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**NAVAL
POSTGRADUATE
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MONTEREY, CALIFORNIA

THESIS

**THE IMPACT OF JUNIOR RESERVE OFFICER TRAINING
CORPS AND OTHER YOUTH PROGRAMS ON NAVY
FIRST-TERM ATTRITION, PROMOTION, AND
REENLISTMENT**

by

Roy A. Lamont

March 2007

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**THE IMPACT OF JUNIOR RESERVE OFFICER TRAINING CORPS AND
OTHER YOUTH PROGRAMS ON NAVY FIRST-TERM ATTRITION,
PROMOTION, AND REENLISTMENT**

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

This study investigates whether participation in the Junior Reserve Officers Training Corps (JROTC) and other youth programs significantly affects the performance of first-term Navy enlistees. This analysis makes use of multivariate models to estimate the causal effect of JROTC participation on first-term attrition, promotion and reenlistment.

The analysis uses data from the Defense Manpower Data Center (DMDC) enlisted personnel cohort files for Fiscal Years (FY) 1994 to 2002. The analysis finds that participation in JROTC reduces first-term attrition and increases the probability of reenlistment, but also reduces the probability of promotion. This latter result is in part due to the Navy's hierarchical structure, which limits the number of promotions combined with the fact that JROTC enlistees tend to enter at higher grades. The results also show that females who participate in JROTC reenlist at higher rates than males. These findings are relevant to policy-makers when determining the future of the JROTC program. By investing early in this program, the Navy could generate substantial cost savings in the form of recruiting and training costs. I would recommend that a cost benefit analysis study be conducted to determine if the high school JROTC program is cost-effective.

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TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	OVERVIEW OF THE JUNIOR RESERVE OFFICER TRAINING CORPS.....	1
B.	BACKGROUND OF THE JROTC PROGRAM	2
C.	PURPOSE AND SCOPE.....	3
D.	ORGANIZATION OF THE STUDY.....	4
II.	LITERATURE REVIEW	5
A.	INTRODUCTION.....	5
1.	Attrition	5
2.	Promotion	7
3.	Reenlistment	8
B.	CONCLUSION	11
III.	DATA DESCRIPTION	13
A.	INTRODUCTION.....	13
B.	DMDC COHORT DATA.....	14
C.	VARIABLE DESCRIPTIONS	14
1.	Dependent Variables.....	14
2.	Independent Variables.....	15
D.	DATA SAMPLES AND DESCRIPTIVE STATISTICS.....	17
IV.	METHODOLOGY	23
A.	INTRODUCTION.....	23
1.	Models for First Year Attrition and First-Term Attrition.....	23
2.	Model of Promotion to E4 or E5 in the First-term	23
3.	Reenlistment Models.....	24
B.	HYPOTHESIZED EFFECTS OF EXPLANATORY VARIABLES.....	25
V.	RESULTS	27
A.	ONE-YEAR ATTRITION RATES	27
B.	FIRST-TERM ATTRITION.....	30
C.	PROMOTION TO E4 OR E5.....	34
D.	REENLISTMENT MODELS	39
VI.	CONCLUSION	47
A.	INTRODUCTION.....	47
B.	IMPLICATIONS OF STUDY	47
C.	FUTURE RESEARCH.....	47
	LIST OF REFERENCES.....	49
	INITIAL DISTRIBUTION LIST	51

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LIST OF TABLES

Table 1.	Dependent Variable Descriptions	15
Table 2.	Independent Variable Descriptions.....	15
Table 3.	Recruit Participation numbers.....	17
Table 4.	Recruit Distributions by Gender by Youth Programs.....	18
Table 5.	Recruit Distribution by Race and Ethnicity by Youth Programs.....	19
Table 6.	Education, AFQT CAT Groups, and AFQT Percentile Scores by Youth Programs	20
Table 7.	Distribution of Entry Rank by Youth Programs	20
Table 8.	Attrition, Promotion, and Reenlistment Rates for Demographic Categories...21	
Table 9.	Pay grade distribution by fourth year.....	24
Table 10.	Hypothesized effects of Explanatory Variables.....	25
Table 11.	Logistic Regression Estimates of One-Year Attrition	28
Table 12.	Partial Effects from One-Year Attrition Models	29
Table 13.	Logistic Regression Estimates of First-Term Attrition.....	31
Table 14.	Partial Effects From First-Term Attrition models	33
Table 15.	Logistic Regression Estimates of Promotion to E4 or E5.....	35
Table 16.	Partial Effects From Promotion to E4 or E5 Models.....	37
Table 17.	Promotion over 4 years	39
Table 18.	Logistic Regression Estimates of Reenlistment.....	40
Table 19.	Partial Effects from Reenlistment Models.....	42
Table 20.	Logistic Regression Estimates of Reenlistment models for All, Females only, and Males Only.....	44
Table 21.	Partial Effects from Female/Male Reenlistment Models.....	45

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I. INTRODUCTION

A. OVERVIEW OF THE JUNIOR RESERVE OFFICER TRAINING CORPS

The first JROTC program was established by the passage of the National Defense Act of 1916, which established the program for students over the age of 14 attending high school. Under this act the military was authorized to loan equipment and active or retired personnel to high schools as long as the school allowed the military personnel to teach approved military courses. The school was also required to have at least 100 students participate in the program every year, or 10% of the school enrollment, if the high school had fewer than 1000 students.¹ The first JROTC programs consisted of three hours of military training per week for a period of three years. Any JROTC graduate who completed this course of instruction (COI) was eligible to receive a reserve commission at age 21. However, after WWI the need for officers decreased and the authorization to grant a commission was eliminated.

Government support for the JROTC program in its first 23 years (1916-1939) was reduced because of budgetary issues. Due to these funding constraints and a lack of support by the armed forces themselves, the program saw little growth. Also, many of the high schools that hosted the program would schedule the classes and training at inconvenient times (lunch time or after school). Due to these scheduling problems many students lost interest in the program. However, in 1963 President Kennedy signed Public Law 88-647, the ROTC Vitalization Act, which reinvigorated the JROTC program. This law required the armed forces to increase support, funding, and the number of JROTC programs under their control.

After the Vietnam War and the end of the draft, the JROTC program was seen as a tool the armed forces could use to entice new recruits into the military. Public support of the military was at an all time low even though the United States was focused on increasing the size of its military forces to combat the threat of communists during the Cold War with the Soviet Union. The armed forces provided benefits to personnel who attended the JROTC program. If a JROTC graduate joined the military they were offered an advanced pay grade upon enlistment, such as E3 or E4, based on their time spent and

¹ JROTC Universe, January 2007, < <http://www.geocities.com/pentagon/bunker/5841/Units.html> >.

rank held in their JROTC program. Qualified JROTC graduates were even given preferential treatment in being selected to any of the Military Academies. During the early 1970's the JROTC program opened its doors to female students. Prior to 1972 no females were allowed to join or participate in the program. However, as of 1993, females made up over 40% of the JROTC participants. The Air Force, Navy, and Marines JROTC programs were established in 1964 under passage of Title 10, U.S. Code, chapter 102.² Each of the separate services programs was very similar to the Army's JROTC program with the exception that the other three services teach service-specific material.

The goals of the JROTC program include promoting leadership, patriotism, community service, and providing information on military service as a possible career. However, the program also helps develop students into well-informed and responsible citizens who have respect for teachers, police, and elders. Students of the program are given all the tools to develop leadership and become better citizens of the community. The JROTC provides an alternative to joining gangs and promotes living a healthy and drug-free life style. In order to participate in any of today's JROTC programs, a student must be enrolled in and attending a regular course of instruction (COI) at the high school hosting the program in grades 9 through 12. Students must be physically fit and qualified to participate in all physical education programs of the host school; furthermore, the student must maintain a set standard of academic grades and an academic standing that leads to high school graduation. Standards of conduct must be adhered to and students must meet specified personal grooming standards (similar to military standards).

B. BACKGROUND OF THE JROTC PROGRAM

As of June 2006, there were 1,555 Army JROTC units, 794 Air Force JROTC units, 619 Navy JROTC units, 260 Marine Corps JROTC units, and 1 Coast Guard JROTC unit for a total of 3,229 units.³ These programs are active in all 50 states and some overseas locations. However, due to the war in Iraq, many of the programs have come under scrutiny and controversy has erupted in the last five years about JROTC programs in schools. Both the American Friends Service Committee (AFSC) and Central Committee

² Cornell Law School, "U.S. Code Collection", January 2006, <http://www.law.cornell.edu/uscode/html/uscode10/usc_sec_10_00002031----000-.html>.

³ "JROTC Universe" January 2007, <<http://www.geocities.com/pentagon/bunker/5841/Units.html>>.

for Conscientious Objectors (CCCO) argue that the JROTC programs are a military recruiting tool and distract students from concentrating on their education and instill violence in its members. In November, 2006 the San Francisco School Board voted to disband all JROTC program in the city. The board argued that "armed forces should have no place in public schools, and the military's discriminatory stance on gays makes the presence of JROTC unacceptable."⁴

In FY2005 the DOD budgeted \$243 million for the JROTC program and increased that amount to \$272 million in FY2007 to help supplement the costs of state schools in providing this program to its students.⁵ To date, there is little evidence to support any of these policy actions, whether they involve removing JROTC from schools or increasing its funding

C. PURPOSE AND SCOPE

This thesis will analyze the effects the Junior Reserve Officer Training Corps (JROTC) program on sailors in their first term of enlistment. The outcomes that will be analyzed include attrition, promotion, and reenlistment. The data used for this analysis was obtained from the Navy's Active Duty Military Master and Loss Edit Documentation, created by the Defense Manpower Data Center. The file provides information on all personnel who enlisted in the Navy from 1994 - 2002. Using this data, I will perform different estimations to predict first term attrition, promotion during the first term, and reenlistment at the end of the term as a function of demographic, other background characteristics, and participation in JROTC or other similar youth programs. The focus of the study, therefore, will be the additional effect of JROTC participation on the performance of sailors, holding constant everything else. For promotion models, the focus will be on the promotion to Petty Officer Third Class (E4) and Petty Officer Second Class (E5). For the attrition models, I will focus on first term attrition only. Finally, I will determine if JROTC has any effects on reenlistment in the Navy. This thesis attempts to answer several questions:

⁴ "A School Board War on JROTC" San Francisco Chronicle, 13 November 2006, January 2007, <<http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2006/11/15/BAG2HMD46B1.DTL>>.

⁵ Secretary of Defense, "O&M review of FY2007 Armed Forces Budget Estimates", February 2006, January 2007, http://www.dod.mil/comptroller/defbudget/fy2007/fy2007_overview.pdf.

1. What effect does participation in JROTC have on first term attrition rates?
2. What effect does participation in JROTC have on first term promotion rates to grades E4 and E5?
3. What effect does participation in JROTC have on first term reenlistment rates?

D. ORGANIZATION OF THE STUDY

Chapter II provides a review of various studies that have analyzed attrition, promotion, and reenlistment. The studies are used to develop the models of how participation in JROTC affects the career of Navy enlistees. Chapter III discusses the empirical models traditionally employed to explore military manpower issues to include reenlistment decisions and attrition. Chapter III also discusses the data used in this study, obtained from the Defense Manpower Data Center (DMDC). In Chapter V the empirical results and findings are presented. Finally, Chapter VI presents concluding remarks and a discussion of the policy implications of this study and areas for future research.

II. LITERATURE REVIEW

A. INTRODUCTION

JROTC students are introduced to the military way of life and its ideologies during high school. Although the JROTC program does not set recruitments as its primary goal, it does provide hands-on information about the military way of life and what to expect if one joins the military. A study conducted by the Denver public schools Office of Program Evaluation, found that JROTC graduates were as much as five times more likely to enlist than non-participants.⁶ However, the study suggested that these students could be interested in the military early on, and joined the JROTC program in order to obtain a head start on the military career. Annual enlistees who are JROTC students increased from 1994-1998 (1,349 enlistees in 1998) and have since dropped to just under 992 in FY02, which was an all time low for the last nine years. One hypothesis is that this training in high school prepares JROTC students for success in the armed forces. The literature review that follows will summarize results from previous studies that have looked at attrition, promotion, and reenlistment in the military of enlistees with JROTC backgrounds.

1. Attrition

One hypothesis is that attrition rates of JROTC participants would be lower than non-participants, because participants are better informed about their choice to enlist. Empirically, it is important to test whether this difference exists and whether it is significant. In addition, it is important to evaluate its magnitude in order to determine whether the cost of JROTC outweighs the benefits it provides to the Navy.

In a master's thesis, Days and Ang of the Naval Postgraduate School used data from the Defense Manpower Data Center on all enlisted cohorts who entered the Armed Forces between 1980 and 2000 to study the performance of JROTC participants. The overall population for the study contains 2,270,089 recruits who were tracked longitudinally. In this database, 85,120 recruits had participated in the JROTC Program,

⁶ Office of Program Evaluation. "JROTC Program Evaluation" 1996. p 3.

or roughly 3.7%.⁷ As for first term attrition, generally one third of recruits attrite in their first term.⁸ The military devotes substantial resources to reduce this attrition but has made little head way over the past 5 years. Days found that JROTC participants attrite at lower rates (3% lower than non-participants over 12 years).⁹ In a comprehensive study conducted by Professors from the Naval Postgraduate School on JROTC found that minority groups (defined as black, Hispanics, and other race) that had participated in JROTC had much lower attrition rates than their white counterparts who also participated in JROTC. For black and Hispanic recruits the average attrition rate was 4% lower and for the 'other race' minority group it was lower by an average of 5%.¹⁰ The study also presents a basic cost benefit analysis, estimating that it costs an average of \$11,000 to recruit a military member and \$35,000 to initially train them for a total cost of \$46,000.¹¹ The study assumes that it costs less to recruit a JROTC Graduate (\$5,000) and they attrite at a 3% lower rate so the government saves more than \$9,000,000 annually.¹²

In another study, Lieutenant Days uses a Cox Proportional hazard model to analyze the attrition of naval recruits in both their first year and the first four years in service. Using DMDC data (FY1980-FY2000), she focused on Navy recruits in their first 4 years of service. The data set contained 529,971 observations.¹³ With respect to 1st year attrition, she found that participation in JROTC did not affect attrition rates significantly. However, when focusing on black JROTC students, she found that they were significantly more likely to complete the first year compared to other JROTC participants.¹⁴ Other variables that were found to decrease first year attrition were

⁷ Days and Ang, "An Empirical Examination of the Impact of JROTC Participation on Enlistment, Retention, and Attrition. Naval Postgraduate School, December 2004. p 72.

⁸.Ibid p 72.

⁹ Ibid p 74.

¹⁰ Graduate School of Business and Public Policy. "A Comprehensive Study of the JROTC Program" Naval Postgraduate School. January 2002. p 77.

¹¹ Ibid p 86.

¹² Ibid p 86.

¹³ Janet Days, "Directed Study of NJROTC" Naval Postgraduate School. 21 March 2005. p 6.

¹⁴ Ibid p 14.

higher pay-grades at entry, prior service, being a minority, and high AFQT scores.¹⁵ In the four year attrition model Days found that participation in JROTC increased the chances of completing four years of service in the Navy by 5 percentage points (the effect, however, was only significant at the 10% level).¹⁶¹⁷ Other variables that significantly decreased first term attrition were found to be minority status, being married with dependents, prior service, and having high AFQT scores.¹⁸

In a NPS Masters thesis Arias and Dal looked at attrition of Hispanics in the military. Although their analysis did not focus on JROTC participation, and they looked at all four services, some of their results will be useful when comparing attrition rates for naval personnel. They also used a data base supplied by DMDC that contained all armed forces personnel that entered the military from FY1992-FY2005. The data was updated each year for each enlistee (3,798,617 total enlistees) to reflect the changes in their military careers throughout the years.¹⁹ In their analysis of attrition they utilized a multivariate probit model to estimate the probability of attrition in the first six months and at four years of service. They found that minorities (blacks, Hispanics, and Asians) had lower attrition rates in the first six months than whites.²⁰ They also found that recruits who enter at a higher pay grade attrite at much lower rates, probably due to perceived better career prospects.²¹ This may be one reason JROTC gradates could have a lower attrition rate, because most enter the military at E2 and E3. For the four year attrition results, Arias and Dal found similar results.²²

2. Promotion

Compared to attrition, there are relatively few studies of promotion. This may in part be due to the fact that the hierarchical structure within the military is rigid and path-

¹⁵ Janet Days, "Directed Study of NJROTC" Naval Postgraduate School. 21 March 2005. p 14.

¹⁶ Ibid p 16.

¹⁷ Ibid p 16.

¹⁸ Ibid p 17.

¹⁹ Arias and Dal, "Hispanics in the U.S. Military" Naval Postgraduate School. September 2006. p 45.

²⁰ Ibid. p 71.

²¹ Ibid. p 75.

²² Ibid. p 74.

dependent. Nevertheless, it is important from a personnel viewpoint to analyze how recruits advance through the ranks. Buddin (2002) developed a model to look at first term reenlistment and promotion. The model incorporated the likelihood of a recruit in the Army to attain the rank of E5 in his first term of service. In the model, the dependent variable was defined as the expected amount of time it takes for each soldier to attain the rank of E5. Control variables included, among other things, race, gender, military occupational specialties (MOSs), AFQT Scores, and educational background.²³ The study finds that blacks, older recruits, those who have completed some college credits, and those with higher AFQT scores had higher probabilities of promotion.²⁴ On the other hand, being female or Asian, and having obtained a GED instead of a high school diploma had a negative effect on promotion.²⁵

Arias and Dal also looked at promotion to the pay grade of E4. In the probit model (very similar to the one for attrition) they found that being a minority, female, having higher AFQT scores, and entering the service at a higher pay grade have positive effects on the promotion probability of Naval recruits.²⁶ The variables that decreased the chances of promotion were having more dependents and lower AFQT scores.²⁷ Based on the literature, my promotion models will control for the effects of race, gender and AFQT scores. Unfortunately, there are no studies that focus on the effect of JROTC or other similar youth programs on military promotions, so it will be very interesting to determine how JROTC graduates fare in promotion to E4 and E5 in the Navy.

3. Reenlistment

Reenlistment is an important goal in the Navy today, especially given the recent technological advances. This study investigates whether participation in the Junior Reserve Offices Training Corps (JROTC) program reduces attrition in the first-term, increases the chances of promotion, and influences reenlistment. This analysis makes use

²³ Richard Buddin, "Success of First-Term Soldiers: The Effects of Recruiting Practices and Recruit Characteristics," The Rand Corporation, Santa Monica, CA, March 2002.

²⁴ Ibid.

²⁵ Ibid.

²⁶ Arias and Dal, "Hispanics in the U.S. Military" Naval Postgraduate School. September 2006. p 83.

²⁷ Ibid. p 83-84.

of multivariate models to estimate the causal effect of JROTC participation on attrition, promotion and reenlistment.

I utilized data from the Defense Manpower Data Center (DMDC) enlisted personnel cohort files from Fiscal Year (FY) 1994 to 2002. Using econometric analysis, I find that participation in JROTC reduces attrition and increases the probability of reenlistment, but also reduces the chance of promotion. This latter result is in part due to the hierarchical structure of the organization, which limits the number of promotions combined with the fact that JROTC enlistees tend to enter at higher grades. My results also show that females that participate in JROTC reenlist at higher rates than both males and females that participate in no youth programs. These findings are relevant to policy-makers when determining the future of the JROTC program. By investing early in this program, the Navy could provide substantial cost savings in the form of recruiting and training costs. I would recommend that a cost benefit analysis study be conducted to determine if money spent on the JROTC program is money well spent.

development of state of the art weapons systems. The Navy now has a greater need to “age” its force in order to keep well-trained sailors and reduce the costs of training new ones. Numerous studies have looked at military reenlistment and the identifiable characteristics of recruits to ensure that the costs of training can be recouped or minimized via re-enlistments. There have been three basic studies that have looked at variables that affect individuals’ reenlistment decisions. The first looks at the effects of pay, selective reenlistment bonuses (SRB)/incentive pays, pay grade, and marriage on a military members’ decisions to reenlist and remain in the armed forces. The second group of studies looks at aptitude test scores, race, gender, and educational background of recruits prior to entering the armed forces. The third and last group of studies analyzes the effects of youth programs (e.g, JROTC) on an individual’s career decisions in and out of the armed forces.

Quester and Adedeji (1991) analyzed the effect of bonuses, pay grades, marriage, and the number of dependents for Marine Corp members on their decision to reenlist.²⁸ The population sample was restricted to marines who were eligible and recommended for

²⁸ Quester and Adedeji, Reenlisting in the Marine Corps: The Impact of Bonuses, Grade, and Dependency Status,” C.N.A. Corporation, Alexandria, VA, July 1991.

retention. The results indicate that those with higher pay grades and those who receive Selective Reenlistment Bonuses (SRB) had higher reenlistment rates.²⁹ It was also determined that minorities, females, and married marines were more likely to reenlist.³⁰ The study also determined that, when the ratio of military pay to civilian pay is higher, and when the unemployment rate is higher, reenlistments increase.³¹ Warner and Asch (1995) came to the same conclusion while analyzing the effects of the Annualized Cost of Leaving (ACOL) on reenlistment decisions.³² Similarly, Mackin and Darling (1996) found comparable results while analyzing the impact of incentive pay on officer retention.³³

Cooke and Quester (1992) analyzed the effect of background characteristics on the attrition rates of naval personnel. They discovered that high school graduates with high AFQT scores and those who entered through Delayed Entry Program (DEP) were more likely to complete their first term of service and to reenlist.³⁴ They also found that Black and Hispanic recruits promoted and reenlisted at higher rates.³⁵ Although this study focused on male recruits, its findings are similar to others that indicate that race and education predict how military members make decisions on reenlistment.

Days and Ang (2004) analyzed the military enlistment rates of JROTC students as well as retention and attrition of JROTC participants who enlist. The sample was drawn from the Department of education (High School and Beyond study) and was made up of all personnel that enlisted in the armed forces from FY1980-FY2000.³⁶ In this study

²⁹ Quester and Adedeji, "Reenlisting in the Marine Corps: The Impact of Bonuses, Grade, and Dependency Status," C.N.A. Corporation, Alexandria, VA, July 1991.

³⁰ Ibid.

³¹ Ibid

³² Warner and Asch, "The Economics of Military Manpower," Handbook of Defense Economics, Vol I, Elsevier Science, BV, 1995.

³³ Mackin and Darling, "Economic Analysis of Proposed Surface Warfare Officer Career Incentive Pay", Bureau of Naval Personnel, Washington, DC, September 1996.

³⁴ Cooke and Quester, "The Characteristics of Successful Enlistees in the All-Volunteer Force; A Study of Male Recruits in the US Navy", Social Science Quarterly, Vol 73, Number 2, June 1992.

³⁵ Cooke and Quester, "The Characteristics of Successful Enlistees in the All-Volunteer Force; A Study of Male Recruits in the US Navy", Social Science Quarterly, Vol 73, Number 2, June 1992.

³⁶ Days and Ang, "An Empirical Examination of the Impact of JROTC Participation on Enlistment, Retention, and Attrition. Naval Postgraduate School, December 2004.

JROTC participants are compared to non-JROTC participants. They found that participation in JROTC had a positive effect on reenlistment. In particular, they report that JROTC participants reenlist at a 3.5% greater rate than non-JROTC personnel.³⁷ However, given that only 3.09% of the personnel that reenlisted had participated in JROTC, the authors expressed doubt as to the overall cost-savings provided by the JROTC program.³⁸

Although this study focuses on the military performance of JROTC participants, the program itself has many goals, most of which involve improving students' educational outcomes. Bailey, Hodak, Sheppard, and Hassen (1992) surveyed 38 NJROTC units (out of 300) and found that participation in the NJROTC program reduces the drop out rate of high school students who participated in the program.³⁹ The study also noted that the NJROTC program positively affected the student's decisions to stay in school and graduate.⁴⁰ With respect to enlistment intentions, the authors report that 20% of the surveyed students planned to join the military after high school, whereas 60% planned to attend college.⁴¹ It must be pointed out that the study was limited to comparisons of means between participants and non-participants, and did not employ an empirical analysis to establish whether these differences were statistically significant or causal.

B. CONCLUSION

This section reviews findings of various studies on attrition, promotion, and reenlistment. While pinpointing demographic characteristics that affect these measures of performance, the literature also provides limited evidence on the effect of JROTC on military enlistments, and performance in the military. In particular, no studies have looked at career progression in the way of military promotion and the rate of promotion for JROTC personnel. In addition, whether the effect of JROTC varies by gender, has

³⁷ Days and Ang, "An Empirical Examination of the Impact of JROTC Participation on Enlistment, Retention, and Attrition. Naval Postgraduate School, December 2004.

³⁸ Ibid

³⁹ Bailey, Hodak, Sheppard, and Hassen, Technical Report 92-015, "Benefits Analysis of the Naval JROTC", Naval Training System Center, Orlando, FL, June 1992.

⁴⁰ Ibid.

⁴¹ Ibid.

also escaped academic scrutiny. The following chapters introduce and describe the data, and present the empirical findings. In addition, the results are compared to the studies presented in this chapter to determine if the results are similar.

III. DATA DESCRIPTION

A. INTRODUCTION

This chapter describes the Defense Manpower Data Center (DMDC) enlisted personnel cohort data that will be used to determine the impact of JROTC participation on first term attrition, promotion, and reenlistment of U.S. Navy recruits. Three basic groups will be identified: recruits that participated in the JROTC program for 3 or 4 years; recruits that participated in other youth programs; and recruits that participated in no youth programs. I have already discussed the JROTC program in detail so the rest of the discussion will provide information on other youth programs that high school students participate in and could have similar effects as JROTC. These programs consist of senior ROTC, Civil Air Patrol, and Sea Cadet.

The first program, ROTC, is a college-based program that is used as an officer recruitment tool. The ROTC program provides tuition funding for students who cannot afford to pay for college. In exchange for this funding students must enter the armed forces for a minimum of 4 years. Most will enter the armed forces as officers. However, those who do not graduate from college or who do not complete the ROTC program may enter as enlisted personnel. The program is designed to focus on leadership development, problem solving, ethics and preparing the students for serving as officers in the armed forces. Given its similarity to the JROTC program, the analysis will separate ROTC participants from both JROTC-participant and non-participant groups.

The second program, Civil Air Patrol, is an Air Force program to help develop leadership skills and educate youths between the ages of 12-18 in the fundamentals of aerospace science. This program teaches core values similar to JROTC. However, unlike JROTC it is an after-school program and students that participate only receive community service hours. Students that have participated in Civil Air Patrol usually make up around 10% of the freshman class at the Air Force Academy, but there is no information on how many join the military as enlisted personnel.⁴²

⁴² “Civil Air Patrol” January 2007. http://www.cap.gov/visitors/quick_info/for_students.cfm.

Finally, the Naval Sea Cadet Corps (NSCC) is a youth program for ages 13-17 who are interested in learning about the Navy, Marine Corps, Coast Guard and Merchant Marine. These programs introduce students to the navy way of life. They also develop a sense of pride, patriotism, and how to live in an environment free of drugs and gangs. This program is very similar to the Civil Air Patrol and only meets after school or on weekends. Students who participate in this program are also eligible to enter the armed forces at higher pay grades (E2 and E3) under certain circumstances. In the analysis that follows, students participating in any of the three programs described above will be grouped and analyzed separately from JROTC students.

B. DMDC COHORT DATA

The Defense Manpower Data Center (DMDC) supplied the data for this study, which consist of Navy enlisted cohort files. Each cohort of naval recruits is identified by the fiscal year (FY) they entered the Navy. The cohorts obtained include enlisted personnel who entered the Navy from FY 1994 to FY 2002.⁴³ These cohort files were matched with corresponding active duty inventory files at 7-year intervals in order to track changes in several variables, such as pay grade, marriage, number of dependents, education levels, and rank to name a few.

C. VARIABLE DESCRIPTIONS

1. Dependent Variables.

I will focus on three dependent variables: attrition, promotion, and reenlistment. While prior attrition studies distinguish between early attrition (first six months) and first term attrition (first four years), here I will analyze attrition in the first year and overall first term attrition rate. Promotion is defined as promotion to E4 or E5 by year 4 (prior to the reenlistment decision). Chapter IV will discuss each specific model and reasons for excluding certain variables from some models and restricting the sample for part of the analysis. Table 1 summarizes the dependent variables and their definitions.

⁴³ The original data set covers 1994-2005. However, those enlisting after 2002 would not be in the sample long enough to observe re-enlistment decisions. In addition, after 2002, the Race/Ethnic variable was replaced with another variable consisting of self-reported ethnicity categories. Since this study will consider JROTC effects by race, it was deemed more appropriate to use consistent definitions of this variable. Therefore, the data summary and analysis will only focus on the 1994-2002 period.

Table 1. Dependent Variable Descriptions

VARIABLE	DEFINITION
Dependent Variables	
Attrite year 1	=1 if a recruits attrite in year 1; else 0
Attrite year 2	=1 if a recruits attrite in year 2; else 0 (all year 1 recruits that attrite are excluded)
Attrite year 3	=1 if a recruits attrite in year 3; else 0 (all year 1 and 2 recruits that attrite are excluded)
Attrite year 4	=1 if a recruits attrite in year 4; else 0 (all year 1, 2 and 3 recruits that attrite are excluded)
Attrition overall	=1 if a recruits attrite in the first term; else 0 (no exclusions)
Promotion to E4 or E5 at the end of first-term	=1 if a recruit promotes to E4 or E5 in first-term; else 0 (those who attrite in the first 4 years were excluded)
Reenlist	=1 if a recruit reenlisted at the end of his contract; else 0 (all first-term recruits that attrite are excluded)

2. Independent Variables.

Independent variables include demographics (gender, race, marriage, number of dependents) and other background characteristics, such as pay grades, education level, mental group (CAT's), and an indicator for participation in youth programs. As a reminder, gender, education, pay grade, and marital status could not be determined for individuals who attrite in year 1, due to recording practices. The race categories were created by combining information from "Race/Ethnic" and "Ethnic" variables. In particular, I separated Hispanics into sub-categories based on their country of origin. The pay grade variable denotes the rank a recruit attained in each specific fiscal year. The marriage variable indicates if a recruit was married in the year of his enlistment. Table 2 summarizes the variable definitions and their coding.

Table 2. Independent Variable Descriptions

VARIABLE	DEFINITION
Gender	
Male	=1 if a recruit is a male; else 0
Female	=1 if a recruit is a female; else 0
Race/Ethnic	
White	=1 if a recruit is a white; else 0
Black	=1 if a recruit is a black; else 0
Mexican	=1 if a recruit is a other Mexican; else 0
Puerto Rican	=1 if a recruit is a other Puerto Rican; else 0

Cuban	=1 if a recruit is a other Cuban; else 0
Latin American	=1 if a recruit is a other Latin American; else 0
Other Hispanic descent	=1 if a recruit is a other Hispanic descent; else 0
Native	=1 if a recruit is a native American/pacific islander; else 0
Asian	=1 if a recruit is a Asian; else 0
Other	=1 if a recruit is a other; else 0
Pay grade	
E1 year 1	=1 if a recruit was a E1 in year 1; else 0
E2 year 1	=1 if a recruit was a E2 in year 1; else 0
E3 year 1	=1 if a recruit was a E3 in year 1; else 0
E4 year 1	=1 if a recruit was a E4 in year 1; else 0
E1 (used in Promotion Model)	=1 if a recruit was a E1 in the designated year; else 0
E2 (used in Promotion Model)	=2 if a recruit was a E2 in the designated year; else 0
E3 (used in Promotion Model)	=3 if a recruit was a E3 in the designated year; else 0
E4 (used in Promotion Model)	=4 if a recruit was a E4 in the designated year; else 0
E5 (used in Promotion Model)	=5 if a recruit was a E5 in the designated year; else 0
Education	
No high school degree	=1 if a recruit entered the Navy with no high school degree; else 0
High school degree	=1 if a recruit entered the Navy with a high school degree; else 0
Some college	=1 If a recruit had attained college credit prior to entering the Navy, but not college degree; else 0
College degree	=1 if a recruit entered the Navy with a college degree or higher; else 0
Mental group	
CAT Missing	=1 if a recruit has no score on AFQT; else 0
CAT I	=1 if a recruits scores between 93 rd and 99 th Percentile on the AFQT; else 0
CAT II	=1 if a recruits scores between 65 th and 92 nd Percentile on the AFQT; else 0
CAT IIIA	=1 if a recruits scores between 50 th and 64 th Percentile on the AFQT; else 0
CAT IIIB	=1 if a recruits scores between 31 st and 49 th Percentile on the AFQT; else 0
Personnel Data	
Marriage	=1 if Married; else 0
Dependents	= the number of dependents listed for each specific year of a recruits career
Youth Programs	

No youth program	=1 if a recruit had participated in no youth program; else 0
Other youth program	=1 if a recruited participated in a youth program other then JROTC; else 0
JROTC	=1 if a recruit participated and completed 3 or 4 years in a JROTC program; else 0

D. DATA SAMPLES AND DESCRIPTIVE STATISTICS

The key variable in the dataset is the “Youth Program” variable, which allows identification of recruits who participated in JROTC or other youth programs (Civil Air Patrol, Sea Cadet, ROTC) prior to enlisting. It should be noted that this variable classifies a recruit as a JROTC-participant if he/she participated in the program for three or more years. Participation in other youth programs (Civil Air Patrol, Sea Cadet, and ROTC) was combined into one dummy variable named ‘other youth programs’. While the focus of this study is the performance of JROTC participants as compared to non-participants, enlistees who participated in other youth programs, will also be considered. I exclude from the data all prior service personnel, because their decisions to come back in the Navy or transfer into the Navy from another service, may bias the estimates.

The following tables provides descriptive statistics for the three identified groups: recruits that participated in JROTC, those who participated in other youth programs, and finally recruits with no prior exposure to the military or any of the above programs. Table 3 summarizes the total number of recruits that participated in JROTC, Other Youth Programs, and No Youth Programs for each fiscal year (entry cohort).

Table 3. Recruit Participation numbers

Cohorts	JROTC	Other Youth Program	No Youth Program	TOTAL
Cohort 94	1,097	446	34,888	36,431
Cohort 95	1,122	403	36,139	37,664
Cohort 96	1,136	469	39,219	40,824
Cohort 97	1,342	534	44,294	46,170
Cohort 98	1,349	504	43,107	44,960
Cohort 99	1,278	476	49,459	51,213
Cohort 00	1,185	303	49,809	51,297
Cohort 01	1,109	325	50,201	51,635
Cohort 02	992	287	43,435	44,714
TOTAL	10,610	3,747	390,551	404,908

Source: Derived from Defense Manpower Data Center Cohort Files

It is interesting to note that the number of recruits that have participated in JROTC and Other Youth Programs has declined starting with cohort FY99, while the total number of recruits has increased (at least until FY2002). Overall, the recruits that participate in JROTC represent 2.62% of all recruits that entered the Navy between 1994 and 2002. Recruits that participate in other youth programs represent only 0.93% of total enlistments for this period.

Next, I compare the main demographic and other characteristics of recruits for the three groups I defined above. First, I focus on the gender composition, which can be derived from the SEX variable in the DMDC files. However, since this variable is only coded at the end of the first year, I am only able to determine the gender of recruits who complete their first year of service. Table 4 presents the gender distribution across all three participant groups, by cohort. It appears that the percentage of female JROTC participants that enlist is slightly higher than the proportion of females that enlist in the other two groups (by about 4%).

Table 4. Recruit Distributions by Gender by Youth Programs

GENDER	JROTC	Other Youth Programs	No Youth Programs
Male	68.28%	71.91%	70.46%
Female	18.67%	14.12%	13.94%
Unknown	13.03%	13.96%	15.60%

Source: Derived from Defense Manpower Data Center Cohort Data Files

Next, I explore the race and ethnic distribution of the sample. Table 5 shows the minority representation for all recruits that entered the Navy from FY94 – FY02. Table 5 indicates that about half of JROTC participants that entered the Navy in the past nine years are minorities. This could be due to the fact that JROTC units are usually hosted by schools located in urban areas with relatively high minority enrollments. Table 3 shows that minorities make up a little less than 50% of the recruits that participated in JROTC and joined the Navy compared to 37% of recruits that do not participate in any youth programs. According to Ang and Days (2004) the JROTC participation rate for Blacks and Hispanics steadily increased up until FY00.

Table 5. Recruit Distribution by Race and Ethnicity by Youth Programs

RACE/ETHNICITY	JROTC	Other Youth Program	No Youth Program
White	50.74%	58.01%	62.68%
Black	36.02%	24.55%	18.47%
Mexican	3.36%	3.56%	4.19%
Puerto Rican	.92%	1.84%	1.25%
Cuban	.09%	.13%	.17%
Latin American	.34%	.50%	.78%
Other Hispanic	3.05%	3.42%	4.37%
Native American/ Pacific Islander	1.65%	2.46%	2.74%
Asian	2.94%	4.84%	4.42%
Other	.89%	.67%	.90%
Total	100%	100%	100%

Source: Derived from Defense Manpower Data Center Cohort Files

Table 6 shows the education level, Armed Forces Qualification Test (AFQT) percentile score, and test category (CAT) of the recruits who entered the Navy. The education categories include: no high school degree/GED, high school graduate, some college, those with a college degree, and no education information (since education level is missing for a large number of recruits) The AFQT is a military aptitude test that helps recruiters place recruits into jobs they are qualified for and have the aptitude to complete the required training successfully. The score on the AFQT is used to place the individual into four basic categories (CAT). In CAT I are individuals who score in the 93rd-99th percentile, CAT II score between the 65th-92nd, those in CAT IIIA score between 50th and 64th, and those in CAT IIIB score between 31st and 49th. Most individuals that score lower than CAT IIIB are not permitted to join the military without a waiver. Table 6 shows that JROTC recruits are more likely to be high school graduates as opposed to the ‘other youth programs’ and ‘no youth programs’ groups, which both display a higher proportion of GED-holders and high school dropouts. However, JROTC recruits score lower than the other two groups on the AFQT.

Table 6. Education, AFQT CAT Groups, and AFQT Percentile Scores by Youth Programs

Education/CAT Group/AFQT	JROTC	Other Youth Programs	No Youth Programs
Non High school Grad/GED	5.87%	8.93%	9.20%
High School Grad	87.21%	82.24%	82.27%
Some College	1.33%	1.97%	2.36%
College Degree	.77%	1.87%	2.12%
No Education Info	4.82%	4.98%	3.32%
CAT Missing	.78%	1.44%	2.18%
CAT IIIB	37.59%	32.60%	30.91%
CAT IIIA	26.77%	25.38%	25.63%
CAT II	31.49%	34.82%	36.14%
CAT I	3.37%	5.75%	5.14%
AFQT (AVG score)	57.55%	60.74%	61.14%

Source: Derived from Defense Manpower Data Center Cohort Files

Table 7 breaks down the rank at which the recruits enter the Navy. As discussed in Chapter I, most JROTC graduates enter the military at higher pay grades due to their training and experience. In fact, Table 5 shows that most JROTC recruits enter at the pay grade of E3. As discussed earlier, the other youth programs also enable recruits to enter the Navy at higher pay grades and that is why we see more enlistees at E3 for this group compared to the ‘no youth program’ recruits. For a recruit who has not participated in any military youth programs, he/she can only enter the Navy at a higher pay grade by referring friends to the Navy recruiter, by completing some college credits, or attaining a college degree prior to enlisting. As discussed in the literature review, pay grade has been shown to have a negative effect on attrition and a positive effect on retention. The models estimated below will analyze such effects.

Table 7. Distribution of Entry Rank by Youth Programs

Pay Grade in Year 1	JROTC	Other Youth Programs	No Youth Programs
E1	7.56%	15.94%	40.30%
E2	16.23%	39.04%	33.07%
E3	72.77%	40.09%	20.09%
E4	3.17%	4.45%	5.19%

Source: Derived from Defense Manpower Data Center Cohort Files

Table 8 summarizes the performance of recruits (attrition, reenlistment, promotion) based on their background characteristics and program participation. The one-year and first-term attrition columns shows that recruits who participate in JROTC have attrition rates that are about 3% less for one-year and 4% less for the first-term of service when compared to recruits who do not participate in any youth programs. Whites attrite at higher rates than all the other minorities except for native Americans/pacific islanders. In addition, recruits with higher AFQT scores have lower attrition rates. The promotion column shows that JROTC recruits, males, Asians, recruits with college degrees, and those with higher AFQT scores promote at higher rates. With respect to reenlistments, JROTC recruits, males, Asians, and recruits with some college credits reenlist at higher rates. We also see that the higher the entry pay-grade the better chance of promoting to E4 or E5 and reenlisting. It should be noted that promotion and reenlistment results are calculated only for those who did not attrite during the first-term. However, this table doesn't indicate if these differences in performance are statistically significant. For that we will turn to multivariate models.

Table 8. Attrition, Promotion, and Reenlistment Rates for Demographic Categories

	One-Year Attrition	First-Term Attrition	Promotion to E4 or E5	Reenlistment
JROTC	14.15%	35.39%	66.45%	67.04%
Other Youth Program	15.36%	37.42%	65.64%	65.32%
No Youth Program	17.36%	39.59%	65.17%	62.47%
Male			66.22%	62.77%
Female			60.27%	61.89%
White	18.53%	41.34%	67.75%	60.46%
Black	16.33%	39.93%	55.23%	66.85%
Hispanic	13.88%	33.03%	65.28%	61.91%
<i>Mexican</i>	12.94%	30.86%	66.04%	60.20%
<i>Puerto Rican</i>	16.28%	35.83%	63.69%	67.10%
<i>Cuban</i>	15.50%	38.29%	60.25%	57.29%
<i>Latin American</i>	12.18%	30.53%	65.53%	64.70%
<i>Other Hispanic</i>	14.34%	34.53%	65.14%	61.83%

Native American/ Pacific Islander	19.78%	43.76%	66.73%	66.15%
Asian	10.31%	24.55%	71.75%	71.25%
Other	15.61%	36.25%	64.04%	66.04%
Non High school Grad/GED			57.79%	61.85%
High School Grad			66.39%	63.05%
Some College			55.87%	62.60%
College Degree			77.65%	62.30%
No Education Info			54.77%	54.73%
CAT Missing	38.14%	63.36%	65.31%	65.95%
CAT IIIB	18.64%	41.73%	54.37%	58.65%
CAT IIIA	18.83%	41.50%	62.62%	59.43%
CAT II	15.47%	36.69%	73.91%	66.17%
CAT I	12.11%	33.18%	79.18%	74.37%
E1			55.08%	56.23%
E2			69.29%	63.73%
E3			77.23	70.55
E4			83.48	83.92
Sample Rate	17.26%	39.45%	65.21%	62.62%

Source: Derived from Defense Manpower Data Center Cohort Files

IV. METHODOLOGY

A. INTRODUCTION

I developed three basic models to measure the effects of participation in the JROTC program on attrition, promotion during the first term, and on reenlistment. For each of the three outcomes I estimate a baseline model by excluding the JROTC and other youth program variables. I then estimate the same models including the variables for JROTC, other youth programs, and no youth programs (which is the control group). Finally, I break down the Hispanic group into ethnic categories (Mexican, Puerto Rican, Cuban, Latin American, and other Hispanic descent). Below I describe each basic model and the reasons for including or excluding independent variables.

1. Models for First Year Attrition and First-Term Attrition

The models were specified based on prior attrition studies. However, due to the coding of the DMDC data, I am unable to determine gender, education, pay grade, and married for those who attrite in the first year. I have also decided to exclude all prior service personnel because I believe they may bias my results due to their decision to re-enter the Navy. The model for attrition (first year/first term) is specified as follows:

$$\text{Pr}(\text{Attrition Yr1 and First-term}) = \beta_0 + \beta_1 (\text{CAT missing}) + \beta_2 (\text{CAT I}) + \beta_3 (\text{CAT II}) + \beta_4 (\text{CAT IIIB}) + \beta_5 (\text{Black}) + \beta_6 (\text{Mexican}) + \beta_7 (\text{Puerto Rican}) + \beta_8 (\text{Cuban}) + \beta_9 (\text{Latin American}) + \beta_{10} (\text{Other Hispanic}) + \beta_{11} (\text{Native}) + \beta_{12} (\text{Asian}) + \beta_{13} (\text{Other}) + \beta_{14} (\text{JROTC}) + \beta_{15} (\text{Other youth programs}) + e_i$$

The category with the majority of observations in each variable group was selected as the base case. For this model the base case is: Cat IIIA, white, and no youth program.

2. Model of Promotion to E4 or E5 in the First-term

The promotion models are similar to the ones discussed in the literature review with the exception that I define promotion as achieving the rank of E4 or E5 during the first term. The score a recruit achieves on his rating exam coupled with his evaluations and time-in-grade will determine if he is promoted to the next pay grade. See Table 9 below for pay grade distributions achieved by year 4 in the data.

Table 9. Pay grade distribution by fourth year.

Pay Grade	% at year 4
E1 and E2	2.49
E3	18.55
E4	60.70
E5	18.26

Source: Derived from Defense Manpower Data Center Cohort Files

The promotion model also excludes prior service for the reasons discussed above. I have also excluded from the sample recruits who enter the Navy under a five or six year contract. Because these recruits are promoted to E4 upon completion of “A” school they may bias my promotion model if they were included. I also included variables for entry pay grades of each recruit. These variables will allow me to determine if recruits who enter at higher pay grades promote faster. The model for Promotion to E4 or E5 is specified as follows:

$$\text{Pr(Promotion to E4 or E5 in Year 4)} = \beta_0 + \beta_1 (\text{No education info}) + \beta_2 (\text{Non-high school graduate}) + \beta_3 (\text{Some college}) + \beta_4 (\text{College degree}) + \beta_5 (\text{Married (in year of attrition)}) + \beta_6 (\text{CAT missing}) + \beta_7 (\text{CAT I}) + \beta_8 (\text{CAT II}) + \beta_9 (\text{CAT IIIB}) + \beta_{10} (\text{Female}) + \beta_{11} (\text{Black}) + \beta_{12} (\text{Mexican}) + \beta_{13} (\text{Puerto Rican}) + \beta_{14} (\text{Cuban}) + \beta_{15} (\text{Latin American}) + \beta_{16} (\text{Other Hispanic}) + \beta_{17} (\text{Native}) + \beta_{18} (\text{Asian}) + \beta_{19} (\text{Other}) + \beta_{20} (\text{JROTC}) + \beta_{21} (\text{Other youth programs}) + \beta_{22} (\text{E01}) + \beta_{23} (\text{E03}) + \beta_{24} (\text{E04}) + e_i$$

The category with the majority of observations in each variable group was selected as the base case. The base case for the promotion model is: high school graduate, not married, CAT IIIA, white, no youth program, entry pay grade of E02.

3. Reenlistment Models

This model specification is based on the models discussed in the literature review. However, I exclude all those who attrite during the first four years, because if a person is not eligible to promote due to attrition they could bias the model estimates. The model will also exclude prior service for the same reason and will control for marital status during the fourth year. The model for reenlistment is specified as follows:

$$\text{Pr(Reenlistment at the end of the first-term)} = \beta_0 + \beta_1 (\text{No education info}) + \beta_2 (\text{Non-high school graduate}) + \beta_3 (\text{Some college}) + \beta_4 (\text{College degree}) + \beta_5 (\text{Married (in year of attrition)}) + \beta_6 (\text{CAT missing}) + \beta_7 (\text{CAT I}) + \beta_8 (\text{CAT II}) + \beta_9 (\text{CAT IIIB}) + \beta_{10} (\text{Female}) + \beta_{11} (\text{Black}) + \beta_{12} (\text{Mexican}) + \beta_{13} (\text{Puerto Rican}) + \beta_{14} (\text{Cuban}) + \beta_{15}$$

(Latin American) + β_{16} (Other Hispanic) + β_{17} (Native) + β_{18} (Asian) + β_{19} (Other) + β_{20} (JROTC) + β_{21} (Other youth programs) + e_i

The category with the majority of observations in each variable group was selected as the base case for purposes of estimating the partial effects. The base case for this model is: high school graduate, not married, CAT IIIA, white, and no youth program.

B. HYPOTHESIZED EFFECTS OF EXPLANATORY VARIABLES

Recruits who participate in JROTC are expected to have lower rates of attrition and higher rates of retention. This hypothesis is based on the prior studies of JROTC participants in the military. However, promotion of JROTC recruits has never been studied so I would hypothesize that they would promote at a slightly higher rate due to the training they received in the JROTC program. This training helps a participant familiarize themselves with military life and gives them a head start on learning the fundamentals of the military. However, JROTC participants enter the military at higher pay grades, and the hierarchical structure of the military limits the number of promotions, so JROTC recruits may appear less likely to promote. Table 10 displays the hypothesized effect of each of the variables in the basic models, which are based on the previous studies discussed in the literature review.

Table 10. Hypothesized effects of Explanatory Variables

Variable	Attrition	Promotion	Reenlistment
Cat Missing	+	-	-
Cat I	-	+	+
Cat II	-	+	+
Cat IIIB	+	-	-
No education info	+	-	-
Non high school grad	+	-	-
Some college	-	+	-
College degree	-	+	-
Married	+	+	+
Black	-	-	+
Mexican	-	+	+
Puerto Rican	-	+	+
Cuban	-	+	+
Latin American	-	+	+
Other Hispanic	-	+	+

descent			
Native American / Pacific Islander	+	-	+
Asian	-	+	+
Other	-	-	+
JROTC	-	+	+
Other Youth Programs	-	+	+

V. RESULTS

A. ONE-YEAR ATTRITION RATES

The results of the first year attrition model are presented in Tables 11 and 12. Table 11 presents estimates from logistic regressions and Table 12 presents the marginal effects obtained from these estimates. Six models of attrition were estimated. The first models in columns one and two provides baseline estimates similar to those reported in prior attrition studies. The models in columns three and four add indicators for JROTC participation, and for participation in other military youth programs. The models in columns five and six add interaction variables for all races and ethnic groups with JROTC. This model allows the effect of JROTC on the first year attrition to vary by race and ethnicity.

The estimates in Tables 11 and 12 indicate that JROTC participation is associated with a lower first year attrition rate, as hypothesized. Other determinants that reduce attrition are the CAT I-II groups (higher ability associated with lower attrition). However, the partial effects table shows that CAT IIIB recruits had a .68 percentage point higher one-year attrition rate than CAT IIIA. The Race/Ethnic results all indicate that minorities have a lower one-year attrition rate except for Native Americans who appear to attrite at 7.22 percentage points higher than whites (base case). Model (5) reveals that Hispanics who participate in JROTC have even lower attrition rates than all other minorities. When breaking down the Hispanic group into the various ethnic subgroups in model (6) it appears that the lower attrition rates for Hispanics in JROTC are driven by Mexican-American participants. In addition, while Native Americans appear to have higher attrition rates, Native Americans who participate in JROTC attrite at a lower rate than whites (base case). When looking at the partial effects in Table 12 when the model accounts for all minorities and AFQT scores the first year attrition probability is 16.68% lower for JROTC participants⁴⁴ and 12.74% lower for other youth program participants⁴⁵ lower than recruits who participated in no youth programs in high school.

⁴⁴ Partial Effects divided by the actual one-year attrition rate.

⁴⁵ Ibid.

Table 11. Logistic Regression Estimates of One-Year Attrition

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
JROTC			-.2455*** (.0297)	-.2457*** (.0297)	-.1854*** (.0393)	-.1855*** (.0393)
Other youth programs			-.1380*** (.0487)	-.1395*** (.0487)	-.1380*** (.0487)	-.1395*** (.0487)
CAT missing	.9912*** (.0618)	.9922*** (.0618)	.9889*** (.0618)	.9900*** (.0618)	.9885*** (.0618)	.9896*** (.0618)
CAT I	-.5906*** (.0240)	-.5909*** (.0240)	-.5920*** (.0240)	-.5923*** (.0240)	-.5919*** (.0240)	-.5922*** (.0240)
CAT II	-.2774*** (.0113)	-.2775*** (.0113)	-.2780*** (.0113)	-.2782*** (.0113)	-.2780*** (.0113)	-.2781*** (.0113)
CAT IIIB	.0409*** (.0114)	.0410*** (.0114)	.0409*** (.0114)	.0409*** (.0114)	.0409*** (.0114)	.0409** (.0114)
Black	-.2652*** (.0121)	-.2652*** (.0121)	-.2583*** (.0122)	-.2584*** (.0122)	-.2568*** (.0122)	-.2569*** (.0122)
Black JROTC					-.0671 (.0644)	-.0671 (.0644)
Hispanic	-.4220*** (.0158)		-.4228*** (.0158)		-.4178*** (.0159)	
Hispanic JROTC					-.3198** (.1340)	
Mexican		-.5118*** (.0249)		-.5123*** (.0249)		-.5057*** (.0249)
Mexican JROTC						-.4239* (.2174)
Puerto Rican		-.2565*** (.0407)		-.2562*** (.0407)		-.2495*** (.0410)
Puerto Rican JROTC						-.4236 (.3559)
Cuban		-.2860** (.1091)		-.2880** (.1091)		-.2849** (.1097)
Cuban JROTC						-.2333 (1.0678)
Latin American		-.5794*** (.0577)		-.5823*** (.0577)		-.5705*** (.0577)
Latin American JROTC						-.8.709 (39.79)
Other Hispanic		-.3690*** (.0234)		-.3700*** (.0234)		-.3679*** (.0235)
Other Hispanic JROTC						-.1186 (.1878)

JROTC						
Native	.0656** (.0257)	.0656** (.0257)	.0640** (.0257)	.0640** (.0257)	.0722*** (.0258)	.0722*** (.0258)
Native JROTC					-.7312** (.2844)	-.7312** (.2844)
Asian	-.7356*** (.0266)	-.7357*** (.0266)	-.7369*** (.0266)	-.7369*** (.0266)	-.7344*** (.0268)	-.7344*** (.0268)
Asian JROTC					-.1641 (.2374)	-.1644 (.2375)
Other	-.2628*** (.0485)	-.2628*** (.0485)	-.2617*** (.0485)	-.2617*** (.0485)	-.2490*** (.0489)	-.2490*** (.0489)
Other JROTC					-.6606* (.3983)	-.6609* (.3983)
Sample Size	363,041	363,041	363,041	363,041	363,041	363,041
-2 Log L	330908.74	330863.64	330829.18	330783.81	330812.74	330760.49
LR-Test Chi Square	3043.9817	3089.0777	3123.5421	3168.9095	3139.9829	3192.2336
R squared	.0083	.0085	.0086	.0087	.0086	.0088

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

Table 12. Partial Effects from One-Year Attrition Models

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
JROTC			-.0375***	-.0375***	-.0288***	-.0288***
Other youth program			-.0218***	-.0220***	-.0218***	-.0220***
CAT missing	.2058***	.2061***	.2058***	.2061***	.2056***	.2059***
CAT I	-.0806***	-.0806***	-.0811***	-.0811***	-.0810***	-.0810***
CAT II	-.0418**	-.0418***	-.0421***	-.0421***	-.0420***	-.0420***
CAT IIIB	.0068**	.0068***	.0068**	.0068***	.0068***	-.0068***
Black	-.0401***	-.0401***	-.0393***	-.0393***	-.0391***	-.0391***
Black JROTC					-.0108	-.0108
Hispanic	-.0608***		-.0612***		-.0605***	
Hispanic JROTC					-.0477** (.1340)	
Mexican		-.0716***		-.0720***		-.0712***
Mexican JROTC						-.0612*
Puerto		-.0389***		-.0390***		-.0381***

Rican						
Puerto Rican JROTC						-.0612
Cuban		.0430***		.0434***		-.0430***
Cuban JROTC						-.0358 (1.0678)
Latin American		-.0794***		-.0800***		-.0786***
Latin American JROTC						-.2077
Other Hispanic		-.0540***		-.0544***		-.0541***
Other Hispanic JROTC						-.0188
Native	.0109**	.0109**	.0107**	.0107**	.0121***	.0121***
Native JROTC					-.0957**	-.0957**
Asian	-.0958***	-.0957***	-.0963***	-.0957***	-.0960***	-.0960***
Asian JROTC					-.0257	-.0257
Other	-.0398***	-.0389***	-.0398***	-.0389***	-.0380***	-.0380***
Other JROTC					-.0884*	-.0885
Sample Size	363,041	363,041	363,041	363,041	363,041	363,041
Predicted probability for base case	.20692	.20693	.20798	.20799	.20799	.20780
YR1 Attrition	17.26%	17.26%	17.26%	17.26%	17.26%	17.26%

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

B. FIRST-TERM ATTRITION

The models used for first-term attrition are specified the same as those used to estimate one-year attrition. Negative coefficients indicate a lower likelihood of attrition while positive coefficients indicate that the particular variable increases attrition. The results for first-term attrition are presented in Tables 13 and 14.

As hypothesized, JROTC participants, minorities (except Native Americans), and those who score well on the AFQT have lower first-term attrition rates than the base case

(white, CAT IIIA, and recruits that did not participated in a youth programs). The results in Table 14 are very similar to the results in the one-year attrition models and indicate that those who score higher on the AFQT have lower first year attrition rates. The Race/Ethnic results also indicate that minorities have a lower first year attrition rate except for Native Americans who appear to attrite at a higher rate. When I controlled for all minorities and AFQT scores in model (6) and utilize the partial effect results, the first-term attrition probability for JROTC participants is 9.13%⁴⁶ lower and other youth programs is 5.58%⁴⁷ lower than those who participated in no youth programs. First-term attrition rates for JROTC and other youth programs are about 7 percentage points lower than those with no program participation, respectively, but it still shows that participation in JROTC and other youth program participation effectively reduces attrition of recruits throughout the first-term.

Table 13. Logistic Regression Estimates of First-Term Attrition

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
JROTC			-.2006*** (.0217)	-.2006*** (.0217)	-.1478*** (.0298)	-.1478*** (.0298)
Other youth programs			-.0905** (.0364)	-.0913** (.0364)	-.0906** (.0364)	-.0914** (.0364)
CAT missing	.8952*** (.0621)	.8969*** (.0621)	.8932*** (.0621)	.8949*** (.0621)	.8930*** (.0621)	.8943*** (.0621)
CAT I	-.4147*** (.0170)	-.4153*** (.0170)	-.4160*** (.0170)	-.4166*** (.0170)	-.4159*** (.0170)	-.4165*** (.0170)
CAT II	-.2354*** (.0088)	-.2358*** (.0088)	-.2360*** (.0088)	-.2363*** (.0088)	-.2360*** (.0088)	-.2364*** (.0088)
CAT IIIB	.0508*** (.0090)	.0516*** (.0090)	.0508** (.0090)	.0516** (.0090)	.0510** (.0090)	.0517** (.0090)
Black	-.1569*** (.0092)	-.1572*** (.0092)	-.1511*** (.0093)	-.1514*** (.0093)	-.1470*** (.0094)	-.1474*** (.0094)
Black JROTC					-.1150** (.0473)	-.1150** (.0473)
Hispanic	-.4254*** (.0117)		-.4261*** (.0117)		-.4227*** (.0118)	
Hispanic JROTC					-.1872** (.0886)	
Mexican		-.5329***		-.5334***		-.5281***

⁴⁶ Partial effect divided by the actual first-term attrition rate.

⁴⁷ Ibid.

		(.0182)		(.0182)		(.0184)
Mexican JROTC						-.2831** (.1386)
Puerto Rican		-.3219*** (.0314)		-.3219*** (.0314)		-.3246*** (.0317)
Puerto Rican JROTC						.1355 (.2216)
Cuban		-.1891** (.0813)		-.1908** (.0813)		-.2025** (.0820)
Cuban JROTC						.8343 (.6775)
Latin American		-.5473*** (.0410)		-.5498*** (.0410)		-.5425*** (.0412)
Latin American JROTC						-.7546 (.4886)
Other Hispanic		-.3444*** (.0173)		-.3452*** (.0173)		-.3417*** (.0175)
Other Hispanic JROTC						-.1925 (.1331)
Native	.0863*** (.0206)	.0862*** (.0206)	.0850*** (.0206)	.0850*** (.0206)	.0874*** (.0208)	.0874*** (.0208)
Native JROTC					-.1426 (.1708)	-.1425 (.1708)
Asian	-.8213*** (.0189)	-.8215*** (.0189)	-.8225*** (.0189)	-.8227*** (.0189)	-.8269*** (.0191)	-.8271*** (.0191)
Asian JROTC					-.2846** (.1426)	-.2847** (.1426)
Other	-.2640*** (.0367)	-.2642*** (.0367)	-.2631*** (.0367)	-.2632*** (.0367)	-.2541*** (.0371)	-.2543*** (.0371)
Other JROTC					-.3644 (.2421)	-.3645 (.2421)
Sample Size	363,041	363,041	363,041	363,041	363,041	363,041
-2 Log L	482341.99	482252.50	482249.94	482160.35	482233.68	482137.69
LR-Test Chi Square	4677.1811	4766.6688	4769.2352	4858.8239	4785.4917	4881.4872
R squared	.0128	.0130	.0131	.0133	.0131	.0134

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

Table 14. Partial Effects From First-Term Attrition models

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
JROTC			-.0487***	-.0487***	-.0360***	-.0360***
Other youth program			-.0221**	-.0223**	-.0222**	-.0224**
CAT missing	.2177***	.2181***	.2172***	.2176***	.2171***	.2174***
CAT I	-.0984***	-.0986***	-.0988***	-.0990***	-.0988***	-.0989***
CAT II	-.0570***	-.0570***	-.0571***	-.0572***	-.0571***	-.0572***
CAT IIIB	.0125***	.0127***	.0125**	.0127**	.0126**	.0127**
Black	-.0382***	-.0383***	-.0368***	-.0369***	-.0359***	-.0359***
Black JROTC					-.0281**	.0281**
Hispanic	-.1008***		-.1011***		-.1003***	
Hispanic JROTC					-.0455** (.0886)	
Mexican		-.1245***		-.1248***		-.1236***
Mexican JROTC						-.0682**
Puerto Rican		-.0772***		-.0773***		-.0779***
Puerto Rican JROTC						.0336 (.2216)
Cuban		-.0459**		-.0464**		-.0492**
Cuban JROTC						.2039
Latin American		-.1277***		-.1283***		-.1267***
Latin American JROTC						-.1707
Other Hispanic		-.0824***		-.0827***		-.0818***
Other Hispanic JROTC						-.0468
Native	.0213***	.0213***	.0210***	.0210***	.0216***	.0216***
Native JROTC					-.0348	-.0348
Asian	-.1835***	-.1835***	-.1840***	-.1840***	-.1848***	-.1848***

Asian JROTC					-.0708**	.0709**
Other	-.0637***	-.0637***	-.0635***	-.0636***	-.0614***	-.0615***
Other JROTC					-.0871	-.0871
Sample Size	363,041	363,041	363,041	363,041	363,041	363,041
Predicted probability for base case	.44152	.44152	.44284	.44284	.44255	.44256
First-term Attrition Rate	39.45%	39.45%	39.45%	39.45%	39.45%	39.45%

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

C. PROMOTION TO E4 OR E5

The results of the promotion models are presented in Tables 15 and 16. Table 15 displays the logistic regression estimates and Table 16 displays the marginal effects. Positive coefficients indicate that a recruit associated with the predictor variable is more likely to promote while a negative coefficient indicates lower promotion rates.

The baseline model indicates that those recruits who enter the Navy with college degrees, who score higher on the AFQT, and those who are married tend to promote at higher rates. Table 16 indicates that those with some college are 6.89 percentage points less likely to promote than high school graduates (base case) and females are 4.85 percentage points less likely to promote than males (base case). Mexican-Americans, Latin Americans, Native Americans and Asians all had positive coefficients indicating they promoted at higher rates, while blacks, Puerto Ricans, Cubans, and females had negative coefficients indicating they promote at lower rates. When I included the entry pay grade as one of the controls, I was able to control for the effects of JROTC recruits entering at higher pay grades. As hypothesized in these models I found that those who entered the Navy at higher pay grades had a better chance of promotion to E4 or E5. Table 16 model (6) indicates that entering the Navy at E1 reduces your chances of promotion to E4 or E5 by 18.57 percentage points when compared to entering an E2 (base case). When I include in the model all minorities, education levels, AFQT scores,

gender, married, race/ethnicity, and pay grade at entry the promotion to E4 or E5 probability for JROTC participants by year 4 is 10.78%⁴⁸ lower and for other youth programs is 4.31%⁴⁹ lower than those who participated in no youth programs. This is not what I had hypothesized and may require some further research to determine why JROTC recruits promote at slower rates. Female and male only models were also created to determine if female or male JROTC recruit promote faster or slower than their counterparts. However, most results from the models were insignificant and the findings didn't provide me with any information I didn't already find in Tables 15 and 16.

To further explore the factors that determine promotion I examined how each of the sample groups promoted over a four-year period. These promotion rates are displayed in Table 17. The table displays promotion only for years 2 through 4 (first year entry pay grades were presented in Table 7 above). Interestingly, we see that in year 4 the pay grade distribution of the recruits is almost the same. This would explain why entering at a higher pay grade doesn't always guarantee faster promotion. Promotion in the enlisted ranks takes three basic variables into account when promoting to the pay grades of E4-E6: Score on rating exam, time-in-rate, and individual's rank on personnel evaluations. The time-in-rate requirement and evaluations are most likely the reason we see this equalizing effect in promotion over time. A longer time-in-rate improves the chances of being promoted; also, seniority increases the probability of receiving higher marks on evaluations and thus promoting.

Table 15. Logistic Regression Estimates of Promotion to E4 or E5

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
JROTC			-.2583*** (.0301)	-.2591*** (.0301)	-.3504*** (.0434)	-.3509*** (.0434)
Other youth programs			-.1485*** (.0503)	-.1477*** (.0503)	-.1478*** (.0434)	-.1470*** (.0434)
No education	-.6462*** (.0227)	-.6464*** (.0227)	-.6784*** (.0234)	-.6786*** (.0234)	-.6785*** (.0234)	-.6786*** (.0234)
Non-high school graduate	-.3227*** (.0170)	-.3234*** (.0170)	-.2685*** (.0172)	-.2696*** (.0172)	-.2689** (.0172)	-.2698** (.0172)

⁴⁸ Partial effect divided by the actual promotion rate.

⁴⁹ Ibid.

Some college	-.3095*** (.0315)	-.3079*** (.0315)	-.4013*** (.0320)	-.4000*** (.0320)	-.4008*** (.0320)	-.3995*** (.0320)
College degree	.2190*** (.0375)	.2211*** (.0375)	-.2069*** (.0393)	-.2039*** (.0393)	-.2068*** (.0393)	-.2037*** (.0393)
Married year 4	.5306*** (.0109)	.5310*** (.0109)	.4835*** (.0111)	.4820*** (.0111)	.4838*** (.0111)	.4844*** (.0111)
CAT missing	.1736 (.1088)	.1712 (.1088)	-.0632 (.1123)	-.0665 (.1123)	-.0627 (.1123)	-.0657 (.1123)
CAT I	.9625*** (.0271)	.9627*** (.0271)	.4860*** (.0291)	.4854*** (.0291)	.4858** (.0291)	.4853** (.0291)
CAT II	.5708*** (.0124)	.5709*** (.0124)	.4065*** (.0127)	.4063*** (.0127)	.4064** (.0127)	.4064** (.0127)
CAT IIIB	-.3758*** (.0119)	-.3762*** (.0119)	-.3360*** (.0121)	-.3359*** (.0121)	-.3365*** (.0121)	-.3363*** (.0121)
Female	-.2236*** (.0122)	-.2240*** (.0122)	-.2463*** (.0124)	-.2469*** (.0124)	-.2472*** (.0124)	-.2478*** (.0124)
Black	-.3017*** (.0122)	-.3016*** (.0122)	-.3134*** (.0124)	-.3135*** (.0124)	-.3218*** (.0126)	-.3219*** (.0126)
Black JROTC					.2148*** (.0619)	.2149*** (.0619)
Hispanic	-.0244 (.0149)		-.0233 (.0149)		-.0234 (.0149)	
Hispanic JROTC					-.0013 (.1046)	
Mexican		.0240 (.0223)		.0318** (.0226)		.0336 (.0226)
Mexican JROTC						.2139 (.1608)
Puerto Rican		-.0722** (.0400)		-.1411** (.0406)		-.1320** (.0411)
Puerto Rican JROTC						-.3761 (.2603)
Cuban		-.2591** (.1036)		-.2983*** (.1054)		-.2822*** (.1066)
Cuban JROTC						-.9102 (.7905)
Latin American		.0170 (.0495)		-.0051 (.0502)		.0126 (.0506)
Latin American JROTC						-.5517 (.3981)
Other Hispanic		-.0577** (.0173)		-.0464** (.0225)		-.0468* (.0227)
Other Hispanic JROTC						-.0148 (.1592)

JROTC						
Native	.0137 (.0303)	.0138 (.0303)	-.0018 (.0308)	-.0018 (.0308)	-.0033 (.0311)	-.0031 (.0311)
Native JROTC					.0647 (.2450)	.0647 (.2450)
Asian	.2047*** (.0220)	.2047*** (.0220)	.1588*** (.0224)	.1586*** (.0224)	.1583*** (.0226)	.1512*** (.0226)
Asian JROTC					-.0039 (.1772)	-.0038 (.1772)
Other	-.0938** (.0475)	-.0938** (.0475)	-.1116** (.0482)	-.1116** (.0482)	-.1178** (.0489)	-.1178** (.0489)
Other JROTC					.2377 (.2911)	.2377 (.2911)
E01			-.5777*** (.0109)	-.5777*** (.0109)	-.5770*** (.0109)	-.5775*** (.0109)
E03			.1211*** (.0053)	.1214*** (.0053)	.1211*** (.0053)	.1213*** (.0053)
E04			.1281*** (.0112)	.1281*** (.0112)	.1282*** (.0112)	.1281*** (.0112)
Sample Size	236,228	236,228	236,228	236,228	236,228	236,228
-2 Log L	271502.61	271487.72	263453.33	263428.47	284981.29	263407.51
LR-Test Chi Square	148809.49	14824.38	19273.90	19294.87	19265.54	19294.87
R squared	.0596	.0597	.0784	.0784	.0784	.0784

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

Table 16. Partial Effects From Promotion to E4 or E5 Models

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
JROTC			-.0508***	-.0509***	-.0702***	-.0703***
Other youth programs			-.0285***	-.0283***	-.0283***	-.0281***
No education	-.1502***	-.1503***	-.1449***	-.1450***	-.1449***	-.1448***
Non-high school graduate	-.0720***	-.0721***	-.0529***	-.0531***	-.0529**	-.0531**
Some college	-.0689***	-.0685***	-.0814***	-.0811***	-.0812***	-.0809***
College degree	.0441***	.0445***	-.0402***	-.0396***	-.0401***	-.0395***
Married year 4	.0991***	.0992***	.0781***	.0782***	.0781***	.0782***

CAT missing	.0353	.0348	-.0118	-.0124	-.0117	-.0123
CAT I	.1602***	.1603***	.0785***	.0784***	.0783**	.0783**
CAT II	.1055***	.1056***	.0672***	.0671***	.0671**	.0671**
CAT IIIB	-.0845***	-.0846***	-.0672***	-.0672***	-.0672***	-.0672***
Female	-.0491***	-.0492***	-.0483***	-.0484***	-.0484***	-.0485***
Black	-.0671***	-.0670***	-.0624***	-.0624***	-.0641***	-.0641***
Black JROTC					.0374***	.0374***
Hispanic	-.0051		-.0043		-.0043	
Hispanic JROTC					-.0002	
Mexican		.0050		.0069**		.0061
Mexican JROTC						.0373
Puerto Rican		-.0154**		-.0270**		-.0251**
Puerto Rican JROTC						-.0758 (.2603)
Cuban		-.0572**		-.0591***		-.0557***
Cuban JROTC						-.2011
Latin American		.0035		.0009		.0023
Latin American JROTC						-.1152 (.3981)
Other Hispanic		-.0123**		-.0086**		-.0087*
Other Hispanic JROTC						-.0027
Native	.0028	.0029	-.0003	-.0003	-.0006	-.0006
Native JROTC					.0117	.0117
Asian	.0413***	.0413***	.0281***	.0281***	.0280***	.0280***
Asian JROTC					-.0007	-.0007
Other	-.0201**	-.0201**	-.0212**	-.0212**	-.0224**	-.0224**
Other JROTC					.0411	.0411
E01			-.1212***	-.1213***	-.1210***	-.1211***
E03			.0216***	.0217***	.0216***	.0217***

E04			.0228***	.0228***	.0228***	.0228***
Sample Size	236,228	236,228	236,228	236,228	236,228	236,228
Predicted probability for base case	.69779	.69779	.75534	.75536	.77574	.75575
Promotion rate to E4 or E5	65.21%	65.21%	65.21%	65.21%	65.21%	65.21%

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

Table 17. Promotion over 4 years

Pay Grade	YR2			YR3			YR4		
	JROTC	OTHER PRGM	NO Youth PRGM	JROTC	OTHER PRGM	NO Youth PRGM	JROTC	OTHER PRGM	NO Youth PRGM
E1	1.3%	1.78%	1.90%	1.21%	1.07%	1.30%	0.90%	.70%	.81%
E2	8.04%	16.94%	34.00%	2.12%	2.46%	2.88%	.93%	.93%	1.1%
E3	71.36%	63.34%	47.8%	39.28%	42.53%	49.14%	18.80%	18.75%	19.41%
E4	19.21%	17.67%	16.30%	53.30%	48.88%	42.52%	62.20%	61.56%	61.64%
E5	0%	0%	0%	4.0%	4.70%	3.93%	17.13%	17.58%	16.72%
E6	0%	0%	0%	0%	.04%	0.03%	0%	.04%	.04%
TOTAL	99.9%	99.73%	100%	99.91%	99.64%	99.8%	99.96%	99.56%	99.72%

Source: Derived from Defense Manpower Data Center Cohort Files

D. REENLISTMENT MODELS

The results of the reenlistment models are presented in Tables 18 through 21. Tables 18 and 20 present the logistic regression estimates, while Tables 19 and 21 present the marginal effects for Tables 18 and 20, respectively. Tables 20 and 21 are the female/male-only models used to determine the effects of gender. Positive coefficients indicate that a recruit associated with the predictor variable is more likely to reenlist while a negative coefficient indicates a recruit is less likely to reenlist.

Model (6) indicates that recruits who are non-high school graduates, who have some college and who enter the Navy with a college degree reenlist at a lower rate than high school graduates (base case). However, those who score higher on the AFQT (CAT I) reenlist at an 18.66 percentage point higher rate than CAT IIIA (base case) recruits. For recruits that were married in year 4, the reenlistment rate is 8.38 percentage points higher

than for single recruits (base case). The results also indicate that minorities (with the exception of Cuban and other race) have higher reenlistment rates than whites (base case). The highest rates are for Asians at 14.33 percentage points followed by blacks at 11.15 percentage points higher than whites. The results also indicate that females reenlist at lower rates than males. When the model controls for minorities, education levels, AFQT scores, gender, marriage, race/ethnicity, and pay grade at entry the results indicate that the reenlistment probability for JROTC participants is 13.03%⁵⁰ higher and for other youth programs is 4.46%⁵¹ higher than those who participated in no youth programs.

Female and male-only models are estimated and displayed in Table 20 and 21. The tables indicate that there are some differences in the effects of the youth program variables between the two gender groups, especially in the reenlistment models. The tables show that females who participate in JROTC have a higher reenlistment rate than other females and males that don't participate in a youth program (see Table 20 and 21). Since the Hispanic ethnic subgroups were insignificant individually, I grouped them under a single Hispanic category to simplify the model. Reenlistment probability for female JROTC participants is 6.4%⁵² higher than males who participated in no youth programs and 10.06%⁵³ higher than for females who participated in no youth programs. Males who participate in JROTC are 6.76%⁵⁴ more likely to reenlist than males who didn't participate in a youth program. The results are very interesting because in prior studies females have usually been found to have lower reenlistment rates and the Navy is always trying to find ways to retain female sailors.

Table 18. Logistic Regression Estimates of Reenlistment

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
JROTC			.1990*** (.0277)	.1995*** (.0277)	.2299*** (.0277)	.2299*** (.0277)
Other youth programs			.1162** (.0470)	.1131** (.0470)	.1162** (.0470)	.1132** (.0470)
No	-.4305***	-.4302***	-.4317***	-.4314***	-.4317***	-.4314***

⁵⁰ Partial effect divided by the actual reenlistment rate.

⁵¹ Ibid.

⁵² Partial effect divided by the actual reenlistment rate.

⁵³ Ibid.

⁵⁴ Ibid.

education	(.0232)	(.0232)	(.0232)	(.0232)	(.0232)	(.0232)
Non-high school graduate	-.0446** (.0171)	-.0428** (.0171)	-.0424** (.0171)	-.0406** (.0171)	-.0425** (.0171)	-.0408** (.0171)
Some college	-.0398 (.0325)	-.0390 (.0325)	-.0364 (.0325)	-.0355 (.0325)	-.0355 (.0325)	-.0356 (.0325)
College degree	-.2664*** (.0303)	-.2721*** (.0303)	-.2631*** (.0303)	-.2687*** (.0303)	-.2632*** (.0303)	-.2689*** (.0303)
Married year 4	.3450*** (.0097)	.3442*** (.0097)	.3455*** (.0098)	.3447*** (.0098)	.3454*** (.0098)	.3446*** (.0098)
CAT missing	.2258** (.1046)	.2281** (.1046)	-.2286** (.1046)	-.2309** (.1046)	-.2283** (.1046)	-.2304** (.1046)
CAT I	.8164*** (.0228)	.8170*** (.0228)	.8179*** (.0228)	.8186*** (.0228)	.8180*** (.0228)	.8187*** (.0228)
CAT II	.3562*** (.0116)	.3565*** (.0116)	.3572*** (.0116)	.3575*** (.0116)	.3573*** (.0116)	.3575*** (.0116)
CAT IIIB	-.1118*** (.0120)	-.1138*** (.0120)	-.1118*** (.0120)	-.1137*** (.0120)	-.1119*** (.0120)	-.1139*** (.0120)
Female	-.0371*** (.0121)	-.0369*** (.0121)	-.0381*** (.0121)	-.0379*** (.0121)	-.0380*** (.0121)	-.0378*** (.0121)
Black	.4694*** (.0126)	.4701*** (.0126)	.4632*** (.0127)	.4639*** (.0127)	.4636*** (.0129)	.4644*** (.0129)
Black JROTC					-.0245 (.0613)	-.0245 (.0613)
Hispanic	.1725*** (.0143)		.1731*** (.0143)		.1763*** (.0144)	
Hispanic JROTC					-.1498 (.0143)	
Mexican		.1132*** (.0211)		.1135*** (.0211)		.1193*** (.0213)
Mexican JROTC						-.2509** (.1379)
Puerto Rican		.4260*** (.0403)		.4259*** (.0403)		.4252*** (.0407)
Puerto Rican JROTC						.0416 (.2940)
Cuban		-.0420 (.1025)		-.0394 (.1025)		-.0343 (.1031)
Cuban JROTC						-.4516 (1.102)
Latin American		.3088*** (.0478)		-.3110*** (.0479)		-.3117*** (.0482)
Latin American JROTC						-.7127* (.3872)

Other Hispanic		.1477*** (.0213)		.1486*** (.0213)		.1483*** (.0215)
Other Hispanic JROTC						.0164 (.1514)
Native	.2613*** (.0290)	.2613*** (.0290)	.2623*** (.0290)	.2623*** (.0290)	.2645*** (.0292)	.2645*** (.0292)
Native JROTC					-.1214 (.2247)	-.1216 (.2247)
Asian	.6005*** (.0212)	.6010*** (.0212)	.6021*** (.0212)	.6026*** (.0212)	.6076*** (.0213)	.6081*** (.0213)
Asian JROTC					-.3393** (.1627)	-.3369** (.1627)
Other	.3338*** (.0470)	.3342*** (.0470)	.3322*** (.0470)	.3326*** (.0470)	.3324*** (.0477)	.3328*** (.0477)
Other JROTC					.3355 (.2937)	.3356 (.2937)
Sample Size	219,795	219,795	219,795	219,795	219,795	219,795
-2 Log L	285047.26	284982.79	284989.19	284924.79	294956.01	284912.52
LR-Test Chi Square	5485.7437	5550.2096	5543.8078	5608.2076	5551.3465	5620.4756
R squared	.0246	.0249	.0249	.0252	.0252	.0252

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

Table 19. Partial Effects from Reenlistment Models

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
JROTC			.0488***	.0490***	.0563***	.0816***
Other youth programs			.0263**	.0279**	.0286**	.0279**
No education	-.1072***	-.1070***	-.1075***	-.1073***	-.1075***	-.1073***
Non-high school graduate	-.0112**	-.0106**	-.0106**	-.0101**	-.0107**	-.0101**
Some college	-.0100	-.0097	-.0091	-.0088	-.0092	-.0088
College degree	-.0666***	-.0679***	-.0657***	-.0670***	-.0658***	-.0671***
Married year 4	.0837***	.0836***	.0839***	.0838***	.0838***	.0838***
CAT missing	.0553**	.0559**	-.0560**	-.0566**	-.0559**	-.0565**

CAT I	.1866***	.1869***	.1873***	.1875***	.1873***	.1875***
CAT II	.0863***	.0865***	.0866***	.0868***	.0866***	.0868***
CAT IIIB	-.0280***	-.0283***	-.0280***	-.0283***	-.0280***	-.0284***
Female	-.0093***	-.0091***	-.0096***	-.0094***	-.0095***	-.0094***
Black	.1124***	.1127***	.1111***	.1114***	.1112***	.1115***
Black JROTC					-.0062	-.0061
Hispanic	.0423***		.0425***		.0433***	
Hispanic JROTC					-.0375	
Mexican		.0279***		.0280***		.0295***
Mexican JROTC						-.0626** (.1379)
Puerto Rican		.1026***		.1027***		.1026***
Puerto Rican JROTC						.0103
Cuban		-.0104		-.0098		-.0085
Cuban JROTC						-.1122 (1.102)
Latin American		.0752***		-.0758***		-.0783***
Latin American JROTC						-.1744*
Other Hispanic		.0364***		.0366***		.0366***
Other Hispanic JROTC						.0040
Native	.0638***	.0639***	.0641***	.0642***	.0646***	.0647***
Native JROTC					-.0304	-.0040
Asian	.1416***	.1418***	.1421***	.1423***	.1433***	.1436***
Asian JROTC					-.0847**	-.0303**
Other	-.0810***	-.0812***	.0807***	.0809***	.0784***	.0786***
Other JROTC					-.0815	-.0846
Sample Size	219,795	219,795	219,795	219,795	219,795	219,795
Predicted probabilit	.53828	.53839	.53671	.53682	.53661	.53667

y for base case						
Reenlist rate	62.62%	62.62%	62.62%	62.62%	62.62%	62.62%

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

Table 20. Logistic Regression Estimates of Reenlistment models for All, Females only, and Males Only

Variable	Baseline (All)	Female only model	Male only model
JROTC	.1650*** (.0311)	.2654*** (.0616)	.1723*** (.0311)
Other youth programs	.1162** (.0470)	.0447 (.1167)	.1248** (.0515)
No education	-.4316*** (.0232)	-.6621*** (.0407)	-.3009*** (.0285)
Non-high school graduate	-.0425* (.0171)	-.0848 (.0550)	-.0432** (.0180)
Some college	-.0361 (.0325)	-.0440 (.0855)	-.0538 (.0352)
College degree	-.2727*** (.0303)	-.1240* (.0649)	-.3075*** (.0343)
Married year 4	.3455*** (.0097)	-.0802*** (.0228)	.4457*** (.0109)
CAT missing	.2286** (.1046)	.2448 (.2693)	.2145* (.1137)
CAT I	.8177*** (.0228)	.5809*** (.0690)	.8437*** (.0243)
CAT II	.3573*** (.0116)	.1866*** (.0276)	.3906*** (.0128)
CAT IIIB	-.1120*** (.0120)	-.1068*** (.0279)	-.1118*** (.0133)
Female	-.0433*** (.0123)		
Female JROTC	.1627** (.0685)		
Black	.4625*** (.0126)	.5643*** (.0279)	.4229*** (.0143)
Hispanic	.1729*** (.0143)	.3452*** (.0350)	.1350*** (.0157)
Native	.2624*** (.0290)	.2634*** (.0642)	.2629*** (.0325)
Asian	.6020*** (.0212)	.5884*** (.0540)	.6128*** (.0230)
Other	.3322*** (.0470)	.1768 (.1095)	.3682*** (.0522)

Sample Size	219,795	36,612	183,183
-2 Log L	285047.26	48663.867	241859.06
LR-Test Chi Square	5549.5173	894.7577	5330.6921
R squared	.0249	.0241	.0287

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

Table 21. Partial Effects from Female/Male Reenlistment Models

Variable	Baseline (All)	Female only model	Male only model
JROTC	.0406***	.0634***	.0426***
Other youth programs	.0287**	.0109	.0309**
No education	-.1073***	-.1639***	-.0750***
Non-high school graduate	-.0105*	-.0208	-.0107**
Some college	-.0089	.0107	-.0134
College degree	-.0655***	-.0306*	-.0766***
Married year 4	.0840***	-.0197***	.1079***
CAT missing	.0561**	.0586	.0529*
CAT I	.1873***	.1330***	.1942***
CAT II	.0867***	.0449***	.0951***
CAT IIIB	-.0279***	-.0263***	-.0279***
Female	-.0107***		
Female JROTC	.0401**		
Black	.1111***	.1296***	.1026***
Hispanic	.0426***	.0817***	.0334***
Native	.0642***	.0629***	.0646***
Asian	.1422***	.1346***	.1456***
Other	.0805***	.0426	.0898***
Sample Size	219,795	36,612	183,183
Predicted probability for base case	.53679	.57109	.52807
Reenlistment rate	62.62%	61.89%	62.77%

Note: *** significant at the 1%, ** significant at 5%, * significant at 10%.

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VI. CONCLUSION

A. INTRODUCTION

The primary goal of this thesis has been to determine the effects of JROTC participation on the attrition, promotion and reenlistment of Navy enlisted personnel. Analysis of the data provided by the Defense Manpower Data Center (DMDC) indicate that personnel who participated in the JROTC program for 3 or 4 years have lower attrition in the first term and have higher reenlistment rates. However, the models analyzing promotion to E4 or E5 in the first four years indicate that JROTC participants promote more slowly than those who participated in no youth programs.

B. IMPLICATIONS OF STUDY

My thesis concurs with prior studies on JROTC attrition and reenlistment, but the information discovered on promotion may need further research to identify what other factors may explain why JROTC participants promote at lower rates. It is possible that this finding is due to the higher entry grades for JROTC participants and the hierarchical structure of the Navy, which limits the number of possible promotions. My findings on attrition and reenlistment rates suggest that participants in the JROTC program are more likely to complete their initial contracts and to reenlist once they choose the military as a career.

The JROTC program prepares students for military life by introducing them to military training and its ideology. This allows the students to better adapt to life in the military. I would expect the JROTC training coupled with their inherent interest in the military gives JROTC students a head start on those who did not participate in any youth programs. Therefore, the Navy might find it beneficial to target JROTC students in their recruitment efforts. I have shown that JROTC recruits attrite less and reenlist at higher rates so it benefits the Navy and the JROTC recruit in two ways.

C. FUTURE RESEARCH

This study provides evidence of positive effects of JROTC participation on performance during a Navy recruit's first-term of service. The next step in this study would be to conduct a cost-benefit analysis of the JROTC program to determine whether money savings from better performance and higher reenlistment exceed the Navy's share

of the cost of the JROTC program. The cost-benefit analysis should provide the Navy with the information to make better decisions on funding and possible expansion of JROTC programs in high schools.

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