is directly related to academic achievement. In a study by Shulz (1986), student drop out rates were compared using several factors including reading achievement, entry age (age of enrollment), gender, and ethnicity. The reading achievement was based on the Iowa Tests of Basic Skills scores given during the eighth grade. The study was based on a sample of 98,000 Chicago public high school students who were enrolled between 1978 and 1980. Loglinear and multiple regression were used to determine the association between student attributes and the dropout rates. Findings showed that high school dropouts are higher in Hispanic and black

students with low reading achievement than all other students. But when reading achievement and age were controlled for, the dropout rate for whites was comparable to blacks and Hispanics.

Gender

Over ten years ago, "women still trail men in their participation in mathematics and related fields" (National Science Foundation, NSF, 1988). Reasons for the significant gap back then between boys and girls include the limited involvement in learning opportunities, low achievement and lack of interest in math by girls (Oakes, Guiton, Selvin, and Karoly, 1990). For many girls, completing only the minimal mathematics courses required for graduation is common, thus, explaining in part, the gender differences in math (Sadkar, Sadkar, and Klein 1991).

Over the last several decades, research on gender has been bountiful. Earlier research indicated that there were still gender differences in math and science achievement. However, most recent research has indicated that the gender gap had significantly minimized and many of these differences have all but closed. Only a limited number of studies suggest that there are still large differences between boys and girls in math and science achievement.

Some studies (Sadkar, Sadkar and Klein, 1991, Han, 1993, Thorndike-Christ, 1991) have shown that the differences between boys and girls in academic achievement and aspiration are more evident in math and science than in any other subjects. Much of the research indicated that girls and boys perform equally well in math and science at the elementary level. However, by high school, the gap between the boys and the girls becomes significant with respect to performance and aspiration in math and sciences.

Other studies (Caporimo, 1990, Coladarci and Lancaster, 1998, Capraro and Capraro, 2000) suggest that there is no difference in academic achievement between boys and girls, especially after socioeconomic status, ethnicity and parents' education are controlled for. The following studies reflect the continued

disagreement between researchers on the gap between gender academic achievement.

According to Sadkar, Sadkar and Klein (1991), the shortcomings of girls in math are results of years of bias in self-esteem, attention, and test results. Though often inadvertent, teachers, parents, and other adults encourage girls to avoid math and sciences. More encouragement is given to the boys to succeed in math and science and to choose careers in those fields. Girls, on the other hand, are taught to speak quietly, be passive and even yield to the boys. During grade school, there is no difference in math achievement between boys and girls. However, by high school, girls on average perform significantly lower in math than boys (Sadkar, Sadkar and Klein, 1991). A study by Catsambis (1994) also suggests that girls do not lag behind boys in math until high school. It is in high school when the gap between girls and boys is distinguishable. They believe that the equity in math achievement in the early grades is not due to the girls' interest in math, but the school's placement and course requirements. Unlike in secondary education, where the number and type of math courses are often selected by the student, elementary schools generally place students within the same track.

Han (1993) studied gender differences on the English and mathematics American College Testing (ACT) scores. Both course taking and course grades were controlled for. The sample was from 5,100 Illinois students who took the ACT during the 1989-1991 academic year. Forty-four percent of the sample were males and 56% were females. Analysis of variance was used to compare both course-taking pattern and course grades to study gender differences. General linear model was used to examine the relationship of the independent variables in the design. The findings show that mathematics scores differed across gender. Males with moderate math backgrounds performed better on the mathematics ACT than the females with comparable background. However, females in the 11th grade with equal math backgrounds performed slightly better than their male counterparts in the 11th grade.

Less recent studies (Thorndike-Christ, 1991) also suggested that there were gender differences in mathematics. In her study, Thorndike-Christ used the Fennema-Sherman Math Attitude scale. She examined the relationship of attitudes toward mathematics to mathematics performance, gender and mathematics course-taking plans using students enrolled in middle and high school mathematics courses. A total of 1516 individuals were included in this study (722 males and 794 females). Results indicated that attitudes towards mathematics were predicative of the final grade. Although female attitudes were more positive than expected, they scored lower on the attitude tests than the males. Furthermore, females also showed less confidence in their abilities to learn mathematics than boys.

Capraro and Capraro (2000) studied gender using the National Educational Longitudinal Study of Eighth Graders (NELS: 88) and found that females were scoring comparable to their male counterparts in the standardized mathematics tests. Based on the NELS: 88, a random sample of 180 students was selected. Using linear regression analysis, race, gender, socioeconomic status and math grades were used to determine which factor explains math achievement on the standardized tests. Of these factors, socioeconomic status, and not gender, was found consistently significant across all racial lines.

Caporrimo (1990) used 122 eighth grade students to study gender differences in mathematics. Of the 122 students, 70 were females and 52 were males. The subjects selected were a representation of students from all level of math achievement. Students were compared based on standardized math achievement scores, problem-solving strategies, self-report scores and Confidence in Learning Mathematics survey scores. Using survey data, he measured the amount of confidence the students had in taking math courses. The findings indicated that there were no gender differences between males and females when comparing standardized math achievement scores, problem-solving strategies, or self-report scores. However, there were differences in the amount confidence the students had in taking math courses between males and females.

In another study, Coladarci and Lancaster (1989) suggested that there are no differences in math achievement between boys and girls. They used a highly stratified national probability sample of 1,222 high schools from the High School and Beyond (HSB) data. Of the 1,222 high schools, a total of 1,015 schools were actually used. A total of 25,875 students from those 1,015 schools participated in the study. Factors considered in the study included mathematics course taken, mathematics attitude, educational aspirations, academic orientation, parental involvement, prior achievement, verbal ability, socioeconomic status and gender. Using regression, only negligible effects were found of gender on mathematics achievement. However, socioeconomic status accounted for much of mathematics achievement. McLure (1998) studied mathematics course taking and achievement by gender and various other factors. These other factors included mathematics courses taken, ethnicity, and family income. "Five separate 10% systematic samples of ACT-tested 12^{th} grade students in the graduating classes" of 1987 (N=50,779), 1990 (N= 52,076), 1993 (N=56,749), 1996 (57,775) and 1997 (N=61,610) were used. The American College Testing (ACT) was the instrument used to compare mathematics achievement. Results show that there is only a very small gap between genders and that females have made very large gains between 1987 and 1996 with respect to the ACT scores.

There are still disagreements over the gender achievement gap in math and science. Earlier research reflects the continued gap between boys and girls in the math and sciences. However, more current research indicated that the gap is narrowing and that more girls are excelling and pursuing in math and science careers than ever before.

Parent's Education

Children of parents with a high education level are less likely to dropout of high school than are children of parents with a lower education level. According to NCES, based on 1997 data, children of parents with only a high school degree are more than three times as likely to drop out of high school than children of

parents with a Bachelor's degree or higher. Children of parents with less than a high school degree are almost 10 times more likely to drop out of high school than children of parents with a Bachelor's degree or higher (see Table 2.6).

Little attention has been given to the influence parents have over their children's course selection and placement. In the U.S., well-educated parents are more likely than less-educated parents to be involved and to intervene to improve their children's education (Horn and Chen, 1998). A study conducted by Useem (1992) demonstrated that there is high correlation between the parents' educational level, the parent's involvement and the students' placement in math class.

Parents with higher educational level are more involved with their children's education and tend to discuss with their children school-related matters. A study done by Horn and Chen (1998) using the National Education Longitudinal Study of 1988 (NELS: 88), found that students who were considered moderate to high risk had higher rates of enrolling in postsecondary education when parents frequently had discussions with them about school related matters.

Based on a recent NCES study (1996), student's success in enrolling in and graduating from a postsecondary education of any kind was strongly related to their parent's education. That is, parents with college degrees tend to influence their children to attend and complete a postsecondary education program more than do parents without college degrees. Parents with little or no experience with higher education are more often unaware of the financial aid that is available and the enrollment process in the postsecondary level (Nunez & Cuccaro-Alamin, 1998).

Table 2.6: Dropout Rates for Children in Grades 10-12, ages 15-24, by Parents' Highest Education Level[a]

	1995	1996	1997
Less than high school	11.9	10.2	11.7
High School Completion	7.5	4.7	5.0
Some College	3.8	3.9	2.8
Bachelor's Degree or higher	1.1	1.4	1.2
Total	5.7	5.0	4.6

[a]Source: U.S. Department of Commerce, Bureau of the Census, October Current Population Surveys, various years, 2000.

Employment

Having a job during high school may be beneficial to a student and may developmentally help the child to grow. However, work may also cause students to drop out of high school or have low academic aspirations for college. In a study by Erkstom, Goertz, Pollack and Rock (1986), nearly 27% of the males who dropped out of high school did so due to employment. Another 14% cited family support obligations as their reason for dropping out of school. Working long hours can affect the child negatively. It can lead to increased school absences, less time spend on doing homework, lower test scores, cheating and even lower teacher expectations. Employment among high school students, especially during the school year, decreases the amount of time for homework and other school related activities. That is, as the student spends more time at work, the amount of time available for after-school related activities (homework, science projects, clubs, theater, sports) would be less. Although some studies suggest that employment may be good for the students and that students who work during high school tend to find better jobs after high school than students who did not work, other data suggest that student employment while in school may have severe consequences on their academic performance.

MacArthur (1989) investigated the relationship between employment and student characteristics among high school juniors. In the study, data were obtained from 400 high school juniors during the fall of 1988. Multiple regression was used to analyze GPA, scores on the Brown and Holtzman's Survey of Study Habits and Attitudes (SSHA), participation in extracurricular activities, plans for college, number hours worked, race, gender and socioeconomic status with respect to employment. Similar to other studies, the result indicated there is a relationship between high hours of work to lower mean GPA and lower SSHA scores among working students and non-working students.

Marsh (1991) used the High School and Beyond (HSB) study, conducted by the National Center for Educational Statistics (NCES, 1986), to investigate the effects of working during the sophomore, junior, and senior years of high school. The study included 36 students from each of the sampled 1,015 high schools for

the first follow-up and 14,825 students for the second follow-up study. Analyses were done to determine if there were positive or negative effects of working during the academic year. The study found that the number of hours worked during the sophomore year was related to dropping out of school. There was also a correlation between the number of hours the student work per week and student academic performance. The more hours the students worked per week, the lower their grades were in school. Summer employment, however, showed no negative effects on school performance.

In addition to total hours worked per week, student success in school was also related to how the students spent the money earned. In previous studies of high school employment, Bronfenbrenner (1986) challenged researchers to determine why some students worked during their high school years and yet were not negatively affected by working. Analyses on how students spent their money earned from working indicated that saving money for college had positive effects for many school related outcomes, the largest being enrollment in college.

According to Stern, Finkelstein, Urquiola, and Cagampang (1997), most research studies on high school employment suggest that students working more than 15 or 20 hours a week suffer academically. The results include lower grades, fewer homework assignments completed, greater likelihood of dropping out of school and lower likelihood of completing their postsecondary education.

Individual projects in the Upward Bound Program differ by academic and student characteristics. Studies on academic characteristics (class size and instructional time) and student characteristics (SES, ethnicity, gender, and employment) provided in this chapter help shed a better understanding of how these variables may affect the success of a project in the Upward Bound Program.

CHAPTER 3
METHOD

In order to answer questions and test hypotheses about the relationship between Upward Bound project characteristics and student achievement, data gathered by Mathematica Policy Research, Inc., contractor for the Department of Education to evaluate the Upward Bound program were used. This includes data from two follow-up studies for the 1995 summer session, 1995-1996 academic year and the 1996 summer session. The data collected were from a nationally representative sample of students who applied to the Upward Bound program between 1992 and 1994 and were randomly assigned to either the Upward Bound or a control group.

All students completed an initial baseline questionnaire before they were assigned to either the Upward Bound or a control group. The baseline questionnaire included information about their family backgrounds, attitudes, expectations, and school experiences. In addition to the student baseline questionnaire, Upward Bound grantees were given a questionnaire on project operations and staffing for the 1992-1993 year (Myers & Schirm, 1999). Selected variables from both the student and grantees data sets were used for this study.

Sample and Data Collection Procedures

Creating the project grantees data files. Of the 536 Upward Bound projects active in 1992-1993 academic year, Mathematica deemed 440 as "universe" projects. These "universe" projects were eligible to be selected for survey because they were active, regular projects. That is, they were not veteran projects or math/science projects. From the 440 projects, 244 Upward Bound Projects were selected by way of stratified random sampling. Each of the "universe" projects was assigned to a stratum and a sample was drawn from each stratum. The sampling rates varied across strata, therefore, some projects had a greater chance of being selected than others. These 244 Upward Bound

projects were sent surveys, which resulted in a 92% response rate (224 Upward Bound projects responded). Of these 224 projects, a random sample of 70 projects was selected for the study (Myers & Schirm, 1999).

Of the 70 selected projects, 11 could not participate or had to be ruled out for various reasons. Reasons for these projects not being included in the study were: 1) projects were not refunded by the U.S. Department of Education, 2) the projects did not plan to recruit new students for the 1992-93 school year or 3) the projects had too few applicants to accommodate random assignment. These 11 projects were replaced by eight similar projects. Therefore, the final number of projects included in the data files by Mathematica was 67. Additional data were collected through field visits to a representative sample of 20 Upward Bound projects (from the 67 projects selected for the study) in the spring and summer of 1993 (Myers & Schirm, 1999)

Creating the student data files. Of all the students who were eligible applicants to these 67 projects, 1,524 students were randomly assigned to the treatment (Upward Bound) group and 1,320 to the control group. Only students who were invited to the Upward Bound program were included in the treatment group (though this does not necessarily mean the student actually participated in the Upward Bound program). Students who were not invited to the Upward Bound program were included in the control group. As part of the application process to be accepted in the Upward Bound program, both groups had completed a baseline questionnaire. The baseline questionnaire was used to compare Upward Bound invitees with the control group (student who were not invited). In addition, both groups of students (treatment and control) were given the first follow-up survey via telephone. This survey achieved more than a 97 percent student response from both groups. A second follow-up survey that was given afterwards, also done by telephone, achieved about 85 percent response rate (Myers & Schirm, 1999).

In both follow-up questionnaires, the telephone surveys addressed a wide variety of topics, which include the students' background information, their experiences related to school, supplemental services available to these students,

employment and their future plans. In addition, with their permission, the students' academic transcripts were obtained in 1994 and 1996 from their official high schools. The transcripts provided information on the students' grades and determine the number and types of courses the students had taken (Myers & Schirm, 1999).

Pledge of Confidentiality. Questionnaires for the student participants and project grantees were collected through the Horizons' National Study of Upward Bound, done by Mathematica Policy Research, Inc. To protect the privacy of student participants and program grantees, all information obtained for this study was kept confidential. A pledge agreement of confidentiality was signed before any information was released from Mathematica Policy Research, Inc. Data provided by Mathematica Policy Research, Inc. were used exclusively for this study. This includes data from the individual projects and students who participated in the study.

For this study, only students who actually participated in the Upward Bound project were included in the treatment group. That is, merely being invited to participate in the Upward Bound program does not warrant a student to be in the treatment group.

Instruments: Questionnaires for Upward Bound Students and Project Grantees

Students' Questionnaires

Three questionnaires were given to student participants of the Upward Bound program. These questionnaires included the initial baseline, first follow-up and second follow-up. The baseline was given in 1992, the first follow-up was given in 1994 and the second follow-up was given in 1996.

The baseline questionnaire. All students who applied to the Upward Bound program were given this questionnaire as part of the application, regardless of acceptance to the program. This baseline questionnaire provided information needed to compare Upward Bound students with the control group.

The baseline questionnaire included five parts: family information, school experiences and activities, employment, student plans for the future and background information. All of the questions were multiple choice except for a very few “fill in the blanks” and short answers. There were 11 questions on family information, 23 questions on school experiences and activities, 8 questions on employment, 10 questions on student plans for the future and 10 questions on background information.

The first-follow up questionnaire. Done by telephone, an interviewer read a series of questions to the student, which included five parts: current school enrollment status, supplemental services, out of school employment, future plans and background information. Similar to the baseline questionnaire, most of the questions were in multiple choice form, with a very few “fill in the blanks” and short answers. There were 25 questions on current school enrollment status, 19 questions on supplementary services, 22 questions on out of school employment, 17 questions on future plans, and 13 questions on background information.

The second follow-up questionnaire. Also done by telephone, with an interviewer reading a series of questions to the students. The second follow-up questionnaires were given only to Upward Bound students who answered the first follow-up questionnaire. This questionnaire included six parts: current school enrollment, supplemental services, employment, after high school, background information and a consent section. Most of the questions were in multiple choice form, with a very few “fill in the blanks” and short answers. The second follow-up questionnaire had some similar questions to the first follow-up questionnaire, but also included other varying questions. There were 25 questions on current school enrollment, 25 questions on supplemental services, 16 questions on employment, 44 questions on after high school, 12 questions on background information and a consent question to use responses given by student for research purposes.

Upward Bound Grantees' Questionnaire

In the spring of 1993, Upward Bound grantees were given a questionnaire on project operations and staffing for the 1992-1993 year. Unlike the student questionnaire, the grantees' questionnaires were mailed to project directors. Upon completion, the project director mailed the questionnaire back to Mathematica Policy Research, Inc. The grantees' questionnaire included six parts: project setting, project staff, student recruitment and selection, project participants, innovation and change, and a section for comments. All of the questions were in multiple choice form, except for a very few "fill in the blanks" and short answers. There were eight project setting questions, 20 project staff questions, 13 questions on student recruitment and selection, 24 questions on project participants, 18 questions on innovation and change and a section for comments.

Data and Variables

The Upward Bound data include two files, one for the project grantees and the other for the students. The project grantees' file has an N of 67 and the students' file has an N of 3,028. Both files include the project ID number that may be merged to identify which Upward Bound project the student participated in. Selected variables of interest were used from both the project grantees' file and students' file to answer the research questions. Tables 3.1 to 3.4 include the variables that were used in analyses for this study.

Variable names for the student and grantee questionnaires were labeled by the letter and number which corresponds to the appropriate section (A, B, C…) and item number in each instrument. For example, A6 would indicate part A of the questionnaire, question 6. All four questionnaires (grantees', student baseline, first follow-up, and second follow-up) were labeled using the same format. The project grantees' and students' questionnaire instruments can be used as codebooks.

For the questions in the instrument, when only one option is given, a respondent has a value of 1 if they checked the box, and a 0 if they left the box empty. Missing values are indicated by a period, or in some cases, negative integers (such as –5 or –7).

Table 3.1 lists three variables from the grantees' file that were used in this study. These include location, size, and host institution, all of which were used to define the project setting. Location was recoded into rural, small city/suburban and large city/metropolitan.

Table 3.2 lists project academic characteristics, all but one at the ratio level of measurement. The variables created by Mathematica Policy Research, Inc., were combined to create four new variables (Student-Staff Ratio, Number of Years Project in Operation, Number of Courses Project Offers for the summer and Number of Courses Project Offers for academic year).

To create the student-staff ratio variable, the actual number of participants in the project were divided by the sum of full-time staff plus one-half of all part-time staff. This formula was based on the idea that two part-time staff was equivalent to a full-time staff (Table 3.2).

To create the variable expressing the number of years that the project was in operation, the variable A2 was subtracted from 96. The variable A2 indicates the two-digit year in which the project was established. The number 96 represent 1996, the year in which the data were collected. For example, a project with a value 75 indicates that the project was established in 1975. To get the year of operation, 96 minus 75 equals 21 years of project operation (Table 3.2).

To create the variable expressing the number of courses offered in the Upward Bound project, all the course variables were summed. The summer course variables were summed to create the variable indicating the number of courses offered during the summer. The academic year course variables were summed to create the variable indicating the number of courses offered during the academic year (Table 3.2).

Table 3.1: Project Setting Variables from Grantees' File

Variable Name	Variable Label	Value Label	Recoded As
A1	Location	1=rural 2=suburban community 3=small city 4=medium-sized city 5=large city/metropolitan	1=rural 2=small city/suburban (formerly 2 and 3) 3=large city/ metropolitan) (formerly 4 and 5)
D1	Size		1= small (<60) 2= medium (60-100) 3=large (>100)
HOST	Host	1= 2 year college 2= 4 year private 3= 4 year public	

Table 3.2: Academic Characteristics Variables from Grantees' File

Variable Name	Variable Label	Computed From*
SSRATIO	Student-Staff ratio	D1/[B17B_3FT +1/2(B17B_3PT)]
NYEARS	Number of Years Project in Operation	96-A2
CRS_SUM	Number of Courses Offered during Summer	(D18A+D18B+D18C….+ D18Z)
CRS_ACAD	Number of Courses Offered during Academic Year	(D19A+D19B+D19C….+ D19Z)
*Original Variables		
D1	Number of students during 91-92 academic year or summer	
B17B_3FT	Total Full-Time Staff	
B17B_3PT	Total Part-Time Staff	
A2	Years Project in Operation	
D18A-D18Z	Courses Offered in the Summer	
D19A-D19Z	Courses Offered in the Academic Year	

Table 3.3 lists student characteristics, all of which are categorical. The variable “Ffutc” (First follow-up treatment/control) indicated whether the students were invited to the Upward Bound program or whether the students were not invited to the Upward Bound program. However, to determine if the students actually participated in the Upward Bound program, the “Show” variable was used to create the “treatment” variable. Students who were invited to the Upward Bound project and actually participated in the program were the treatment group. These students would have 1 for “ffutc” and 1 for “show” variable. Students who were not invited to the Upward Bound program were the control group. These students would have 0 for “ffutc” variable.

For the race/ethnicity variable, because the numbers were small, American Indian and “Other” were merged together. A fifth value was created for Hispanic. Any students who responded “yes” to question E5 (Spanish Decent) were included as Hispanic on variable E6 (Race) (Table 3.3).

Table 3.4 lists student success measures, all except for high school graduation and drop out are metric variables. All were used as originally coded by Mathematica.

Table 3.3: Student Characteristics Variable from Students' File

Variable Name	Variable Label	Value Label
Ffutc	Treatment/control status	1= treatment group (invited to program) 0= control (not invited to program)
Show	Upward Bound Participant	1= yes (invited to the program and participated) 0=no (invited to the program but did not participate)
E3	Gender	1=male 2=female
E5	Spanish Decent	0= no 1=yes, Mexican 2=yes, Cuban 3=yes, Puerto Rican 4=yes, other Hispanic; recoded as 0=no 1=yes
E6	Race	1=Asian 2=Black 3=White 4=American Indian 5=Other
C1	Employment for pay during 92-93 school year (does not include summer employment)	1=yes 2=no
Computed Variables		
Race/Ethnicity		1=Asian 2=Black 3=White 4=Other 5=Hispanic
Treatment	Upward Bound Participant	1=yes (invited to the program and participated) 0=no (not invited to program)

Table 3.4: Student Success Variables from Students' File

Variable Name	Variable Label	Value Label
HSCRDALL	Total Credits Earned	Numbers of Credits
CREDAP5S	Total AP Credits Earned	Number of Credits
G12CGPA	Grade 12 cum GPA	GPA to hundredths
HSGRAD	Graduated from High School	0=no 1=yes
DROPOUT	HS Dropout	0=no 1=yes

Data Analysis

Only about 35% of the students who enter Upward Bound remain in the program until high school graduation. The high drop out rate of participants in Upward Bound is an important issue that needs to be addressed, but that is not a focus for this study. Although students may drop out for a variety of reasons, including employment, family obligations, moving, new commitments, sports, or feeling self sufficient, students that remain in Upward Bound are likely to be more motivated individuals. Regardless of reasons for leaving the program, attrition rates and high school graduation rates were used to compare projects.

Preliminary Analyses

Descriptive analyses using means, standard deviations, frequency, distributions and percents were conducted to complete the profile of the Upward Bound project characteristics. T-tests were used determine if there are any significant differences between the treatment group (Upward Bound participants) and the control group on student characteristics and performance. Correlations were done for metric variables, including academic and success characteristics. The remaining analyses focused only on the Upward Bound participants.

Design for Analysis

Upward Bound projects differ with respect to project settings. Table 3.5 illustrates the design for project setting along with the number of student participants in each cell. Given that project settings may vary by host type (2-year college, 4-year public or 4-year private college institution), location (rural, suburban, or metropolitan) and size of the program (small, medium and large), it is reasonable to expect that there would be differences in both the project academic characteristics and student variables among these individual projects.

Table 3.5: 3 x 3 x 3 Design for Project Setting with Number of Student Participants

Host	Location	Size		
		Small <60 N=247	Medium 60-100 N=510	Large >100 N=502
2 year college host N=394	Rural	19	119	0
	Suburban	33	52	42
	Metropolitan	32	49	48
4-year private college host N=318	Rural	2	79	0
	Suburban	6	14	101
	Metropolitan	31	17	68
4-year public college host N=547	Rural	35	60	81
	Suburban	20	22	73
	Metropolitan	69	98	89

Questions and Hypotheses

How do academic characteristics differ by project settings? How does student success differ between the project setting? What is the relationship between the project setting and the student characteristics? Given these questions, which were raised in Chapter One, and the discussion of school variables detailed in Chapter Two, the main hypothesis that was tested was that there are positive relationships between student success measures and academic characteristics of the Upward Bound programs. Specifically, students would be more successful in programs that have been in operation longer, offered more courses during the summer and academic year, and had smaller staff to student ratios.

Analyses

Relationship between Project Setting to Academic Characteristics and Student Success in the Upward Bound Projects

Academic characteristics include course offerings during the summer and academic year, student-staff ratio, and number of years the project has been in operation. Student success measures include high school credits earned, Advanced Placement (AP) credits earned, grade point average (GPA), high school drop out and high school graduation. There are four project academic characteristics and five student success variables, all of which are metric.

To determine if the project academic characteristics and student success variables differ by project designs, Multivariate Analysis of Variance (MANOVA) across the 3 x 3 design were done. The intended analysis (MANOVA across the 3 x 3 x 3 design) resulted in two empty cells. Therefore, the design was collapse over the “size” variable, resulting in a 3 x 3 design. For the first design, the dependent variables were the projects’ academic characteristics (Table 3.2). For the second design, student success scores were the dependent variables (Table 3.4). Cell sizes across the 3 x 3 design is shown on Table 3.6.

Table 3.6: 3 x 3 Design for Project Setting with Number of Student Participants (collapsed over size)

Host	Location		
	Rural N=415	Suburban N=363	Metropolitan N=501
2 year college host N=394	138	127	129
4-year private college host N=318	81	121	116
4-year public college host N=547	176	115	256

Relationship between Project Setting and Student Characteristics in the Upward Bound Projects

The relationship between project setting and student characteristics in the Upward Bound projects were determined by using contingency tables and Chi square analyses. A total of six variables were to be used. Three variables were used to define project setting (host type, location, and size) and three variables were used to define student characteristics (ethnicity, gender, and employment). To determine the distribution of student characteristics, a 2 x 2 x 5 design was created (Table 3.7).

The design in Table 3.7 for student characteristics resulted in some cells with very small numbers. In particular, under "employed" there are two cells with 1 and two cells with 2. Therefore, the design was collapsed over the employment variable, resulting in a sex by race/ethnicity analysis (Table 3.8).

Using Chi square statistics, race/ethnicity and gender (Table 3.8) were examined across project settings (see Table 3.6) to determine if there are relationships.

Table 3.7: 2 x 2 x 5 Design for Student Characteristics

Sex	Ethnicity: Employ	Black N=524	White N=360	Hispanic N=239	Asian N=67	*Other N=77
Boys N=427	Employ N=64	22	27	12	2	1
	Not Employ N=363	143	91	76	28	25
Girls N=840	Employ N=87	27	39	18	1	2
	Not Employ N=753	332	203	133	36	49

*Includes American Indian

Table 3.8: 2 x 5 Design for Student Characteristics (collapse over employment)

Sex	Race/Ethnicity: Black N=524	White N=360	Hispanic N=239	Asian N=67	*Other N=77
Boys N=427	165	118	88	30	26
Girls N=840	359	242	151	37	51

*Includes American Indian

Relationship between Academic Characteristics and Student Success

The relationship between academic characteristics and student success was determined by using Canonical Correlation Analysis (CCA). The independent variables were the academic characteristics, which include staff to student ratio, number of courses offered during the summer, number of courses offered during academic year and number of years project in operation (Table 3.2). The dependent variables were the student success measures, including high school credits earned, Advanced Placement credits earned, grade point average, high school drop outs, and high school graduation (Table 3.4).

CHAPTER 4
RESULTS

The first section of this chapter will be a comparison between treatment and control group in the Upward Bound program to determine differences between the two groups. This section will also provide a student profile of the Upward Bound program.

The second section of this chapter will examine project level characteristics of the Upward Bound program. This will include the distribution of Upward Bound participants with respect to project location, size and host type. In addition, academic characteristics (student-staff ratio, course offerings and years of operation) will be examined across project settings.

The third section of this chapter will examine student profile across project settings. This will include race/ethnicity, gender and employment. Student success measures (GPA, H.S. Credits, AP Credits, H.S. Graduate, and Drop out) will also be examined across project settings.

The last section of this chapter will examine the relationship between project and student variables. This section will also provide results of analyses to answer the research questions addressed in Chapter 3.

Upward Bound Participants

Comparison between Upward Bound Participants and the Control Group

There were 2,844 records in the student data file for this study. Over half (1,524) had been randomly assigned to participate in Upward Bound programs across the country. Of those, 1,285 (84.3%) enrolled in a program. The analyses in this chapter focus on this treatment group. In this first section, they are compared to the 1,320 students who did not participate in Upward Bound programs, having been randomly assigned to the control group. It is important to emphasize that this control group were students who had applied to and been found acceptable for the Upward Bound program. That is, they were a comparable group to the treatment group and were likely to be as motivated.

Table 4.1 indicates that the treatment group performed slightly better in all success measures than comparable students who were in the control group. The differences in three of the five success measures were statistically significant. However, the differences were relatively minor and produced very small effect sizes. The largest difference was in drop out rates (4% for the treatment group and 8% for the control group). This difference, however, was only a .15-point difference in standard deviation terms.

From this comparison, it does not appear that participation in Upward Bound dramatically increases the success of a comparable set of students. The purpose of this study, however, was to attempt to differentiate programs based on their characteristics and to relate those to student success measures.

Table 4.1: Academic Success Differences in Comparable Upward Bound Attendees and Non-Attendees

Treatment/ Control	N	X.	SD	ES	t	p
H.S. Graduation	1149 1098	.64 .60	.48 .49	.08	1.49	< .001
GPA	1231 1252	2.50 2.42	.81 .81	.10	2.41	.47
Total H.S. Credits Earned	1099 1056	21.1 20.3	5.8 6.6	.12	2.87	< .001
H.S. Drop Outs	1149 1098	.04 .08	.20 .27	.15	-3.68	< .001
Total AP Credits Earned	1099 1056	1.3 1.2	2.8 2.5	.04	1.22	.05

X.= mean, SD= standard deviation, ES= effect size

Overall Student Profile in the Upward Bound Program

As shown in Table 4.2, there were a greater number of female participants than male participants in the Upward Bound program. Approximately two-thirds of the participants were female, and almost 70% were either black (41%) or white (28%). Only 12% of the Upward Bound students had part-time jobs.

Table 4.2: Student Profile in the Upward Bound Program

	N	Percent*
Gender		
Male	427	34%
Female	840	66%
Race/Ethnicity		
Asian	67	5%
Black	524	41%
White	360	28%
Hispanic	239	19%
Other	77	6%
Employment Status		
Employed	152	12%
Not Employed	1116	88%

*May not total 100 percent due to missing data

Upward Bound Project Level Characteristics

Project Setting

Upward Bound programs are offered in all 50 states and the District of Columbia. Programs are provided in all types of localities, including rural, suburban and metropolitan areas. Although programs are prevalent in all localities, a greater number of student participants from the sample came from rural (32%) and metropolitan (39%) areas than the suburbs (28%; Table 4.3). Only about 20% of the students in the sample participated in small-sized Upward Bound projects, and the rest were almost evenly split between medium- and large-sized projects (Table 4.3).

Upward Bound projects are usually hosted by an institution of higher education. Only about a third of the students in the sample participated in an Upward Bound project hosted by a two-year college. Over 42% of the students in the sample participated in projects that were hosted by a four-year public college or university. The other 24% of the students in the sample participated in an Upward Bound project that was hosted by a four-year private college or university (Table 4.3).

Table 4.3: Distribution of Upward Bound Participants with respect to Project Location, Size and Host Type

	N	Percent
Location		
Rural	415	32.4%
Suburban/small city	363	28.4%
Large city/metropolitan	501	39.2%
Size		
Small	247	19.6%
Medium	510	40.5%
Large	502	39.9%
Host Type		
2-year	420	32.7%
4-year private	318	24.7%
4-year public	547	42.6%

Academic Characteristics by Project Settings

Academic characteristics include class-size, the number of course offerings by project, and the number of years a project has been in operation.

Class-size is often measured by the student to staff ratio. Based on the grantees who were surveyed, the student to staff ratio varied from project to project (Table 4.4). Overall, projects averaged 14 students per staff member. Projects that were from rural areas had a smaller student to staff ratio, about 10.5 students per staff member. The suburban and metropolitan area Upward Bound projects tended to have larger student to staff ratios, averaging 16.5 and 14.7, respectively. Class-size tended to be larger in large-sized programs. The average large-sized project was 17 students per staff member. By comparison, small- and medium-sized projects averaged only about 12 students per staff member (Table 4.4).

In this study, course offerings were examined both during the summer and also during the academic year. According to the sample from the grantees' survey, projects offered an average of 16.5 courses during the summer and 11.8 courses during the academic year (Table 4.4). Small-sized Upward Bound projects offered fewer courses (13.7) than medium- (16.6) and large-sized projects (17.9) during the summer session. During the academic year, course offerings from small- and medium-sized Upward Bound projects were slightly less than large-sized projects (11.1, 10.3, and 13.2, respectively). During the academic year, Upward Bound projects hosted by two-year colleges offered fewer courses (9.3) than Upward Bound projects hosted by four-year colleges and universities (12.1 course offerings by projects hosted by four-year private colleges and 13.6 courses offered by projects hosted by four-year public colleges).

Overall, Upward Bound projects have been in operation for an average of 21 years (Table 4.4). Projects that were hosted by both private and public four-year colleges have been in operation for an average of 24 years. In comparison, Upward Bound projects hosted by 2-year colleges have been in operation for only about 15 years. Larger projects have been in operation longer than smaller

projects. Large projects have been in operation for an average of 24 years, compared to an average of 19 years for medium-sized projects and an average of 18 years for small-sized projects. With respect to location, rural projects have been in operation longer (23 years) than metropolitan and suburban projects (20 years).

Table 4.4: Description of Academic Characteristics by Project Setting

	Student-staff ratio		N course Summer		N course Academic year		N year in operation	
	X.	SD	X.	SD	X.	SD	X.	SD
Location								
Rural	10.5	3.3	16.1	3.2	12.4	6.2	22.9	6.9
Suburban/small city	16.5	9.8	17.3	5.5	8.8	5.9	20.2	8.9
Large city/metropolitan	14.7	6.2	16.3	5.2	12.8	3.6	20.1	9.1
F(p)	79.6	(.00)	6.1	(.00)	50	(.00)	14.9	(.00)
Size								
Small Program	12.2	4.3	13.7	4.2	11.1	5.1	18.0	10.5
Medium Program	11.7	5.6	16.6	3.9	10.3	5.0	19.3	7.3
Large Program	17.1	8.6	17.9	5.2	13.2	5.5	24.4	7.5
F(p)	90.3	(.00)	70.4	(.00)	31.1	(.00)	70.3	(.00)
Host-Type								
Two-year	13.4	9.1	16.8	4.3	9.3	5.5	14.8	6.9
Four-year Private	13.2	5.3	16.0	6.0	12.1	4.6	24.5	6.5
Four-year Public	14.7	6.6	16.6	4.2	13.6	5.0	23.9	7.9
F(p)	5.6	(.00)	2.7	(.07)	63.1	(.00)	226.3	(.00)
Overall	13.9	7.2	16.5	4.8	11.8	5.4	21.1	8.5

Student Profile by Project Setting

Student Characteristics by Project Settings

The student characteristics in the Upward Bound program varied from project to project. For example, Asian students were more prevalent in metropolitan area Upward Bound projects than in suburban and rural area Upward Bound projects. In Upward Bound projects from the metropolitan areas, 10% of the student participants were Asian, while only 4% of the suburban area and less than 1% of the rural Upward Bound projects were Asian (Table 4.5).

When comparing race composition by project location, over half of the participants in the metropolitan area projects were black, 10% were Asian, and only 9% were white. In contrast, only about a third of rural and suburban project participants were black, and over 40% were white (Table 4.5).

Regardless of the locality, size, or college host type of the Upward Bound projects, the ratio of males to females participating in the projects was relatively constant. Approximately two-thirds of the participants were females, and one-third were males (Table 4.6).

The number of students who were employed while participating in the Upward Bound program was about 12%. Again, differing project level characteristics did not result in appreciably different student employment distributions in the program (Table 4.6).

Table 4.5: Descriptive of Upward Bound Student Race/Ethnicity Background by Project Settings

	Asian		Black		White		Hispanic		Other	
	N	%	N	%	N	%	N	%	N	%
Location										
Rural	2	<1	140	34	165	40	83	20	25	6
Suburban/small city	15	4	115	32	153	43	48	13	28	8
Large city/metropolitan	50	10	272	55	43	9	110	22	19	4
Size										
Small Program	36	15	91	37	49	20	60	24	11	4
Medium Program	24	5	153	30	208	41	88	18	29	6
Large Program	7	1	282	57	102	20	76	15	32	6
Host-Type										
Two-year	4	1	191	45	126	30	82	20	17	4
Four-year Private	17	5	145	46	94	30	56	18	5	1
Four-year Public	46	9	191	36	141	26	104	19	55	10
Overall	67	5	527	41	361	28	242	19	77	6

*May not total 100 percent due to missing data

Table 4.6: Descriptive of Upward Bound Student Gender and Employment Status by Project Settings

	Male		Female		Employed	
	N	%	N	%	N	%
Location						
Rural	145	35	270	65	51	12
Suburban/small city	111	31	247	69	48	13
Large city/metropolitan	171	35	323	65	53	11
Size						
Small program	89	36	158	64	23	10
Medium program	180	36	322	64	69	14
Large program	149	30	349	70	56	11
Host Type						
Two-year	146	35	273	65	52	12
Four-year private	110	35	207	65	32	10
Four-year public	173	32	364	68	68	13
Overall	429	34	844	66	152	12

*May not total 100 percent due to missing data

Student Success across Project Settings

As shown in Table 4.7, all five student success measures resulted in statistically significant differences across the three locations, dropout rate at the .05 level and the rest at the .01 level. However, none of the three location types stand out as having the best results for all student success measures. Perhaps the most dramatic difference was in graduation rates, with 70% of students in rural programs graduating from high school while 60% did so from programs in other areas ($F = 5.2$, $p = .01$). It should be noted that the control group also had a 60% graduating rate (see Table 4.1). Although statistically significant ($F = 9.0$, $p < .01$), there were no dramatic differences in grade point average (GPA) across location. Students participating in Upward Bound projects located in metropolitan areas had a slightly lower GPA (2.4) than those in suburban and rural areas (2.6). Students in suburban projects earned slightly more total credits (22) than did students in the other areas (21; $F = 9.6$, $p < .01$), but students in rural areas earned almost two AP credits compared to only about one in other areas ($F = 6.0$, $p < .01$). The only measure where metropolitan area projects did best was the dropout rate, with only 3% of students in such projects dropping out of high school compared to 6% from rural areas ($F = 3.1$, $p = .05$).

Three of the five student success measures resulted in statistically significant differences for size (GPA and Total Credits at the .05 level and High School Graduate at the .01 level). Students from small-sized projects earned more total credits (21.9) than medium (20.2) and large-sized projects (20.5; $F=4.0$, $p< .05$). Although statistically significant, medium-sized projects had only slightly higher GPA (2.57) than small (2.43) and large-sized projects (2.46; $F=3.7$, $p< .01$). With respect to high school graduates, medium-sized projects had more students graduating (69%) than small (64%) and large-sized projects (58%; $F=5.9$; $p< .01$).

Two of the five student success measures resulted in statistically significant differences for host type. This was for AP credits earned (at the .05 level) and high school graduate (at the .01 level). Students in projects hosted by two-year colleges earned one-half more AP credit (1.7) than students in projects

hosted by private and public four-year colleges (1.2; F=3.4, p< .05). When comparing high school graduates, projects hosted by public four-year colleges had more students graduating from high school (70%) than projects hosted by two-year colleges (57%) and private four-year colleges (61%; F= 8.5, p< .01).

Table 4.7: Description of Upward Bound Student Success Measures by Project Settings

	GPA		Total Credits		Tot AP credits		Graduate H.S		Dropout	
	X.	SD	X.	SD	*X.*	*SD*	X.	SD	X.	SD
Location										
Rural	2.56	.81	20.8	6.1	1.6	3.4	.70	.46	.06	.24
Suburban/small city	2.59	.78	22.3	5.3	0.9	2	.61	.49	.04	.19
Large city/metropolitan	2.38	.82	20.5	5.9	1.4	2.8	.60	.49	.03	.16
F(p)	9.0	(.00)	9.6	(.00)	6.0	(.00)	5.2	(.01)	3.1	(.05)
Size										
Small projects	2.43	.86	21.9	5.4	1.2	2.2	.64	.48	.03	.17
Medium projects	2.57	.84	20.2	5.7	1.3	3	.69	.46	.04	.20
Large projects	2.46	.74	20.5	6.3	1.5	3.1	.58	.49	.04	.21
F(p)	3.7	(.02)	4.0	(.02)	0.8	(.44)	5.9	(.00)	0.6	(.57)
Host Type										
Two-year	2.54	.81	21.4	5.9	1.7	3.2	.57	.5	.05	.22
Four-year private	2.54	.77	20.9	6	1.2	2.3	.61	.49	.02	.13
Four-year public	2.45	.83	21.1	5.7	1.2	2.9	.70	.46	.05	.21
F(p)	2.0	(.14)	0.5	(.61)	3.4	(.03)	8.5	(.00)	2.5	(.08)
Overall	2.50	.81	21.1	5.8	1.3	2.9	.64	.48	.04	.20

Relationships between Project and Student Variables

The original design on the project setting, a 3 x 3 x 3 design (host type by location by size), resulted in several empty cells (see table 3.5). Using such a design would make answering the research questions difficult. Approaches to answering the research questions depended on how the empty cells were handled. The solution taken was to eliminate the variable size from the design. There are several arguments for eliminating size: a) by eliminating size, empty cells were eliminated (See Table 3.6); b) only three of the five comparisons of student success measures were statistically significant for size; c) MANOVA results indicated that interaction effects between size and the other project setting variables had very few differences among student success measures that were statistically significant; and d) compared to location and host type, size is a more subjective measurement of project setting. The numbers that determine project size are arbitrary and can result in major changes within the cells at the slightest shift of a number.

By eliminating size from the design, the following research questions were approached using only host type and location.

Question One: What Is the Relationship between Project Setting to Academic Characteristics and Project Setting to Student Success in the Upward Bound Projects? There are four project academic characteristics and five student success variables, all of which are metric. Multivariate Analysis of Variance (MANOVA) across a 3 x 3 design (host type by location) was used to determine if these sets of variables differed by project.

Tables 4.8 and 4.11 provide correlations for project academic characteristics and student success measures, respectively. Tables 4.9 and 4.12 provide data from the MANOVA for project academic characteristics and student success measures, respectively. Tables 4.10 and 4.13 provide data from the univariate analyses of variance for project academic characteristics and student success measures, respectively. Tables 4.11 and 4.14 provide means and

standard deviations for the project academic characteristics and student success measures, respectively.

Academic Characteristics across Project Settings

For the first MANOVA design, the dependent variables included the following project academic characteristics: student to staff ratio, the number of course offerings in the summer, the number of course offerings in the academic year, and the number of years the project has been in operation. Correlations among these four dependent measures of academic characteristics indicated a relatively strong positive relationship between courses offered during the summer and courses offered during the academic year (r = .66). However, there were relatively small correlations between the other dependent variables. There was also a negative correlation between academic year course offerings and student to staff ratio (see Table 4.8).

Pillai's Trace statistics were used for the MANOVA. Results from the MANOVA (Table 4.9) indicated that both main effects and the interaction for host type and location with respect to academic characteristics were statistically significant, at the .01 level.

Subsequent univariate analyses of variance (ANOVA'S) indicated that differences in each of the four project academic characteristics were statistically significant among host types. That is, the differences in student to staff ratio, summer course offerings, academic year course offerings, and the number of years the project has been in operation were different across projects hosted by 2-year, 4-year private and 4-year public institutions. When examining location, the differences in each of the project academic characteristics except for summer course offerings were statistically significant among rural, suburban and metropolitan projects. There were statistically significant interactions between host type and location for all four academic characteristic variables (see Table 4.10).

Table 4.8: Correlation Coefficients for Relations among Four Dependent Measures of Academic Characteristics

Measures	Studnt/Staff Ratio	Summer Crse Offer	Academic Crse Offer	Yrs Project in Operation
Student/Staff Ratio	--			
Summer Course Offering	.25*	--		
Academic Year Course Offering	-.07*	.66*	--	
Number of Years Project in Operation	-.16*	.15*	.26*	--

*p value < .01

Table 4.9: Multivariate Analyses of Variance for Project Academic Characteristics

	MANOVA			
Source	df	Pillai values	F	p
Host Type (H)	8	.670	120.7	< .001
Location (L)	8	.564	94.1	< .001
H x L	16	.726	53.2	< .001

Note. Multivariate F ratios were generated from Pillai's statistics.

Table 4.10: Univariate Analyses of Variance for Project Academic Characteristics

	df	F	p
Host			
Student to Staff Ratio	2	68.5	< .001
Summer Courses	2	12.5	< .001
Acad. Year Courses	2	34.2	< .001
Years in Operation	2	279.5	< .001
Location			
Student to Staff Ratio	2	196.1	< .001
Summer Courses	2	1.1	.35
Acad. Year Courses	2	92.2	< .001
Years in Operation	2	14.3	< .001
Host x Location			
Student to Staff Ratio	4	45.3	< .001
Summer Courses	4	7.9	< .001
Acad. Year Courses	4	88.7	< .001
Years in Operation	4	27.8	< .001

Table 4.11 indicates that regardless of host type, rural projects had smaller student to staff ratios than suburban and metropolitan projects. Projects in 2-year rural colleges had the smallest student to staff ratio (8.3). Projects in 2-year metropolitan colleges offered a greater number of academic year courses (14.3) than projects in 2-year rural colleges (7.4) and in 2-year suburban colleges (6.1). The differences between the number of academic year courses offered across project settings were greatest between projects in 4-year public rural colleges (17) and 4-year public suburban colleges (4). With respect to the number of years a project has been in operation, 4-year host type projects had been in operation longer than 2-year host type projects. Projects in 4-year public colleges had been in operation longer than projects in 4-year private colleges. Projects in two-year suburban colleges had been in operation for the least number of years (8.3).

Table 4.11: Mean and Standard Deviations for Student-Staff Ratio, Course Offerings (summer), Course Offerings (Academic Year) and Years Project in Operation

		Student-Staff Ratio		Course Offerings (Summer)		Course Offerings (Acad Year)		Years Project In Operation	
Host	Location	X.	SD	X.	SD	X.	SD	X.	SD
2-year college	Rural	8.3	2.0	14.9	2.7	7.4	6.2	17.7	4.0
	Sub	21.1	12.8	17.3	3.3	6.1	2.1	8.3	4.5
	Met	15.7	7.3	17.8	5.9	14.3	3.5	14.9	6.6
4-year private college	Rural	10.8	3.1	16.8	3.0	12.7	3.3	24.3	3.7
	Sub	13.5	5.9	15.3	8.7	12.5	6.7	25.7	5.7
	Met	13.8	5.7	14.8	4.0	11.1	2.7	22.8	8.8
4-year public college	Rural	11.5	3.2	18.0	3.7	17.3	4.0	26.8	6.6
	Sub	32.8	0	19.0	0	4.0	0	30.0	0
	Met	14.8	6.1	17.0	5.3	12.9	3.8	22.8	8.7

p value < .01

Student Success across Project Settings

For the second MANOVA design, the dependent variables included the following five student success measures: GPA, the number of high school course credits earned, the number of Advanced Placement (AP) course credits earned, high school graduation, and high school dropout.

Correlations were made among the five dependent measures for student success. Although all dependent student success measures were correlated, the correlation was not as strong as expected. There was a moderate positive relationship between high school credits earned and GPA ($r = .45$). There was also a moderate positive relationship between high school credits earned and high school graduation ($r = .39$). As expected, there were negative relationships between the number of student dropouts and all of the other student success measures. This indicates that students who did not drop out of high school had higher GPA's and earned more H.S. and AP credits than did students who did drop out of high school (see Table 4.12).

Again, Pillai's Trace statistics were used for the MANOVA in the second design. Results from the MANOVA (Table 4.13) indicated that there were statistically significant differences between host type, location, and the interaction effects between host type and location with respect to student success, at the .01 level.

Table 4.12: Correlation Coefficients for Relations among Five Dependent Measures of Student Success Characteristics

Measures	GPA	H.S. Credits Earned	AP Credits Earned	H.S. Graduate	H.S. Drop Out
GPA	--				
H.S. Credits Earned	.45	--			
AP Credits Earned	.30	.22	--		
H.S. Graduation	.24	.39	.11	--	
H.S. Drop Out	-.27	-.39	-.11	-.33	--

Table 4.13: Multivariate Analyses of Variance for Student Success Measures

	MANOVA			
Source	df	Pillai values	F	p
Host Type (H)	10	.03	3.3	< .001
Location (L)	10	.06	6.4	< .001
H x L	20	.16	9.1	< .001

Note. Multivariate F ratios were generated from Pillai's statistics

Subsequent univariate analyses of variance indicated that differences in only two of the five student success measures (AP Credits at the .05 level and High School Graduate at the .01 level) were statistically significant among host types. When examining location, the differences in all of the student success measures except for drop out were statistically significant (GPA and H.S. Credits at the .01 level; AP Credits and H.S. Graduate at the .05 level). Each of the student success measures produced statistically significant interactions between host type and location (Table 4.14).

Students had higher GPA in projects in 2-year rural colleges (2.81) and 4-year public suburban colleges (2.82), than in the other project settings. In addition to having students with the highest GPA, projects in 4-year public suburban colleges had students with the most high school credits (23.3). However, it was the projects in 2-year rural colleges that had students with the greatest number of AP credits (2.9). In addition, projects in 2-year rural colleges had the greatest number of students graduating from high school (81%). Projects in 4-year metropolitan colleges had the fewest high school dropouts (less than one percent for projects in 4-year private metropolitan colleges and 1% for projects in 4-year public metropolitan colleges).

There were two interesting trends: First, for projects in 4-year host type colleges, regardless of private or public, the students in metropolitan colleges had greater success than the students in rural colleges. This is true in all student success measures except for GPA where projects in 4-year public metropolitan colleges and 4-year public rural colleges had the same GPA (2.43). Secondly, when examining projects in 2-year colleges, students in rural projects performed better across all student success measures than metropolitan projects (Table 4.15).

Table 4.14: Univariate Analyses of Variance for Student Success Measures

	df	F	p
Host			
GPA	2	.3	.76
H.S. Credits	2	.1	.96
AP Credits	2	3.1	.04
H.S. Graduate	2	8.9	< .001
Drop-out	2	2.0	.13
Location			
GPA	2	6.8	< .001
H.S. Credits	2	9.1	< .001
AP Credits	2	3.8	.02
H.S. Graduate	2	4.0	.02
Drop-out	2	1.9	.16
Host x Location			
GPA	4	12.8	< .001
H.S. Credits	4	9.0	< .001
AP Credits	4	14.3	< .001
H.S. Graduate	4	17.1	< .001
Drop-out	4	4.8	< .001

Table 4.15: Mean Scores and Standard Deviations for Measures of GPA, High School Credits Earned, AP Credits Earned, H.S. Graduation and H.S. Dropout

		GPA		Credits Earned		AP Credits Earned		Graduated H.S.		H.S. Dropout	
Host	Location	M.	SD	M.	SD	M.	SD	M.	SD	M.	SD
2-year college	Rural	2.81	.77	22.3	5.9	2.9	4.2	.81	.39	.02	.14
	Sub	2.62	.80	22.3	4.7	.7	1.5	.48	.50	.04	.20
	Met	2.17	.68	19.0	6.4	1.0	2.4	.37	.49	.07	.25
4-year private college	Rural	2.51	.82	20.6	5.2	.3	.9	.49	.50	.04	.20
	Sub	2.51	.76	21.5	6.4	1.6	2.9	.74	.44	.02	.14
	Met	2.72	.70	21.7	5.0	1.5	2.2	.60	.49	<.01	0
4-year public college	Rural	2.43	.76	19.5	6.3	1.1	3.1	.71	.45	.10	.30
	Sub	2.82	.72	23.3	4.7	.4	.9	.62	.49	.04	.20
	Met	2.43	.83	21.2	5.4	1.7	3.2	.74	.44	.01	.09

p value < .001

Question Two: What Is the Relationship between Academic Characteristics and Student Success? The relationship between academic characteristics and student success was determined by using Canonical Correlation Analysis (CCA). Table 4.16 highlights the results of the analysis. The independent variables were the academic characteristics, and the dependent variables were the student success measures. Based on the CCA, only one of the canonical equations was statistically significant ($F = 2.78$, $p < .01$). There was a moderate canonical correlation between student success and academic characteristics (.41), with an $R^2 = .17$, indicating only a 17% overlap between the two sets of variates.

Based on the standardized canonical coefficients, the lower the student to staff ratio and the fewer number of courses provided by a project in the academic year, the greater the number of total high school credits were earned by the students, and the greater the number of high school graduates. These positive results also seem to be related to a greater number of course offerings in the summer.

In explaining the variates, 20% of the variance in the student success variate was explained by the five variables used to create it. Only 6% of the academic characteristics variate was explained by the four variables used to create it. For the redundancy values, only 3.4% of the variance in the student success variate could be explained by the academic characteristic variables. Only 1% of the variance in the academic characteristic variate could be explained by the student success variable.

Although there was a moderate correlation between the two variates, the variates were not a very good representation of the variables used to create them, and both variates had very little in common with the variables on the opposite side of the equation.

Table 4.16: Correlations and Standardized Canonical Coefficients between Upward Bound Academic Characteristics and Student Success Measures

	Variate	
Variable	Correlation	Canonical Coefficient
Academic Characteristics		
Student-Staff Ratio	-.18	-2.96
Courses Offered (summer)	.01	1.88
Courses Offered (Academic Year)	.08	-2.38
Years Project in Operation	-.03	-1.77
Student Success Measures		
Grade Point Average	.06	-.33
Total H.S. Credits	.29	1.03
Total AP Credits	.05	-.09
Graduated H.S.	.28	.53
H.S. Dropout	-.01	.49

Canonical Correlation .41
R^2 .17

Question Three: What Is the Relationship between Project Setting and Student Characteristics in the Upward Bound Projects? The relationship between project setting and student characteristics in the Upward Bound projects was determined by using cross tabulations and chi-square. The initial design examined project setting (host type by location) across student characteristics (gender by employment by ethnicity). However, the cross tabulation analysis produced some empty cells and several cells with very small numbers. Therefore, the initial cross tabulation design was collapsed into three smaller designs. Project settings (host type by location) were examined across gender, employment and ethnicity.

Project Settings Examined across Gender

As shown in Table 4.17 and Figure 4.1, gender was examined across project settings. Chi-square was used to test relationships between project settings and gender. Analyses indicated that there were no statistically significant differences between project settings in the frequency of males and females (C^2=3.92; p= .92).

Table 4.17: Gender Breakdown by Host Type and Location

		Gender			
Host Type	Location	Male	%	Female	%
2-year	Rural	57	36	101	64
	Suburban	40	32	86	68
	Metropolitan	47	36	82	64
4-year private	Rural	30	37	51	63
	Suburban	41	34	79	66
	Metropolitan	39	34	77	66
4-year public	Rural	58	33	118	67
	Suburban	30	27	82	73
	Metropolitan	85	34	164	66

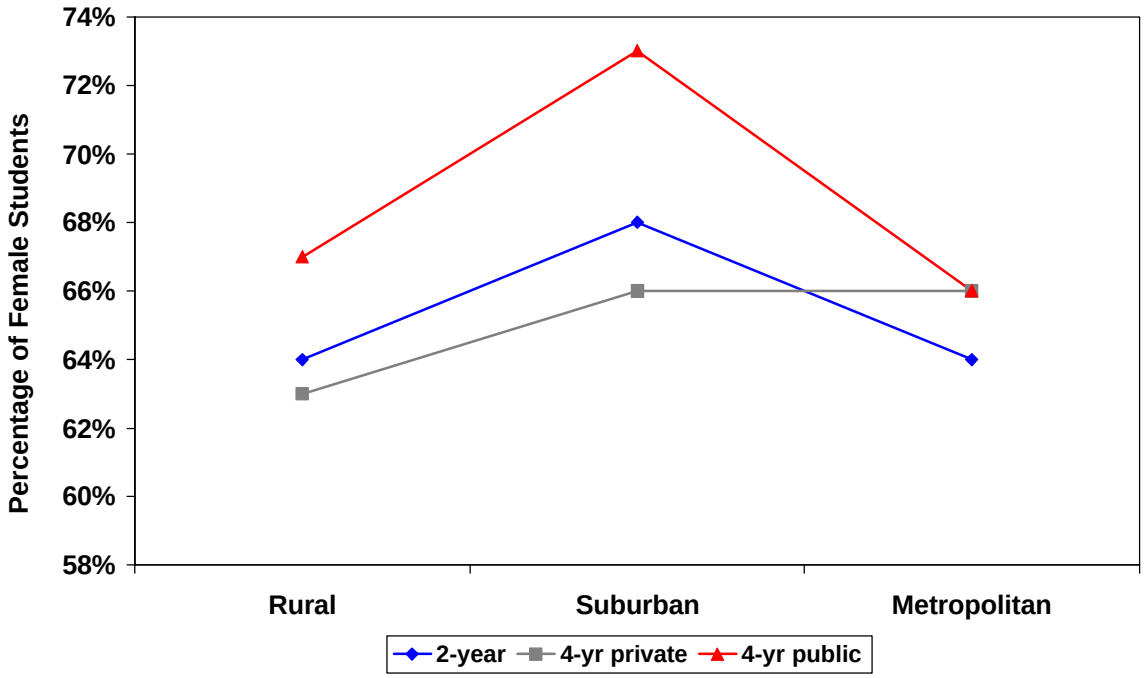

Figure 4.1: Gender Breakdown Across Project Settings

Project Settings Examined across Student Employment

As shown in Table 4.18 and Figure 4.2, student employment was examined across project settings. Chi-square was used to test relationships between project settings and employment. Analyses indicated that there were no statistically significant differences between project settings in the frequency of employed and unemployed students (C^2=18.66; p=.41).

Table 4.18: Employment Breakdown by Host Type and Location

		Employment			
Host Type	Location	Employ	%	Not Employ	%
2-year	Rural	26	16	132	84
	Suburban	14	11	112	89
	Metropolitan	12	9	117	91
4-year private	Rural	7	9	74	91
	Suburban	19	16	100	84
	Metropolitan	6	5	110	95
4-year public	Rural	18	10	157	90
	Suburban	15	14	96	87
	Metropolitan	35	14	212	86

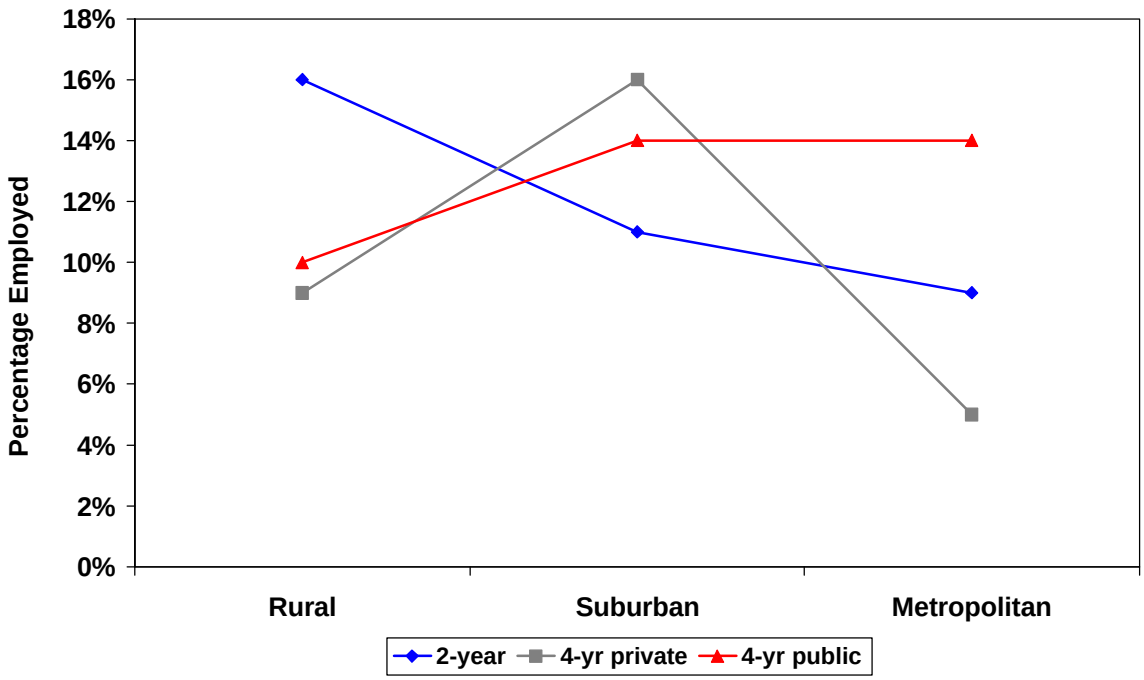

Figure 4.2: Employment Breakdown Across Project Settings

Project Settings Examined across Race/Ethnicity

Chi-square was used to test relationships between project settings and ethnicity/race. Analyses indicated that there were statistically significant differences between project settings in the frequency of Asian, black, white and Hispanic students (C^2=472.06; p < .001).

As shown in Table 4.19, race/ethnicity was examined across project settings. Figures 4.3 and 4.4 compared black and white students across project settings. Regardless of host type, the number of white students in metropolitan colleges was lower than the number of white students in rural and suburban colleges. Projects in 4-year private colleges had more white students in the rural than in the metropolitan location (see Figure 4.3).

Regardless of host type, more than 50% of the students in the metropolitan projects were black. Only 8% of the students from projects in 4-year public suburban colleges were black; however, 68% of the students from projects in 2-year metropolitan colleges were black (Table 4.19).

Table 4.19: Race/ethnicity Breakdown by Host Type and Location

		Race/Ethnicity							
Host Type	Location	Asn	%	Blk	%	Wht	%	Hisp	%
2-year	Rural	0	0	57	36	63	40	37	24
	Suburban	1	1	52	42	53	42	19	15
	Metro	3	3	82	68	10	8	25	21
4-year private	Rural	0	0	30	38	50	62	0	0
	Suburban	4	3	56	48	44	37	14	12
	Metro	13	11	59	52	0	0	42	37
4-year public	Rural	2	1	53	35	52	34	46	30
	Suburban	10	11	7	8	56	64	15	17
	Metro	34	14	131	54	33	14	43	18

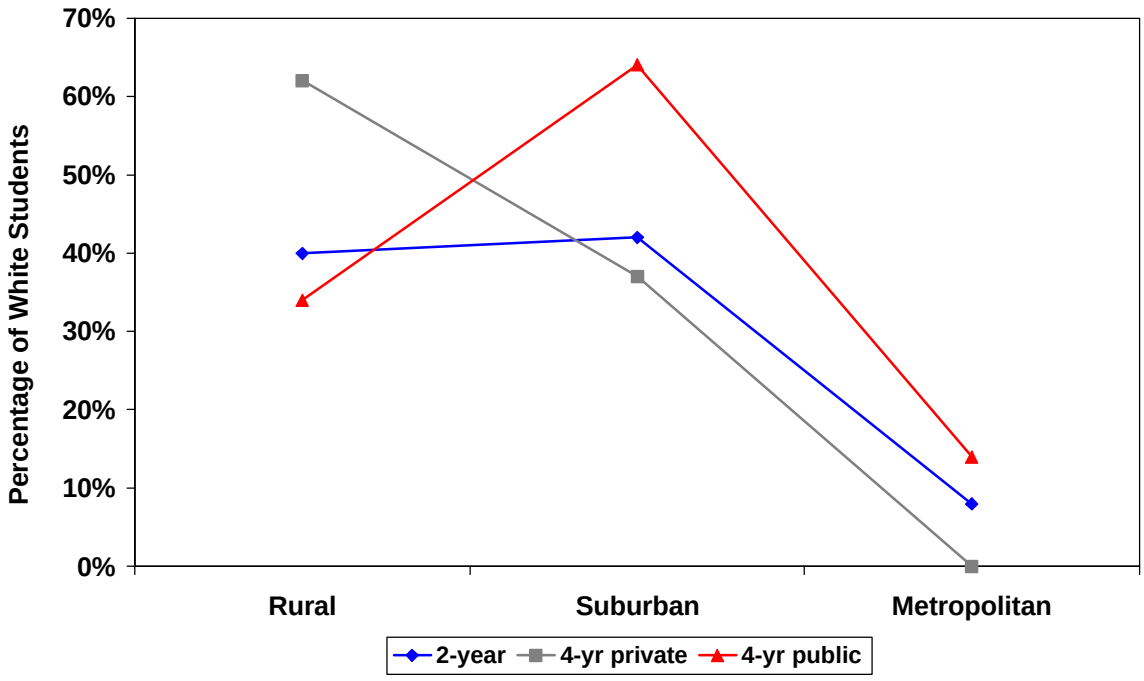

Figure 4.3: Percentage of White Students Across Project Settings

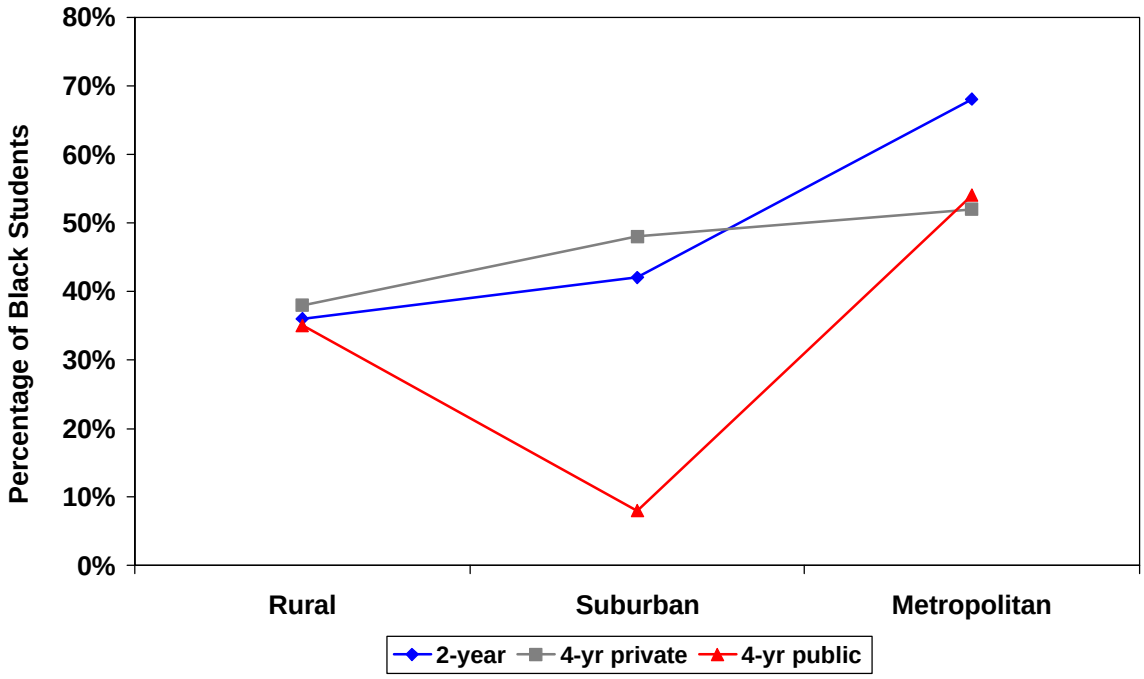

Figure 4.4: Percentage of Black Students Across Project Settings

Summary

Regardless of host type, rural projects had smaller student to staff ratios than suburban and metropolitan projects. Projects in 4-year public colleges typically offered more courses than projects in 2-year colleges. With respect to years in operation, 4-year projects have been in operation longer than 2-year projects.

When comparing projects in 2-year colleges, rural projects had students with greater student success measures than metropolitan projects. However, in 4-year colleges, metropolitan projects had students with greater success measures than rural projects.

There were some indications that projects with lower student to staff ratio had students with greater success measures. However, this was not consistent across all project settings. Although project settings with more course offerings had more students with a greater number of earned credits, this too, was not always consistent among all projects. Project settings with the most number of years in operation did not always have the students with the greater student success measures.

Chapter 5 will discuss the findings to the research questions in greater detail. In addition, the chapter will discuss the limitations of the findings and suggest applications for findings and implications for further research.

CHAPTER 5
DISCUSSION

The aim of the current study was to identify successful Upward Bound project level characteristics by identifying relationships between project and student variables. In this chapter, a discussion of the findings for the research questions and the limitations of these findings will be presented. Suggestions of how these findings can be applied to the Upward Bound program will be discussed. The last section of this chapter will provide implications for future research.

Relationship between Project Setting to Academic Characteristics

There were statistically significant differences in academic characteristics among the project settings. The MANOVA analysis indicated statistically significant interactions between host type and location at the .01 level.

Regardless of host type, rural projects had a much lower student to staff ratio than suburban and metropolitan projects. Because rural projects tend to be small, project size may explain the lower student to staff ratio. When comparing host type, projects in 4-year private colleges had slightly lower student to staff ratios than projects in 2-year colleges and 4-year public colleges. Projects in 2-year rural colleges had the lowest student to staff ratio.

Although statistically significant, differences in the number of course offerings during the summer were not very large between project settings. The range for summer course offerings among the project settings was only four courses. This suggests that there is little variability on the number of summer course offerings among project settings and may reflect the mandated course offerings by the Upward Bound program.

The difference in academic year course offerings among project settings was statistically significant. The range for academic year course offerings among project settings was about 13. With the exception of projects in 2-year metropolitan colleges, projects in 2-year colleges generally offered fewer

academic year courses than projects in 4-year colleges. Projects in 2-year colleges offered less than eight courses during the academic year. These projects may have focused more on tutoring and counseling over providing courses during the academic year (Myers and Moore, 1999). In contrast, projects in 4-year colleges (with the exception of 4-year public suburban colleges) had more academic year course offerings.

Projects in 4-year colleges had been in operation longer than projects in 2-year colleges. Projects in 2-year suburban colleges had been in operation for the least number of years (8.3 years). These findings suggest that projects in 2-year colleges are relatively new to the Upward Bound program. This is consistent to the National Evaluation of Upward Bound report that indicated a gradual increase in projects that are hosted by 2-year colleges within the past three decades. Between 1973 to 1995, the percentage of projects in 2-year colleges increased from 8 to 28 (Myers and Moore, 1997).

Relationship between Project Setting and Student Success

There were also statistically significant differences in student success between the project settings. The MANOVA analysis indicated statistically significant interactions between host type and location at the .01 level.

Projects in 2-year rural colleges had students with greater success measures than students from projects in 2-year suburban or metropolitan colleges. However, regardless of private or public, projects in 4-year metropolitan colleges had students with greater success measures than projects in 4-year rural colleges. Projects in 2-year rural and 4-year public suburban colleges had the most successful students.

Projects in 2-year rural and 4-year public suburban colleges had students with the highest GPA (2.81 and 2.82, respectively). These projects also had students with the most earned high school credits, averaging more than 22 per student. With respect to AP credits, projects in 2-year rural colleges had students with more AP credits than any other project setting (2.9). Projects in 2-

year rural colleges had students earning almost ten times more AP credits than students from projects in 4-year rural colleges.

Relationship between Academic Characteristics and Student Success

The research hypothesis stated that there is a positive relationship between academic characteristics and student success. That is, projects with lower-student to staff ratios, more summer and academic year course offerings and more years in operation will have more successful students.

Analyses indicated that projects in 2-year rural colleges and 4-year public suburban colleges had students with the highest GPA (2.81 and 2.82, respectively). Projects in 2-year rural colleges had students with higher GPA than projects in 2-year suburban (2.62) and metropolitan (2.17) colleges. Because projects in 2-year rural colleges had a lower student to staff ratio than projects in 2-year suburban and metropolitan colleges, this is consistent with current research on class size. Housden (1992) findings suggested greater academic gains with lower student to staff ratios when comparing achievement test scores of high school students. Similar studies have found that smaller class size relates positively to student achievement (Finn and Achilles, 1999).

Not all project setting results were consistent with current literature. Despite having a higher student to staff ratio, projects in 2-year suburban colleges had students with higher GPA (2.62) than projects in 2-year metropolitan colleges (2.17). And although projects in 4-year public suburban colleges had the highest student to staff ratio of the all the project settings (32.8), they also had the highest GPA (2.82). Students from projects in 4-year public suburban colleges also earned more high school credits than all other project settings. This particular finding suggests other confounding variables are affecting student success in the Upward Bound program.

With respect to course offerings, there is an inverse relationship between academic year courses and earned credits. For example, projects in 2-year rural colleges had fewer academic-year course offerings (7.4) than projects in 2-year metropolitan (14.3) colleges. However, projects in 2-year rural colleges had

students earning more high school credits (22.3) than projects in 2-year metropolitan colleges (19). In another example, projects in 4-year public suburban colleges had the fewest academic year course offerings, but had students with the most earned high school credits. In contrast, projects in 4-year public rural colleges had the most academic year course offerings but had students with one of the fewest earned high school credits.

There are some indications that there is a positive relationship between years of operation and student success. For example, projects in 4-year suburban colleges have been in operation longer (30 years) than any other project setting. Projects in 2-year rural colleges have been in operation longer (17.7 years) than projects in 2-year suburban (8.3 years) and metropolitan (14.9 years) colleges. Both of these project settings (the 2-year rural and 4-year public suburban colleges) had the highest GPA of all project settings. In addition, projects in 4-year public suburban colleges had students with the most earned high school credits (23.3). Although these two project settings indicate a positive relationship between the years of operation and student success, other project settings were not as consistent. For example, projects in 4-year private rural colleges had been in operation longer than projects in 2-year colleges, projects in 4-year private and public metropolitan colleges. However, projects in 4-year private rural colleges had students with the fewest earned AP credits.

Based on the canonical correlation analysis, the lower the student to staff ratios and fewer academic courses provided by a project, the more total high school credits were earned by the students and the more high school graduates. Again, this is consistent with most studies on class size. However, future research needs to be done to better understand why offering fewer courses would result in more earned credits and more high school graduates. This was not explored in this study but may be useful for improving curriculum and instruction in the Upward Bound program.

Relationship between Project Setting and Student Characteristics

Approximately two-thirds of the participants were females and one-third were males. There were no statistically significant differences in gender distribution across project settings. The Chi-square statistics indicated a non-significant difference between project settings in the frequency of males and females (p= .86).

With respect to student employment, the differences in student employment distribution across the Upward Bound project settings were non-significant. Again, Chi-square statistics indicated a non-significant difference between project settings in the frequency of employed and unemployed students (p= .10).

There were significant differences in race/ethnicity across project settings. In the Upward Bound program, over 40 percent of the students were black, approximately 30 percent were white and 20 percent were Hispanic. Only about 5 percent of the students were Asian. There were more white students in rural and suburban projects than there were in metropolitan projects. In contrast, there were more black students in metropolitan projects than there were in rural and suburban projects. Of all the project settings, projects in 4-year private metropolitan colleges had the fewest number of white students and projects in 4-year public suburban colleges had the fewest number of black students.

Because white students performed better than black students across all five student success measures (GPA, Earned Credits, AP credits, H.S. Graduation and Dropout), this may explain why projects in 4-year suburban colleges had the highest GPA and earned credits despite having the highest student to staff ratio of all project settings.

Conclusion

There are strong indications that suggest projects offering fewer academic courses have students with more earned high school credits and have more high school graduates. In fact, the three project settings with the fewest academic year course offerings had students earning the most high school credits.

Although there is no definite explanation for this relationship, it is suspected that projects offering fewer academic courses focus more on tutoring and homework help. Providing students with help in courses that they are taking concurrently at their high school can help the students pass the course, earning more high school credits and graduating from high school.

There are also indications of a positive relationship between student to staff ratio and student success. Having the lowest student to staff ratio, the projects in 2-year rural colleges had more successful students than any other projects. Students from projects in 2-year rural colleges earned more AP credits, had the most students graduating from high school, had one of the highest GPA and earned high school credits and had one of the lowest dropout rates. However, having lower student to staff ratio did not yield the same success consistently for all project settings. For example, projects in 2-year metropolitan colleges had fewer than 16 students per staff member. However, these projects had students with the lowest success measures of all project settings including GPA, earned high school credits, and student graduation. On the other hand, projects in 4-year public suburban colleges had the highest student to staff ratio, but also had the highest GPA and earned credits.

The inconsistency between low student to staff ratio and success among project settings may in part, be attributed by characteristics involving ethnicity differences, which interact as confounding variables. For example, projects in 2-year metropolitan colleges (the project settings with the lowest student success) had 68 percent blacks and only 8 percent whites. In contrast, projects in 4-year public suburban colleges had 64 percent white students and only eight percent black students. Current research indicated that whites outperform blacks in academic achievement, even when controlled for other variables such as socioeconomic status.

Of the students selected to the Upward Bound program, 20% chose not to participate. In addition, another 40% eventually dropped out of the program. As a result, of the students being evaluated in the National Study, only about 50% of the students actually participated in the program for the full 12 months (Myers

and Moore, 1997). Attrition data were not available in the data files provided by Mathematica. As a result, the attrition factor was not accounted for and needs to be addressed in future research. Having this information may possibly reveal stronger relationships between project level characteristics and student success measures.

Another variable that may have helped reveal stronger relationships between project level characteristics and student success measures is attendance in the Upward Bound program. Because student attendance varies by project, such data can determine how much of the "treatment" each student received. This would include attendance for each of the classes the students were enrolled in and all special academic sessions made available to the students. Data on these variables would have been extremely helpful in analyzing successful project level characteristics.

Limitations

The size of Mathematica's Upward Bound data files has been the major limitation of this study. Although there were 2,844 records in the student data file, only 1,285 students actually were invited and participated in the program. The initial 3 x 3 x 3 design contained a total of 27 possible cells. That comes to about 47 cases per cell. As a result, the design has several low numbers or empty cells. Furthermore, the distributions of numbers between the cells were unequal. Future research needs careful planning to develop a database large enough to accommodate the 3 x 3 x 3 design that can test for differences in project settings. At this point, Mathematica does not have a data file of that would allow a test of that magnitude.

As with the data used in The National Evaluation of Upward Bound report, this current study used student success measures that are underestimates. These student success measures (GPA, Credits Earned, AP Credits, H.S. Graduation and Dropout) from the Upward Bound data are underestimates of the true predictor variables, therefore, should be interpreted with caution.

Implications for Policy Makers and Researchers

Relationships between project characteristics and student success were identified in this studied. Findings seem to indicate a positive relationship between student to staff ratio and student success and a potentially inverse relationship between academic year course offerings and student success. Although these relationships are relatively small, they can be used as arguments for a) reducing class sizes in the Upward Bound program allowing for more personal attention to the students b) de-emphasizing elective courses and focusing more on core courses during the academic year and c) strengthening the tutoring and homework help component of the Upward Bound program.

There are additional student and project variables in the Upward Bound program that have yet to be examined or identified. Exploring other student and project variables may help policy makers develop strategies to improve the effectiveness of the Upward Bound program and to maximize the resources allocated to the program by modifying current operations and experimenting with different program designs. Suggestions for future research to better understand the Upward Bound program are highlighted in the next section.

Further Research

Future research should include a comparison between students who were invited to the Upward Bound program but did not participate to students who were invited to the Upward Bound program and participated. A study of this type would help explain the affects of the Upward Bound program. This will provide critical information for future policy decisions for the Upward Bound program.

As previously stated in the conclusion, attrition should be considered for future research. Once attrition is accounted for, stronger relationships between project characteristics and student success may be revealed. Attrition should also be analyzed across project settings to determine which projects retain student participation the most and how it affects the overall student achievement.

It would be interesting to examine following questions: Which types of project settings have the highest attrition rate? Are there any relationships between project characteristics and attrition? How might attrition be a reflection of the quality of the Upward Bound project?

Attendance in the Upward Bound program should not be overlooked. Depending on the number of days a student misses from the program, the attendance variable may possibly account more for student success than the actual project level characteristics. Therefore, it is critical to examine this variable further and make sure it is controlled for in any future research studies.

In addition to the five student success measures, future research should consider other dependent variables that measure student success such as college enrollment, type of college (2 or 4-year), college GPA, class ranking and college graduation. By including additional success measures, more definite relationships can be made about long-term affects from participating in Upward Bound.

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- Plan, prepare and implement Biology, Environmental Science, BSI (Biological Science Investigations) and Life Science lesson plans and activities for middle and high school students.
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Program Supervisor and Instructor, Summer Technology Program
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- Supervise and monitor summer technology program.
- Plan, prepare and implement technology lessons for middle and high school students, including the use of Excel, Microsoft Word, PowerPoint, Internet/Web Page Design, and interactive scientific/educational software programs.
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Virginia Cooperative Extension Site Director, AmeriCorps Project
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- Direct Homework Help Center for Kingsley Community in Fairfax County.
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- Plan, prepare, and implement Biology and Chemistry lesson plans for the Upward Bound Program.
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