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THESIS

**NROTC FOUR-YEAR SCHOLARSHIP ATTRITION:
A DESCRIPTIVE ANALYSIS**

by

Maureen M. Cahill

March 1993

Co-Advisors:

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A DESCRIPTIVE ANALYSIS**

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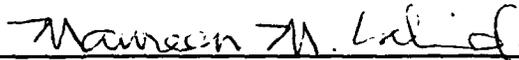
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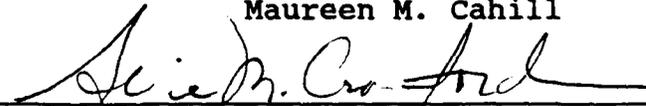
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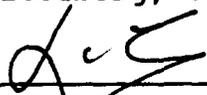
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I. INTRODUCTION

A. BACKGROUND

As the Navy moves further into the personnel drawdown phase that is shaping the smaller force of the future, the casual observer might think that attrition would not be a concern. After all, the primary goal of the drawdown is to reduce the Navy's size. But in this environment of limited resources, attrition becomes even more important due to the financial impact associated with early personnel losses from high-cost programs.

The Naval Reserve Officers Training Corps (NROTC), one of three Navy commissioning sources, offers young men and women the opportunity to qualify for commissions in the Navy and Marine Corps while attending college, many on Navy scholarships. While cost-per-graduate is lower than that of the Naval Academy, the total program costs are relatively high due to the large number of officers produced through NROTC annually.

Costs borne by the Navy include: tuition (this varies depending on the institution), textbooks, instructional fees, \$100 per-month for ten months each year, and midshipmen pay during summer training periods. According to the Chief of Naval Education and Training (CNET), the annual expenses average close to \$13,400 per student in NROTC. For comparison

purposes, the average annual cost to produce a Naval Academy graduate is \$37,800 and the cost to send someone through 16 weeks of Officer Candidate School is \$19,876.¹

Upon graduation from both college and the NROTC program, scholarship recipients are commissioned as regular officers in the Navy or Marine Corps and must serve a minimum of four years on active duty. Beginning in October 1996, all new officers regardless of commissioning source, will receive reserve commissions with the same minimum service requirement.

While the majority of scholarship students are recruited for NROTC directly from the civilian community, active-duty sailors and marines may also compete for scholarships. Individuals, both civilian and active duty, with high potential but otherwise not qualified for immediate entry into NROTC, have the opportunity to earn a scholarship through the Navy's Broadened Opportunity for Officer Selection and Training (BOOST) program. BOOST offers participants an opportunity to study courses they may not have been exposed to in high school, such as physics or chemistry, before entering NROTC (Jackson and Maddox, 1990, 35).

A number of scholarship students do not complete the NROTC program and disenroll without receiving an officer commission.

¹Cost figures for all three commissioning sources were provided by CNET, Code N12. Annual costs for both Naval Academy and NROTC are based on four-year figures. It should also be noted that the Naval Academy total can be calculated on the basis of marginal cost--with a much smaller total.

This attrition from NROTC occurs for many reasons and can either be self-imposed by the individual (voluntary) or mandated and initiated by the unit. After being selected to receive a scholarship, each individual must enroll in one of 192 colleges serviced by the 66 NROTC units nationwide. Midshipmen are required to maintain certain scholastic, moral, physical, and performance standards to remain eligible for continued enrollment in the NROTC program. Mandatory disenrollment procedures may be started by the unit commander for a student's failure to meet the established standards. Voluntary disenrollments, on the other hand, are initiated by the individual based on reasons that may include: inability to adapt to college life; dislike for travel or the military; desire to enter another profession; financial problems; personal reasons; or refusal to accept a commission.

Scholarship recipients who disenroll prior to beginning their sophomore year of college are under no obligation to the Navy for any type of repayment. However, individuals who leave the program and are still qualified for NROTC are obligated to serve two years active duty as an enlisted member. This service can be delayed to allow for the completion of school.

Attrition in itself can be beneficial as a means to weed out individuals unsuited for military life as commissioned officers. On the other hand, attrition also equates to lost training dollars. While it is beyond the scope of this thesis

to examine the specific costs and benefits associated with NROTC attrition, it is clear that the costs far outweigh any benefits for individuals who disenroll from NROTC prior to incurring an obligation to remain in the Navy. NROTC attrition may further represent a loss of many highly talented young people, with the qualities and attributes necessary to contribute to the increasingly technical Navy of the future.

B. OBJECTIVES

The purpose of this thesis is to examine attrition behavior by individuals who have received NROTC four-year national scholarships. This is accomplished by analyzing both background and performance data on scholarship recipients and data available on the NROTC units.

Many studies of the NROTC program have centered on the selection process but, the models used to select NROTC candidates are aimed at identifying the highest quality individual who is most likely to be successful as an NROTC midshipman, not as a "completer" of NROTC. (Mattson, Neumann and Abrahams, 1986; Owens-Kurtz, Borman, Gialluca, Abrahams and Mattson, 1989; and Burch and Abrahams, 1991) Motivational, or voluntary attrition from NROTC has been examined in the context of using existing biographical data to predict attrition. (Kantor, 1989) Although providing insight, this approach does not take into consideration the various environmental factors, such as type of school and instructional elements, which appear to be important in

explaining why students may drop out of college (Porter, 1990 and Ramist, 1981). This thesis examines environmental variables, as well as any impact the NROTC service obligation policy may exercise on attrition behavior.

C. RESEARCH QUESTIONS

Which scholarship students disenroll from the NROTC program and why? Are there any similarities between the behavior of college dropouts and those who leave NROTC? How prevalent is motivational attrition? Finally, is attrition influenced by the NROTC service obligation policy? These are the primary questions addressed in the thesis.

D. SCOPE, LIMITATIONS AND ASSUMPTIONS OF RESEARCH

1. Scope

Four-year scholarship recipients were chosen for this study, since all midshipmen in this group participated in a national scholarship competition and were therefore subjected to similar selection criteria. A proper analysis of attrition behavior and trends requires that students in each cohort group be allowed ample time to either complete the four-year NROTC program or disenroll. Consequently, the primary analysis is concentrated on those students who entered NROTC as freshmen no later than 1987.

Students apply for either Navy or Marine Corps-option scholarships and once enrolled may request a transfer from one option to the other. Marine-option students, who represent

almost 17 percent of the NROTC scholarship population, were not removed or isolated from any portions of analysis. Consequently, all references to scholarship students, Naval officers and Naval service are inclusive of both Navy and Marine Corps-option individuals.

This study focuses on students who leave the program as a result of voluntary drop requests as well as unit-initiated disenrollments. Using available personal background and NROTC program factors, it is possible to characterize both attrition trends and behavior.

2. Limitations

Although the data set provided by CNET is quite extensive, it does limit the research in several ways. Attempts to construct a comprehensive model for predicting NROTC attrition were thwarted by the non-availability of essential data elements. For example, high school demographic and performance variables are only available for students who recently enrolled in NROTC, and individual family background data, such as socioeconomic status and parents' educational attainment, are not present at all.

Motivational factors that may indicate interest in (or a commitment to) Naval service were also not available and had to be proxied using existing variables. Additionally, no method exists to determine whether or not students drop out of college upon disenrollment from NROTC. Consequently,

comparisons between program attrition behavior and college dropout behavior could only be approximated.

Finally, inconsistencies inherent in the methods used to record a student's grade-point average limited the use of this variable. Some of these problems included: schools with "pass/fail" grading were not identified; there was no distinction between schools on semester terms or quarters; and there were four different grade-point scales used by the colleges in the data set.

3. Assumptions

The primary assumption made regarding NROTC is that, unlike the "all military" environment found at the Naval Academy and Officer Candidate School, students function primarily in a college atmosphere and are subject to many of the same influences as their civilian college peers. Also, rather than concentrate on graduating classes, emphasis was placed on entering freshmen who started NROTC during the same school year. Since annual attrition rates for this study are based on school years (September through August) rather than the government fiscal year (October through September), they probably do not match rates based on fiscal-year data.

E. ORGANIZATION OF THE STUDY

College dropout and attrition studies are the primary focus of the next chapter, and are presented after a brief look at the development of the NROTC selection process. The

next chapter concludes with a discussion of motivational attrition.

Following a description of the NROTC data set used here is a discussion of the variables and method of analysis. This is followed by a detailed analysis of the results obtained, and, finally, conclusions and recommendations for further research. Tables showing the distribution of scholarship students by ethnicity and SAT score level are provided in the Appendix.

II. LITERATURE REVIEW

As with other officer commissioning sources, the goal of NROTC is to produce high-quality Naval officers. The uniqueness of NROTC is that this goal is accomplished, not in a sterile "military-only" environment, as is the case at the Naval Academy and Officer Candidate School, but on college campuses located throughout the country. Consequently, the task of examining NROTC attrition must include commentary on college attrition.

After a brief review of the NROTC selection process and associated research, three college/university attrition studies are discussed. Topics covered include: college persistence, the attrition process, and dropouts. The chapter concludes with an examination of research on NROTC motivational attrition.

A. SELECTION CRITERIA STUDIES

Selection of the "best-qualified" of all applicants, is of great importance to NROTC. The four-year scholarship program uses a two-step process in selecting students: (1) initial screening, where Scholastic Aptitude Test (SAT) or American College Test (ACT) scores serve as the sole criterion; and (2) final selection through review by a selection board, where elements such as high school ranking, officer interviews, interest inventory scores, and background questionnaires are

taken into account (Eitelberg, Laurence, and Brown, 1989, p. 53).

With the goal of improving the final selection process, researchers assigned to the Navy Personnel Research and Development Center (NPRDC) developed a "Quality Index," that is, a composite of variables optimally weighted to predict NROTC performance criteria, such as grade point average, Naval aptitude grades, and Naval science grades (Mattson, Neumann, and Abrahams, 1986). This selection composite was developed to replace the "Overall Index of Academic and Officer Potential" that had been used since the late 1960s. The first "Quality Index" was implemented by CNET with the February 1985 NROTC Scholarship Selection Board.

Variables used as predictors in the "Quality Index" (QI) include the following six academic and personal factors: SAT Verbal, SAT Math, high school ranking, officer interview, a career-tenure scale developed from the Strong-Campbell Interest Inventory (SCII), and a career-tenure scale developed from a Background Questionnaire (BQ) (Mattson, et al., 1986). It should be noted that ACT scores are converted to equivalent SAT scores for use in the Quality Index.

Since about 1985, NPRDC researchers have continued to study and refine the QI using improved statistical prediction techniques. Its ability to predict NROTC performance continues to be validated by researchers since it is possible that the QI will require revision as characteristics of the

applicant pool change (Owen-Kurtz, Borman, Gialluca, Abrahams, and Mattson, 1989, 1). The selection composite was further improved to increase its ability to predict NROTC scholarship recipients who select technical majors without decreasing the ability to predict the original three criteria (Burch and Abrahams, 1991). As recently reported by CNET, the QI currently used by selection boards breaks down into components as follows: SAT Verbal (10 percent), SAT Math (25 percent), high school rank (47 percent), officer interview (8 percent), SCII (4 percent), and BQ (6 percent). By using this index, selection board members are able to look at multiple aspects of the individual. In other words, a "whole person" selection process is used to screen NROTC four-year scholarship applicants.

NROTC midshipmen receive their military training while attending civilian colleges and universities. Consequently, the propensity to disenroll should be subject to similar influences faced by college dropouts across the country.

B. COLLEGE/UNIVERSITY ATTRITION STUDIES

1. College Persistence

A study of the persistence of American college students during the 1980s--the way they enroll, stay enrolled, complete their degrees, or dropout--was found to be relevant to NROTC attrition. Oscar Porter (1990) researched the similarities and differences in persistence behavior between public and independent four-year institutions by using the

High School and Beyond² study as his data base. In addition to base year information, data from 1986 follow-up surveys of nearly 12,000 students were available and used.

Porter uses the independent variable, "persistence," to describe the flow of students through college over a six-year period as "completers (those who completed a bachelor's degree), persisters (those who were continuously enrolled), stopouts (those who left and returned), and dropouts (those who left and did not return)." (Porter, 1990, vii) Variables analyzed included: institution type, ethnicity, academic ability, socioeconomic status, and a composite of ability/socioeconomic status. Since this study was descriptive in nature, cross-tabulations with additive layers of control variables were used as the primary method of analysis.

Results showed that students left the system in the largest single group during their first year and prior to the second, and that close to one-half (44.5 percent) of all eventual dropouts did so prior to beginning their sophomore year. Porter also found that, for all students, overall degree completion within six years was lower than expected from previous literature, with independent institutions more likely to see their students complete a bachelor's degree in four years. Porter suggests, based on his findings:

²The High School and Beyond study is a national, longitudinal survey of 28,000 young people who were high school seniors in 1980. It was developed by the U. S. Department of Education's National Center for Educational Statistics.

Completion of a degree after four years is no longer the norm, if it ever was. Of those high school graduates who entered four-year institutions on a full-time basis only one in six completed their degree in four years. Thus the average bachelor's degree recipient may now take five or more years to complete a degree. (Porter, 1990, p. 33)

Dropout rates over a six-year time period were compared for racial/ethnic groups, with blacks showing the highest dropout percentage (63.3 percent), followed by Hispanics (54.4 percent) and whites (41.5 percent). Asian-Americans had the lowest dropout rate (37.2 percent) in the study.

To measure academic ability, Porter combined high school grades and scores from a test prepared especially for **High School and Beyond**. Although the test given was not a national test, such as the SAT or ACT, correlation with these tests is strong according to Porter. Students who either scored high on the test or received A's or A's and B's were identified as high-ability students. In combining grades and test scores in this manner, concerns over possible discrimination in standardized tests or grade variation from one school to another could be diminished. (Porter, 1990, p. 9)

Results showed that, for all students, degree completion is positively related to ability, and dropping out is negatively associated with ability, even when controlling for the institution. Additionally, regardless of institution type or racial/ethnic group, low-ability students are substantially less likely to complete college than are persons

in higher ability groups. Porter also looked at the interaction of ability and socioeconomic status on completion behavior. He found that for minority students, the high-ability/low-socioeconomic completion rates far exceed the overall completion rates for each ethnic group. (Porter, 1990, p. 34)

As described in the first section of this chapter, the NROTC selection process is structured to select high-ability applicants. One question examined in this thesis is whether Porter's college persistence findings specifically relate to NROTC attrition.

2. College Attrition Process

A 1988 study by Stage supports the concept of the college attrition process as a series of changing commitments and experiences that affect students' integration and, ultimately, decisions to withdraw from or continue in the institution (Stage, 1988, p. 344). Explanatory background variables found in other research on student persistence were used, but Stage added another dimension through the use of endogenous variables including: educational goal attainment, commitment to the institution, and integration--both social and academic--once enrolled.

Focusing on early dropouts, Stage used survey data collected in the third month of the Fall semester of 1984, and at the beginning of the Spring semester of 1985. Random samples were taken at a major public university in the

Southwest that had a typical Fall-to-Spring attrition rate between 10 and 12 percent. The surveys elicited responses to motivational questions, institutional and goal commitment, and demographic information.

Stage's findings, for both men and women, indicate that age (negative) was a significant predictor of social integration; father's education (positive) was a significant predictor of both academic and social integration; ethnicity (negative for minorities) was a significant predictor of academic integration. He also found that certain endogenous variables--academic integration, social integration, and institutional commitment--were significant, positive predictors of persistence.

Both women and minorities with high levels of social integration were more likely to drop out, while minorities at high levels of academic integration were more likely to persist. For those students, perhaps high levels of social integration came at a cost to other aspects of college life. For men, only academic integration and social integration were found to significantly and directly influence persistence. High levels of institutional commitment led to high levels of social integration and, consequently, as stated above, can influence a student's persistence. (Stage, 1988, p. 355)

Although little is known about the motivation of individual midshipmen, there are likely vast differences between what they expect the NROTC program to be and their

actual experiences once they become members of a particular unit. As Stage points out, academic and social integration, as well as institutional commitments, can be predictors of persistence. NROTC program factors, although not available for this thesis, may prove useful in exploring program, academic, and social dimensions that act as influences in the NROTC/college environment.

3. College Dropouts

Ramist reviewed previous works related to college attrition and retention for the New York College Entrance Examination Board (Ramist, 1981). The purpose of his study was to look at overall dropout rates and examine reasons students give for dropping out. Ramist found that the largest number of students (30 percent) who do not graduate from their college of entry within four years leave the school during the first year and prior to beginning the second year. Additionally, he compiled results on demographic, academic, motivational, and personal characteristics of students who are likely to drop out. Only those factors most pertinent to this work--gender, race/ethnicity, and academic factors--are covered here.

Research results described by Ramist show that men tend to drop out of college at a greater rate than women, while other studies indicate that women tend to drop out more. Ramist attributes these conflicting results to several factors, two of which are discussed. First, men are more

likely to "stopout" during undergraduate years, but were more likely to return and graduate. Consequently, studies on freshman dropouts are more likely to show that men have higher dropout rates; and long-term follow-up studies are more likely to show that women have higher dropout rates. Second, he found that women tend to leave for nonscholastic reasons, and men are more likely to be academic dropouts. Studies that focus only on voluntary withdrawals show women with relatively higher dropout rates, as compared to studies that distinguish between voluntary and involuntary withdrawals.

Several of Ramist's findings should be highlighted with regard to the racial/ethnic make-up of students. Without controls for socioeconomic status and academic ability, blacks have slightly higher dropout rates than whites. However, most research shows that, with controls, rates are essentially the same. Additionally, research shows that blacks are more likely to drop out from predominantly white colleges than from predominantly black colleges. There was also an indication that, after controlling for academic ability and socioeconomic status, Hispanics tend to have lower dropout rates than either blacks or whites in four-year colleges.

Ramist found that high school grade point average or GPA and high school class rank are the best predictors of persistence and attrition, with correlations of high school record and persistence ranging from 0.25 to 0.50 (Ramist,

1981, p. 9). In addition, data³ show that the freshman year dropout rate generally ranges from nine percent for those scoring 600 or above on the SAT math component to 27 percent for those scoring below 300 (Ramist, 1981, p. 8).

Another aspect that Ramist brings to light in this study is that, when considering college dropouts, NROTC benefits seem to have a positive effect on persistence. He attributes this to the commitment represented by participation in NROTC. This statement could be misleading when looking at NROTC attrition. In civilian data sets that contain NROTC students, true dropouts from the institution would be those midshipmen who disenroll and go immediately to perform two years of active duty service as enlisted members or those who disenroll and also leave the college. In Ramist's study, individuals disenrolling from NROTC but remaining in school would be counted as persisters, even if they are still obligated to the Navy for reimbursement of scholarship expenses or two years of active-duty enlisted service upon leaving the institution. So, while NROTC students may appear to have higher persistence tendencies from a civilian perspective, their attrition rates from NROTC should differ from college attrition rates.

Ramist found that most students gave the following reasons for leaving school: academic matters, financial

³Data were compiled by the College Board's Admissions Testing Program Summary Reporting Service with no specific dates provided.

difficulties, motivational problems, personal considerations, dissatisfaction with college, military service, full-time jobs, and lack of initial plans to obtain a degree. In this study, each of these reasons was examined, and while many factors were found to be related to both persistence and dropping out, Ramist felt the two most-used reasons for departure--academic matters and financial difficulties--may depend heavily on motivation. Ramist states:

With the exception of those who do not have the requisite ability, students continue in college because they choose to do so and drop out because they choose to do so, for reasons that may or may not be accurately assessed. For a student with the requisite ability, even involuntary withdrawal due to low grades is really voluntary: a result of the student's choice not to do the work that is necessary to obtain sufficiently high grades. (Ramist, 1989, p. 10)

This observation about motivation may certainly apply to NROTC scholarship program students who are specifically screened for academic ability and normally score well on the SAT or ACT.

C. MOTIVATIONAL ATTRITION

Individuals who voluntarily leave the NROTC scholarship program prior to receiving a commission are considered personnel losses due to motivational attrition, since they are otherwise still eligible for continued participation. Based on an analysis of the 1982 and 1983 NROTC student files, over 50 percent of all personnel who left the program did so for motivational reasons, while approximately 40 percent disenrolled for academic reasons. (Kantor, 1989, p. 1)

Kantor investigated the use of "biodata" to predict NROTC attrition, since previous studies of college dropouts had found that the demographic, motivational, academic, and personal characteristics of students are predictive of college disenrollment (Kantor, 1989, p. 1). Biodata elements are available in the form of student profiles that are completed by each individual when taking either the SAT or ACT. These student profiles, along with test results, are forwarded to the institution indicated by the test taker and become a part of the NROTC application.

Although research results were not conclusive, since the biodata currently available appeared limited in scope, Kantor did find that certain self-reported characteristics were evident for students who completed the NROTC program when compared to individuals who left the program for motivational reasons. These characteristics, self-reported by graduates, included: (1) greater certainty about the student's chosen field; (2) a higher interest to pursue college courses in the student's chosen field; (3) greater involvement in high school sports; and (4) more participation in leadership roles in high school. Additional insight obtained by Kantor was that self-reported high school rank and scholastic aptitude scores alone are not good predictors of NROTC completion. His final recommendation was that, with further research, a detailed biodata inventory should be constructed and administered experimentally by CNET.

Kantor also suggests two possible explanations for motivational attrition from the NROTC scholarship program and recommends that the following hypotheses be explored:

First, during year one of their academic careers, students may withdraw from the program without obligation to the Navy. The underlying motivation for some candidates to enter the NROTC scholarship program may be to receive financial assistance at least during the first year of their education. Second, some students entering the program (i.e., those who become motivational drops) may have unclear expectations of what the program and the military career require of them. Once they experience the military life style, some may find it too strenuous and restrictive, and decide to withdraw. (Kantor, 1989, p. 7)

As can be seen thus far, a myriad of factors--both military and civilian--have the potential to cloud or enhance the attrition picture. There is both consensus and disagreement as to specific characteristics having the most relevance to an analysis of the student's stay/leave decision. This thesis considers many of these possibilities using available NROTC data. The next chapter provides an overview of how this is accomplished.

III. DATA AND METHODOLOGY

A. DATA

The data file used for analysis was obtained from Chief of Naval Education and Training (CNET), Pensacola, Florida. CNET's Officer Programs Management Information System (OPMIS) data base contains longitudinal information on students who were enrolled in NROTC units throughout the country at any one time since 1979. Midshipmen participating in both Navy and Marine Corps-options are represented in the data base.

Changes to OPMIS files are performed locally at each unit and transmitted to CNET monthly to update the master tape. OPMIS is composed of several files that include placement, student, special programs and staff/unit data. However, only the student file was made available for this analysis.

1. Data Set Variables

Although the student file contains a variety of information, availability of pre-NROTC background variables is very limited. The only indicators of academic ability contained in the data set are SAT (verbal, math, and combined) scores. All students are shown to have SAT scores, since ACT results are converted to SAT equivalents. In 1986 CNET added high school type, size, and academic standing to the student file, along with variables that would indicate military parents, dependents, marital status, and achievement of "eagle

scout" (in Boy Scouts of America), but these entries are missing for all individuals who had disenrolled prior to that time. General background information--gender, ethnicity, home state, and prior military experiences--are available for the entire data set population.

Program performance variables, such as grade point averages, Naval aptitude grades, and Naval science grades--by school term and cumulative--are a part of the data. Academic majors are also available for most students. Additionally, data are accessible on leave of absence, with the student's academic standing at the time, and whether and why students were placed on probation. Another indicator of program performance is found in the disenrollment comments that represent a departing student's assigned recommendation for possible re-enrollment in the future.

Unit information is also extremely limited. Observations can be identified by NROTC unit, but there is no indication whether students are enrolled in crosstown schools or in the host unit for that particular area.

Attrition information is present in multiple categories. Included here is the outcome or consequence of disenrollment--whether enlisted active duty is to be performed, if a waiver of service obligation was granted, or no obligation existed--and the reason the disenrollment occurred, such as academic, dislikes military, personal, or disciplinary. Also included in the variable are codes that

identify individuals receiving either a Navy or Marine Corps commission, indicating completion of the bachelor's degree at the college or university. By grouping attrition codes and commissioning codes, the dependent variable ALLMIDS could be broken down into ATTR (those who left without completing the program) or NO ATTR (those who graduated).

2. Proxy Variables

Due to the limited availability of explanatory variables in the student file, several proxy variables were created to represent performance in the NROTC program. By comparing second-term and first-term freshman grade point averages (GPAs), the variable ACADEMIC--which indicates whether GPA went up, down, or stayed the same--was established.

Another aspect--whether students complete the entire freshman year before disenrolling--may indicate a tendency to stay in NROTC just long enough to receive a year's worth of associated benefits. To capture this trait, GPAs were again utilized to create a proxy. The assumption was made that, if a student attended classes, the GPA for that term would be greater than zero, and if a student did not attend classes or dropped all classes, the GPA for the term would be shown as zero. Applying this reasoning, if GPAs greater than zero existed for both terms, it would indicate that the student participated in ALLTERMS of the school year prior to disenrolling from the scholarship program. Appropriate

adjustments were made to account for students in NROTC units that are located at schools on quarter terms instead of semester terms.

Students have the option to major in the academic area of their choice. Since there is a diversity of academic majors available, technical majors were separated from nontechnical majors, based on how CNET classifies each. The variable TECH was established to indicate if a student majored in a technical field.

With no information on the particular unit, other than identifying the school and its location, additional variables were created to examine attrition patterns as a function of a unit's racial/ethnic composition. By comparing the racial/ethnic distribution of students in each unit, it was possible to isolate the percentages of minority students at each unit. The variable ETHNUNIT was created and subdivided into the following: BUNIT--blacks make up 25-100 percent of the unit; HUNIT--Hispanics make up over 40 percent of the unit; MUNIT--whites make up 70-80 percent of the unit; and UNIT--whites make up over 80 percent of the unit.

3. Dependent Variables

With the ability to determine when students prematurely depart the NROTC scholarship program, several categories of attrition can be examined. Comparisons can be made between early and late attrition by isolating students who leave before starting their sophomore year from those who

leave after that point. The dependent variable ALL_ATTR was created for this purpose. Additionally, by grouping all students who survive the first year, comparisons between students who graduate and those who still leave before graduation can be examined.

One final dependent variable was constructed to look at motivational attrition. As discussed earlier, students who leave the scholarship program voluntarily, but are otherwise eligible for continued participation, are considered personnel losses due to motivational attrition. An indication of continued eligibility can be represented using the departing student's re-enrollment code assigned by CNET based on the unit commander's recommendation and the associated disenrollment package.

A dependent variable, MOATTR, was created by grouping students receiving codes indicating the following: not recommended; not recommended unless "needs of the service" are weighed against reason for re-enrollment; and recommended only if physical or personal disqualifying factor is eliminated. These codings would identify individuals who did not leave the program for motivational reasons. The remaining observations should then consist of those who left based on motivational influences.

B. STRUCTURING THE DATA

Since the intent of this thesis is to investigate only the four-year scholarship program participants, those individuals

had to be identified and isolated. This breakout resulted in a population size of 21,496.

Students were then grouped into cohorts by the date they reported to NROTC as a freshman or a fourth-class midshipman. To accommodate the various school-year start dates (which depend on the institution), observations with report dates in August of one year and prior to August the following year were considered to all belong to that school-year of entry cohort. This seemed to suit the data set, since most students reported between August and January, which would accommodate both semester and quarter-term schools. Twelve cohorts were created and labeled START80 to START91.

Tenure, or how long a student remained enrolled in the NROTC program, was established by taking the difference in months, between the month and year of a scholarship recipient's REPORT DATE and the month and year the midshipman became an ATTR or GRAD. Using September through August as the measurement for a full school year, the standard college class divisions--freshman, sophomore, junior, senior, and beyond--were created. Departure patterns could be examined by isolating the year, after enrollment as freshman, during which attrition or graduation occurred.

One additional category had to be established to capture all available data. For cohorts starting after 1987, sufficient time had not elapsed for all individuals to either disenroll or graduate. A third condition was added by

identifying observations with no entry for attrition code as STILL IN SCHOOL. These observations were included in the NO ATTR category.

After examining overall attrition and graduation patterns for all cohorts by when departures occurred, the data were subdivided into three sets. SETAA includes cohorts with starting years 1980-1982 and a population of 6,275. SETBB includes cohorts with starting years 1983-1987 and a population of 10,422. This division coincides with a policy change requiring the starting class of 1983 to obligate for military service prior to beginning their sophomore year, whereas students in the SETAA group were not required to obligate until prior to the start of their junior year. (Analysis of specific early attrition trends and observations regarding this policy change are discussed in Chapter IV.) SETBB is used as the primary sample for analysis.

The final group established, SETDS, is composed of cohorts with starting years 1986-1991 and contains 8,430 observations. Although cohorts starting after 1987 have too many students still enrolled in NROTC to establish accurate attrition rates, SETDS is used to look at early attrition patterns and to profile how Operations Desert Shield and Desert Storm may have affected attrition at NROTC.

C. METHODOLOGY

The analysis was performed on the Naval Postgraduate School's IBM mainframe computer using the Statistical Analysis

System (SAS) software package. Bivariate analysis of the data was accomplished using the SAS FREQUENCY procedure.

Since the focus of this thesis is a descriptive analysis of NROTC attrition behavior, examining the relationships between the dependent variable and explanatory variables is essential. Cross-tabulation, with and without control variables, was used to identify and account for variations in the data.

Attrition patterns were examined over time with the availability of this longitudinal data base. In addition to analyzing characteristics between individuals who leave NROTC and those who do not, comparisons were made between early and late attrition.

IV. DATA ANALYSIS/INTERPRETATION

Analysis was conducted on data contained in the three samples discussed in Chapter III--including students who enrolled for school years 1980-1982, students who enrolled for school years 1983-1987, and those enrolled for school years 1986-1991. The relationship between outside factors and attrition trends is then examined after a brief overview of the entire sample population. This is followed by a detailed look at several aspects of NROTC attrition using SETBB.

A. POPULATION OVERVIEW

Table 1 presents the distribution of scholarship students for the entire sample, by gender, ethnicity, SAT scores, and type of major. As shown in Table 1, there were only slight increases in the percentage of women receiving four-year scholarships from 1980 through 1985, with somewhat larger increases shown over the following three years. Although women account for only 4.6 percent of the SETBB (1983-1987) sample, it is important to note that in the later years, beginning with 1988, the proportion of women is consistently at eight percent or above.

Also of note is the number of four-year scholarships awarded. As seen here, the total number of students drops to 1,581 in 1987 (from over 2,000 in previous years); and, despite a slight increase in 1989, it continues to decline to

TABLE 1: TOTAL NUMBER OF NROTC FOUR-YEAR SCHOLARSHIP STUDENTS WITH SAT MEAN SCORES AND PERCENTAGE DISTRIBUTION OF THE SCHOLARSHIP STUDENTS, BY SCHOOL YEAR OF ENTRY AS FRESHMAN, GENDER, ETHNICITY AND TYPE MAJOR, 1980-1987

ENTRY YEAR	NO. TOTAL SCHOLARSHIPS	MEAN SAT SCORES		GENDER		ENROLLMENT (PERCENTAGES)					MAJOR	
		MATH	VERBAL	MALE	FEMALE	BLACK	WHITE	HISPANIC	OTHER	TECH	NON-TECH	
1980	2,329	640	554	97.2	2.8	3.2	92.8	1.4	2.6	66.7	33.3	
1981	1,729	641	564	96.4	3.6	4.3	90.0	2.2	3.5	65.9	34.1	
1982	2,217	640	562	97.2	2.8	4.9	88.8	2.8	3.5	67.8	32.2	
1983	2,069	643	565	95.7	4.3	5.0	87.0	3.8	4.2	65.8	34.2	
1984	2,626	637	566	96.6	3.4	4.3	88.0	4.5	3.2	61.6	38.4	
1985	2,096	632	567	96.1	3.9	4.7	88.5	3.9	2.9	57.1	42.9	
1986	2,050	636	564	94.1	5.9	8.6	83.9	4.3	3.2	56.1	43.9	
1987	1,581	640	570	91.1	8.9	9.2	80.8	5.5	4.5	52.1	47.9	
1988	1,264	631	561	91.0	9.0	12.4	75.6	6.7	5.3	54.9	45.1	
1989	1,430	636	559	91.4	8.6	12.2	73.1	7.9	6.8	54.2	45.8	
1990	1,205	627	593	91.3	8.7	13.0	72.5	8.9	5.6	63.0	37.0	
1991	900	639	563	92.0	8.0	17.7	66.8	9.3	6.2	62.9	37.1	

Source: Derived from data provided by Chief of Naval Education and Training

just 900 in 1991. The increases in total scholarships offered after 1981 were part of a four-year plan by the Navy to "beef up" the nuclear power program and the number of NROTC students with technical degrees. Total scholarships then declined and, by 1987, they were just below the 1981 level. As part of the Navy's personnel drawdown plan, CNET was directed, after the 1989 freshman class had been enrolled, to cut the number of officer accessions in subsequent years. Consequently, the total number of scholarships awarded decreases after that time.

Minority representation is similar to the pattern displayed by women. Blacks have experienced the largest percentage increase in scholarship participation, while the data for Hispanics show slightly smaller but steady increases in representation. The final minority group--"other"--is composed of Asians and all racial/ethnic groups not included in any previous category.

The mean scores on the SAT (math and verbal components) for each class of entering freshmen are also shown in Table 1. SAT scores have remained relatively stable for each group of NROTC participants over the 12-year period. Math scores range from 627 (1990) to 643 (1983), and verbal scores show a slightly wider range between 559 (1989) and 593 (1990). Also shown is the breakout of students who selected a technical major and those who did not. As can be seen from these data, despite a modest increase in 1982 (to almost 68 percent), the

tendency of scholarship students to major in technical fields declined between 1980 and 1987, and then increased to about 63 percent in 1990 and 1991.

B. REAL WORLD FACTORS

1. Service Obligation Policy and Attrition

As described in Chapter I, four-year scholarship students start receiving benefits during their first year in the program, but they do not incur an obligation for Naval service until the second year. Consequently, freshman students have the opportunity to experience college through NROTC, tuition-free, before committing to continue in the program and serve as a commissioned officer for four years after graduation. Prior to 1983, students were allowed to receive two years of scholarship benefits before incurring a service obligation.

Table 2 shows the percentage of attrition for each of the two samples by academic year in the program, and school year of entry as freshman. For SETAA, about 34 percent of all attrition occurred in the first year. This is consistent with college dropout rates for freshmen, as noted in Chapter II. Previous research also shows that dropout rates decrease in each successive year. This is not the case for SETAA. As shown in Table 2, an additional 43 percent of all students who disenrolled from NROTC left during their second (or sophomore) year of college. Since students in this sample who did not

TABLE 2: PERCENTAGE DISTRIBUTION OF NROTC FOUR-YEAR SCHOLARSHIP ATTRITION, BY SCHOOL YEAR OF ENTRY AS FRESHMAN, ACADEMIC YEAR, AND SUBSAMPLE, 1980-1987

Subsample Entering Year	Attrition (Percentages)					
	Year 1	Year 2	Year 3	Year 4	Year 5/6*	Total
SETAA						
1980	35.1	43.2	14.4	4.7	2.6	100.0
1981	34.1	42.8	15.5	5.2	2.4	100.0
1982	33.4	43.8	15.5	4.7	2.6	100.0
ALL	34.2	43.1	15.1	4.8	2.5	100.0
SETAA						
1983	63.3	16.9	9.3	7.6	2.9	100.0
1984	69.3	13.1	8.3	6.3	3.0	100.0
1985	66.8	15.6	9.8	6.1	1.7	100.0
1986	62.8	17.0	10.6	6.2	3.4	100.0
1987	64.3	12.9	8.5	10.9	3.4	100.0
ALL	65.5	15.1	9.3	7.2	2.9	100.0

Source: Derived from data provided by Chief of Naval Education and Training.

* Scholarship students unable to complete the program can be granted extensions allowing continued enrollment until able to graduate.

want to continue in NROTC had to leave the program before beginning their junior year, it is reasonable to conclude that the high attrition in year two is due largely to the pre-1983 policy concerning service obligation. The data also show that, after the second year, attrition rates decrease (as expected) in each subsequent year.

In contrast, Table 2 also shows that the highest percentage of attrition for the SETBB sample occurs during the

first year of college, with rates decreasing each year thereafter. At over 60 percent, these first-year attrition rates are much higher than would be expected based on college dropout studies. NROTC disenrollment rates cannot be explained solely by students dropping out of college, which generally involves between 30 and 40 percent of freshmen.

When comparing the two samples in Table 2, the data clearly indicate that the bulk of NROTC attrition occurs immediately preceding the cutoff point at which students incur an obligation for service. It would be reasonable to conclude that, when CNET moved the obligation point one year earlier in the NROTC program, the attrition pattern itself also shifted forward by one year. Consequently, early attrition may now include a combination of college dropouts as well as individuals who are unable or unwilling to continue in NROTC.

With regard to those who are unwilling to continue, the possibility may exist that scholarships are accepted by students with no intention of completing the program. As discussed previously, it was suggested by Kantor (1989) that the desire or need to receive financial assistance during the first year of college may be an underlying motivation for students to sign up for NROTC and then disenroll prior to incurring a service obligation.

Although student economic status cannot be examined with the available data, the possibility that some students only enroll to receive a year's worth of college can be

explored. An assumption was made that, to really receive a tuition-free, "no obligation" year of school, the student would complete the entire school year prior to disenrollment. The opposite of this behavior would be the student who begins NROTC, then becomes disenchanted with school or the program, and disenrolls without completing the full year as a freshman. By using grades received as an indication that a school term was completed, these two possibilities were explored.

Table 3 shows the percentages of freshmen (for samples SETAA and SETBB) who did and did not complete all terms during the first year of school prior to disenrolling. By comparing two student groups--each under a different obligation policy--freshman behavior can be highlighted. It should be noted that freshman grades are optional at some colleges, so the results may not depict a truly accurate picture of all students who complete the entire freshman year before disenrolling. However, the information can help to determine whether some students simply endure NROTC participation for one year, in exchange for a year of tuition-free education.

The data in Table 3 show that, when the "two-year, no obligation" policy was in effect, less than 37 percent of NROTC students completed all terms of their freshman year before leaving the program. After 1983, with the "one-year, no obligation" policy, 43 percent of all entering freshmen disenrolled from NROTC after finishing the full year of

TABLE 3: PERCENTAGE AND NUMBER DISTRIBUTION OF ATTRITION FOR NROTC FOUR-YEAR SCHOLARSHIP FRESHMAN, BY SCHOOL YEAR OF ENTRY, COMPLETION OF ALL FRESHMAN TERMS AND SUBSAMPLE, 1980-1987

ENTRY YEAR	FRESHMAN ATTRITION COMPLETED ALL FRESHMAN TERMS		TOTAL
	YES	NO	
SETAA			
1980			
PERCENT	38.6	61.4	100.0
NUMBER	(191)	304	495
1981			
PERCENT	34.4	65.6	100.0
NUMBER	114	217	331
1982			
PERCENT	36.2	63.8	100.0
NUMBER	254	144	398
ALL			
PERCENT	36.7	63.3	100.0
NUMBER	449	775	1,224
SETBB			
1983			
PERCENT	48.3	51.7	100.0
NUMBER	305	326	631
1984			
PERCENT	43.1	56.9	100.0
NUMBER	376	497	873
1985			
PERCENT	40.2	59.8	100.0
NUMBER	231	343	574
1986			
PERCENT	42.8	57.2	100.0
NUMBER	227	304	484
1987			
PERCENT	40.4	59.6	100.0
NUMBER	174	257	431
ALL			
PERCENT	43.2	56.8	100.0
NUMBER	1,313	1,727	3,040

Source: Derived from data provided by Chief of Naval Education and Training.

* Does not include NROTC students from Massachusetts Institute of Technology where freshman grades are optional.

school. Based on previous findings that, under the two-year policy, NROTC attrition behavior seemed similar to that of college freshmen, the above results do not seem out of line. Consequently, it may be concluded that the 6.5 percent increase (from all SETAA to all SETBB) in freshmen completing all terms before disenrolling, as shown in Table 3, suggests that the change in policy increased early attrition from NROTC.

2. Outside NROTC Influences on Attrition

Whether looking at college dropout rates or attrition from a military training program, external circumstances--what is going on in the world outside the college campus or training environment--must be considered as possible influencers in the "stay/leave" decision. Although it is beyond the scope of this thesis to consider the possible effects of unemployment rates or other economic conditions on NROTC attrition, it is possible to look at a specific event that caused the peacetime Navy/Marine Corps team to participate in "warfighting" business.

With the activation of reserve units and the deployment of forces brought on by Iraq's invasion of Kuwait in August 1990, members of the military came face to face with the reality that service--regardless of military branch--really does involve obligation and commitment. With this commitment of troops so vividly portrayed by the news media,

some students may have reconsidered their initial decision to join the NROTC program.

Since several classes of scholarship students who entered during the period just prior to Operations Desert Shield and Desert Storm are still enrolled in the program, the full implications of the gulf war are not yet clear. But with the data available in the SETDS sample, preliminary findings can be discussed.

By focusing only on attrition during the first and second year for each entering class, it is possible to compare attrition percentages across groups and draw certain conclusions about the possible effects of the gulf war. Table 4 shows attrition as a percentage of total enrollment (for classes entering between 1986 and 1990,) during the first two years in which the disenrollment occurred.

To check for a gulf-war effect on attrition behavior, the 1989, year-two, and 1990, year-one, percentages must be compared to the other cohort classes. As seen in Table 4, the year-one attrition rate for the 1990 class is only one percent higher than the year-one rate for the 1989 group and about five percent lower than that for the 1988 group.

Turning next to the group of students who were just about to start their sophomore year when the gulf war deployments began, results in Table 4 show that the year-two attrition rate for the 1989 class was 7.9 percent. This is just slightly over two percent higher than the year-two rate for

TABLE 4: PERCENTAGE DISTRIBUTION OF NROTC FOUR-YEAR SCHOLARSHIP STUDENT ATTRITION DURING FIRST TWO YEARS OF PROGRAM, BY ACADEMIC YEAR IN WHICH DISENROLLMENT OCCURRED AND ENTRY YEAR AS FRESHMEN, 1986-1990

Year Disenrollment Occurred	Attrition First Two Years				
	1986	1987	1988	1989	1990
Year 1	26.7	28.2	26.6	20.5	21.5
Year 2	<u>7.3</u>	<u>5.7</u>	<u>5.6</u>	<u>7.9</u>	<u>6.3</u>
Total	34.0	33.9	32.2	28.4	27.8

Source: Derived from data provided by Chief of Naval Education and Training.

the previous classes (1987 and 1988) and it is only 0.6 percent more than that for the 1986 class. Based on these results, it appears that the reality of America at war exercised a fairly minor impact, if any, on NROTC attrition. Indeed, the difference in attrition rates found here could just as easily be due to random variation between the cohort classes.

C. ATTRITION OVERVIEW

Turning specifically to the SETBB sample group, Table 5 displays disenrollment attrition, regardless of when it occurs, and graduation percentages for each class of entering freshmen. As seen here, attrition is almost six percent lower for the 1985 class than for the previous two groups. At the same time, attrition from NROTC rises slightly for groups after 1985, though graduation rates still remain higher than for groups that entered in 1983 or 1984.

Table 6 displays the same entering classes by early and late attrition and by graduation. Early attrition is the percentage of disenrollments occurring during the first year

TABLE 5: PERCENTAGE AND NUMBER DISTRIBUTION OF NROTC FOUR-YEAR SCHOLARSHIP STUDENTS, BY SCHOOL YEAR OF ENTRY AS FRESHMAN, DISENROLLMENT FROM NROTC, AND GRADUATION, 1983-1987

Entry Year	Disenrollment	Graduation	Total
1983			
Percent	47.6	52.4	100.0
Number	(984)	(1,085)	(2,069)
1984			
Percent	47.8	52.2	100.0
Number	(1,256)	(1,370)	(2,626)
1985			
Percent	42.0	58.0	100.0
Number	(880)	(1,216)	(2,096)
1986			
Percent	42.6	57.4	100.0
Number	(874)	(1,176)	(2,050)
1987			
Percent	44.0	56.0	100.0
Number	(695)	(886)	(1,581)
All Years			
Percent	45.0	55.0	100.0
Number	(4,689)	(5,733)	(10,422)

Source: Derived from data provided by Chief of Naval Education and Training.

TABLE 6: NUMBER AND PERCENTAGE DISTRIBUTION OF NROTC FOUR-YEAR SCHOLAR-SHIP STUDENTS, BY SCHOOL YEAR OF ENTRY, AND TYPE ATTRITION AND GRADUATION, 1983-1987

Entering Year	Type Attrition		Graduation	Total
	Early	Late		
1983				
Percent	30.1	17.5	52.4	100.0
Number	(622)	(362)	(1,085)	(2,069)
1984				
Percent	33.1	14.7	52.2	100.0
Number	(870)	(386)	1,370)	(2,626)
1985				
Percent	28.1	13.9	58.0	100.0
Number	(588)	(292)	(1,216)	(2,096)
1986				
Percent	26.7	15.9	57.4	100.0
Number	(548)	(326)	(1,176)	(2,050)
1987				
Percent	28.2	15.8	56.0	100.0
Number	(446)	(249)	(886)	(1,581)
All Years				
Percent	29.5	15.5	55.0	100.0
Number	(3,074)	(1,615)	(5,733)	(10,422)

Source: Derived from data provided by Chief of Naval Education and Training.

at NROTC, and late attrition is the percentage of disenrollments occurring in all later years. Results show that slightly over two-thirds of each class survived the first year and passed the obligation-point hurdle mentioned at the beginning of this chapter. For all classes (1983-1987), 29.5 percent of starting freshmen left before beginning the second year; 15.5 percent of all students disenrolled after the first year; and 55 percent went on to graduate and receive an officer commission. There is some variation between cohort classes from year to year. The magnitude of early attrition from NROTC can be calculated from the attrition totals in Table 6. Of the 4,689 students who disenrolled from the NROTC program, 3,074 (or 65.6 percent) did so before the second year of school began.

D. WHO LEAVES NROTC AND WHY

For a closer look at the "who and why" aspect of scholarship attrition, analysis focused on the following characteristics of NROTC scholarship students: gender, ethnicity, pre-enrollment training, SAT scores, type major, and service option. Examining these areas should provide a balanced overview in areas of interest to the Navy and CNET.

1. Who Becomes an Attrition Statistic?

Table 7 presents attrition and graduation percentages for scholarship students by their background characteristics. The results show that the attrition rate for men (over the 1983-1987 period) is just over 11 percent higher than the rate

TABLE 7: PERCENTAGE DISTRIBUTION OF NROTC FOUR-YEAR SCHOLARSHIP STUDENTS, BY GENDER, ETHNICITY, PRE-PROGRAM TRAINING, SAT LEVEL, MAJOR, OPTION, AND ATTRITION OR GRADUATION, 1983-1987

Characteristic	Scholarship Students (Percentage)		Total
	Attrition	Graduation	
Gender			
Men	45.5	54.5	100.0
Women	34.1	65.9	100.0
Racial//Ethnic			
Black	54.2	45.8	100.0
White	43.8	56.2	100.0
Hispanic	49.5	50.5	100.0
Other	52.2	41.8	100.0
Pre-Program Training			
Yes	41.2	58.8	100.0
No	45.8	54.2	100.0
SAT Level Group			
1	44.9	55.1	100.0
2	44.6	55.4	100.0
3	45.1	54.9	100.0
4	45.0	55.0	100.0
Tech Major			
Yes	36.1	63.9	100.0
No	51.2	48.8	100.0
NROTC Option			
USN	45.3	54.7	100.0
USMC	43.6	56.4	100.0
All Students	45.0	55.0	100.0

Source: Derived from data provided by Chief of Naval Education and Training.

for women. Additionally, the rate for blacks is just over 10 percent higher than it is for whites, a trend that coincides partially with the results of a study by Porter (1990). Porter found the college dropout rate for whites was 41 percent, followed by Hispanics at 54 percent, and then blacks with the highest rate at 63 percent. As can be seen in Table 7 the attrition rates for black (54.2 percent) and Hispanic (49.5 percent) NROTC students are somewhat lower than Porter's dropout rates for the same groups. This could be due to the advantages some minority students gain through the Navy's BOOST program.

As mentioned in Chapter I, BOOST provides specialized training for individuals who have high potential, but are otherwise not qualified for immediate entry into the scholarship program. Consequently, students who participate in BOOST may have an advantage over other college students who do not receive this type of special, pre-college training. The data in Table 7 show that NROTC students who have received some sort of training disenrolled from the program at a lower rate than did individuals with no pre-program training. BOOST is only one of several sources of pre-program training, but a large proportion of minorities in NROTC--47 percent of blacks and 40 percent of Hispanics--have completed the BOOST program. It thus appears that BOOST participation may help to explain why minorities tend to have lower NROTC attrition rates than college dropout rates. Other factors associated with NROTC

participation, such as the opportunity to develop greater self-discipline and the mitigation of financial burdens through receipt of scholarship benefits, may also help explain the differences in minority rates. In addition to the Navy's practice of selecting NROTC applicants, minority or not, with high SAT scores, individuals who join NROTC may be more motivated or more goal-oriented than the typical college student.

It appears from the data displayed in Table 7 that SAT scores--the only available indicator of academic ability--make no difference in the attrition picture. (This topic is addressed in the next section.) In contrast, there is a large difference between attrition rates for students who have chosen to major in a technical field (36.1 percent) of study and those who have not (51.2 percent).

To further analyze differences for students with and without technical majors, Table 8 presents their enrollment, disenrollment, and graduation percentages by gender. As seen here, over 64 percent of the 478 women who entered the NROTC scholarship program selected a technical major, while less than 40 percent of the 9,944 men did so. The data show that almost 70 percent of men without majors in technical fields disenrolled, which has raised the proportion of graduates who had technical majors. Still, fewer than half of all men graduating from NROTC had a degree in a technical field. In contrast, less than 49 percent of women with a non-technical

TABLE 8: PERCENTAGE DISTRIBUTION OF NROTC FOUR-YEAR SCHOLARSHIP STUDENTS, BY FIELD OF STUDY (TECH OR NON-TECH), GENDER AND ENROLLMENT, DISENROLLMENT AND GRADUATES, 1983-1987

Gender Field of Study	Scholarship Students (Percentage)		
	Enrollment	Disenrollment	Graduation
Men			
Tech	39.9	32.2	46.3
Non-Tech	<u>60.1</u>	<u>67.8</u>	<u>53.7</u>
Total	100.0	100.0	100.0
Women			
Tech	64.4	51.5	71.1
Non-Tech	<u>35.6</u>	<u>48.5</u>	<u>28.9</u>
Total	100.0	100.0	100.0

Source: Derived from data provided by Chief of Naval Education and Training.

major disenrolled from NROTC, and over 71 percent of all female graduates possessed a technical degree.

NROTC has placed greater emphasis on technical degrees over the years, and the higher percentages of these graduates may have two explanations. First, students, both men and women, who select technical majors may enter NROTC with higher levels of motivation to complete the program. It may be that scholarship students who are serious about completing NROTC are also committed about selecting a major in a technical field. Second, and this may be especially true for women, students may feel that having a technical degree will improve

their competitive position in both NROTC and the officer corps.

2. Unit Ethnicity and Attrition

Returning briefly to ethnicity, an attempt was made to determine whether there were any differences in attrition rates based on the racial/ethnic mix of students enrolled in NROTC units. As described in Chapter III, each NROTC unit was placed in one of four racial/ethnic mix groups: blacks greater than 25 percent, Hispanics greater than 40 percent, whites between 70 and 80 percent, and whites greater than 80 percent. Attrition rates were then compared for different combinations of unit mixes and racial/ethnic groups of scholarship students.

Table 9 presents attrition and graduation results for black and white scholarship students by type of unit with

TABLE 9: NUMBER AND PERCENTAGE DISTRIBUTION OF BLACK AND WHITE NROTC FOUR-YEAR SCHOLARSHIP STUDENTS, BY ATTRITION AND GRADUATION, AND RACIAL/ETHNIC UNIT MAKE UP, 1983-1987

Unit Racial/ Ethnic Makeup	Blacks			Whites		
	Attrition	Grads	Total	Attrition	Grads	Total
Blacks > 25%						
Number	103	132	235	95	95	190
Percent	43.8	56.2	100.0	50.0	50.0	100.0
Whites > 80%						
Number	210	123	190	3374	4477	7851
Percent	63.1	36.9	100.0	43.0	57.0	100.0

Source: Derived from data provided by Chief of Naval Education and Training.

student makeup favoring either whites or blacks. As expected, based on previous studies of college dropouts, attrition rates for blacks attending schools with units having high black participation tend to be lower than the attrition rates for whites attending the same schools. Conversely, attrition by blacks is much higher in predominantly white units. Although the unit's racial/ethnic mix may not be a true indicator of the racial makeup of the affiliated college, it should be noted that, of the eight NROTC units found in the "Blacks > 25%" group, six are located at historically black colleges.

Table 10 shows the attrition results for Hispanic and white students by type of unit with student makeup favoring Hispanics or whites. It can be seen here that Hispanic students tend to have lower attrition rates at units where Hispanics make up a significant portion of the student population. Combining these results with those from Table 9, it would be reasonable to conclude that the racial/ethnic mix of an NROTC unit can make a difference in the attrition behavior of minority students.

A comparison was made of black and Hispanic students enrolled in NROTC units where neither group dominates the racial/ethnic mix of students. Table 11 presents these attrition results. The attrition percentages for the two racial/ethnic groups are almost identical, but slightly lower for blacks, at schools where the percentage of whites is

TABLE 10: NUMBER AND PERCENTAGE DISTRIBUTION OF HISPANIC AND WHITE NROTC FOUR-YEAR SCHOLARSHIP STUDENTS, BY ATTRITION AND GRADUATION, AND RACIAL/ETHNIC UNIT MAKE UP, 1983-1987

Unit Racial/ Ethnic Makeup	Hispanics			Whites		
	Attrition	Grads	Total	Attrition	Grads	Total
Hispanics > 40%						
Number	19	29	48	24	29	53
Percent	39.6	60.4	100.0	45.3	54.7	100.0
Whites > 80%						
Number	133	121	254	3374	4477	7851
Percent	524	47.6	100.0	43.0	57.0	100.0

Source: Derived from data provided by Chief of Naval Education and Training.

TABLE 11: NUMBER AND PERCENTAGE DISTRIBUTION OF BLACK AND HISPANIC NROTC FOUR-YEAR SCHOLARSHIP STUDENTS, BY ATTRITION AND GRADUATION, AND RACIAL/ETHNIC UNIT MAKE UP, 1983-1987

Unit Racial/ Ethnic Makeup	Blacks			Hispanics		
	Attrition	Grads	Total	Attrition	Grads	Total
Whites = 70-80%						
Number	32	32	64	63	57	120
Percent	50.0	50.0	100.0	52.5	47.5	100.0
Whites > 80%						
Number	210	123	333	133	121	254
Percent	63.1	36.9	100.0	52.4	47.6	100.0

Source: Derived from data provided by Chief of Naval Education and Training.

between 70 and 80 percent. On the other hand, at units where whites account for over 80 percent of participants, Hispanic attrition is almost 10 percent lower than that of blacks.

3. Why Does Attrition Occur?

As previously noted, CNET uses 66 disenrollment codes to identify why and under what circumstances individual students leave NROTC prematurely. For ease of analysis, these codes were grouped into five categories. The five categories and examples of subcategories are as follows:

1. Personal choice to disenroll (PERS)

Examples:

The majority of these are "drop own request" and underlying motivations are undocumented.

2. Personal sentiment regarding NROTC program or Navy (P/N)

Examples:

Dislike Military

Dislike Travel

Bad Cruise Experience

Desire to Change Profession

Naval Science Courses Not Completed

Lack of Motivation

Dropped by Institution

Disenrolled During Indoctrination

Voluntary Disenrollment

3. Academic difficulties (ACAD)

4. Problem individual is personally accountable for (PROB)

Examples:

Discipline

Inaptitude/Unsuitability

Involuntary Disenrollment

Voluntary/Involuntary

Conscientious Objector

Refused Commission

Commission Denied

Desertion

5. Problem that may be beyond individual's control (BIC)

Examples:

Hardship Situations

Financial Difficulties

Physical Disqualifications--includes physical readiness

Table 12 presents the percentage distribution of attrition by disenrollment reason and gender. The first thing to notice in Table 12 is that close to one-third of all attrition for both men and women falls into the PERS--personal choice--category. With no further explanation provided regarding the disenrollment, actual motivation is unknown and would likely encompass a wide range of reasons. It is possible that some students in this category never intended to make a service obligation or found NROTC too regimented for

TABLE 12: PERCENTAGE ATTRITION FOR NROTC FOUR-YEAR SCHOLARSHIP STUDENTS, BY DISENROLLMENT REASON AND GENDER, 1983-1987

Disenrollment Reason	Attrition		
	Men	Women	All
PERS	31.0	30.1	31.0
P/N	30.3	24.5	30.1
ACAD	17.9	11.0	17.7
PROB	14.4	20.3	14.5
BIC	<u>6.4</u>	<u>14.1</u>	<u>6.7</u>
Total	100.0	100.0	100.0

Source: Derived from data provided by Chief of Naval Education and Training.

their personal tastes, but may be unwilling to admit to a specific reason for their dissatisfaction with the program.

Close to a third of all attrition is found in the P/N group--sentiment toward program or Navy. Some individuals in this group disenroll due to dislike for the military, travel or the summer cruise, while others lack motivation or will not take required courses. As shown in Table 12, just over 30 percent of attrition by men and slightly less than 25 percent by women fall into this category.

The remaining attrition, roughly more than one-third, falls into one of three groups: academic difficulties (ACAD), accounting for almost 18 percent, followed by problems for which the individual is personally accountable (PROB), at nearly 15 percent, and problems that may be beyond the student's control (BIC), at roughly seven percent.

As seen in Table 12, men tend to experience higher attrition than women for academic reasons. This was expected, based on previous studies showing that women tend to leave college for nonscholastic reasons, and men are more likely to be academic dropouts. (Ramist, 1981) The one area of surprise in these findings is that almost six percent more women than men disenroll due to problems for which they are personally accountable. As Table 12 shows, 20.3 percent of attrition by women is located in the FROB group. Although unexpected, further examination of the CNET disenrollment codes, used to create the PROB category, revealed that 11 percent of attrition by women is recorded as "involuntary" and over seven percent as "inaptitude and/or unsuitability." These attrition percentages for men are five and six percent, respectively.

The last result pertaining to gender is the BIC category, which is skewed toward women. Results in Table 12 show that about 14 percent of women disenroll due to problems considered beyond their control. Again, by taking a closer look at the codes, it was found that 14 percent of attrition by women is due to physical disqualification. Since medical problems cannot be isolated from physical readiness test failures, it is impossible to know what portion of these disenrollments were truly beyond the student's control.

4. Ethnicity, SAT Scores and Attrition Reason

Adding racial/ethnic groups and ability--as measured by SAT levels--to the previous findings produce additional insight into the "who and why" of NROTC attrition. Table 13 shows how the attrition percentages are distributed between the reason categories and racial/ethnic groups. Results indicate variation in disenrollment reasons across racial/ethnic groups.

As seen in Table 13, over 35 percent of disenrollments for whites appear in the personal choice group, and a similar percentage of attrition by blacks occurs for academic reasons. Academic difficulties are also the most-cited reason for disenrollment by individuals of "other" racial or ethnic origins. Attrition data shown in Table 13 support previously-cited studies that found Hispanics were less likely than blacks to leave college for academic reasons.

Since SAT scores are the only available indicators of academic ability, it is useful to include this variable in the attrition picture. By using the SAT cutoff scores found in the top four college selectivity ratings in Barron's College Guide, (1991), four corresponding SAT levels were created:

Level SAT Score (Verbal and Math Combined)

1	1600 - 1250
2	1240 - 1150
3	1140 - 1050
4	1040 - 700

Table 14 presents the percentage distribution of attrition by racial/ethnic group, SAT levels, and disenroll-

ment reasons. The far right column of Table 14 shows that, for all students, disenrollments by personal choice and sentiment toward the program and the Navy tend to be concentrated in the top SAT levels. Approximately 43 percent of all disenrollments in the PERS category are by students who scored

TABLE 13: PERCENTAGE ATTRITION FOR NROTC FOUR-YEAR SCHOLAR-SHIP STUDENTS, BY DISENROLLMENT REASON AND ETHNICITY, 1983-1987

Disenroll Reason	Attrition			
	Black	White	Hispanic	Other
PERS	13.3	35.5	21.1	22.8
P/N	20.2	31.3	27.3	26.4
ACAD	35.3	15.3	21.1	30.1
PROB	24.6	13.0	26.0	15.5
BIC	<u>6.6</u>	<u>6.9</u>	<u>4.5</u>	<u>5.2</u>
Total	100.0	100.0	100.0	100.0

Source: Derived from data provided by Chief of Naval Education and Training.

in the highest SAT group. In contrast, attrition for academic reasons (ACAD) shows little variability across SAT levels for all racial/ethnic groups combined (with the exception of the lowest SAT level).

Within each reason category, as Table 14 shows, there appears to be a polarization in disenrollment percentages for blacks and whites between the upper-two and lower-two SAT levels. This tendency is likely due to similar patterns displayed in the SAT distribution of the sample population by racial/ethnic group. Almost 75 percent of all blacks enter

TABLE 14: PERCENTAGE DISTRIBUTION OF ATTRITION FOR NROTC FOUR-YEAR SCHOLARSHIP STUDENTS, BY SAT LEVEL, ETHNICITY, AND DISENROLLMENT REASON, 1983-1987

Disenrollment Reason SAT Level	Attrition				
	Black	White	Hispanic	Other	All
PERS					
1	6.5	45.0	31.1	36.4	43.1
2	23.9	31.6	22.2	29.5	31.0
3	37.0	17.4	28.9	15.9	18.3
4	<u>32.6</u>	<u>6.0</u>	<u>17.8</u>	<u>18.2</u>	<u>7.6</u>
Total	100.0	100.0	100.0	100.0	100.0
P/N					
1	11.4	45.9	21.3	38.8	42.9
2	25.7	28.8	21.3	24.5	28.2
3	32.9	20.1	32.8	24.5	21.4
4	<u>30.0</u>	<u>5.2</u>	<u>24.6</u>	<u>12.2</u>	<u>7.5</u>
Total	100.0	100.0	100.0	100.0	100.0
ACAD					
1	4.9	36.1	12.8	8.6	28.2
2	17.2	30.9	25.5	29.3	28.4
3	41.0	24.4	36.2	31.0	28.0
4	<u>36.9</u>	<u>8.7</u>	<u>25.5</u>	<u>31.0</u>	<u>15.4</u>
Total	100.0	100.0	100.0	100.0	100.0
PROB					
1	3.5	36.7	10.3	6.7	29.0
2	24.7	30.0	19.0	30.0	28.4
3	37.7	26.0	43.1	30.0	29.1
4	<u>34.1</u>	<u>7.3</u>	<u>27.6</u>	<u>33.3</u>	<u>13.5</u>
Total	100.0	100.0	100.0	100.0	100.0

TABLE 14 (CONTINUED)

Disenrollment Reason SAT Level	Attrition				
	Black	White	Hispanic	Other	All
BIC					
1	4.5	34.9	--	--	30.5
2	13.6	31.6	30.0	30.0	30.2
3	45.5	28.3	60.0	40.0	30.9
4	<u>36.4</u>	<u>5.2</u>	<u>10.0</u>	<u>30.0</u>	<u>8.4</u>
Total	100.0	100.0	100.0	100.0	100.0

Source: Derived from data provided by Chief of Naval Education and Training.

NROTC with SAT scores falling in the two lowest levels. Conversely, 72 percent of all white scholarship students have SAT scores in the top two levels. The complete distribution of scholarship students by ethnicity and SAT scores is displayed in the Appendix.

With this additional information on the initial SAT score distribution, a new perspective is now available to look again at the right column of Table 14 showing academic drops for all students. About 30 percent of the students disenrolling for academic reasons tend to come from each of the top three SAT levels, possibly indicating that SAT scores are not a factor of academic disenrollments. Additionally, the distribution of SAT scores by racial/ethnic group noted in the Appendix suggests there would likely be larger percentages of blacks and Hispanics in those same SAT levels disenrolling for academic reasons. Thus even for blacks and Hispanics, the

higher percentage of academic attrition can not be attributed solely to SAT scores.

5. Motivation Drives Attrition

Although reasons for attrition have been analyzed, the remaining "why" component to be examined is motivation. As previously noted, motivational attrition occurs when students voluntarily leave the scholarship program but are still eligible for continued enrollment. By combining attrition reasons and NROTC eligibility status at the time of disenrollment, it should be possible to analyze where motivational attrition is most prevalent. Results of this analysis are presented in Table 15. It can be seen here that motivational attrition is less likely when students have problems considered beyond their control or problems they possibly caused themselves.

Table 15 also shows that the largest concentrations of motivational attrition occur in the "personal choice" (PERS) and "sentiment toward program or Navy" (P/N) categories. This finding was anticipated, since the two reasons are highly subjective and include most of the voluntary disenrollments. The middle ground is occupied by students who disenroll for academic reasons. As can be seen, 42.5 percent of all the academic disenrollments are by students still eligible and recommended for re-enrollment in NROTC. For all students in the sample, data show that almost 64 percent of all reasons for NROTC attrition could be classified as "motivational."

TABLE 15: NUMBER AND PERCENTAGE DISTRIBUTION NROTC FOUR-YEAR SCHOLARSHIP ATTRITION, BY REASON FOR DISENROLLMENT AND ELIGIBILITY TO CONTINUE IN NROTC, 1983-1987

Disenrollment Reason	Attrition		Total
	NROTC Eligible		
	No	Yes	
PERS			
Percent	17.9	82.1	100.0
Number	(260)	(1,194)	(1,454)
P/N			
Percent	28.3	71.7	100.0
Number	(399)	(1,012)	(1,411)
ACAD			
Percent	47.5	52.5	100.0
Number	(393)	(435)	(828)
PROB			
Percent	68.4	31.6	100.0
Number	(467)	(216)	(683)
BIC			
Percent	63.6	36.4	100.0
Number	(199)	(114)	(313)
ALL			
Percent	36.6	63.4	100.0
Number	(1,718)	(2,971)	(4,689)

Source: Derived from data provided by Chief of Naval Education and Training.

The next chapter provides a summary of the NROTC four-year scholarship analysis findings. This is followed by final conclusions and recommendations.

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY

One of many strengths of the NROTC four-year scholarship program is that it attracts a broad range of individuals with very high SAT scores and the potential to be successful Naval officers. Attrition by scholarship students was consistently over 50 percent ten years ago, and it was still over 44 percent just five years ago. The largest portion of that attrition--over 65 percent--occurs during the freshman year of college. Analysis of early attrition behavior showed that a major share of early NROTC scholarship attrition is driven by the policy that obligates students for Naval service. Whether under the "two-year" or "one-year" system, the bulk of attrition tends to occur just prior to the obligation deadline.

The preliminary analysis of a possible "gulf-war effect" on attrition behavior was inconclusive. Although there were slight increases in attrition after August 1990 by the 1989 sophomores and 1990 freshmen, these differences could just as easily be due to random variation between each class.

The analysis of overall attrition shows that men tend to have higher attrition rates than women. There is also evidence indicating that men have a higher propensity than women to disenroll for academic reasons. In addition, women

tend to receive more involuntary disenrollments than men, but specific causes are unknown.

Attrition rates for non-white scholarship students tend to be higher than rates of white students. At the same time, attrition of blacks and Hispanics is generally lower at units where the race/ethnicity balance is weighted toward the group being evaluated. For example, blacks enrolled in NROTC units at predominantly black colleges tend to have lower attrition rates than do blacks enrolled at units affiliated with schools where blacks are a minority.

Results of this thesis also show that academic disenrollments by blacks are typically higher than those of Hispanics or whites, and that these disenrollments cannot be adequately explained from available data. Unlike previous studies of college dropouts, SAT level does not appear to be a major factor in explaining attrition, since disenrollments for academic reasons are evenly spread over SAT levels.

The attrition rate for students who majored in a technical field was about 36 percent, while over 50 percent of the students with a non-technical major disenrolled from NROTC. Results also show that less than 29 percent of women, and just over 50 percent of men disenrolling from NROTC, are technical majors.

Motivational attrition is concentrated among students disenrolling for reasons of personal choice and general dissatisfaction with the NROTC program or Naval service.

Additionally, these two reasons--composed primarily of "drop own request" disenrollments--account for over 60 percent of all attrition. It is also evident from this analysis that motivational attrition is present to some degree in each of the five categories covering reasons for disenrollment, for example, personal choice, sentiment toward NROTC program or the Navy, academic difficulties, problems the individual is accountable for, and problems beyond the individual's control.

B. CONCLUSIONS

Although NROTC four-year scholarship attrition has been declining since 1983, it is still a cost burden to the Navy. Additionally, the focus of concern should be disenrollments during the first year of NROTC, where most attrition occurs. Results presented here suggest that early attrition by NROTC scholarship students can be attributed primarily to college freshmen leaving school and college freshmen who want to avoid an obligation for Naval service.

Although events outside the training environment have the potential to affect attrition behavior, the Navy's involvement in Operations Desert Shield and Desert Storm exercised a fairly minor, if any, impact on NROTC attrition. Since only two groups of students, 1989 sophomores and 1990 freshmen, were considered in this analysis, it is unknown if the gulf war had any impact on the more senior students from earlier classes.

Attrition patterns for NROTC scholarship students, by gender and racial/ethnic group, mirror patterns found in studies of college dropouts. Men have higher attrition rates and are more likely to disenroll for academic reasons than are women. Although Hispanics have higher attrition rates than whites, and blacks have higher attrition rates than either whites or Hispanics, attrition rates for NROTC minority students were generally lower than college dropout rates for minorities. These findings are likely a result of the positive aspects associated with NROTC participation, such as adequate financial assistance, greater opportunity for self-discipline, and selection of high ability individuals.

Lower attrition rates by students with technical majors may indicate a possible relationship between NROTC commitment and a student's desire to undertake a field of study that may enhance one's competitive edge in both the program and subsequent Naval service. The lower attrition rates by both men and women who complete technical degrees tend to raise the proportion of NROTC graduates joining the officer corps with technical backgrounds.

Finally, results show that, based on re-enrollment recommendations, 64 percent of all NROTC attrition can be considered "motivational." Although specific reasons for most "drop own request" disenrollments are not available, this seemingly high percentage of disenrollments for motivational reasons should be an area of concern.

C. RECOMMENDATIONS

Motivational attrition should be the focus of future NROTC research. Causal relationships could be examined, and predictive analysis techniques could be used to their fullest advantage with additional information on the background characteristics of students. The problem here, however, is the availability of data. Though some background characteristics are included in the CNET data set, missing data elements for students entering NROTC before 1987 prevented the use of these analysis techniques. Also, it would be useful to have data indicating whether scholarship students drop out or stay enrolled in school after disenrolling from NROTC. Perhaps a method could be explored or developed to obtain pertinent follow-up data directly from the college or university. Consideration should also be given to developing a survey that could be used to more accurately assess specific reasons for early disenrollments.

The "Quality Index," used to screen applicants for NROTC scholarships, was not developed specifically to control attrition from the NROTC program, and it appears that no research has been conducted on the relationship between current attrition rates and the use of these improved selection techniques. Analysis of the subject was beyond the scope of this thesis due to the non-availability of pertinent data. However, it is strongly recommended that this important factor be examined in future research on NROTC attrition.

Available CNET data could be used to increased advantage with minor changes in data file maintenance. The current coding system used to record GPAs caused several problems: schools with pass/fail grading were not identified; "zeroes" were recorded as third-quarter grades for students at schools on a semester system; and four different grade-point scales were discovered to be in use by the various institutions. Specialized coding could be developed to increase the analysis potential of academic, Naval science, and aptitude grades.

The analysis of data on NROTC attrition has shown that, although early attrition is influenced primarily by the Navy's service obligation policy, overall scholarship attrition patterns are similar to those of college dropouts. Further, even though the obligation policy may increase early NROTC attrition, the unique nature and positive program aspects associated with NROTC participation appear to decrease attrition rates, especially for minorities and students selecting technical majors.

APPENDIX

PERCENTAGE DISTRIBUTION OF NROTC FOUR-YEAR SCHOLARSHIP STUDENTS, BY ETHNICITY, AND SAT SCORES, 1983-1987

Ethnicity ^a	Scholastic Aptitude Test (Math and Verbal)				Total
	1600-1250	1249-1150	1149-1050	1049-800	
Black	5.2	19.8	38.6	36.4	100
White	41.4	30.8	21.2	6.6	100
Hispanic	16.0	19.2	37.6	27.2	100
Other ^b	24.5	25.3	29.3	20.9	100

Ethnicity	Scholastic Aptitude Test (Math)				Total
	800-625	624-575	574-525	524-350	
Black	18.5	26.1	39.9	15.5	100
White	59.9	22.6	13.4	4.1	100
Hispanic	30.3	31.6	28.1	10.0	100
Other	47.5	24.5	20.7	7.3	100

Ethnicity	Scholastic Aptitude Test (Verbal)				Total
	800-625	624-575	574-525	524-350	
Black	4.7	8.9	23.1	63.3	100
White	25.5	21.6	25.8	27.1	100
Hispanic	10.7	13.8	22.3	53.2	100
Other	12.0	15.4	22.9	49.7	100

Source: Derived from data provided by Chief of Naval Education and Training.

^a Population (n=10,422) make up: Blacks 6.1 percent; whites 86.0 percent; Hispanics 4.3 percent; other (which includes Asians) 3.6 percent.

^b Includes Asians and all other racial/ethnic groups not previously identified.

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