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FACTORS AFFECTING FIRST-TERM REENLISTMENT DECISIONS IN THE UNITED STATES ARMY

by

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FACTORS AFFECTING FIRST-TERM REENLISTMENT DECISIONS IN THE UNITED STATES ARMY

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ABSTRACT

The purpose of this thesis is to analyze factors that influence first-term reenlistment decisions in the United States Army. The main focus of the thesis is the analysis of information collected from soldier's official records that bear on the reenlistment decision. Data from the US Army Small Tracking File (STF) and records from the Defense Manpower Data Center (DMDC) cohort files were employed. The Army currently categorizes enlistees into ten characteristic groups (C-groups) based on gender, education, Armed Forces Qualification Test (AFQT) scores, and initial enlistment term. This thesis examined data across all C-groups and for enlistees from three cohorts: 1990, 1991 and 1992. The data was evaluated using descriptive statistics, cross-tabulation analysis, and logistics regression. The estimated model compares the results across C-groups using C-group 1 as the base group. Results indicate that certain factors affect the various C-groups differently. Not all factors were significant for all C-groups, but race, age, and youth organization participation were key influences across most C-groups. The family status and enlistment term variables were significant, however, they affected men and women differently. This thesis should be helpful to Army personnel responsible for establishing reenlistment policy.

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I. INTRODUCTION

A. BACKGROUND

Recruiting and retention are vital to maintaining a strong force. Studying retention requires an understanding of recruiting programs and difficulties. The United States Army must recruit over 70,000 new personnel every year to maintain the current force structure of 480,000 active duty troops. The Department of Defense has mandated certain parameters that each recruit must meet in order to qualify for the service, a few of which may be waived under specific circumstances. Attracting and keeping these top quality recruits has become difficult given the expanding economy and low unemployment.

Retention provides stability to a changing force structure and ensures mid-level positions are filled with appropriately seasoned veterans. Retaining quality recruits develops the future leadership of the Army. The Army is one of the few organizations that promotes from within, unable to hire from outside sources if the needed resources are not readily available. In 1999, the Army missed its recruiting goal but made up for the difference by a substantial increase in retention. Recruiting and retention are complementary components for maintaining a quality force.

Military readiness has received intense scrutiny over the past couple of years by members of Congress and the Executive Branch. During the debate over the state of the military, several personnel topics focusing on recruiting and retention always arise. In the FY 2000 budget, additional funding was awarded to the Department of Defense to bolster pay in order to decrease the perceived pay gap between the military and civilian

workforce. Funding was also provided to increase other quality of life issues such as retirement, military housing, housing allowances, retention bonuses and specialty pay. These monetary increases were designed to assist with the recruiting and retention crunch that maligned the services. One solution to the perceived problem from members of Congress with the backing of several prominent military support organizations is to enhance monetary endorsements for service members via several programs such as recruitment bonuses and college funds.

This study is designed to determine what factors influence first-termer's reenlistment rates. This study determines the main factors that motivate young recruits to reenlist and then compares them by characteristic group. This study should also provide information on whether the money directed to obtain the "higher" classification of recruit, assists in the retention of that recruit. Or does this recruit accept the higher bonus and college fund money only to depart after one term of service.

B. SCOPE AND OBJECTIVES

The main thrust of this thesis is to analyze statistical data collected from soldier's official records utilizing data from the US Army Small Tracking File (STF) and files from the Defense Manpower Data Center (DMDC) cohort files. The scope includes a demographic analysis by gender, education, and Department of Defense Occupation Codes but not by Military Occupational Specialty (MOS). The model designed compares the results across cohorts and across characteristic groups using Characteristic Group 1 as the base group. The limitations inherent to this type of study include the quality of data collected, the data fields available in the STF and the DMDC cohort files, and the three-year time period of the study.

C. CHARACTERISTIC GROUP (C-GROUP) DEFINITION

The Army categorizes enlistees into ten broad characteristic groups (C-groups) based on their Armed Forces Qualification Test (AFQT) score category, gender, education, and enlistment term. This thesis looks at all ten C-groups and compares them against each other and to C-group 1, the preferential C-group of the "highest quality" male enlistees, and C-group 6 for the "highest quality" female enlistees. The C-groups are defined in table 1-1.

C-GROUP	GENDER	EDUCATION	AFQT CAT	TERM YEARS
1	M	HSDG	I-III (50-99)	3,4
2	M	HSDG	IIIB (31-49)	3,4
3	M	HSDG	IV-V (0-30)	3,4
4	M	NHSDG	I-IIIA	3,4
5	M	NHSDG	IIIB-V	3,4
6	F	HSDG	I-IIIA	3,4
7	F	HSDG	IIIB-V	3,4
8	F	NHSDG	All	3,4
9	M	All	All	2,5,6
10	F	All	All	2,5,6

Table 1-1

NOTE:
HSDG = High School Graduate
NHSDG = Non-High School Graduate

D. RESEARCH QUESTIONS

The primary research questions addressed in this thesis are:

1. Is the Army keeping the "highest" quality recruits past the first term?

2. How has the demographic structure of the force changed by sex, education and race?

3. What is the effect of race, age, Army College Fund input, recruitment bonus, education, occupation, family status, enlistment term, junior ROTC program participation, and waiver required on reenlistment?

4. What changes and similarities are evident across C-groups?

E. ORGANIZTION OF THE STUDY

This thesis is divided into five remaining chapters. Chapter II is a literature review of relevant reenlistment and retention writings as well as previous theses on this topic. Chapter III explains the data and methodology incorporated in the study. It discusses the source of the data, C-group definitions, and the methodology used to examine the data. Chapter IV is the preliminary analysis of the merged data utilizing frequency distribution and cross-tabulation analysis. Chapter V specifies the model and the ensuing outcome for each C-group. Chapter VI is the conclusion and recommendations. In Chapter VI, a comparison of relevant variables across C-groups and comparisons of the C-groups themselves is studied for similarities and differences.

F. BENEFITS OF THE STUDY

This study is potentially beneficial to policy makers in the Pentagon and the Department of the Army to determine what factors influence first-termers reenlistment decisions. The analysis might assist in determining the leading cause of first-termers

decisions to reenlist or not to reenlist. This analysis will also determine if the "highest quality" recruits, as defined by the US Army, are the ones that reenlist in the first term. This will help policy makers forecast which recruits are more likely to reenlist during their first term. With predictive models in place, proper resources can be allocated to assist in improving retention.

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II. LITERATURE REVIEW

A. INTRODUCTION

The purpose of this chapter is to discuss previous studies on retention and attrition. Employee turnover, or retention, is highly studied in manpower and human resources departments. For the Army, studying retention means determining what factors influence soldiers' decisions to stay in the Army or depart. Understanding those factors is vital to the development of an Army-wide retention plan aimed at maintaining the force structure at a specific level with the desired soldiers. – in aggregate numbers, skill composition, and quality.

Since the advent of the All-Volunteer Force in 1973, recruiting raw talent and retaining skilled personnel have been major issues facing the Army's personnel command structure. Numerous studies were conducted in the late 1970s and throughout the 1980s intended to find methods of maintaining the force. During the 1990s, studies were tailored to deal with the effects of the drawdown, and methods to maintain a smaller, higher quality Army.

Prior to the drawdown, the Army required about one-third of all enlistees to reenlist to maintain the mandated force structure. The enlistee attrition rate during their first term of service is over 33% while another 33% choose not to reenlist. With initial term attrition so high, the Army must reenlist half of the eligible population to maintain its force structure.[1] This is not an easy task in a country with a good economy and low levels of unemployment.

A soldier has two basic answers to the reenlistment question; either he stays or he leaves. The soldier can stay by either reenlisting for a designated term of service or he

can extend his current enlistment for a given period of time. Although the extension is not a reenlistment, it still assists in providing the manpower needed for the Army so extensions are a vital part of the sustainment program. If the soldier decides to leave the active Army, he can either join the reserves fulfilling another requirement for Army manpower planners, or he can leave the service completely.

B. LITERATURE

The literature review focuses on previous analyses of attrition and retention that attempt to determine factors involved in reenlistment decisions among first-term enlistees. This thesis builds on a previous thesis that evaluated only C-group 1 and only those soldiers within that group that were eligible to reenlist. Karl Delaney, *An Analysis of Factors that Influence Reenlistment Decisions in the US Army* (1999), conducted a thesis using data from the STF database merged with the US Army cohort files from the Defense Manpower Data Center. He analyzed soldiers from the 1990, 1991, and 1992 cohorts using descriptive statistics, cross-tabulation analysis, and logistics regression. He concluded that the most significant predicators of reenlistment behavior from C-group 1 were pay grade, family status, race, first-term enlistment length, education, and AFQT category. Pay grade was the chief predictor of reenlistment behavior. Higher ranks were more likely to reenlist while lower ranks were more likely to leave. Soldiers with families were also more likely to reenlist, as were black soldiers. On the other hand, soldiers that received enlistment bonuses or had previous college experience were less likely to reenlist than their counterparts.[2]

Richard Buddin, *Trends in Attrition of High-Quality Military Recruits* (1998), indicates that although the level of high-quality recruits, those scoring above the 50th

percentile on the Armed Forces Qualification Test (AFQT), has increased through the years, cohort attrition trends are not well predicted from trends in cohort quality. He maintains that attrition rates of high-quality recruits historically are half the rate of low-quality recruits. Manpower planners have advocated that an increase in resources to attract the high-quality recruits would significantly decrease the attrition rate. The higher cost of recruiting these recruits would be partially offset by the savings from the lower attrition rate. Buddin, however, indicates that the rising recruit quality did not lower the attrition rate, but the 6-month attrition rate in fact increased. He maintains that his research does not advocate abandoning the pursuit of high-quality recruits, but that additional factors are involved with each cohort that affect attrition. His research still confirmed the attrition rate for individual high-quality recruits is still substantially lower than that of low-quality recruits. His study also indicates that basic training attrition rates vary as much as 9 to 16 percentage points higher at certain bases. In contrast to many of the earlier studies, Buddin conducted his research on entire cohorts and across training bases instead on individual recruits.[3]

Thomas Daula and Robert Baldwin, *Reenlistment Decision Models: Implications for Policy Making* (1986), discuss the use of econometric reenlistment decision models in the policy-making process. They advocate that the reenlistment decision confronted by the soldier is based on the individual's perception of the relative values of the pecuniary and nonpecuniary returns accruing to the careers within his choice set. Their model included relative pay, marital status, race, early promotion, unemployment, education, and length of initial enlistment. The model incorporated these variables through six different combinations that also included reenlistment bonuses as part of the relative pay.

The results of the model indicate that race and marital status were significant in determining pay elasticity, or the degree of competitiveness between military pay and relative civilian earnings. They also illustrate that the practice of using the DOD two-digit occupation code to illustrate a soldier's MOS limits the usefulness of particular models because it prevents the identification of the MOS-specific reenlistment bonus available to a soldier at the time of his reenlistment.[4]

Richard Buddin, *Analysis of Early Military Attrition Behavior* (1998), conducted another study using pecuniary and nonpecuniary measures. He discusses two types of models that apply to job separations: the firm-specific human capital model, and the job matching model. The firm-specific human capital model provides the basis for three hypothesis: First, separation rates decline with longevity; Second, separation rates are inversely related to specific individual characteristics that are compatible with firm specific objectives; and last, indicators of previous job mobility are positively correlated with the probability of separation.

The job matching model is further divided into an experience model and a search model. The search model assumes an individual understands the parameters of an explicit trade and has the capacity to evaluate alternate job opportunities. The experience model advocates that a person cannot evaluate the true nature of a perceived job match without experiencing it first. Buddin indicates the military is better defined by the experience model and identifies three hypothesis from the model: first, most separations take place early in their term; second, recruits' increased uncertainty about career decisions increases the probability of separation; and last, the probability of separation is positively related to the perceived ease of future separation at the initial enlistment.

Buddin used MEPS data, work history surveys, and service information to estimate the effect of several explanatory variables on early attrition. He found that younger recruits are less likely to separate than older recruits. He also found that experience and work history are found to have an important impact on early attrition.[5]

Hyder Lakhani and Curtis Gilroy, *Army Reenlistment and Extension Decisions by Occupation* (1986), conducted a similar study that built on the previous study. They postulate that the decision of military personnel to reenlist, extend, or separate from the service at the end of their term depends on expected monetary and nonmonetary returns. The former includes wages, allowances, bonuses, and to some extent, retirement benefits. The latter includes refers to the taste of military life and includes things such as patriotic satisfaction, psychological benefits, training, and travel. Monetary returns are competing against the opportunity costs of forgoing potential wages in the civilian sector. If civilian wages are expected to be higher than the military wages, then the nonmonetary benefits of military service must offset the differential or the serviceperson is likely to separate. To complete their model, they developed a civilian wage model to present a realistic picture of labor market opportunities that enlisted personnel would face should they choose to separate.

The Lakhani-Gilroy study concludes that race and dependants play a significant determining role in a soldier's reenlistment decision. Blacks and soldiers with dependants reenlist at a much higher rate than do their white and single soldier counterparts. That also found that soldiers with higher AFQT scores have higher reenlistment rates than those with lower rates but they also thought that that finding was counterintuitive and required further research. Further, they determined that the Army

should rely increasingly on the market forces of supply and demand to ensure that specific technical occupations were maintaining monetary congruency with the civilian sector. They advocated the use of targeted bonuses to ensure that the initial investment spent to train certain technical occupations was not lost to the civilian workforce at a higher rate than the Army could sustain.[6]

James Hosek, Christine Peterson, and Rick Aden, *Educational Expectations and Enlistment Decisions* (1986), produced a report that focused on the role of educational expectations in the enlistment decision of high school seniors and graduates. The study divided the enlistment population into high school seniors and those that had already graduated from high school. The purpose of the study was to determine enlistment behavior based on an enlistee's expectations for further education. The study analyzed actual enlistment behavior, not expectations; and it analyzed the behavior of individuals, not groups or cohorts. This study found that among high school seniors, the higher the AFQT score, the lower the likelihood of enlistment. In contrast, higher AFQT scores for those that have already graduated results in increased enlistment probabilities. The study further indicates, however, that graduates who do not expect further educational opportunities have a lower enlistment probability as AFQT scores increase.[7]

Cooke and Quester (1992) studied only the first enlistment term of Navy enlistees. They built three logistics models to estimate the relationship between recruit background characteristics and successful outcomes in the Navy. The study defined a successful outcome as a recruit that completed his initial enlistment, was eligible to reenlist, and either reenlisted or extended. The study was limited to only male recruits with no prior service with an initial four-year obligation. The study concluded that

characteristics associated with initial term completion are that same characteristics that are predictive of retention and promotion. Recruits with high-school diplomas with high AFQT scores that entered the service in the delayed entry program (DEP) are more likely to be successful. The study also found that Black and Hispanic recruits were more likely than others to complete their initial term and be promoted.[8]

Major Young Oh, *An Analysis of Factors That Influence Enlistment Decisions in the US Army* (1998), used the 1997 New Recruit Survey from the Army Recruiting Command to determine is there were similar factors that affected recruit decisions to enlist. He focused on recruits that contracted between 1 October 1996 and 30 September 1997, but had not yet entered basic training. He used cross-tabulation and a multi-nomial logit model to analyze the data. The results concluded that recruits who differ in gender, ethnicity, educational expectations, years of service, and contact initiation are influenced to enlist by different factors. He suggested that family and friends were the biggest influences on enlistment decisions and that the Army should strive to improve its image and service environment.[9]

Lieutenant Haluk Elis, *A Decomposition Analysis of First-Term Attrition in the U.S. Military* (1999), analyzed causal factors associated with first-term attrition for all four military services. His intent was to identify demographic and other factors that influence the change in attrition rates over time. He used data from the Defense Manpower Data Center cohort files from 1984, 1989, and 1994. The results indicate that sex, education, race, AFQT scores, and months spent in delayed entry program consistently affect attrition behavior. It is also found that the relationship between age at enlistment and attrition is not clear.[10]

C. SUMMARY

This literature review focuses on studies relevant to the scope of this thesis. This review is not meant to be an exhaustive study of previous retention studies, but a representative sample of research conducted relating to factors affecting retention. Extensive research has been conducted on enlistment and reenlistment. Analysts have attempted to determine what factors affect enlistment decisions and what factors affect the reenlistment decision with varying results. This literature review is not meant to provide a cookie-cutter approach of providing a model that fits every aspect of retention or a list of attributes to measure a soldier against to determine if he will reenlist. The review is meant to provide a background or framework of completed studies. Based on these studies, broad categories of explanatory variables can be ascertained to assist in reenlistment predictions.

[1]Ward M. and Tan H., *The Retention of High-Quality Personnel in the US Armed Forces* (Santa Monica, California: The RAND Corporation, 1985).

[2]Karl Delaney, *An Analysis of Factors That Influence Reenlistment Decisions in the US Army* (Monterey, California: The Naval Postgraduate School, 1999), thesis.

[3]Richard Buddin, *Trends in Attrition of High-Quality Military Recruits* (Santa Monica, California: The RAND Corporation, August 1998).

[4]Thomas V. Daula and Robert H. Baldwin, *Army Manpower Economics*, edited by Curtis L. Gilroy, Chapter 7, *Reenlistment Decision Models: Implications for Policy Making* (Boulder, Colorado: Westview Press, 1986).

[5]Richard Buddin, *Analysis of Early Military Attrition Behavior* (Santa Monica, California: The RAND Corporation, 1984) and Sean A. Kerr, *Retention of First-Term and Second-Term Marine Corps Enlisted Personnel* (Monterey, California: The Naval Postgraduate School, 1997), thesis.

[6]Hyder Lakhani and Curtis L. Gilroy, *Army Manpower Economics*, edited by Curtis L. Gilroy, Chapter 8, *Army Reenlistment and Extension Decisions by Occupation* (Boulder, Colorado: Westview Press, 1986).

[7]James R. Hosek, Chrostine E. Peterson, and Rick A. Eden, *Educational Expectations and Enlistment Decisions* (Santa Monica, California: The RAND Corporation, 1986).

[8]Cooke, T. W. and Quester, A. O., "What Characterizes Successful Enlistees in the All-Volunteer Force: A Study of Male Recruits in the US Navy," *Social Science Quarterly*, Vol. 73, 1992, 238-252.

[9]Major Young Yeol Oh, *An Anlysis of Factors That Influence Enlistment Decisions in the US Army* (Monterey, California: The Naval Postgraduate School, 1998), thesis.

[10]First Lieutenant Haluk Elis, *A Decomposition of First-Term Attrition in the U.S. Military* (Montery, California: The Naval Postgraduate School, 1999), thesis.

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III. DATA AND METHODOLOGY

A. DATA

1. Data Source

The data used for this thesis were taken from two sources, the US Army Small Tracking File (STF) and the Defense Manpower Data Center US Army enlisted cohort files. They were then merged to provide one consolidated data group. The STF database is a contractor-maintained database supplied by DCSPER.

All first-term enlistees from calendar year 1989 through June 30, 1997 were included in the database. Each enlistee encompassed one record or line in the STF database. Each record has a series of specific demographic inputs coupled with "trailer records" that identify specific dates for a variety of personnel transactions. Trailer records identified who was eligible to reenlist, who did reenlist, reasons for discharges and non-prior service enlistees. By date of enlistment, it was possible to divide the records into cohort year groups to merge with the DMDC records. The DMDC database identifies records by cohort.

The STF database contains the following demographic variables: AFQT score, race, gender, term of service, civilian education code, and age in months at time of enlistment among others. Other explanatory variables that were required for this analysis had to be ascertained from the DMDC database, therefore a merge were necessary. The following additional variables were added from the DMDC cohort files: Department of Defense occupation code, marital status, number of dependents, enlistment bonus, enlistment option, and youth group participation. After the database merge, a comprehensive data set was available for cohort FY90, FY91, and FY92.

B. METHODOLOGY

There are five sequential steps used in methodology for this thesis: Background Analysis; Database Merge; Preliminary Analysis; Cross-tabulation; and Logistic Regression Analysis. The Statistical Product and Service Solutions (SPSS) software was the specific tool used to conduct the analysis.

1. The first step is background analysis. Included in this step is a review of turnover and retention studies followed by a literature search of previous military retention studies. This step involves studies of previous models to prevent duplication and also to prevent repetition of the same errors that may have been uncovered in other analyses. This step concludes with the forming of the retention model designed to answer the preliminary thesis questions as outlined in Chapter One.

2. The next step involves collecting the data from the STF database and determining which data points are acceptable for this thesis. An analysis of the quality and completeness of the data allows the selection of three successive cohort years to be analyzed. The three cohorts selected for this analysis are FY90, FY91, and FY92. An analysis of the DMDC cohort files to determine suitable additional data fields to add to the analysis follows. The STF database is then categorized by characteristics group and merged with the DMDC database to develop the working database. The working database is separated by C-group.

3. The descriptive statistic analysis provides a framework from which to understand the data and gain some insight into the characteristics of each cohort and C-group. These simple statistics cannot lead to accurate conclusions, as individual variables are not isolated from the effects of other explanatory variables. Although not used to

provide detailed analysis, the descriptive statistics suggests preliminary hypotheses that may or may not be proven with the regression model. It also provides a baseline for all analyses to compare against.

4. After a preliminary analysis of the data, a cross-tabulation analysis allows a better and more thorough understanding of the data. This is performed between likely explanatory variables and reenlistments rates for each cohort. The purpose of conducting cross-tabulation is to determine to what degree the values of the variables coincide with reenlistment rates. Since cross-tabulation analysis can also be misleading, as it does not account for the effect of other variables, a logistic regression model must be constructed to provide for the limitations of the previous analyses.

5. The logistic regression model is used to estimate the probability that an event will occur for a dichotomous dependent variable. In this case, the event is reenlisting and the predictor variables are the various characteristics derived from the merged databases. The model has the ability to calculate changes in the likelihood of reenlistment when one independent variable is changed and all other independent variables are held constant. The dependent variable is a binary event; meaning either the soldier reenlists or he does not. The specified database means the soldier chose to reenlist beyond his initial term of service, depending on his C-group, or leaves the service at his Expiration of Term of Service (ETS). The logit model is suited to situations in which the independent variable is dichotomous as it is based upon the cumulative distribution function of a random variable. The decision to reenlist is a dichotomous variable that assumes a value of one if the soldier reenlists and a value of zero if the soldier does not reenlist. The logit model

determines the relation between the probability of the soldier's decision to reenlist and the defined characteristics of that soldier.

IV. DESCRIPTIVE DATA ANALYSIS

A. PURPOSE

The purpose of this chapter is to provide an analysis of the data for all three cohorts. The merged STF and DMDC databases will be referred to as the working database to differentiate between the three recognized data sets. This descriptive data analysis allows a better understanding of the significant portions of each database that we will analyze in order to build an effective regression model for further analysis.

Descriptive statistics are provided for all C-groups by cohort and consolidated cohorts. Since the purpose of this thesis is to define potential reenlistees as early in their career as possible, all enlistees' records are included in the analysis. Frequencies of C-groups by cohort are included in table 4-1.

Table 4-1

Enlistee By C-group by Cohort			
C-group	FY90	FY91	FY92
1 (M; HS; I-III; 3,4)	26,474	24,001	27,624
2 (M; HS; IIIB; 3,4)	19,428	12,555	11,517
3 (M; HS; IV-V; 3,4)	1,288	553	255
4 (M; NHS; I-IIIA; 3,4)	4,018	2,132	508
5 (M; NHS; IIIB-V; 3,4)	693	559	185
6 (F; HS; I-IIIA; 3,4)	5,425	3,415	4,056
7 (F; HS; IIIB-V; 3,4)	2,680	1,795	2,344
8 (F; NHS; All; 3,4)	171	163	77
9 (M; All; All; 2,5,6)	17,523	21,144	19,339
10 (F; All; All; 2,5,6)	3,900	5,170	4,966
Total	81,601	71,496	70,967

NOTE:
M = Male
F = Female
HS = High School Diploma
NHS = Non-High School Diploma
Roman Numerals = AFQT category
Arabic Numerals = Enlistment Term Length

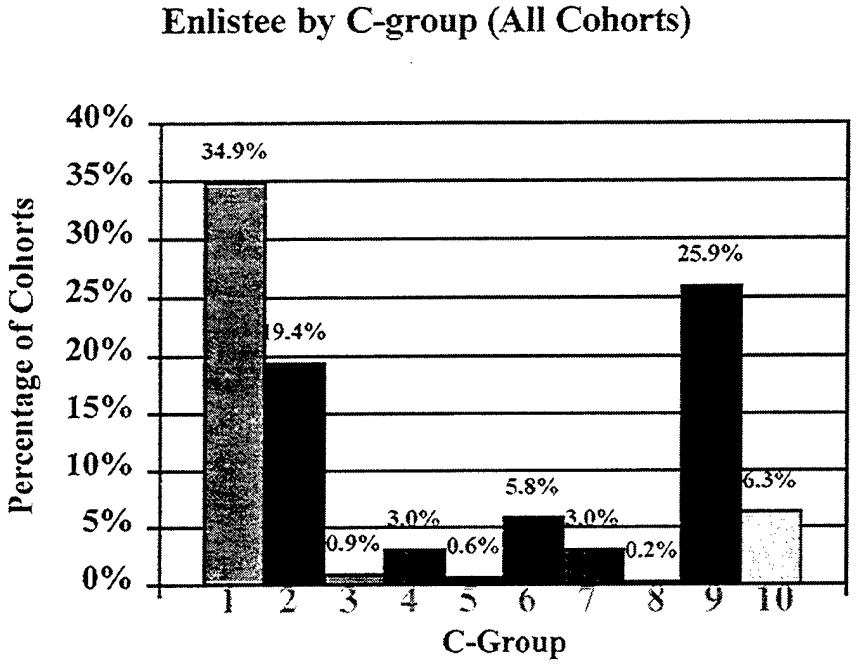
It is interesting to note on table 4-1 is that as the population of the cohorts went down from over 81K in 1990 to almost 71K in 1992, a decline of over 10,000 troops, the number of C-group 1 enlistees increased from 26K to 27K, an increase of over 1,000 soldiers or over 4%. Even though the size of the force is decreasing, the quality of enlistee the Army is targeting is increasing and there is some evidence this has been successful.

B. C-GROUP DATA

1. Frequency

Figure 4-1 illustrates the percentage of total Army enlistees that represent each C-group. For example, 34.9% of all Army enlistees are in C-group 1.

Figure 4-1



Almost 35% of all enlistees are in C-group 1, which are considered to be the "highest quality" male recruits that the Army is striving to maintain in the force. The

second largest segment of the population is C-group 9, which is males with 2, 5, or 6-year enlistments. C-group 6, which is considered to be the "highest quality" female recruits, accounts for only 5.8% of the total enlistee population. C-group 10, all females with 2,5, or 6-year enlistments, constitute 6.3% of the population.

Figure 4-2 illustrates the racial composition of the C-groups while table 4-2 provides a numerical explanation of the chart. Although whites constitute only 72% of the total enlistee population, they consist of 82% of the C-group 1, or "higher" grade of recruit. Blacks, on the other hand, constitute 22% of total enlistees but make-up 47% of C-group 3, which are the lowest AFQT scores enlisted. Other races remain relatively constant between 5-10% of each C-group. White females comprise 59% of the female enlistee population but are 65% of the C-group 6 population, the highest quality female C-group. While blacks constitute 35% of the female enlistee population and only 29% of the C-group 6 population.

Figure 4-2. C-group Frequency by Race.

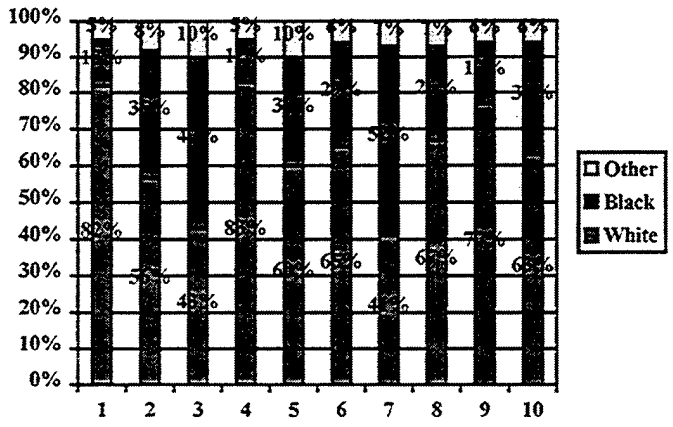
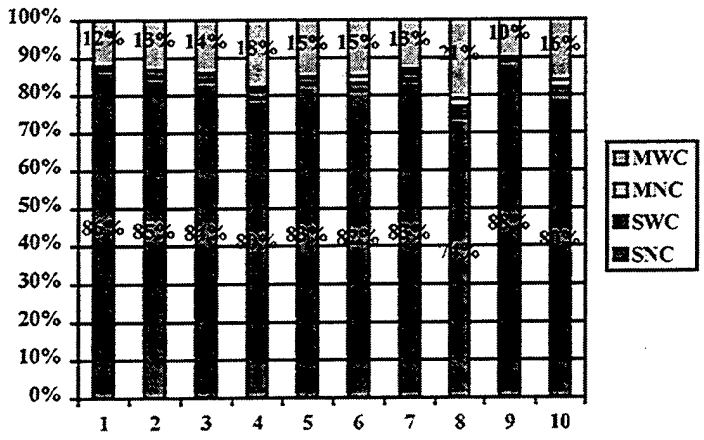


Table 4-2. C-group Frequency by Race.

C-group	White	Black	Other
1	82%	13%	5%
2	56%	35%	8%
3	43%	47%	10%
4	83%	12%	5%
5	60%	30%	10%
6	65%	29%	6%
7	41%	52%	7%
8	67%	26%	7%
9	77%	17%	6%
10	63%	31%	6%
Total	72%	22%	6%

Figure 4-3 illustrates the composition of each C-group by marital status. Each enlistee is either single with no children (SNC), single with children (SWC), married with no children (MNC) or married with children (MWC). Over 86% of all enlistees are single with no children while about 12% or married with children. Single enlistees with children those married with no children comprise only 2% and 1% of the population

Figure 4-3. C-group Frequency by Family Status.



respectively. Of note though, 21% of C-group 8, which are non-high school diploma females, are married with children.

Table 4-3. C-group Frequency by Family Status.

C-group	SNC	SWC	MNC	MWC
1	86%	1%	0%	12%
2	85%	2%	0%	13%
3	84%	2%	0%	14%
4	80%	2%	1%	18%
5	83%	2%	0%	15%
6	82%	2%	2%	15%
7	83%	2%	1%	13%
8	74%	3%	2%	21%
9	88%	1%	0%	10%
10	80%	2%	2%	16%
Total	86%	2%	1%	12%

Figure 4-4 illustrates that less than 4% of the enlistee population received enlistment options (REO). These options were spread among the C-groups and were not relegated to only the highest quality C-groups, as 7% of enlistees in C-group 5 received options vice only 3.5% of C-group 1.

Figure 4-4. C-group Frequency by Enlistment Option.

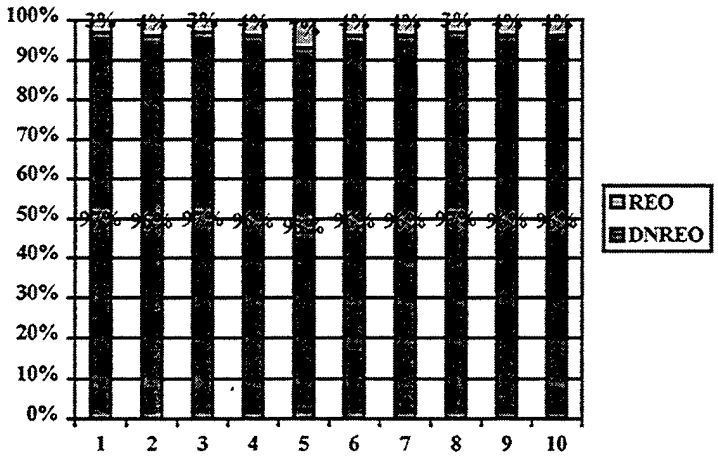


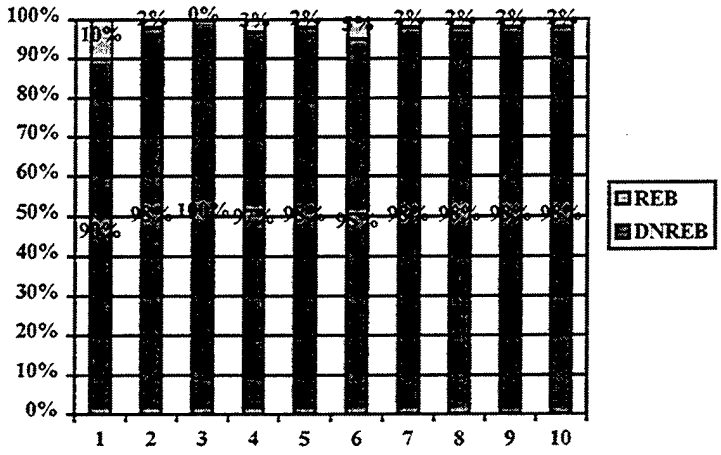
Table 4-4. C-group Frequency by Enlistment Option.

C-group	REO	DNREO
1	3%	97%
2	4%	96%
3	3%	97%
4	4%	96%
5	7%	93%
6	4%	96%
7	4%	96%
8	3%	97%
9	4%	96%
10	4%	96%
Total	4%	96%

NOTE: DNREO = Did not receive enlistment option

Figure 4-5 illustrates the frequency of enlistment bonuses across the C-groups. Similar to the options, bonuses were not relegated to only the "higher quality" recruit but were spread among the enlistees. Although less than 5% of all recruits received a bonus (REB), almost 10% of C-group 1 enlistees received them, indicating the Army was targeting their intended audience.

Figure 4-5. C-group Frequency by Enlistment Bonus.



NOTE: DNREO = Did not receive enlistment option

Table 4-5. C-group Frequency by Enlistment Bonus.

C-group	No Bonus	Bonus
1	90%	10%
2	98%	2%
3	100%	0%
4	97%	3%
5	98%	2%
6	95%	5%
7	98%	2%
8	98%	2%
9	98%	2%
10	98%	2%

Figure 4-6 illustrates the breakdown of enlistees with some college education prior to their enlistment. Less than 10% of all enlistees have some college experience prior to enlisting. Of note, almost 16% of C-group 6, the Army's targeted highest quality female recruits, have college experience versus only 10% of the highest quality male recruits in C-group 1. The same holds true for female recruits with 2,5, and 6-year enlistments in C-group 10 as 14% of them have some college education versus only 10% of males with the same enlistment tours in C-group 9.

Figure 4-6. C-group Frequency by College Experience.

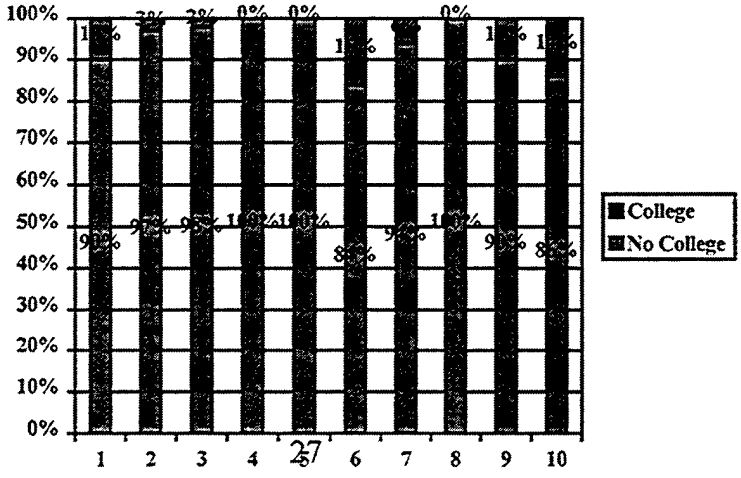


Table 4-6. C-group Frequency by College Experience.

C-group	No College	College
1	90%	10%
2	97%	3%
3	98%	2%
4	100%	0%
5	100%	0%
6	84%	16%
7	94%	6%
8	100%	0%
9	90%	10%
10	86%	14%
Total	91%	9%

Figure 4-7 illustrates the enlistee participation in various military sponsored youth programs prior to their enlistment. Less than 5% of all enlistees participated in military youth programs (Youth) while over 95% did not participate (DNP). The above average C-groups included C-groups 2, 3, 5, 7, and 8, all of which are either non-high school diploma enlistees or in AFQT cat IIIB and below.

Figure 4-7. C-group Frequency by Military Youth Group Participation.

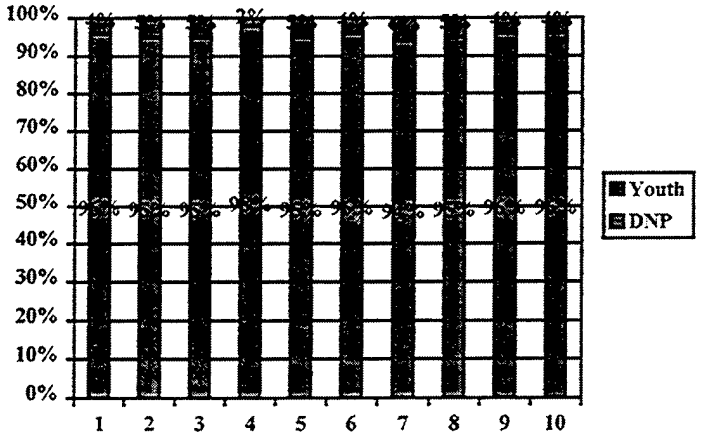


Table 4-7. C-group Frequency by Military Youth Group Participation.

C-group	No Youth	Youth
1	96%	4%
2	95%	5%
3	95%	5%
4	98%	2%
5	95%	5%
6	96%	4%
7	94%	6%
8	95%	5%
9	96%	4%
10	96%	4%

Figure 4-8 indicates that waivers were granted to a greater degree to male enlistees than to females. Enlistees where a waiver was required (WR) consisted of almost 10% of the population while those not requiring a waiver (NWR) constituted over 90% of all enlistees. The preponderance of waivers to join were in C-groups 1, 4, 5 and 9. Males with high AFQT scores without a high school diploma received over 13% waivers, above the total enlistee population average. Every female category trailed the total population and their respective male counterpart C-groups.

Figure 4-8. C-group Frequency by Waiver Required for Enlistment.

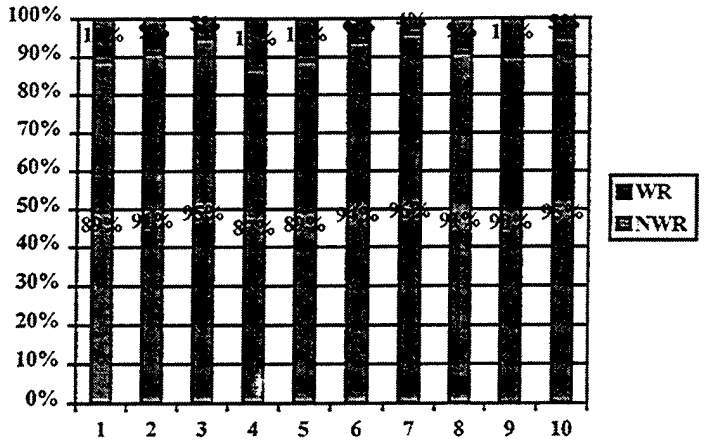


Table 4-8. C-group Frequency by Waiver Required for Enlistment.

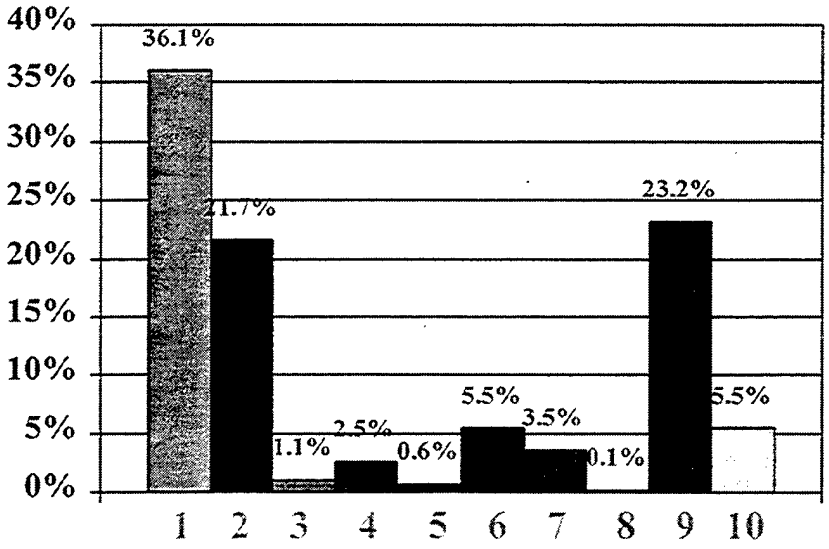
C-group	No Waiver	Waiver
1	89%	11%
2	91%	9%
3	95%	5%
4	87%	13%
5	89%	11%
6	94%	6%
7	96%	4%
8	91%	9%
9	90%	10%
10	95%	5%

2. Cross-Tabulation Analysis

The cross-tabulation function provides a means to compare the associations that exist between two categorical variables, one of which may be the dependent variable of the analysis. It provides insights into the likely predictors of reenlistment behavior. Each of the independent variables is cross-tabulated against whether the enlistee reenlisted or did not reenlist and the results are graphically depicted across the breadth of the working database. The results of the cross tabulation are presented graphically. This provides a basis for the construction of the logit model. The following graphs show some of the data associations identified in the cross tabulations.

To provide an understanding of the composition of the enlistee population by C-group, an illustration of the reenlistment population by C-group is provided at Figure 4-9. This graph provides an illustration of the total number of reenlistees by C-group as a percent of the total Army reenlistee population.

Figure 4-9. Reenlistee by C-group as a Percent of All Reenlistees.



Although C-group 1 personnel are only 34.9% of the enlistee population, they are 36.1% of the reenlistment population--an early indication that the Army is meeting their goals of retaining the highest quality recruits. C-group 2 is also a higher percent of the reenlistment population, while C-groups 9 and 10 have reenlistment percentages significantly lagging their respective enlistment percentages. Preliminary analysis indicates that the Army is reenlisting their "highest quality" recruits because they are a larger proportion of the post-reenlistee population.

Figure 4-10. Reenlist Rates by C-group.

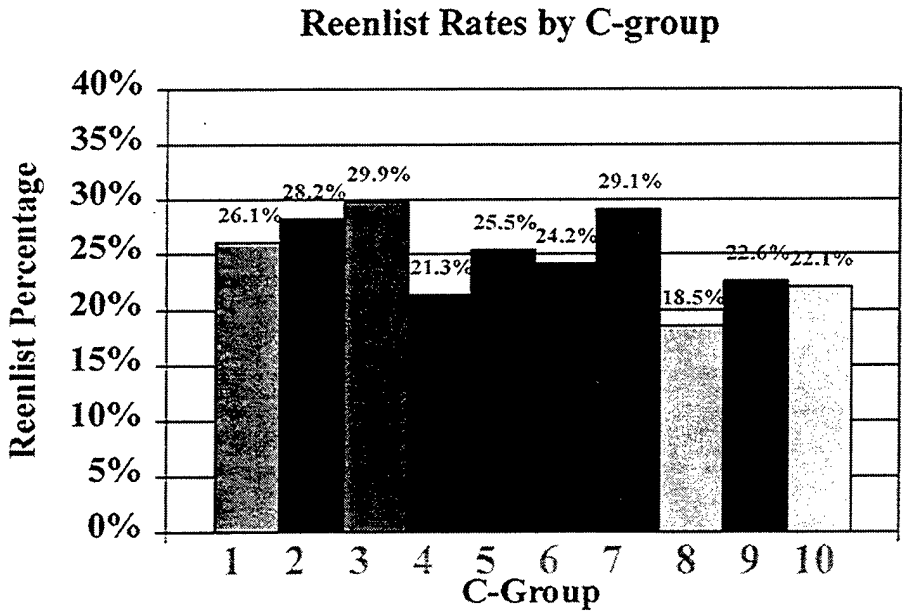


Figure 4-10 provides reenlistment rates by C-group. C-group 3, and C-group 7, which have the recruits with the lowest AFQT scores, have the highest reenlistment rates with 29.9% and 29.1% respectively. It is important to remember the previous chart (Figure 4-9) that indicates these two C-groups are only 1.1% and 3.5% respectively of all Reenlistees, therefore the small statistical increase in rate is not significant in numbers of

reenlistees, i.e. there were only 627 C-group 3 reenlistees versus over 20,000 C-group 1 reenlistees. C-group 1 has a respectable 26.1% reenlistment rate but it still trails the lower quality recruits of C-groups 2 and 3. Preliminary analysis based on this chart would indicate that the Army is maintaining their reenlistment numbers by reenlisting the lower quality recruit at a higher rate than their target recruit if not for the small data set.

Figure 4-11 indicates that overall reenlistment rates increased with each cohort. Cohort FY90 had a reenlistment rate of 23.9% while FY91 and FY92 had 25.6% and 26.3% rates respectively. This is an early indication that reenlistments were increasing as the drawdown decreased the amount of new recruits. An explanation for the rise was discussed in the March 2000 GAO study that indicated retention rates actually increased during the early 1990s. The increase in retention could be from increased stability in the enlisted ranks as a result of the drawdown.

Figure 4-11. Reenlistment Rates by Cohort..

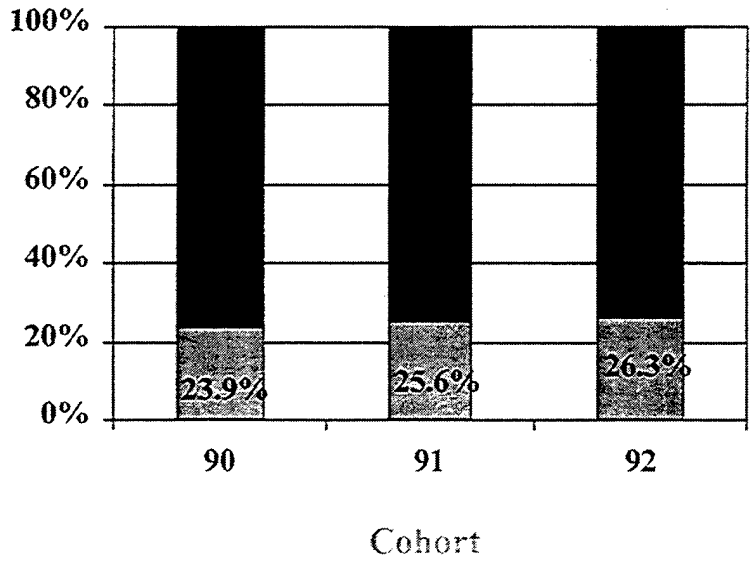


Figure 4-12 illustrates the reenlistment rates among all C-groups and cohorts by race.

Figure 4-12. Reenlistment Rates by Race (all C-groups and all cohorts)

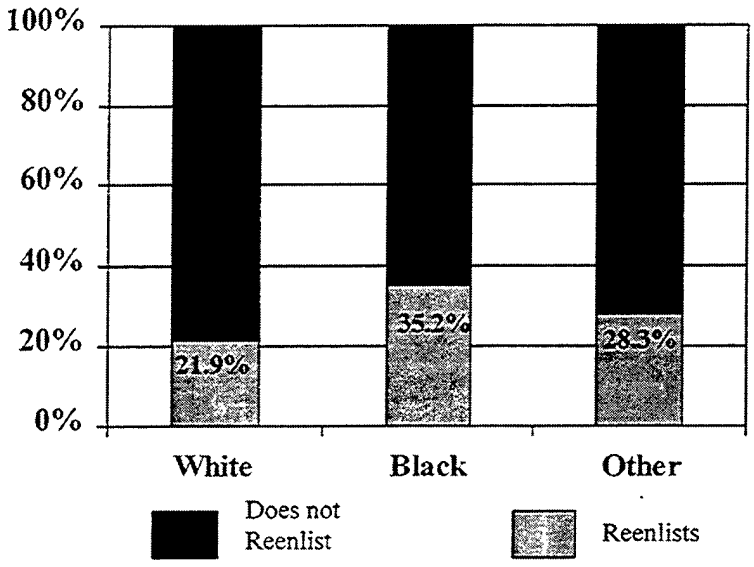
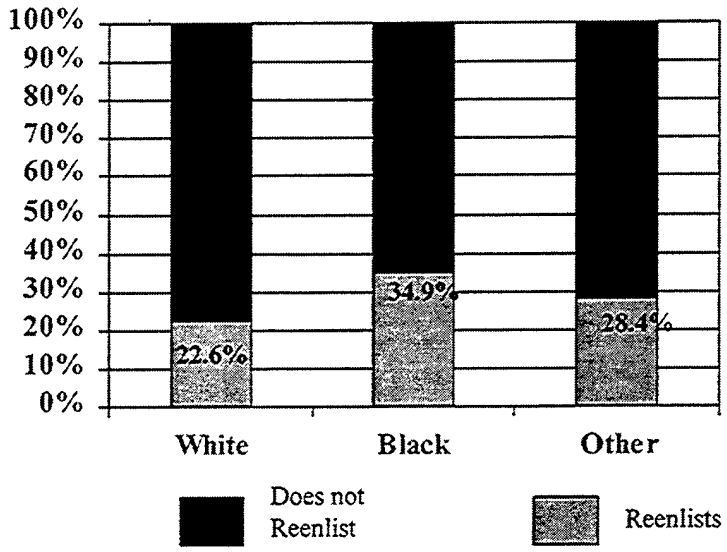


Figure 4-12 indicates that "black" is an important indicator of a positive probability change in the reenlistment decision. This is discussed in the regression analysis later in the brief. Blacks reenlistment rate was over 13% higher than whites and almost 7% higher than other races according to this chart. Blacks are one-half (35% vs. 22%) more likely to reenlist than whites and one-quarter (35% vs. 28%) more likely to reenlist than other races.

Figures 4-13 and 4-14 demonstrate reenlistment rates by sex and race. C-groups 1, 2, 3, 4, 5 and 9 are all male C-groups while C-groups 6, 7, 8, and 10 are all female.

Figure 4-13. Male Reenlistment Rates by Race.



This chart illustrates the significantly higher reenlistment rate among black enlistees than either the white or other races enlistees. Black males are clearly more likely to reenlist than whites and other races according to this chart.

Figure 4-14. Female Reenlistment Rates by Race.

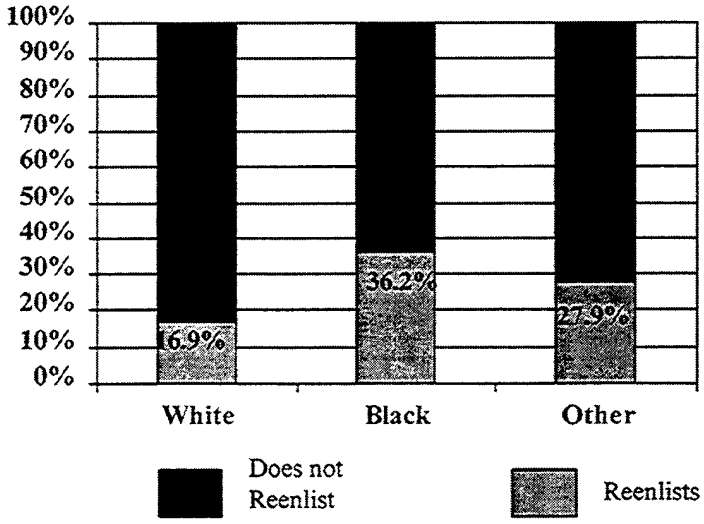


Figure 4-14 shows that black females reenlist at a significantly higher rate than either the white females or the other race females. Black females reenlistment rate is over 36% compared to fewer than 17% for white females.

Figure 4-15 demonstrates reenlistment rates by family type across all C-groups and cohorts. Soldiers with children displayed higher reenlistment rates than their counterparts without children. Single no children (SNC) enlistees reenlist at the lowest rate, less than 25%, while single enlistees with children (SWC) have the highest reenlistment rate at just under 29%. Married enlistees with children (MWC) also reenlist at a higher rate than married enlistees with no children (MNC).

Figure 4-15. Reenlistment Rates by Family Type.

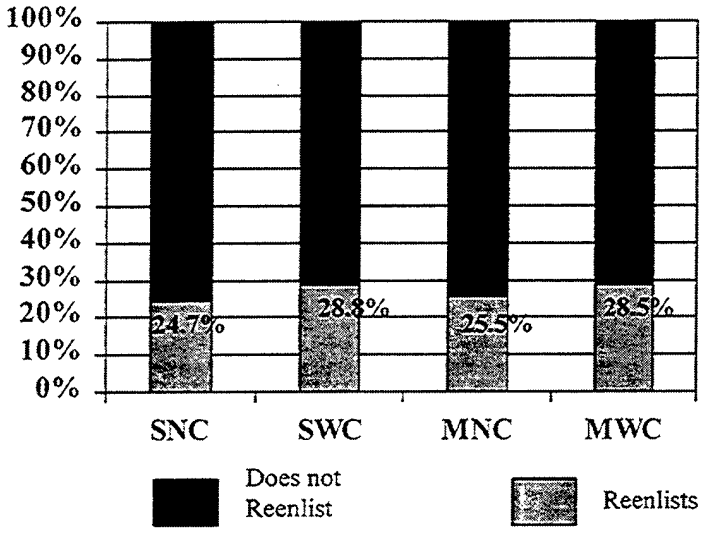


Figure 4-16 indicates that enlistees that received enlistment bonuses tended to reenlist at a lower rate than enlistees that did not receive a bonus. This initial analysis indicates that perhaps the Army's program of targeting the highest quality recruits with bonuses is counterintuitive as those are not the ones that are deciding to stay. Another

hypothesis is that those soldiers may never have enlisted without the bonus, and the Army achieved its goal of reenlisting almost 25% of those high quality soldiers.

Figure 4-17 compares reenlistment rates by enlistment options. Enlistment options include advanced enlistment grade; training or skill; buddy program; unit or geographic location; and/or accelerated promotion. These options, as demonstrated earlier, are not limited to only the highest quality recruits. Although the rates are comparable, enlistees that did not receive an enlistment option reenlisted at a slightly higher rate than those that did receive an enlistment option.

Figure 4-16. Reenlistment Rates by Enlistment Bonus.

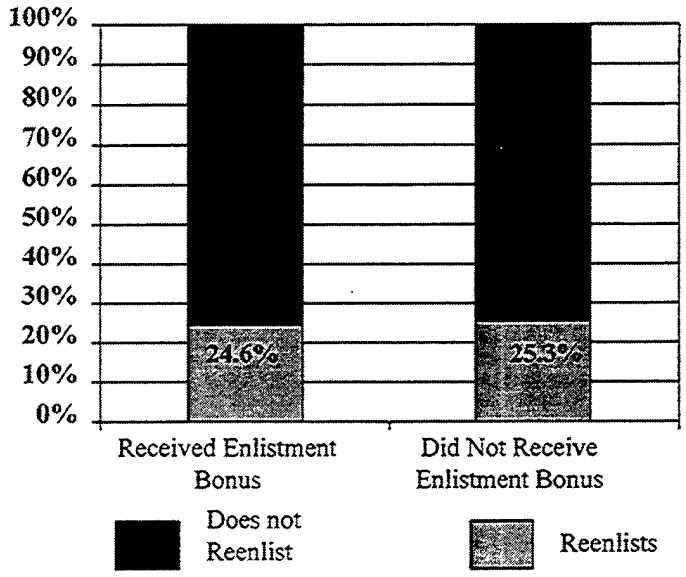


Figure 4-17. Reenlistment Rates by Enlistment Options.

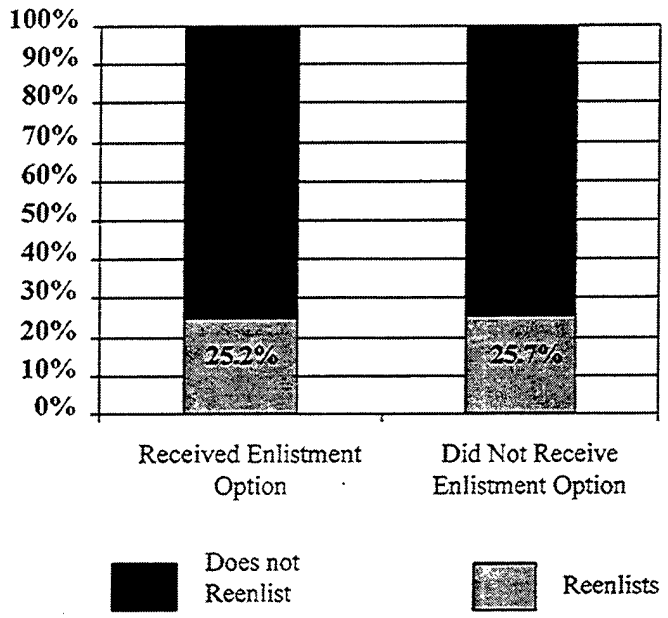


Figure 4-18 illustrates the propensity of enlistees to participate in a military sponsored youth program. Almost 33% of the enlistees that participated in a military sponsored youth program (such as ROTC, JROTC, Civil Air Patrol or US Naval Sea Cadet) reenlisted--a higher rate than their counterparts (25%). Participation is not equal among races however, as over 9% of blacks participated in youth programs, compared to less than 4% of whites.

Figure 4-18. Reenlistment by Youth Program Participation.

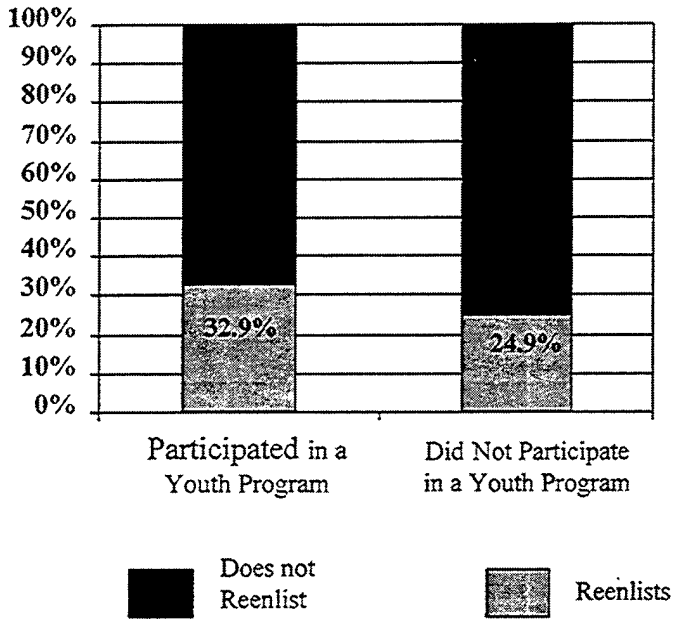


Figure 4-19 reports reenlistment for those requiring an enlistment waiver. The waiver could include medical conditions, age, # of dependents, mental qualification, moral qualification (previous arrests, alcohol and drugs, etc), sole survivor member, education, alien, security risk, or conscientious objector. The tendency from this chart is that soldiers that needed an initial waiver, reenlisted at a smaller rate than their counterparts.

Figure 4-19. Waiver Required to Enlist.

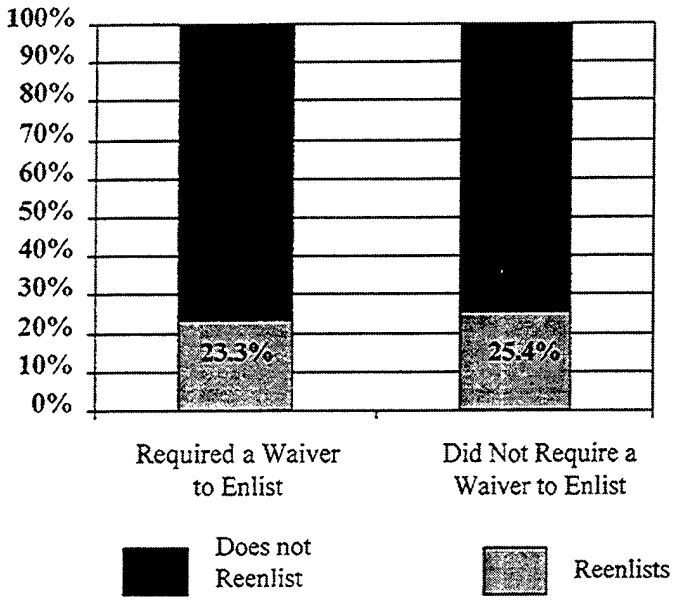
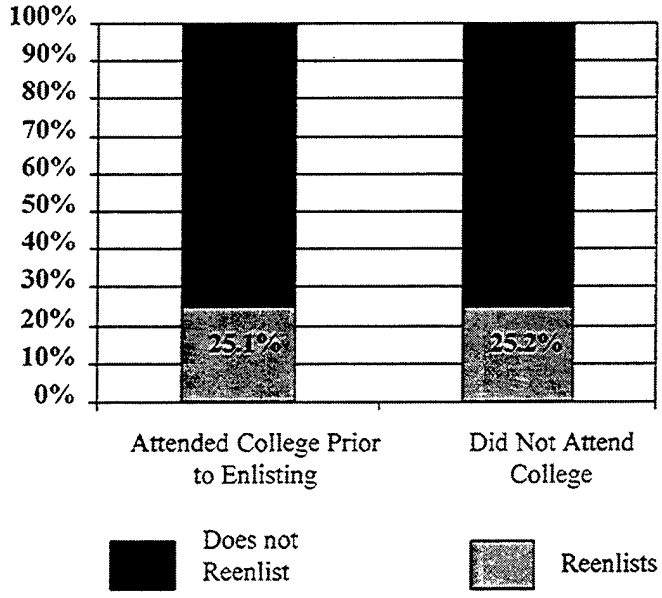


Figure 4-20 demonstrates reenlistment rates by prior college experience. The rate for enlistees with prior college experience is nearly the same as those without prior college, about 25% in both cases.

Figure 4-20. Reenlistment Rates by Some College Education



C. SUMMARY

A summary of key indicators as ascertained from the frequency distribution and cross-tabulation strongly suggests that race is a major indicator of reenlistment propensity. White and other race males reenlisted at a higher rate than their female counterparts whereas black females reenlisted at a higher rate than black males.

Family status indications suggests soldiers with children are more likely to reenlist than soldiers without children, and married soldiers are more likely to reenlist than single soldiers.

Soldiers who received an enlistment bonus were more likely to not reenlist than those without; likewise, soldiers that received an enlistment option were more likely to not reenlist than those who did not receive an enlistment option.

College education experience appears not to be an indicator of reenlistment. The difference between soldiers with some college education and those without college was very small.

Youth program participation appears to be an indicator of reenlistment—compared to the average, and to those that did not participate in youth programs.

Enlistees that required a waiver to enlist were less likely to reenlist.

The cross-tabulation is useful for conducting a preliminary analysis of the working data set, but each of the independent variables is analyzed without the impact of the other variables that affect a soldier's decision to reenlist. Logistics regression will isolate those variables and provide stronger conclusions on the impact of each of these variables on reenlistment.

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V. MODEL SPECIFICATION AND RESULTS

A. MODEL SPECIFICATION

This chapter determines the direct effect of each independent variable while holding all other variables constant. Chapter 4 studied the total relationship between different independent variables and the dependent variable, but separate variables where not held constant. Both chapters are important in this analysis, but the direct effect from the logit model yields the effect of one independent variable on the dependant variable while all other variables are held constant.

The decision to reenlist and remain on active duty beyond an initial obligated service requirement is a binary choice and therefore be evaluated as a dichotomous variable. Either the soldier decides to stay on active service and the decision is given a value of one, or the soldier does not reenlist (or extend) and the value is zero. Once the logistic model has been estimated, the coefficients can be interpreted as the change in log odds with a one-unit change in a specific explanatory variable, holding all other variables constant. A base case is used to evaluate partial effects of explanatory variables as the change in the likelihood of reenlisting. In this thesis, each C-group has a different base case depending on the explanatory variables used in that model. The most common occurring characteristics for each C-group were used as the base case.

B. VARIABLE DEFINITIONS

1. Dependant Variable

REENLIST is the dependent variable used in the logistic regression model. It is a dichotomous variable indicating that either a soldier reenlists, or does not, prior to his Expired Term of Service (ETS). This data was collected from the STF database as the second event trailer record. REENLIST is a binary variable coded one for a soldier who reenlisted within the allocated timeframe, otherwise the soldier is coded zero. In the STF database, that timeframe is coded as no more than twelve months prior to ETS and no more than three months after ETS. A prior study at the Naval Postgraduate School using the same STF database indicated this was an appropriate window and accurate time period for analyses.[1]

2. Explanatory Variables

All of the explanatory variables used in the model except for age are dummy variables, meaning they have a value of one or zero. The base case variable for each C-group is different due to structural differences in each C-group.

a. Race

This variable attempts to identify the effects of race on the reenlistment decision. The variable is divided into three categories in accordance with the DMDC cohort files. The three races are WHITE, BLACK and OTHER. The base case changes with specific C-groups.

b. AFQT Category

The US Army establishes the AFQT category based on an enlistee's score on the AFQT. The following categories are used: CAT I (93-99); CAT II (65-92); CAT

IIIA (50-64); CAT IIIB (31-49); CAT IVA (21-30); CAT IVB (16-20); CAT IVC (10-15); CAT V (1-9). The Army defines high-quality recruits as those that score above the 50th percentile. Given the above definition, this equates to people that are categorized as categories I through IIIA as being the prime targets of recruiters. Category V soldiers are not allowed to enlist in the Army. The AFQT measures a person's innate ability to comprehend military training and potential for future service.

c. Family Status

This variable represents a soldier's family as derived from the DMDC cohort file. The data obtained indicates the marital status of the soldier and the number of dependants. The family status was divided into four categories, each representing a dichotomous variable. The four variables are: single with no children (SNC); married with no children (MNC); single with children (SWC); and married with children (MWC). These four categories provide groups that may follow the same indicators when confronted with questions concerning their personal life.

d. Enlistment Bonus

This variable identifies all soldiers that received an enlistment bonus prior to enlisting in the service, usually for a specific MOS, duty station, or term. The bonus program is used as a monetary incentive to induce specifically defined high-quality soldiers for service. Enlistment bonuses are designed to increase the number of quality soldiers that agree to serve in critical or low-density MOS' that either have specialized skills or difficulties in meeting their manning levels. The variable is coded with a one if a soldier received a bonus; otherwise it is coded zero. All C-groups have a base case of no enlistment bonus received.

e. Enlistment Option

This variable identifies those soldiers that received some type of option when they enlisted. The option includes but is not limited to advanced enlistment grade; training or skill; buddy program; unit or geographic location; and/or accelerated promotion. Soldiers are provided this benefit to entice them to agree to certain options, assignments, or come with a friend. This option is normally second in choice to a bonus but may accompany a bonus. Enlistment options are much more widely disseminated among the C-groups than the bonuses. This is a dichotomous variable that assigns a value of one if the soldier received an enlistment option; otherwise the value is zero.

f. Enlistment Term

This variable is designed to measure whether the term of enlistment affects a soldier's decision to reenlist. Each soldier enlists for a two, three, four, five or six-year term. Each C-group is specific on which terms are categorized in that specific C-group. C-groups one through eight have only three and four-year enlistment terms while C-groups nine and ten have all of the two, five and six-year enlistment terms. Each reference category in the model is specifically tailored so the base case is the same as the term of the majority of soldiers within each C-group. Soldiers with the base case term are coded one and all others are coded zero.

g. Education

This variable is designed to capture a soldier's education level prior to entering active duty. This variable serves to better understand a soldier's motivation, performance and aptitude as well as possible his potential for further education and comprehension. This variable is not included in the models for C-groups four, five, and

eight as these three C-groups are comprised entirely of enlistees without high school diplomas. This variable is coded one if a soldier has some college education and zero otherwise. The reference category for those C-groups that this variable is included is no college education.

h. Waiver Required

This variable looks at the impact of a soldier requiring a waiver to enlist in the Army on his decision to reenlist prior to first term completion. A waiver may be needed and granted for a variety of reasons. This variable is evenly distributed across the C-groups. The reference case for all the C-groups is no waiver required. This variable is coded one for soldiers that required a waiver; otherwise it is coded zero.

i. Military Youth Program Participation

This variable identifies military style youth programs and the effect that inclusion in the program may have had on a future decision to reenlist. Participation in a military youth program at a young age may have a lasting impact on the future decisions or direction that a soldier may decide. Interestingly, whites participated in youth programs at a 3.6% rate, while black participation was 9.1%; other races participated at a 4.0% rate. This is a dummy variable coded one for participation in a youth program and zero if no participation. The reference category for all C-groups is no youth program participation.

j. Technical Occupation

This variable was created to determine if a soldier's occupation influenced his decision to reenlist. The enlisted occupation code is derived from the DMDC cohort files and defined in the DOD Occupation Conversion Manual.[2] DOD defines all like

MOS' across the services into occupation code categories to provide commonality of soldier specialties across the services. The broad categories used by DOD are:

(1) Infantry, Gun Crews and Seamanship Specialists (this includes the majority of combat arms personnel).

(2) Electronic Equipment Repairers.

(3) Communications and Intelligence Repairers.

(4) Other Technical and Allied Specialists.

(5) Functional Support and Administration.

(6) Electric/Mechanical Equipment Repairers.

(7) Craftsmen.

(8) Service and Supply Handlers.

(9) Non-occupational Category (includes soldiers who are in basic or occupational training and are not yet assigned a specialty).

Aptitude tests of soldiers serving in technical occupations have been higher than the scores of personnel in other categories.[3] Soldiers with technical specialties were considered to be in the personnel categories of Electronic Equipment Repairers, Communications and Intelligence Specialists, and other Technical and Allied Specialists. A dummy variable labeled TECH was created to group all enlistees with technical occupations to capture another aspect of high-quality recruit actions within the Army. Enlistees with technical occupations were coded one while all others were coded zero. The reference category for all C-groups was non-technical occupation.

C. RESULTS

The results are separated and analyzed by C-group. Each C-group is compared against C-group one as well as the other C-groups that provide some of the same basic characteristics but differ in gender, term, or AFQT score. The base case is established separately for each C-group to provide a reference point to determine probabilities for the remaining variables. The most common characteristics of each C-group are used to establish the base or reference case.

Each C-group model has a table that summarizes the explanatory variables, key model output data, and the change in the probability of reenlistment when compared to the base case. The logistics coefficients can be interpreted as the change in log odds associated with a change in the independent variables from the base case. To compare the significant coefficients, the effect of an explanatory variable on the log of the odds to the effect on the probability of reenlisting was translated to a more meaningful change in probability of reenlistment for each variable.[4] For example, the model for C-group 1 concludes that blacks are 6.51 percentage points more likely to reenlist than their white counterparts after accounting for the differences in all other variables in the model. The Wald Statistic is the square of the ratio of the coefficient to its standard error and can be interpreted as the "pseudo t^2-statistic." The significance level of each variable is also depicted in the table.

1. C-Group 1

C-group 1 consists of males with high school diplomas with a an AFQT test score between 50 and 99 placing them in AFQT CAT 1 through AFQT CAT IIIA. These soldiers have enlisted for a three or four-year initial term and are considered to be the

highest quality male recruits. The base case is below and provides the most common characteristics as depicted in the preliminary analysis for the base case. Table 5-1 provides a summary of the results of the model to include key model output data and the change in the probability of reenlistment for each variable when compared to the base case for C-group 1.

Base Case C-group 1

Male	
White	4-year term
AFQT CAT II	High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 20.3	No college
Single with no dependants	Non-tech MOS

Table 5-1. Summary of Variables and Reenlistment Probabilities for C-group 1.

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	-.097	.029	11.362	.001	-0.83
ENLISTMENT OPTION	-.051	.044	1.325	.250	-0.15
BLACK	.576	.023	636.381	.000	6.51
OTHER	.227	.037	38.806	.000	1.09
SWC	.103	.070	2.159	.142	0.14
MNC	.213	.133	2.548	.110	0.07
MWC	.276	.026	116.196	.000	2.91
WAIVER	-.064	.027	5.884	.015	-0.63
COLLEGE	-.053	.030	3.060	.080	-0.47
AFQT CAT I	-.061	.030	4.017	.045	-0.50
AFQT CAT IIIA	.024	.018	1.791	.181	0.58
YOUTH PROGRAM	.339	.037	82.702	.000	1.45
AGE	.103	.020	26.988	.000	2.16
TECHNICAL OCCUPATION	.256	.018	200.713	.000	5.05
3-YEAR TERM	-.096	.018	28.704	.000	-2.09
Intercept	-1.203	.046	685.666	.000	

N = 78,099 and the Chi-square = 11,097.054

C-group 1 Model Summary

C-group 1 has 78,099 data points making this the largest data set. Eleven of the fifteen explanatory variables were significant to the .10 level. Black has the most significant positive impact on determining reenlistment rates (6.51%) while Tech Occupation also has a significant influence on reenlisting (5.05%). Soldiers on 3-year enlistments have the most significant negative impact on reenlistment rates (-2.09). Interesting to note also that targeted enlistees, that is, those receiving enlistment bonuses and options, have a negative impact on reenlistment rate. Age, youth group participation, married with children all had a significant positive impact on a reenlistment decision. Enlistment bonus, waiver required, AFQT CAT I, and college all had a negative impact on reenlistment rates. Enlistment option, AFQT CAT IIIA, married no children and single with children were not significant to the 10% level. The logistics regression model for the C-group 1 data set has a Chi-square of 1197.054 with 14 degrees of freedom and is significant at the one percent level.

2. C-Group 2

C-group 2 consists of males with high school diplomas, AFQT test score between 31 and 49 indicating AFQT CAT IIIB, and a three or four-year enlistment term. The base case is relatively the same as the base case for C-group 1 with the exception that the average age climbed to 20.4. Table 5-2 depicts the summary of the logistics regression model.

Base Case C-group 2

Male	
White	4-year term
AFQT CAT IIIB	High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 20.4	No college
Single with no dependants	Non-tech MOS

Table 5-2. Summary of Variables and Reenlistment Probabilities for C-group 2

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	-.089	.083	1.150	.283	-0.83
ENLISTMENT OPTION	-.048	.054	.790	.374	-0.18
BLACK	.588	.023	654.855	.000	13.38
OTHER	.341	.040	74.061	.000	2.58
SWC	.082	.077	1.120	.290	0.14
MNC	.109	.195	.312	.577	0.31
MWC	.199	.034	34.974	.000	2.25
WAIVER	-.192	.039	23.666	.000	-1.60
COLLEGE	.104	.061	2.868	.090	0.31
YOUTH PROGRAM	.237	.046	26.892	.000	1.19
AGE	.048	.025	3.706	.054	1.06
TECHNICAL OCCUPATION	-.008	.027	.098	.754	-0.13
3-YEAR TERM	-.037	.022	2.782	.095	-0.88
Intercept	-1.166	.056	432.154	.000	

N = 42,499 and the Chi-square = 810.704

C-group 2 Model Summary

C-group 2 has 43,499 records. Eight of the thirteen variables are significant and provide some impact on reenlistment rates. Black has the most significant positive

impact on determining reenlistment rates (13.38%) while a waiver required has the most significant negative impact on reenlistment rates. Other race, married soldiers with children, and youth program participation also have a positive impact on the likelihood of reenlistment. College and three-year term have a positive and negative impact on reenlisting respectively, but the impact is small. Bonus, enlistment option, married no children, single with children, and tech MOS were not significant to the ten percent level. The logistics regression model has a Chi-square of 810.704 with 13 degrees of freedom and is significant at the one percent level.

3. C-Group 3

C-group 3 consists of male high school graduates with low AFQT scores. Their scores are between 0 and 30 placing them in AFQT CAT IV and V. There are no CAT V's in the database as CAT V scores are ineligible to enlist. These soldiers also enlisted for a three or four-year term. The base case changes here from white males for C-groups 1 and 2, to black males for C-group 3. Almost 47% of the C-group was black compared to 43% white and 10% other race. Average age has jumped from 20.3 in C-group 1, to 20.7 in C-group 3, indicating an older population. Table 5-3 displays the summary of the model.

Base Case C-group 3

Male	
Black	4-year term
AFQT CAT IV	High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 20.7	No college
Single with no dependants	Non-tech MOS

Table 5-3. Summary of Variables and Reenlistment Probabilities for C-group 3.

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	.643	.681	.890	.346	0.27
ENLISTMENT OPTION	-.106	.275	.149	.699	-0.02
WHITE	-.635	.107	35.327	.000	-15.56
OTHER	.102	.160	.408	.523	0.92
SWC	-.174	.366	.227	.634	-0.14
MNC	-.883	1.118	.624	.430	-0.25
MWC	.008	.153	.003	.957	0.10
WAIVER	-.527	.261	4.077	.043	-2.37
COLLEGE	.278	.326	.727	.394	0.57
YOUTH PROGRAM	.460	.211	4.725	.030	2.11
AGE	.182	.110	2.736	.098	4.14
TECHNICAL OCCUPATION	-.174	.122	2.034	.154	-1.23
3-YEAR TERM	-.024	.101	.055	.815	-0.57
Intercept	-.535	.280	3.652	.056	

N = 2,096 and the Chi-square = 65.038

C-group 3 Model Summary

C-group 3 is a very small C-group with only 2,096 records. There were no CAT V records in the database, only AFQT CAT IV. Race plays a significant role in determining the reenlistment rates of C-group 3. WHITE is a significant negative indicator that a soldier will not reenlist. White soldiers are over 15 percentage points more likely to not reenlist than their black counterparts. Since White has been the base case for the previous models, this is the first time it is included in a model. Given the small nature of the dataset, only four variables in this model are significant; White, Youth, Age, and Waiver. No other variables were significant to the .10 level. Soldiers that required a waiver to reenlist were also more likely to not reenlist. Participation in a

youth program and older soldiers were more likely to reenlist than the younger soldiers with no youth program participation. Both of those variables had a positive impact ion the reenlistment rates. The reason for the high level of insignificant variable is because of the small data set, e.g. there were only 9 enlistment bonuses granted in the 2,096 records. The logistics regression model for the C-group 3 data set has a Chi-square of 65.038 with 13 degrees of freedom and is significant at the one percent level

4. C-Group 4

This C-group consists of male non-high school graduates that scored well on the AFQT. They all earned scores between 50 and 99 placing them in AFQT CAT I-IIIA. They have enlisted for a three or four-year term. The base case is again white males but the AFQT CAT is IIIA compared to AFQT CAT II for C-group 1, which are enlistees with comparable AFQT scores. The average age is back to 20.4, comparable to C-group 1 and C-group 2 enlistees. Table 5-4 provides the summary of probabilities for the model.

Base Case C-group 4

Male	
White	4-year term
AFQT CAT IIIA	No High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 20.4	No college
Single with no dependants	Non tech MOS

Table 5-4. Summary of Variables and Reenlistment Probabilities for C-group 4

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	.246	.156	2.485	.115	0.81
ENLISTMENT OPTION	-.121	.143	.714	.398	-0.46
BLACK	.381	.089	18.171	.000	4.02
OTHER	.490	.127	14.915	.000	2.30
SWC	.425	.198	4.592	.032	0.81
MNC	.399	.365	1.200	.273	0.22
MWC	.156	.080	3.785	.052	2.30
WAIVER	.005	.090	.004	.953	0.06
AFQT CAT I	-.137	.141	.942	.044	-0.72
AFQT CAT II	.134	.063	4.549	.332	3.19
YOUTH PROGRAM	.362	.180	4.039	.033	0.86
AGE	.190	.066	8.341	.004	4.26
TECHNICAL OCCUPATION	.096	.067	2.059	.019	-3.48
3-YEAR TERM	-.151	.064	5.540	.151	-5.87
Intercept	-1.416	.149	90.603	.000	

N = 6,685 and the Chi-square = 72.357

C-group 4 Model Summary

C-group 4 has 6,658 records making it larger than C-group 3 but still significantly smaller than C-group 1 or 2. Eight of the fourteen variables were significant in the model compared with only four for C-group 3. Race again plays a significant role in determining the reenlistment rates of C-group 4. Other and Black both have a significant positive impact on determining reenlistment rates with a probability change of 2.30 and 4.02 respectively. AFQT CAT II, age, and married with children all have significant positive impacts on reenlistment rates while 3-year term enlistees have the most significant negative impact on reenlistment rates. Youth program also had a positive

impact on reenlistment rates. MNC, Waiver, Bonus, enlistment option, AFQT CAT I and Tech MOS were not significant to the ten percent level. The logistics regression model for the C-group 4 data set has a Chi-square of 72.357 with 14 degrees of freedom and is significant at the one percent level.

5. C-Group 5

C-group 5 consists of male enlistees with no high school diploma that scored between 0 and 49 on the AFQT. These low scores place them in AFQT CAT IIIB through V. These scores are comparable to the high school diploma enlistees of C-group 2 and C-group 3. These enlistees are on a three or four-year enlistment term. The reference case for this C-group follows the same general base cases as the previous C-groups except the average age again climbs to 20.6, comparable to C-group 3, the other male low AFQT score C-group. Unlike C-group 3 however, almost 60% of this C-group is white. Table 5-5 displays the summary of variables and reenlistment probabilities.

Base Case C-group 5

Male	
White	4-year term
AFQT CAT IIIB	No High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 20.6	No college
Single with no dependants	Non tech MOS

Table 5-5. Summary of Variables and Reenlistment Probabilities for C-group 5.

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	-.368	.501	.539	.463	-0.73
ENLISTMENT OPTION	-.193	.241	.641	.423	-1.26
BLACK	.488	.138	12.539	.000	10.25
OTHER	.398	.204	3.812	.051	3.58
SWC	.037	.455	.007	.935	0.07
MNC	-4.140	7.706	.289	.591	-0.86
MWC	.424	.176	5.810	.016	5.41
WAIVER	.084	.194	.186	.666	0.82
AFQT CAT IV	.012	.385	.001	.976	0.03
YOUTH PROGRAM	.309	.258	1.437	.231	1.59
AGE	.270	.140	3.721	.054	5.67
TECHNICAL OCCUPATION	-.416	.174	5.701	.017	-5.87
3-YEAR TERM	-.123	.130	.899	.343	-2.83
Intercept	-1.158	.250	21.485	.000	

N = 1,437 and the Chi-square = 37.257

C-group 5 Model Summary

C-group 5 has only 1,437 records. These are non-high school diploma enlistees in AFQT CAT IIIB-V. There are no CAT V's in the database and only 35 CAT IVs, indicating the vast majority of the enlistees are AFQT CAT IIIB, the base case. There are only five significant variables in this model, like C-group 3, most likely because of the small sample size. Race again plays a significant role in determining the reenlistment rates of C-group 5 as does MWC and age. Blacks and other races are 10.25 and 3.58 percentage points more likely to reenlist than their white counterparts. Married with children and the older soldiers are 5.41 and 5.67 percentage points more likely to reenlist than their single and younger counterparts. A Tech MOS has a significant negative

impact on reenlistment rates. The rate of 5.87 is the largest negative indicator in the model. The logistics regression model for the C-group 5 data set has a Chi-square of 37.257 with 13 degrees of freedom and is significant at the one percent level.

6. C-Group 6

This C-group is the female equivalent of the C-group 1. These are the highest quality female recruits, those that scored between 50-99 on the AFQT thereby placing them in AFQT CAT I through IIIA. These females are high school graduates with three or four-year enlistment terms. Compared to the male quality recruits of C-group 1, the females base case is AFQT CAT IIIA versus CAT II for C-group 1 and the average age of 20.9 is significantly older than the 20.3 of C-group 1.

Base Case C-group 6

Female	
White	4-year term
AFQT CAT IIIA	High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 20.9	No college
Single with no dependants	Non tech MOS

Table 5-6. Summary of Variables and Reenlistment Probabilities for C-group 6.

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	-.267	.110	5.920	.015	-1.22
ENLISTMENT OPTION	.019	.104	.032	.859	0.07
BLACK	1.021	.046	487.288	.000	21.02
OTHER	.458	.091	25.568	.000	2.39
SWC	.061	.152	.160	.689	0.10
MNC	-.300	.173	3.010	.083	-0.54
MWC	-.018	.064	.083	.773	-0.23
WAIVER	-.053	.088	.355	.552	-0.32
COLLEGE	-.026	.064	.161	.688	-0.35
AFQT CAT I	-.142	.088	2.574	.109	1.08
AFQT CAT II	-.078	.046	2.911	.088	-0.95
YOUTH PROGRAM	.271	.097	7.777	.005	-1.93
AGE	.144	.051	8.001	.005	3.28
TECHNICAL OCCUPATION	.218	.046	22.175	.000	1.73
3-YEAR TERM	.104	.052	4.010	.045	4.66
Intercept	-1.627	.111	216.235	.000	

N = 12,896 and the Chi-square = 602.542

C-group 6 Model Summary

C-group 6 has 12,896 records, significantly less than over 78,000 records of C-group 1 but still 14% of the top quality recruits. Nine of the fifteen variables were significant. Race has the most significant positive impact on determining reenlistment rates. Black is substantial at 21.02 percentage points while other race is significant at 2.39. Enlistees with a tech occupation, older than the average age, participation in a youth program, and 3-year term enlistees are also more likely to reenlist. Higher AFQT scores and enlistment bonuses are negative influences on reenlistment. Married with no children also had a slightly negative impact on the reenlistment rate. Only five variables

were not significant to the ten percent level: SWC, MWC, Waiver, College, and enlistment option. The logistics regression model for the C-group 6 data set has a Chi-square of 602.542 with 15 degrees of freedom and is significant at the one percent level.

7. C-Group 7

C-group 7 consists of female high school graduates with lower AFQT test scores. These scores ranged from 0 to 49 placing these recruits in AFQT CAT IIIB through V. Although AFQT CAT V is included in this C-group, there are no CAT Vs in the database and there are only 30 CAT IV records. The quality of these female recruits can be compared to the male recruits of C-groups 2 and 3 combined. The majority of the base case variables stays the same except for race. Similar to C-group 3 for the males, blacks are the largest race in this C-group. Blacks account for over 52% of the recruits while whites consist of less than 41%. Table 5-7 displays the summary of the results of the logistic regression model.

Base Case C-group 7

Female	
Black	4-year term
AFQT CAT IIIB	High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 20.9	No college
Single with no dependants	Non tech MOS

Table 5-7. Summary of Variables and Reenlistment Probabilities for C-group 7.

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	-.176	.220	.644	.422	-0.30
ENLISTMENT OPTION	.163	.145	1.265	.261	0.63
WHITE	-1.020	.061	277.645	.000	-24.67
OTHER	-.353	.106	11.157	.001	-2.31
SWC	.057	.194	.085	.770	0.10
MNC	-.090	.231	.154	.695	-0.13
MWC	-.221	.087	6.428	.011	-2.50
WAIVER	-.134	.147	.827	.363	-0.50
COLLEGE	.081	.112	.522	.470	0.49
AFQT CAT IV	.101	.398	.064	.800	0.42
YOUTH PROGRAM	.128	.112	1.287	.257	0.68
AGE	.166	.064	6.753	.009	3.67
TECHNICAL OCCUPATION	.224	.096	5.422	.020	1.76
3-YEAR TERM	.007	.057	.014	.906	0.17
Intercept	-.711	.147	23.478	.000	

N = 6,819 and the Chi-square = 335.247

C-group 7 Model Summary

C-group 7 has 6,819 records, which is larger than C-groups 3, 4 or 5 but still significantly smaller than C-groups 1 or 2. Only five of the variables in the model were significant: white, other race, married with children, age, and technical occupation. Race plays the dominant role in determining the reenlistment rates of C-group 7. White females are almost 25 percentage points less likely to reenlist than their black counterparts. Other races are 2.31 percentage points less likely to reenlist than the black females also. Married with children females are less likely to reenlist than single with no children females, exact opposite of the male categories in the same areas. Older enlistees are more likely to reenlist than their younger brethren and those with technical

occupations are more likely to reenlist. The logistics regression model for the C-group 7 data set has a Chi-square of 335.247 with 14 degrees of freedom and is significant at the one percent level.

8. C-Group 8

This C-group is all female non-high school graduates, regardless of test score. Since test score is not a factor in this C-group, it encompasses AFQT scores from 0 to 99. This C-group is comparable to the combination of the male C-groups 4 and 5. These recruits are enlisted for a three or four-year term. The base case is white with an AFQT CAT of IIIA, comparable to C-group 4. Once again there are no AFQT CAT V records and only one recruit in AFQT CAT IV. However, the average age is 21.2, the highest of any C-group but keeping with the trend of older enlistees for female C-groups. Table 5-8 provides a summary of key data from the logistics regression model.

Base Case C-group 8

Female	
White	4-year term
AFQT CAT IIIA	No High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 21.2	No college
Single with no dependants	Non Tech MOS

Table 5-8. Summary of Variables and Reenlistment Probabilities for C-group 8.

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	-1.052	1.180	.796	.372	-2.49
ENLISTMENT OPTION	-1.267	.591	4.603	.032	-3.69
BLACK	1.154	.297	15.124	.000	22.20
OTHER	.427	.533	.643	.423	2.62
SWC	-.483	.852	.321	.571	-1.48
MNC	-5.708	12.41	.212	.645	-10.91
MWC	-.247	.393	.395	.530	-4.10
WAIVER	-.403	.597	.455	.500	-3.22
AFQT CAT I	.786	.485	2.632	.105	5.32
AFQT CAT II	-.218	.372	.344	.558	-4.30
AFQT CAT IIIB	-.065	.345	.036	.850	-1.37
AFQT CAT IV	8.547	36.66	.054	.816	2.07
YOUTH PROGRAM	-.092	.625	.022	.738	-0.41
AGE	.114	.112	.112	.883	2.35
TECHNICAL OCCUPATION	.505	.314	2.586	.108	8.94
3-YEAR TERM	-.123	.341	.131	.718	-2.18
Intercept	-.698	.641	1.186	.276	

N = 411 and the Chi-square = 37.992

C-group 8 Model Summary

There are only 411 enlistees in C-group 8, making this the smallest C-group. For this data set, only four variables are significant to the .10 level and only BLACK is significant to the .01 level. BLACK has the largest positive influence on determining reenlistment than any other variable in any of the ten models. AFQT CAT I and technical occupation also have significant positive impacts on reenlistment. Enlistment option has a substantial negative impact at 3.69 percentage points. Although comparable to C-groups 4 and 5 through preliminary data, two of the variables are counter to those found among the males. Technical occupation and higher AFQT scores were negative

indicators among male C-groups while they are positive indicators for this C-group. The logistics regression model for the C-group 8 data set has a Chi-square of 37.992 with 16 degrees of freedom and is significant at the one percent level.

9. C-Group 9

This C-group consists of male recruits enlisting for a two, five or six-year term. The C-group is a compilation of all education levels and all AFQT scores and categories. It includes both high school and non-high school graduates and all categories of AFQT. The only significant discriminator is that it is an all male C-group. The base case is white male in AFQT CAT II, which is comparable to C-group 1 by test score. Over 47% of the recruits are classified as AFQT CAT II in C-group 9 compared to just over 50% of C-group 1. There are no CAT V records and only .4% (229) are CAT IV. Over 67% of the recruits have enlisted for a two-year term while almost 77% of them are white. Less than 17% are black and just over 6% are other races. The average age of 20.3 is also the same as C-group 1. Table 5-9 provides the summary of pertinent data from the logistics regression model.

Base Case C-group 9

Male	
White	2-year term
AFQT CAT II	High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 20.3	No college
Single with no dependants	Non tech MOS

Table 5-9. Summary of Variables and Reenlistment Probabilities for C-group 9.

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	.100	.076	1.740	.187	0.16
ENLISTMENT OPTION	.090	.053	2.913	.088	0.35
BLACK	.619	.026	583.374	.000	8.73
OTHER	.289	.041	50.269	.000	1.66
SWC	.077	.085	.819	.366	0.10
MNC	-.044	.188	.055	.815	-0.01
MWC	.314	.033	92.514	.000	2.83
WAIVER	-.097	.035	7.852	.005	-0.87
COLLEGE	-.118	.038	9.904	.002	-1.04
AFQT CAT I	-.140	.044	10.084	.001	-0.88
AFQT CAT IIIA	.056	.022	6.266	.012	1.31
AFQT CAT IIIB	-.075	.037	4.012	.045	-0.61
AFQT CAT IV	.014	.151	.009	.925	0.01
YOUTH PROGRAM	.266	.046	33.262	.000	1.08
AGE	.098	.024	16.404	.000	2.17
TECHNICAL OCCUPATION	.067	.023	8.587	.003	1.35
5-YEAR TERM	.261	.023	127.592	.000	5.14
6-YEAR TERM	.031	.045	.466	.495	0.16
NON-HIGH SCHOOL GRADUATE	-.090	.058	2.430	.119	-0.28
Intercept	-1.613	.054	879.108	.000	

N = 58,006 and the Chi-square = 1,039.526

C-group 9 Model Summary

C-group 9 has 58,006 records making it the second largest C-group behind C-group 1. Thirteen of the eighteen variables were significant to the .10 level. Race again plays a significant role in determining the reenlistment rates. Black is almost 9 percentage points more likely to reenlist than his white counterpart while other races are just under two percentage points more likely. These rates are comparable to those of C-

group 1. A five-year enlistment term is also has a significant positive impact on reenlistment rates. Other moderate positive indicators of reenlistment behavior include participation in a youth program, married with children, AFQT CAT IIIA, age, and technical occupation. Enlistment option, at less than one percentage point, is also a slightly positive influence. College has the most significant negative impact while AFQT CAT I, AFQT CAT IIIB, and enlistment waiver requirement also have slight negative impacts on reenlistment rates. MNC, CAT IV, 6-year term, and Bonus were not significant to the .10 level. The logistics regression model for the C-group 9 data set has a Chi-square of 1039.526 with 19 degrees of freedom and is significant at the one percent level.

10. C-Group 10

C-group 10 is the female version of C-group 9. It consists of all females with a two, five or six-year enlistment term regardless of high school education or AFQT score. The C-group is a compilation of all education levels and all AFQT scores and categories. The base case is again derived from the most common characteristics of the group. The AFQT CAT is IIIA compared to CAT II for the male C-group of the same make-up. Whites account for 63% of the population while blacks are just less than 31%. There are no CAT V records in the database and C-group 10 has only four CAT IV records. Just over 46% enlisted for a two-year term versus 67% of C-group 9 that enlisted for a two-year term. The average age, as with all female C-groups, increases to 21.0, higher than any of the male C-groups. Table 5-10 provides a summary of statistics from the logistic regression model.

Base Case C-group 10

Female	
White	2-year term
AFQT CAT IIIA	High School Diploma
Received Enlistment Option	No enlistment waiver required
No Enlistment Bonus	Did not participate in a youth program
Average age 21.0	No college
Single with no dependants	Non tech MOS

Table 5-10. Summary of Variables and Reenlistment Probabilities for C-group 10.

Variable	Coefficient	S.E.	Wald Statistic	Significance Level	Probability Change (Percent)
BONUS	.319	.152	4.437	.035	0.57
ENLISTMENT OPTION	.133	.109	1.493	.222	0.51
BLACK	.974	.045	460.152	.000	20.83
OTHER	.753	.082	83.907	.000	4.28
SWC	.099	.143	.480	.488	0.19
MNC	.223	.146	2.347	.126	0.42
MWC	-.020	.062	.107	.744	-0.27
WAIVER	-.069	.096	.520	.471	-0.36
COLLEGE	-.050	.066	.584	.445	-0.60
AFQT CAT I	.180	.114	2.486	.115	0.65
AFQT CAT II	-.036	.047	.585	.444	-0.86
AFQT CAT IIIB	.002	.071	.001	.973	0.02
AFQT CAT IV	.270	1.194	.051	.821	0.01
YOUTH PROGRAM	.170	.094	3.273	.070	0.73
AGE	.131	.051	6.747	.009	2.90
TECHNICAL OCCUPATION	.178	.047	14.540	.000	3.67
5-YEAR TERM	-.041	.046	.802	.370	-1.00
6-YEAR TERM	-.635	.082	60.657	.000	-6.22
NON-HIGH SCHOOL GRADUATE	-.191	.134	2.036	.154	-0.52
Intercept	-1.810	.114	250.201	.000	

N = 14,036 and the Chi-square = 622.558

C-group 10 Model Summary

C-group 10 has 14,036 records, making it the fourth largest C-group and the largest female C-group. There are seven variables that are significant within the .10 level: bonus, black, other race, 6-year enlistment term, youth program participation, age and technical occupation. Race plays a significant role in determining the reenlistment rates. Blacks reenlist at almost 21 percentage points higher than their white counterparts while other races reenlist at over four percentage points higher than the whites. Age and technical occupation are also significant positive influences on reenlistment rates. A six-year enlistment term has a significant negative impact on reenlistment rates. Enlistment bonus and youth group participation have slight positive influences on reenlistment behavior. The logistics regression model for the C-group 10 data set has a Chi-square of 622.558 with 19 degrees of freedom and is significant at the one percent level.

D. SUMMARY

The C-groups vary in size from 78,099 records in C-group 1 to a mere 411 records in C-group 8. The extreme differences in C-group size possibly explain some of the reasons that several variables are not significant for certain C-groups. The small population of records does not provide the required ingredients to demonstrate a positive or negative analysis of the explanatory variable are not present. The variation in C-group size also presents statistical problems when attempting to compare data across all of the C-groups.

[1]Hildebrandt G. and Sze M., *Economic Projection of Army Personnel Strength*, Unpublished Paper and Video tele-conference with DCSPER, Naval Postgraduate School, Monterey, California, 29 October 1998.

[2]*Department of Defense Occupation Conversion Manual*, Office of the Secretary of Defense, 1997.

[3]Eitelberg, M. J., *Manpower for Military Occupations*, OSD Force Management and Personnel, Alexandria, Virginia, 1988.

[4]Pindyck and Rubinfeld, *Models of Qualitative Choice.*

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The purpose of this study was to present an analysis of information pertaining to reenlistment rates of first term recruits across all characteristic groups as defined by the US Army. The data used for this study was compiled from the Small Unit Tracking File and the Cohort Files from the Defense Manpower Data Center. It consisted of all recruits for FY90, FY91, and FY92. These two sets of data were merged to provide a working database of pertinent and relevant variables. No records were deleted or omitted and all characteristic groups were analyzed. Each C-group was analyzed using three methods: frequency analysis, cross-tabulation analysis, and the logistic regression model. By not limiting the scope of the thesis to certain records, C-groups or other criteria, the analysis allows for a comprehensive evaluation of all soldiers that enlisted over the course of a three-year time period.

To determine what each model represents; it was compared against a base case for that specific C-group. Each C-group base case was determined from the highest frequency characteristics for that C-group. Comparing an analysis of a specific C-group to that C-group's base case provides an understanding of the specific explanatory variables that pertain to that C-group. To determine variables that equate to explain reenlistment across the broad ranging characteristics and demographics of the Army, the results must be compared across C-groups where permissible and relevant.

Since the Army has placed recruits in C-groups based on certain criteria, this thesis uses those criteria to define what is deemed as the highest quality recruits for the C-group base case, which all the other C-groups can be compared against. The Army

relies heavily on education and test taking to determine which recruits are expected to be the most qualified. Therefore, C-group 1 consisting of all high school graduates and AFQT scores between 50 and 99 are considered the highest quality male recruits and C-group 6 consisting of all high school graduates and AFQT scores also between 50 and 99 are considered to be the highest quality female recruits. Where applicable, the other C-groups will be compared against these two base C-groups.

Explanatory Variables. The base case for each C-group is not the same throughout the analysis so many of the variables cannot be compared across the C-groups. Certain explanatory variables are used in each C-group but are not significant in specific cases thereby limiting their usefulness for the purpose of this evaluation. Among variables studied across all C-groups, race is the dominant predictor of reenlistment. Black or white was a significant predictor in all 10 C-groups while other race was significant in eight of the 10 C-groups. Table 6-1 compares the significance of the race variables across all C-groups.

Table 6-1. Probability Change (Percent) of Reenlistment by Race by C-Group

	C-GROUP									
Variable	1	2	3	4	5	6	7	8	9	10
Black	6.51	13.38	*	4.02	10.25	21.02	*	22.20	8.73	20.83
White	*	*	-15.56	*	*	*	-24.67	*	*	*
Other	1.09	2.58	#	2.30	3.58	2.39	-2.31	#	1.66	4.28

Not significant at .10 level
* Variable not used in model

In concurrence with many of the studies reviewed in Chapter 2 (Delaney, Lakhani-Gilroy, and Cooke-Quester), the results of table 6-1 indicate that BLACK is a significant positive estimator of reenlistment among first term recruits across all C-

groups. The two C-groups where black is the base case; C-groups 3 and 7, the probability of whites reenlisting were substantially lower than that of their black counterparts. Other race was also a consistent positive indicator of reenlistment when compared against the white base case, but was a negative indicator when compared against the black base case. This indicates that other race is a positive indicator when compared to a white recruit but not as positive an indicator as the black recruit.

Another variable used in all ten C-groups is age. Age was a positive indicator of reenlistment in nine of the ten C-groups. The only C-group that age was not significant was C-group 8, the smallest group. Recruits above the average age tended to reenlist at a higher rate than the younger recruits across the C-groups. Table 6-2 compares age across all the C-groups.

Table 6-2. Probability Change (Percent) of Reenlistment by Age by C-Group

	C-GROUP									
Variable	1	2	3	4	5	6	7	8	9	10
Age	2.16	1.06	4.14	4.26	5.67	3.28	3.67	#	2.17	2.90

Not significant at .10 level

Table 6-2 indicates that older soldiers have a tendency to reenlist several percentage points higher than their younger counterparts, in contrast to Buddin's findings (*Analysis of Early Military Attrition Behavior*). Older soldiers may already have attempted to earn a living outside of the military environment and be satisfied with military life.

Two other variables that are consistent indicators across the majority of the C-groups are youth program participation and technical occupation. Youth program participation was significant in seven of the ten C-groups, as was technical occupation.

Table 6-3 compares the youth program participation and technical occupation variables across all ten C-groups.

Table 6-3. Probability Change (Percent) of Reenlistment by Youth Program Participation and Technical Occupation by C-Group

	C-GROUP									
Variable	1	2	3	4	5	6	7	8	9	10
Youth Program	1.45	1.19	2.11	0.86	#	1.08	#	#	1.08	0.73
Technical Occupation	5.05	#	#	#	-5.87	4.66	1.76	8.94	1.35	3.67

Not significant at .10 level

Table 6-3 demonstrates the positive impact of recruits' participation in youth programs among the male recruits and the highest quality female recruits. It is not significant among the lower quality male recruits nor the lower quality female recruits. These three C-groups are also the smallest C-groups in the study.

Technical occupation is a positive indicator among six of the seven C-groups that it is significant. The lone negative indicator is for C-group 5; the lowest quality male recruits. In contrast to Delaney's studies, this thesis found that enlistees with a technical occupation in C-group 1 had a positive impact on the reenlistment decision. All female C-groups had strong indicators of reenlistment from recruits with technical occupations.

C-Group Comparison.

A comparison of across C-groups provides indications of specific variables that may only affect certain C-groups or perhaps that explanatory variable affects all C-groups the same. C-group 1 is considered to be the top quality recruits for males and C-group 6 is considered to be the top quality recruits for females. Table 6-4 compares these two C-

groups against each other to look for differences among female and male high quality recruits and also to establish the base case C-groups for comparison against other C-groups.

Table 6-4. Comparison of Probability Changes between C-groups 1 and 6.

		C-GROUP	
		1	6
VARIABLES	Bonus	-0.83	-1.22
	Enlistment Option	#	#
	Black	6.51	21.02
	Other Race	1.09	2.39
	Single with children	#	#
	Married no children	#	-0.54
	Married with children	2.91	#
	Enlistment Waiver required	-0.63	#
	Prior College	-0.47	#
	Youth program participation	1.45	1.08
	AFQT CAT I	-0.50	-0.95
	3-year term	-2.09	1.73
	Age	2.16	3.28
	Technical occupation	5.05	4.66

Not significant at .10 level

Table 6-4 indicates that not all variables are significant among male and female recruits. Of the eight variables that are significant in both models, seven have the same indicator. The only discrepancy is 3-year term, which is a negative indicator for males but a positive indicator for females. Race, age and technical occupation are strong indicators for both genders while married with children is only significant for males. Black is a much stronger indicator among females then it is among males while the other variables are similar in strength. Interesting to note that those receiving enlistment bonuses are less likely to reenlist than those that did not receive a bonus across both genders. For females, married no children is a negative indicator of reenlistment.

Now that C-groups 1 and 6 are established as the base C-group, other C-groups can be compared against these "high quality" recruits to determine trends and similarities. When comparing future C-groups, only significant variables will be compared while other variables will be discussed on an exception basis.

Since C-group 9 is a compilation of all AFQT scores and education levels, it is the most comparable in terms of recruit quality to C-group 1. A comparison across these two C-groups allows for an analysis of term length as a barometer of recruit quality and reenlistment trends. Table 6-5 displays the comparison of C-groups 1 and 9.

Table 6-5. Comparison of Probability Changes between C-groups 1 and 9

VARIABLES		C-GROUP	
		1	9
	Black	6.51	8.73
	Other Race	1.09	1.66
	Married with children	2.91	2.83
	Enlistment Waiver required	-0.63	-0.87
	Prior College	-0.47	-1.04
	Youth program participation	1.45	1.08
	AFQT CAT I	-0.50	-0.88
	3/5-year term	-2.09	5.14
	Age	2.16	2.17
	Technical occupation	5.05	1.35

Table 6-5 displays the associated probability change for only the variables that are significant for both C-groups. The signs and coefficients are very similar across the board except for term. The variable for C-group 1 is 3-year term and it is negative. The variable for C-group 9 is 5-year term and it is positive. The base case for C-group 1 is 4-year term while the base case for C-group 9 is a 2-year term. The indications are that recruits that enlist for a longer initial term tend to reenlist at a rate several percentage points higher than recruits that enlisted for a shorter initial term. The trend from table 6-5

indicates that the highest quality recruits, those in AFQT CAT I, reenlist at a lower rate than the base case score, which is AFQT CAT II. These two C-groups are very similar in indicators across the variables.

Table 6-6 displays the female version of table 6-5. This table compares the highest quality female recruits, those in C-group 6, against the compilation of recruits in C-group 10, which, like C-group 9, consists of all education levels and all AFQT CAT scores. Both C-groups have close to the same base case with the only exception being the average age of C-group 1 is 21.0 compared to 20.9 for C-group 6.

Table 6-6. Comparison of Probability Changes between C-groups 6 and 10.

VARIABLES		C-GROUP	
		6	10
	Bonus	-1.22	0.57
	Black	21.02	20.83
	Other Race	2.39	4.28
	Youth program participation	1.08	0.73
	3/6-year term	1.73	-6.22
	Age	3.28	2.90
	Technical occupation	4.66	3.67

As with the previous comparison in table 6-5, most variables maintained the same positive or negative influence as the strength of the influence fluctuated moderately. However, receiving an enlistment bonus was a negative indicator of reenlistment for C-group 6, while it was a positive indicator of reenlistment for C-group 10. The enlistment term length, although different signs, indicates the same trend; shorter enlistment terms was an indication of a higher reenlistment rate. This is the exact opposite effect that the enlistment term had on male recruits as discussed in table 6-5. When comparing term

lengths across the C-groups, male C-groups had a negative effect for short-term lengths while female C-groups had a positive effect for short-term lengths.

The Army appears to be achieving its goal of reenlisting the highest quality recruits. As discussed in chapter 4, although C-group 1 is less than 35% of the total population, they are over 36% of the reenlistee population. Given these percentages, it appears that the Army is meeting its goal. But a closer analysis of the high quality recruits in C-groups 1 and 6 indicate that the highest quality recruits within the C-group are not reenlisting at the same rate as the lower quality recruits in that C-group. In both C-group 1 and 6, higher AFQT scores were negative indicators of reenlistment. Other negative indicators were prior college and the receipt of an enlistment bonus. These variables indicate that the ambitious college program offered is not reenlisting the target audience at the same rate as the other categories.

The most dominating variable in all the models was race. This study indicates that the Army is trending toward a higher number of minority soldiers in its ranks than the United States population as a whole and the racial composition of the enlistee cohorts. Although 72% of all enlistees are white, only 62% of reenlistees are white. Black recruits increase from 22% of enlistees to 31% of reenlistees while other races remain relatively stable only increasing from 6% of enlistees to 6.9% of reenlistees.

B. RECOMMENDATIONS FOR FUTURE STUDY

Based on the findings of this study, further analysis on reenlistment behavior can be incorporated into a comprehensive Department of the Army program to appropriately target and recruit those soldiers most likely to stay, based on a variety of factors. Further study on youth program participation to determine likely explanations for its success in

the positive reenlistment decision included. Another area for future study is an analysis of enlistment terms on the reenlistment decisions of recruits by gender. This study indicated that the initial term of service had the exact opposite effects on the reenlistment decisions of male recruits versus female recruits.

The final recommendation is to conduct an ongoing annual study using similar variables with a constantly updated database of recruits. This analysis would evolve with the changing nature of the enlistment audience. Economic factors such as unemployment could be added also.

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