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Augmented Selection Criteria for Enlisted Personnel

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13. ABSTRACT *(Maximum 200 words)*

The Armed Forces Qualification Test (AFQT), a composite of math and verbal scores, is used to determine eligibility for entry into the Armed Services. The goal of this project was to identify characteristics of individuals scoring below average on this test which differentiated those who can or cannot perform successfully in various jobs in the Army. The AFQT is part of a test battery known as the Armed Services Vocational Aptitude Battery (ASVAB). When the ASVAB was put into place in 1976, there were undetected flaws in the method used to determine appropriate percentile scores in reference to the normative population. Because of this "misnorming," many recruits were accessed who, if the misnorming had not taken place, would have been identified as belonging in below average AFQT categories. This misnorming continued until it was discovered and corrected in 1980. This project examined data on over 150,000 soldiers who were accessed during the misnorming period. Predictor variables examined included ASVAB subtest scores, interest measure scores, educational background, and demographic variables. These were linked to the following outcome measures: attrition, reenlistment eligibility, performance on a written job knowledge test, the Skill Qualification Test (SQT), and junior grade (to E-4) promotion rate. Analyses focused on the relationship between predictors and outcome for those identified as below average scorers on the AFQT. Major findings included these: diploma status was best at predicting attrition and also tended to be the best predictor of promotion. A group of cognitive ASVAB subtests were superior predictors of performance on the job knowledge test.

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Armed Services Vocational Aptitude Battery (ASVAB); Armed Forces Qualification Test (AFQT); Skill Qualification Test (SQT); Aptitude; Attrition; High School Diploma Status; Promotion; Army; Selection; Military Occupational Specialty (MOS)

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The HumRRO Project Director for this study was Dr. Janice H. Laurence. Dr. Laurence was joined by many able project team members. Dr. Rodney A. McCloy provided statistical and interpretation in all phases of this project. Ms. Ani S. DiFazio built the analytic data sets for this project, provided critical oversight in defindings the criteria, and documented the entire analytic process. Dr. Peter F. Ramsberger was instrumental in defining the conceptual and policy nature of this effort. In addition to the authors, the project benefitted from the assistance of others. The project itself was administered in the Personnel Selection and Classification program area, whose director is Mr. James H. Harris. Ms. Charlotte Campbell and Mr. Roy C. Campbell provided guidance in selecting the MOS to be studied and lent their historical knowledge of the Army performance measures. In addition Ms. Kerry Brown and Ms. Carolyn Hill-Fotouhi assisted with data analysis at various stages of the project.

PREFACE

Several references are made in this report to "low aptitude personnel." This is shorthand for "below average score on the Armed Forces Qualification Test." It ***should not*** be interpreted as an evaluative statement about individuals with low scores on the AFQT. AFQT is but one indicator of an individual's aptitude to perform well in an Army job. This is a point which is central to the purpose of this effort, which is to identify other indicators predictive of success in an Army job, whether that success be reflected in performance, promotion, reenlistment eligibility or failure to attrit. Thus, the reader is advised to ignore any broad negative connotations which may be associated with the term "low aptitude personnel" and recognize the more restrictive meaning meant to be conveyed.

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Chapter 1

Introduction

Background

The Department of Defense (DoD) and the Military Services have long been concerned with the quality of incoming enlisted personnel. Over the years, intellectual capacity or cognitive ability has increasingly served as the primary measure in this regard (Waters, Laurence & Camara, 1987). In 1940 the principal requirement for accession was that a recruit be able to understand simple commands given in the English language (Laurence, Waters, & Perelman, 1982). During World War II, education screens (e.g., 4th-grade reading level) were applied at entry to ensure sufficient intellectual capacity to absorb military training. After entry, such screens were followed by standardized measures such as the Army General Classification Test (AGCT), used to assign newly enlisted soldiers to occupations. Beginning in 1950, testing programs were expanded with the introduction of a measure of general ability--the Armed Forces Qualification Test (AFQT).[1] Other more specialized tests continued to be used by the individual Services for job assignment purposes.

In 1976, the screening and classification function was consolidated with the introduction of a Joint-Service instrument--the Armed Services Vocational Aptitude Battery (ASVAB). Administered prior to entry, the ASVAB incorporated the AFQT as well as other, more vocational, subtests (e.g., general science, mechanical comprehension). These subtests were configured in various ways to form classification composites, such as general maintenance, electronic, and clerical. Today, new editions of the ASVAB and its AFQT component are used by the Services for both selection and occupational assignment purposes.

Since its institution, the AFQT has served as the principal quality gauge. Scores are typically reported in five broad categories of percentile ranges (with Categories III and IV further subdivided) relative to the national youth population[2] as follows:

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[1] General ability has typically been operationalized in terms of verbal and math skills, although early versions of the AFQT also contained subtests measuring spatial relations and knowledge of tool functions.

[2] From 1950 to 1984 the reference population comprised all men on active duty as of 31 December 1944 who had taken the AGCT, which was later statistically calibrated to the AFQT scale. Since 1984, a nationally representative sample of youth, ages 18 through 24 in 1980, has served as the reference population

Category	Percentile Range
I	93 - 99
II	65 - 92
IIIA	50 - 64
IIIB	31 - 49
IVA	21 - 30
IVB	16 - 20
IVC	10 - 15
V	1 - 9

By law, persons who score in Category V are ineligible for military induction or enlistment. Although qualifying aptitude standards have varied, persons in the lower half of the distribution (Categories IIIB and particularly IV) generally have been admitted sparingly.

These restrictions reflect the fact that quality is always desired. However, the military must also contend with quantitative manpower demands that affect the resulting recruit aptitude distribution. For example, in response to past mobilizations (e.g., World War II, the Korean conflict) standards were lowered to meet increased personnel needs. Since the end of the Vietnam War, and after gaining experience with all-volunteer force recruiting, the Services have been able to maintain fairly high admission standards. Particularly over the last decade or so, the Services have strived for and achieved record proportions of high quality youth as measured by the AFQT. For instance, the percentage of recruits scoring within Category IV has been 10% or less since 1984, and 5% or less since 1987. In fact, in FY 1992 less than 1% of new recruits scored in the Category IV range. At the same time the Army, along with the other Services, has increased the proportion of accessions who score within the upper half of the AFQT distribution. In FY 1992, 75% of those accepted were Category IIIA or higher.

Similar positive trends are evident in another quality indicator--high school diploma graduate status. Almost all recent recruits have had a traditional diploma, compared to an overall graduation rate of about 75% of the nation's youth of prime military age. When AFQT and education credential status are combined into a single quality barometer, 76% of FY 1992 Army accessions were of high quality (Department of Defense, 1993).

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for interpreting AFQT scores.

Despite these favorable quality trends and the current reduction in force brought about by the events in Eastern Europe and the former Soviet Union, there are reasons for concern about the future recruiting environment. First, there is the decrease in the population of 17 to 21 year-olds, from which the Army and the other Services traditionally recruit. Projections indicate that the size of the 18-year-old cohort will be 20% smaller in 1995 than it was in 1980.

Despite the mitigating impact of the drawdown, however, there are indications that even when the so-called "baby-bust" has ended, the availability of *high-quality*, male high school graduates may not make a comeback. This is possible because of the increasing diversity of the workforce, with a growing representation of minorities and immigrants. This trend leads to concerns that, because of language deficits and/or relatively deprived backgrounds, many individuals in the evolving recruit pool may lack the necessary skills for the types of jobs that are available today, not to mention in the future (Educational Testing Service, 1987; Johnston & Packer, 1987; Kageff & Laurence, in press). Further compounding the problem is the fact that this fundamental skills decline is occurring at a time of fast-paced technological growth. Therefore the competition for the best qualified labor force entrants will be fierce. Finally, because of the force drawdown, defense budget cuts will almost certainly affect the recruiting and advertising functions. This may mean that fewer recruiters will have to work even more efficiently to fill the leaner forces with high quality young people.

There are a number of possible strategies that the Army could use to cope with these contingencies. One obvious, though costly, solution would be to increase enlistment bonuses and benefits to ensure that military service remains an attractive option for those in the prime recruiting group. This is most likely untenable given the budget deficits and corresponding constraints on spending. Another possibility is to lower operational cutting scores and quality goals to allow a higher proportion of below-average [3] youth to enter to the Army. In the past this has not been a popular approach among military leaders, primarily because of the vast amounts of data that indicate that lower aptitude individuals do not perform as well as their brighter counterparts. However, this very solution to potential manpower problems is advocated by some in positions of power as a means of uplifting the disadvantaged (Laurence & Ramsberger, 1991; Sellman, 1992).

[3] See Editor's Notes, Note 1.

Similar issues and problems regarding military manpower have surfaced in the past. During World War II and the Korean Conflict, for instance, there were relatively high rejection rates for military entry and widespread reports of in-service performance deficiencies. This led a number of authors to suggest that the selection and classification of lower aptitude individuals be studied to determine who among this group could serve effectively and in what capacities (Rundquist, 1967). However, such efforts were difficult to undertake during times of conflict and were generally deemed unnecessary during times of peace.

Unlike in the past, the Army has now taken a proactive stance and is seeking strategies for recruiting and classifying low-aptitude personnel [4] *before* manpower shortages surface and make such a move necessary. This investigation is the subject of this report. It involves harvesting the lessons learned from the military's previous experiences with large influxes of Category IVs.

One potentially rich source of information in this regard is provided by Project 100,000. Beginning in 1966, over 300,000 low-aptitude men were enlisted or drafted as part of this program, which was initiated by then-Secretary of Defense Robert McNamara to coincide with President Lyndon Johnson's War on Poverty. McNamara sought to aid the disadvantaged through military service and at the same time achieve an equitable distribution of the benefits and burdens of service. Further, it was then argued, by accepting large numbers of lower aptitude men, information could be gleaned on their in-service experience. These data could then provide the military with guidelines on the optimum procedures to be used in their selection and classification.

Towards this end, a vast database was created documenting the characteristics and performance of those who became known as the New Standards Men. Additionally, a variety of studies were undertaken to address such issues as the career fields in which they could function successfully, the attributes that distinguish good performers from bad, and so on. In the end, however, such efforts were apparently hampered by the fact that the nation was involved in the conflict in Vietnam, and therefore military resources were already severely taxed. The data were often found lacking in quality, particularly in the latter years of the project. As the U.S. commitment in Southeast Asia abated, so did any apparent interest in the selection and classification of lower aptitude individuals. There

[4] See Editor's, Note, Note 2, and Preface.

is also anecdotal evidence indicating that the existing performance data from Project 100,000 are tainted by efforts to make the program work (Laurence & Ramsberger, 1991). That is, rather then being treated just like other soldiers (as the project's guidelines dictated), in many cases the new standards men were "helped" to succeed, both in training and on-the-job. Thus the data from Project 100,000, in addition to being dated, can also be considered at least somewhat suspect.

A later episode involving the *inadvertent* admission of large numbers of low-aptitude recruits provides a much better vantage point for studying their performance. When the DoD-wide version of the ASVAB was put into place in 1976, there were undetected flaws in the method used to determine appropriate percentile scores in reference to the normative population. These errors had the effect of inflating scores in the lower ability range, with many recruits who were thought to be of average aptitude actually belonging in the below-average, or Category IV range. By the time the errors were detected, verified, and corrected in October 1980, over 300,000 "Potentially Ineligibles" or PIs (Greenberg, 1980) had entered the military. Because these individuals were accessed unknowingly, no special data were collected on them beyond the considerable amount contained in normal service records.

When the in-service experience of the PIs was examined they were found to have higher basic training drop-out rates, lower Skill Qualification Test (SQT) scores, slower promotion rates, higher attrition rates, and more non-judicial punishments and courts martials as compared to their higher aptitude counterparts (Greenberg, 1980; Shields & Grafton, 1983; Ramsberger & Means, 1987). Such findings, like those obtained during Project 100,000, would seem to confirm the inadvisability of allowing lesser-ability men into the military. However, there may be some important qualifiers to this conclusion. For instance, Vineberg, Sticht, Taylor, and Caylor (1971) examined the performance of the New Standards Men from Project 100,000 in four Military Occupational Specialties (MOS). Although ability to do the job was related to both experience and aptitude, these researchers found that a significant proportion of low-aptitude soldiers were able to reach an adequate level of performance in a reasonable time. Further, the fact that 14% of the Category IV personnel admitted during the ASVAB misnorming era were still on

active duty at the end of FY 1988 can also be taken as an indication that many lower aptitude men can succeed (Laurence & Ramsberger, 1991).

These latter findings suggest that by selecting individuals on the basis of AFQT score alone, the Army may be losing out on a potential source of personnel; personnel that may be needed in the future given the aforementioned population projections and possible recruiting problems. Determining how to differentiate more accurately between the successful and unsuccessful performers among this group, in conjunction with studying how below-average aptitude personnel can be appropriately assigned, would allow the Army to tap further into the potential manpower pool without sacrificing the ultimate goal of a fully-qualified force.

Objectives

Cognizant of the potential expansion of the role of low-aptitude soldiers in the future, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) contracted with the Human Resources Research Organization (HumRRO) to investigate augmented selection criteria for such enlisted personnel. In addition to isolating relevant individual characteristics that might serve as compensatory predictors, the Army also seeks to identify those MOS in which soldiers of average to below-average cognitive ability can perform most and least effectively. Ultimately, recommendations regarding possible compensatory composite(s) for selecting the "best" from among the low-aptitude population are sought on the basis of the findings from this study.

To accomplish these objectives, we relied on readily available information about lower aptitude individuals from extant military databases. Such files contain a wide range of predictor and performance outcome measures. The predictors include height, weight, geographic region of origin, age at entry, highest year of education, marital/dependents status, ASVAB subtest scores, and interest test results. Performance outcome measures include SQT scores, promotion history, length of service, and reasons for discharge.

We focused on those soldiers who entered the Army for the first time during the ASVAB misnorming (1977-1980). Data on this large group of low-aptitude men provided an opportunity to perform extensive analyses aimed at identifying alternative

selection criteria and appropriate MOS [5]. As compared to Project 100,000, data from the misnorming are relatively uncontaminated. Further, because these low-aptitude individuals were brought in inadvertently, many were assigned to jobs they might not have been given had their true aptitude levels been known.

A secondary effort within this project was to conduct an expert judgment study. We examined the convergence between relationships discovered by means of empirical data analysis and relationships predicted by measurement experts. This was intended to provide a basis for generalizing the findings from the misnorming era to the present day. More specifically, if the experts' judgments are similar to the empirical validities for predictors common across time frames, it may suggest that the Army consider using such judgments to evaluate other predictors for the selection of below-average aptitude recruits.

Chapter 2 presents a summary of the research conducted to date as part of this project (i.e., predictor and criterion identification, and MOS selection). Chapter 3 describes the database development and structure. The analyses are explained in Chapter 4. Chapter 5 discusses the results of the expert judgment study and compares those judgments with the comparable findings in Chapter 4. Chapter 6 summarizes the findings and offers conclusions.

[5] See Editor's Notes, Note 3.

Chapter 2

Establishing the Framework

Previous project reports detail the methods used to identify the predictors, criteria, and MOS that were, in turn, used to evaluate selection and classification procedures for low-aptitude personnel (Ramsberger, 1991; McCloy, Ramsberger, Harris, Campbell, & Laurence, 1992). Because this earlier work forms the basis for the efforts described in the remainder of this report, a brief summary is presented here.

Predictor Identification and Definition

The first step in identifying potential predictors was to review past research on the performance of low-aptitude individuals in the military (Ramsberger, 1991). The literature revealed 22 predictors or predictor constructs (including individual ASVAB subtests) that had been examined as possible discriminators between successful and unsuccessful low-aptitude personnel. Of these, it was recommended that four be rejected because: 1) there was little in the way of evidence suggesting a relationship between the construct and performance, and/or; 2) measures of the construct were not available on the databases used in this work. For example, past research suggests that there is little or no relationship between the geographic region in which the recruit was living at the time of enlistment and subsequent performance. At the same time, other work has demonstrated that alternate selection tests (e.g., listening, pattern matching, dial reading) can contribute significantly to the prediction of success/failure among the low-aptitude. Unfortunately, however, such measures were not commonly available on the databases used in this project.

Table 1 displays the final list of predictor constructs and their short definitions or descriptions. The constructs fall into two broad categories: cognitive and non-cognitive. The cognitive predictors consist of abilities such as those measured by subtests of the ASVAB (i.e., numerical operations, mathematical knowledge, mechanical comprehension, general science, general information, electronics information, automotive information, and shop information).

Table 1
Predictor Constructs

Construct	Definition
New AFQT	WK + AR[a]
Numerical Operations	Speed and accuracy in performing simple arithmetic operations (i.e., addition, subtraction, multiplication, division).
Mathematics Knowledge	Ability to use simple algebra and geometry along with arithmetic skills and reasoning power.
Mechanical Comprehension	Ability to learn, comprehend, and reason with mechanical terms. More specifically, the ability to perceive and understand the relationships of physical forces and mechanical elements in practical situations.
General Science	Knowledge of basic scientific principles.
General Information	General knowledge of a variety of subjects.
Electronics Information	Knowledge of electrical or electronic systems and operations.
Automotive Information	Knowledge of maintenance and repair of automotive equipment.
Shop Information	Knowledge of shop terminology and practices and the use of tools.
Education	Successful completion of formal training through four years of high school.
Psychological Variables (Temperament)	Characteristic tendencies of emotional responses (e.g., need for achievement, altruism).
Biographical Information	Measures an individual's background and life experiences.
Interests	Preference for various activities, characteristics, and tasks (e.g., routine work, manipulation of machines).
Physical Fitness	Physical capacity to perform exercise. Comprised of three components: (a) strength--ability to lift heavy objects once; (b) aerobic capacity--cardiovascular endurance, and (c) muscular endurance--ability to lift heavy objects over time.
Psychomotor Abilities	Motor actions directly resulting from mental activity (e.g., multi-limb coordination, manual dexterity).
Perceptual Speed and Accuracy	Ability to perceive visual information quickly and accurately and to perform processing tasks with it (e.g., comparisons).
Spatial Ability	Ability to visualize or rotate objects and figures in space.
Age at Enlistment	Age at which an individual joins the Army, typically 17 to 21 years of age.
Marital Status/Number of Dependents	Having a spouse and/or one or more dependent children.

[a] During the time of the misnorming the AFQT was made up of Word Knowledge, Arithmetic Reasoning, and Space Perception subtests. The latter is not included in the current AFQT, and therefore was eliminated from the construct when used as a predictor in this research so as to provide a better approximation of the measure now in use. Note that all three subtests were used to classify individuals into AFQT categories.

The non-cognitive predictor category can further be subdivided into three classifications. The first, called *Background and Interests*, incorporates education, psychological variables, biographical information, interests, and physical fitness. The second group includes psychomotor abilities, perceptual speed and accuracy, and spatial ability; it is appropriately labelled *Psychomotor Variables*. The final non-cognitive predictor classification, termed *Demographic Variables*, includes age at enlistment, marital status, and number of dependents.

Criterion Identification and Definition

The second step in conducting this phase of the study was to identify aspects of job performance that could be used as criteria. As with predictor selection, our goals were to find job performance criteria that define success in any MOS, and for which scores were available on the extant datafiles. The investigation of previous research yielded four criteria: attrition, SQT score, promotion, and reenlistment eligibility.

Attrition. Attrition is defined as separating from the Army prior to completion of the contracted term of service. The "contract" entered into when enlisting in the military is based on the notion that the Services will make an investment in an individual (selection, training, outfitting, transporting) with the understanding that that investment will be repaid through performance on-the-job. When someone separates prematurely, the balance between investment and return is altered to a greater or lesser extent depending on when that separation occurs (e.g., someone who exits shortly after completing training "pays back" less than someone who performs on the job for some period of time before leaving). Thus, attrition is something that the Army would prefer to avoid. As is detailed in the next chapter, a distinction was made between two types of separations: 1) pejorative, or those that occurred due to negative reasons directly related to the behavior or character of the person in question, such as failure to meet performance standards, and; 2) nonpejorative, or departures that were event-driven (e.g., death, sole surviving son status). Because the latter were unrelated to characteristics of the individual, and thus more difficult to predict, they were not included as cases of attrition in this study.

SQT Score. The SQT is a written, multiple-choice test used in the past to evaluate a soldier's technical knowledge of, and skill level proficiency in, his or her MOS. Generally, the exam took approximately two hours to complete, and all soldiers in skill levels 1 through 4 were tested annually in their primary MOS. The SQT was scheduled in advance to allow soldiers to prepare. (See Chapter 3 for more details on the SQT).

Promotion. Advancement in the Army depends on factors that are both internal and external to a soldier's control. Internal factors include SQT performance and, to some extent, supervisory ratings. External factors include time in grade (e.g., soldiers are generally awarded the rank of E-2 upon completion of basic training), manpower needs, policy decisions, and the number of openings within an MOS.

Reenlistment Eligibility. In the context of this study, reenlistment eligibility refers to a soldier's suitability for a second term of service in the Army. It is often used as a summary indicator of success. Individual achievements as reflected in SQT performance, supervisor ratings, and promotions influence reenlistment eligibility. However, factors outside a soldier's control also have an impact, the most important of which is the need for manpower--overall and within a given MOS.

MOS Identification

There are over 260 entry-level Army MOS. To evaluate all of them in detail in terms of their suitability for lower aptitude soldiers would be beyond the scope of this effort. Therefore, to make the study results more generalizable, the entry-level MOS were grouped on the basis of several characteristics such that the results of exhaustive analyses of one job could then be generalized to others in the same group. This grouping process took place in three phases: a literature review, a cluster analysis, and a consideration of other factors and classification schemes. (See McCloy, et al. for a detailed description of this work.)

Literature Review. The literature review focused on studies of the performance of lower aptitude personnel in specific occupations. Most of this research stemmed from Project 100,000, while some additional studies were found that examined the training and/or job performance of those erroneously admitted as a result of the ASVAB misnorming.

This review revealed that jobs suitable for low-aptitude personnel are characterized by: (1) a high practical performance component; (2) a long period of training, and; (3) a minimal level of supervision needed (i.e., low level of complexity). Jobs not suitable for low-aptitude personnel, on the other hand, have the following characteristics: (1) a high reading and/or computational component; (2) a requirement for learning strategies and information processing techniques; (3) a high cognitive component, and; (4) a need for technically complex equipment.

Cluster Analysis. The next phase in the process of selecting MOS for evaluation in terms of their suitability for low-aptitude personnel was to perform cluster analyses. This involved two steps. First was an examination of 263 entry-level MOS in terms of their attributes on the 44 variables used to analyze jobs for the Dictionary of Occupational Titles (DOT) (U.S. Department of Labor, 1977). Where possible, variable codes and job information for military-specific occupations were used (e.g., Infantryman, Vulcan Crewmember, Antitank Assault Gunner). When such information was unavailable, codes for comparable civilian jobs were substituted.

Describing 263 jobs in terms of 44 variables is rather cumbersome. So the first step was to reduce this number by performing a factor analysis on the job descriptive data. This resulted in the following four principal components: (1) Things versus People; (2) Cognitive Complexity; (3) Difficult Working Conditions, and; (4) Stress/Decision Making. These four components accounted for 50% of the variance in the original variables. Although this is a rather low amount of explained variance for four components, it is similar to that obtained in other research (Harris, et al., 1991).

The second step in this process involved performing cluster analyses on the factor loadings. An iterative method (i.e., k-means cluster procedure) was used, and a 20-cluster solution was selected as providing the most meaningful differentiation.

Other Factors and Classification Schemes. The third and final step in the MOS analysis was to examine other occupational coding schema, along with pragmatic factors, to select representative MOS from each of the 20 clusters. Specifically, we looked at: (1) the number of accessions in each MOS; (2) the MOS membership in the Army's Career Management Fields (CMF); (3) the subject matter expert clustering performed for Project A, (4) the Project A utility values; (5) MOS stability; (6) training costs for

each MOS, and; (7) the degree to which the MOS had been studied in the past. These are described below.

Number of Accessions. As mentioned previously, we were interested in determining the utility of alternate predictors for lower aptitude individuals. To make within-job comparisons between aptitude levels, we considered only MOS with at least 100 Category IV soldiers *and* at least 100 Category IIIB accessions across the 1977-1980 cohorts.

Career Management Fields. The Army's MOS are allocated to CMF to provide logical career progressions from entry into training through retirement at grade E-9. During the years 1977 to 1980, there were 30 CMF. Of these, 25 contained at least one MOS that met the sample size requirements.

Project A Clusters. For Project A, entry-level MOS were sorted into clusters by Army officers and MOS experts based on the similarity of job performance requirements (Hoffman, 1987). This resulted in 23 clusters, 4 of which had no MOS that met the sample size criteria (i.e., Surveyors, Specialists, Firefighter/Diver, and Technical Equipment Repairer).

Project A Utility Values. The utility studies (Sadacca, White, Campbell, DiFazio, & Schultz, 1989; Sadacca, Campbell, DiFazio, Schultz, & White, 1990) provide information on the relative value of job performance at various levels of proficiency (10^{th}, 30^{th}, 50^{th}, 70^{th}, and 90^{th} percentiles) for many of the MOS in our sample. Additionally, ranges of utilities were calculated between (a) the 10^{th} and 30^{th} percentiles and (b) the 10^{th} and 90^{th} percentiles. Using the utility data in conjunction with the clustering results, MOS in which poor performers were expected to be either very useful or of little use were selected from each cluster. Poor performance was considered to be of high utility when the usefulness of individuals performing at the 10^{th} percentile was high and when the difference between the utilities of 10^{th} percentile and 90^{th} percentile soldiers was low. Poor performance was defined to be of little use in MOS where the utility of the 10^{th} percentile group was low and the 10^{th} to 90^{th} percentile difference in utility was great.

MOS Stability. Army MOS, just like jobs in other organizations, are dynamic. To generalize findings to the current Army based on data collected over a decade ago, it is necessary that the MOS studied have direct counterparts today. Job descriptive

information was used to ensure that each MOS chosen is essentially the same job today that it was some 14 years ago.

Training Costs. Another consideration was training costs. The literature review revealed that low-aptitude soldiers typically take longer to reach proficiency levels than do their higher-ability counterparts. Therefore, training data were examined to ensure that the entire range of costs was represented among the MOS selected. The cost data were derived from the Army Manpower Cost System (AMCOS) for the active component (Hogan, et al., 1991). Specifically, we used the average variable cost of training per graduate for a given MOS in grades 1 through 4. As restricted for this application, it includes all variable costs of initial individual training.

Degree Studied. To the extent possible, we tried to include MOS that had not been studied extensively in the past. For instance, jobs that had been thoroughly scrutinized as part of Project A were eliminated from further consideration unless they fit the other criteria particularly well.

Using the criteria described above, 25 MOS were selected for study. Table 2 lists the MOS selected and presents a summary of their characteristics.

Specific Objectives

The remainder of this report describes the analyses of the relationships between the predictors and the criteria, overall and within the 25 MOS. There were two fundamental issues. The first concerned the possibility of differential prediction for aptitude subgroups. This was explored by examining regression equations in terms of their homogeneity. That is, validity coefficients were calculated and compared for each predictor-criterion pair for AFQT Category IV and AFQT Category IIIB plus IV subgroups as well as across all AFQT categories.

The second issue was the amount of incremental validity exhibited by alternate predictors over the AFQT for the various aptitude groupings. To test homogeneity of regression for incremental validities, analyses similar to those just described were repeated. In other words, incremental validity coefficients were calculated and compared for all categories and within Category IV and IIIB plus IV subsets.

Table 2
Summary Characteristics of Selected MOS

MOS		Cluster	CMF	Project A [a]	Utility	Training Cost[b]
05H	EQ/SIGINT Intcp-IMC	7	98	E	Low	High
11B	Infantryman	6	11	A	High	Low
12C	Bridge Crewman	13	12	A	High	Mid-Low
13B	Cannon Crewman	13	13	B	High	Low
15E	PERSHING Msl Cmbr	3	13	B	Low	Low
16R	ADA Short Rg Gnry Crmn	6	16	B	High	Mid-Low
27F	VULCAN Repairer	9	27	U	Low	High
31J	Teletypewriter Rep	17	29	S	Low	Mid-High
36C	Wire Sys Inst/Op	17	31	C	High	Mid-Low
43E	Parachute Rigger	20	76	H	Low	Mid-High
51N	Water Trmt Sp	12	51	M	Mid	Mid-Low
51R	Interior Electrician	8	51	O	Mid	Low
52D	Pwr Gen Equip Rep	16	63	W	Mid	Mid-Low
55G	NUCWPN Maint Spt	1	55	G	Low	Mid-High
61B	Watercraft Operator	4	64	N	High	High
64C	Motor Transport Operator	5	64	N	High	High
68B	Acft Powerplant Rep	17	67	V	Low	High
71L	Administrative Specialist	7	71	J	High	Low
71N	Traffic Mgt Coord	18	64	H	Low	High
74D	Computer/Machine Op	7	74	D	Low	Mid-High
82C	FA Surveyor	18	13	A	Low	Mid-Low
84B	Still Photo Sp	2	84	R	Mid	High
92B	Medical Lab Sp	15	91	K	Low	Mid-High
94B	Food Service Sp	14	94	L	High	Mid-Low
95B	Military Police	19	95	P	Low	High

[a] Project A clusters:

A Combat Soldier
B Weapons Crewman
C Radio/Radar Operations
D Computer Procession
E Electronic Warfare
F Surveyors
G Nuclear/Biological/Chemical
H Supply
I Specialists
J Clerical
K Medical
L Food Service and Inspection
M Lab Specialists
N Heavy Equipment Operators
O Trades
P Military Police
Q Firefighter/Diver
R Arts
S Electronic Repair - Non-Missile
T Technical Equipment Operator
U Missile Repair
V Aircraft Repair
W Mechanics

[b] Training costs:

Low = $4,000 - $6,900
Mid-Low = $7,000 - $7,900
Mid-High = $8,000 - $12,900
High = $13,000 - $45,900

Assuming that constructs exist that identify low-aptitude individuals who are likely to succeed, classification then becomes an issue. For each of the selected MOS, the job proficiency of lower aptitude soldiers was compared to that of their higher aptitude counterparts. Specifically, the outcomes for Category IIIB and IV recruits on each of the criterion measures (i.e., attrition, SQT score, promotion, and reenlistment eligibility) were compared to those for higher scoring recruits. Prediction equations were developed for those MOS that demonstrated the greatest and least deficits for below-average and low-ability soldiers.

In developing prediction equations, a primary concern is whether the equations better predict the performance of low-aptitude recruits across, or within MOS. Other issues focus on fairness and differential prediction for subgroups (e.g., race). Fairness analyses were conducted to examine differential prediction for white and black soldiers. Sample sizes were not large enough to conduct fairness analyses for other racial/ethnic subgroups (e.g., Hispanic, Asian) or by gender.

Chapter 3

Definition of Variables and Development of the Database

Both the predictor and criterion measures analyzed in this study were drawn from archival sources. As a result, a certain amount of data cleaning and variable construction had to be done to suit the present purposes. In this section, we present in detail the operational definitions adopted for each variable in the predictor and criterion sets, and also describe the steps taken to finalize the database by defining the population.

Predictor Variables

The plan called for the examination of various predictor variables that characterize individual soldiers. A number of potentially relevant databases were examined to determine which one(s) provided the most complete picture of a soldier's career. In the end, the decision was made to draw the predictor data from an ARI-maintained version of the Cohort database. This file contains three types of information: accession, transactional, and loss. It includes over 60 variables that characterize an individual at the time of entry into service, including age, gender, race/ethnicity, education, and ASVAB score. Transactional data describe the soldier's career, including such variables as MOS and paygrade. The Cohort file used in this project reports transactional data at two points in time: as of December 1990, and as of the last match with the master or loss file prior to December 1990. Data on a soldier's first loss, including date and type of separation, are recorded for all types of separations, with permanent replacing temporary loss information. The complete list of predictor variables is presented in Table 3, and discussed below.

ASVAB Subtest Scores. These measures are straightforward. From the data tapes we extracted scores for each of the twelve subtests of ASVAB Form 6 or 7, that had been administered prior to enlistment. Cases for which a form of the ASVAB other than 6 or 7 was used, and cases of individuals having invalid scores (i.e., more than 12 subtests and four interest measures or values of zero, which might actually indicate that another form of the ASVAB was used), were deleted.

Table 3
Definitions of Predictors

ASVAB Subtest Scores

GI	General Information	MK	Mathematics Knowledge
NO	Numerical Operations	EI	Electronic Information
AD	Attention to Detail	MC	Mechanical Comprehension
WK	Word Knowledge	GS	General Science
AR	Arithmetic Reasoning	SI	Shop Information
SP	Space Perception	AI	Automotive Information

Interests (Classification Inventory)

CM	Maintenance	CE	Electronics
CA	Administrative	CC	Combat

Education at entry

0	Soldier has no high school diploma, including did not graduate and General Equivalency Diploma or other Certificate of high school attendance.	1	Soldier has a High School diploma or higher

Age at Entry	In months					
Race	1	White	2	Black	3	Other
Number of Dependents at entry	0	No dependents	1	Any dependents (including spouse)		
Advanced Enlistment Grade	0	None	1	Advanced enlistment grade, with or without other programs/options		
Physical characteristics	Height x weight					

Interests. The interest measures that were available from archival data were from the Army's Classification Inventory. This instrument yielded four scores indicating interest in Maintenance, Electronics, Administration, and Combat. As with the ASVAB subtest scores, these were readily available from the Cohort file.

Education. For this study, educational achievement at time of entry was defined as a dichotomous variable: having a high school diploma (with or without other education such as college) versus other credentials. The "other" level included those who did not complete high school, and those with a GED or other high school-equivalency. We could not retain all levels of this variable (e.g., all types of credentials and all levels of education less than high school diploma) because there were insufficient numbers of cases in most instances. Hence, they were collapsed into the "other" category. The inability to make more discrete distinctions in this regard is not terribly troublesome given that in previous research relating education to performance outcomes, high school diploma status has consistently stood out as the most important benchmark.

Dependents. The individual's number of dependents (including spouse) at time of entry was also on the accession portion of the datatapes. Marital status was coded dichotomously, as married (= 1) or other (= 0, including single, divorced, widowed, etc.). Number of dependents was originally coded to reflect the actual number, up to seven dependents, with 8 to 15 as a separate category. These were combined and recoded for this effort to a dichotomous variable (1 = no dependents, 0 = any dependents). This eliminated rarely encountered categories of the variable (i.e., individuals with more than two dependents at entry).

Age. Age at entry has been found to be associated with success in different types of jobs, and so was extracted from the accession data. Cases for which the age at enlistment was either less than 17 or greater than 35 were deleted; either value would suggest a miscoding on the file or an erroneous enlistment.

Race. Although racial group membership was included in the database, it was our intention that it be used only to conduct fairness analyses on any models developed, rather than as a predictor or selection variable. From the accession data, race was available in three formats: 1) White/Black/Other; 2) as any of 14 ethnic categories (in addition to "other" and "none", including, presumably, White), and; 3) as four categories of race-ethnicity (White non-Spanish, White Spanish, Black, or Malayan). In order to capture sufficient observations in each level for analysis, the first definition, with three levels, was adopted.

Advanced Enlistment Grade. Some 20 conditions related to enlistment options were contained in the accession data, including unit or geographic location guarantees, training or skill guarantees, buddy program, advanced enlistment grade, and all combinations thereof. Only the values indicating advanced enlistment grade, alone or in combination with the others, were retained as a control for analysis. This is an option for individuals who already have training or experience in a relevant discipline, and as such seemed likely to be related to promotion.

Physical Characteristics. As no reliable measures of physical strength or stamina were available from the data sets, the variable body mass was created, computed as weight x height. Outlier values were defined using physical standards set out in AR40-501, 1960. Values outside those limits were set to missing.

Criterion Variables

A review of the literature on indicators of success in military occupations, in conjunction with an examination of possible criteria contained on the various databases, led to the selection of five criterion variables: attrition, reenlistment eligibility, reenlistment, Skill Qualification Test (SQT) performance, and promotion rate. The variables are listed in Table 4, and are described below.

Two datasets were used to develop the criteria measures: the aforementioned ARI Cohort, and the Defense Manpower Data Center's Special Cohort Accession and Continuer (DSCAC) files. Like the Cohort file, the DSCAC is made up of accession, transactional (active duty), and loss information. Unlike the Cohort, which contains static snap-shots of a solider's career (i.e., as of certain points in time), the DSCAC contains up to 53 blocks of quarterly or semi-annual transactional data that allows more precise identification and measurement of changes in status. This more detailed information was particularly critical in formulating the promotion and time-to-promotion criteria. The disadvantage of the DSCAC is that it is unavailable for the 1977 cohort. In spite of this, we used the DSCAC to define promotion since it was the only dataset amenable to developing that measure. However, so that we could develop attrition and reenlistment criteria measures for all the years of interest, and because the Cohort file was amenable to the construction of these measures, we chose to use it for the remaining three criteria.

Table 4
Definition of Criteria

Attrition

Defined as separation for pejorative reasons before completion of the first enlistment term. The Interservice Separation Code (ISC) values that define "pejorative reasons" are:

010	=	Medical conditions existing prior to service
016-017	=	Medical, non-disability
022	=	Dependency or hardship
060-087	=	Failure to meet minimum performance or behavioral standards
091	=	Erroneous enlistment
093	=	Marriage
095	=	Minority
096	=	Conscientious objector
097	=	Parenthood
101-102	=	Desertion, imprisonment

Reenlistment Eligibility

Defined as having reenlisted or as having a Reenlistment Eligibility (RE) code indicating eligibility. A soldier who did not reenlist, and who did not have an interpretable RE code, was considered eligible if the ISC was one of the following:

001	=	Expiration of term of service
002-008	=	Early release
040-042	=	Entry to officer programs
090	=	Secretarial authority
092	=	Sole surviving son
098	=	Breach of contract by the Service
099	=	Other separation or discharge
100	=	Immediate reenlistment
103	=	Record correction
104	=	Missing in action or captured
105	=	Other, dropped from strength/rolls

/ Continued /

Table 4
Definition of Criteria (continued)

Reenlistment

Defined as reenlistment that occurs more than 12 months after the first enlistment.

Skill Qualification Test Score

Defined as the standardized percentage score for the first SQT taken by the soldier. [Note that for this criterion only, the soldier's MOS is defined as the SQT MOS rather than the training or enlistment MOS.]

Promotion Rate

Defined in terms of increases during the first term of enlistment and the time (months after entry) when the paygrade increase occurred. First term of enlistment defined by reference to the entry date, loss date, and first and/or second Date of Last Enlistment DOLE):

If:	End of first term defined as:
No DOLE found	Loss date
First DOLE follows a loss	Loss date
First DOLE is more than one year after entry	First DOLE or two years after entry, whichever is later
First DOLE is less than one year after entry, followed by permanent loss	Loss date
First DOLE is less than one year after entry, followed by second DOLE	Second DOLE or two years after entry, whichever is later
First DOLE is less than one year after entry, followed by loss, followed by second DOLE	Loss date

Attrition. For the purposes outlined here, attrition was defined as any early separation from service for pejorative reasons. Keeping in mind that our interest was in the *first-term* of service, there were two key elements to this definition. One is that the soldier left the Army *before* the end of the *first* term of enlistment; the second is that the soldier leave under less than favorable circumstances. Operationally defining attrition in this manner proved somewhat more difficult than initially anticipated. This was due primarily to the fact that temporary loss information is overwritten on an individual's record when subsequent loss data becomes available. Thus, if a soldier completes his first term of service and then reenlists, the record would show a separation for purposes of immediate reenlistment. For argument sake, let's say that early in the second term this same soldier develops major disciplinary problems and is involuntarily separated from the Army. His record will now indicate attrition for pejorative reasons. In classifying cases of attrition, therefore, it was essential to take steps to ensure that the loss information being examined was from the first term.

With this in mind, we used a variable called "enlistment term" from the cohort file to detect early first-term separations. These data are entered at the time of entry into service, and reflect the contractual length of the initial term. If a soldier spent as much (or more) time in the military as he was supposed to (i.e., the length specified by the enlistment term variable), then he was not considered an attrition regardless of information concerning the nature of his separation.

For those soldiers who left the Army at any time before the end of their term of enlistment, we used the Interservice Separation Code (ISC) to categorize the separation as pejorative or not.[4] If the soldier left before completing the first term and the ISC was missing, then the Separation Program Designator code (SPD) was translated to an

[4] The Interservice Separation Codes (ISC) were developed by the Defense Manpower Data Center (DMDC) to enable meaningful cross-service comparisons of separation reasons. Originally developed with Separation Program Numbers (SPN), the ISC codes are now based on the DoD Standard Data Element called the Separation Program Designator (SPD). The first two positions of the ISC code put the cause for separation in a broad category (e.g., 01 = Medical Disqualifications), while the third position specifies the cause within that broad category (e.g., 012 = Permanent disability, retired). For enlisted personnel, the ISC is usually a direct translation from the SPD; however, if the character of service (designating conditions of discharge) is other than Honorable, then the ISC will be coded as 082, Unsuitability (Reason Unknown), even though the SPD might reflect a successful term of enlistment. Prior to 1978, conversion to ISC was not performed.

ISC before the classification rules were applied. The determination as to which ISCs would be considered pejorative was based on the Compensatory Screening Model for Attrition (Dempsey, Laurence, Waters, & McBride, 1991). When the ISC was one of those listed in Table 4, the case was classified as a pejorative attrition.

Note that soldiers separating from the Army shortly before the end of their first term under early release programs would not be flagged as pejorative attrition using this classification scheme. Also, in cases where the ISC and SPD were both missing or had invalid coding, the attrition variable was set to missing.

Reenlistment Eligibility. For our purposes, this means that a soldier was allowed to reenlist at the end of the first term. We first stipulated that those who had in fact reenlisted (as defined below) were considered eligible. Conversely, any soldier who was counted as an attrition was considered ineligible to reenlist. For the remaining soldiers, if the variable "Reenlistment Eligibility" (RE) was coded positively, the soldier was considered eligible. If the RE code was missing or contained an invalid character, we examined the ISC (or SPD, if ISC was missing) and applied the logic described under attrition.

Reenlistment. The event of interest was reenlistment that occurred 12 months or more after the soldier's initial entry into the Army. There are a variety of circumstances under which an individual may opt to reenlist relatively soon in their first term. For instance, a new recruit may want a particular occupation that was not available when he initially entered the Army. If that MOS should open up, he may choose to *re*enlist to obtain the assignment. We decided not to count such events as true reenlistments because of the individual's relatively short tenure; this occurrence doesn't reflect directly on performance per se, which was the real interest in this study.

The dataset contains each soldier's most recent enlistment date as of December 1990. If that date was after entry by more than 12 months, then the soldier was counted as a reenlistment. If, however, it was either the same as, or less than 12 months after the entry date, then the soldier was not counted as a reenlistment. Obviously, cases with pejorative separations (as defined above) were also not counted as reenlistments.

Skill Qualification Test (SQT) Score[6]. Skill Qualification Tests (SQT) were administered to soldiers from 1977 to 1991. Specific versions were developed for each MOS and skill level. In addition, for some MOS, separate tracks were prepared to address duty position differences. Originally designed as a method of assessing individual performance and training needs, the test also were used for personnel decisions. As such, individual scores were maintained in personnel files. By policy, soldiers had to score at least 60% in order to verify their current skill level, and 75% in order to quality for promotion to the next higher skill level.

Although it appears to be an uncontaminated performance measure, there are some problems with using SQT in this manner. For one thing, SQTs were generally first administered when a soldier reached E-4, which typically occurs between 18 and 24 months after entry. However, most attrition occurs in the first year of enlistment. Therefore, SQT scores were unavailable for a substantial portion of those cases of attrition. Another problem in using these tests as performance criteria is that not all MOS had an SQT. And finally, individuals who did poorly (by their own or their commander's standards) may have repeated the SQT as often as annually. Thus there was the potential for a practice effect.

For this study, our interest lay not in the verify-qualify achievements of soldiers, but rather in the actual score achieved. We recognized the likelihood that level of SQT difficulty varied; this being a function of the decentralized development process rather than any inherent differences among MOS responsibilities. To efface any contaminating effects of such variations, all scores were standardized to a mean of 100 and standard deviation of 20 with reference to the population of SQT examinees within each MOS, skill level, and test year.

As mentioned earlier, soldiers would normally take their first SQT after 18 months in service, and were expected to take the test again (at the same or higher skill level) at

[6] At various times, the SQT included a written multiple choice test along with hands-on performance measures. As indicated here and in Campbell (1994), questions can be raised concerning the validity of each of the SQT components. The written portions, however, were somewhat less susceptible to the variations in format and implementation that plagued the hands-on-testing. Thus the focus here is limited to the written SQT scores only.

least every two years thereafter. In order to further standardize the data, we required that for each soldier only the (standardized) score from the first SQT taken would enter the analysis.

Finally, the SQT variable was set to missing when any one of the following conditions was found: 1) soldiers had no score (due to one of several circumstances; see Annex A); 2) no standardizing population was available; 3) the number of cases was so small as to render standardization specious, or; 4) the SQT was for an MOS that was not among the 25 selected for study.

Promotion. For the reasons mentioned earlier, promotion data were obtained from the DSCAC, rather than the cohort files. For the analysis of this variable we required two types of information on each soldier: all paygrade increases during the first enlistment, and when each increase occurred (months after entry). Determining when an increase occurred was relatively simple, as the "date of current paygrade" is encoded in each of the DSCAC's transactional data blocks. In addition to this, there was the need to operationally define the window of time to be called first term. Conceptually this would be the time between accession and reenlistment or permanent separation from the military. However, we did not want to consider reenlistments that occurred soon after accession (within 12 months) as "true" reenlistments. Therefore, we compared accession date, separation date, and "date of last enlistment" (DOLE) encoded in each of the DSCAC's transactional data blocks[7]. This resulted in four possible outcomes. 1) If a solider never reenlisted (i.e., the DOLE was the same as the entry date) or reenlisted after permanent separation from first term, then the first term window was from accession to first separation. 2) If a solider reenlisted within 12 months of entry, the end point for the first term was deemed to be the date that the soldier terminated from the *reenlistment* term. 3) If the reenlistment was between 12 and 23 months of service, the duration of the first term was set to two years. 4) If a solider reenlisted on or after 24 months of initial service, then the end of the first term was set to reenlistment date.

Time to promotion was calculated as time between accession and achieving grade E-4 within the first-term window defined above. Outliers were determined to be those soldiers whose time to E-4 (or total time in service for those who never achieved E-4)

[7] When a soldier reenlists, this date becomes the new DOLE on the file.

exceeded their enlistment term. The time values in these observations were reset to their enlistment term. In addition, those who achieved E-4 after their term was completed (i.e., during the extension period) were recounted as not having achieved E-4 during first term.

Development of the Database

As discussed in the previous chapter, our analysis focused on soldiers in 25 MOS. These were selected to provide a range of required abilities and training. For all analyses involving attrition, reenlistment, reenlistment eligibility, and promotion rate, the MOS for an observation was that recorded at enlistment. For the analyses where SQT was the criterion variable, the MOS for an observation was that of the first SQT taken. Note that fewer than six percent of the soldiers in the sample changed their MOS between the completion of training and their first SQT.

Two databases were constructed: an analysis cohort database derived from the files that the Army Research Institute has maintained over the years; and an analysis continuer/cohort file, developed from a combination of DMDC DSCAC and the Cohort files. The first was used for analyses involving attrition, reenlistment, reenlistment eligibility, and SQT scores; while the second database was used when the criterion was promotion.

The sample was restricted to soldiers who entered the Army from 1977 to 1980 in any of the 25 MOS. A variety of global deletions were imposed on the data to eliminate those with erroneous information and those whose status regarding key variables (e.g., cohort year) could not be determined. The deletions, and their effect on the number of observations in the final data set, are shown in Table 5.

To construct the continuer database in such a way that it would contain the same soldiers as are in the analysis cohort database, we extracted from the continuer file only those observations contained in the cohort file. By so doing, the resultant dataset contains demographic, entry, and loss variables from the cohort file and grade change data from the continuer file.

Table 5
Database Effects of Global Deletions Within FY 1977
Through FY 1980 Cohorts

Cause of Deletion	Number Deleted	Percent Deleted
Enlistment/training MOS not among the 25 MOS	414,802	66.4
Females	21,287	10.1
ASVAB subtests: last four scores less than 10	7,588	4.0
ASVAB Test Form other than 6 or 7	19,626	10.8
Entry age less than 17 or over 35 years	56	0.0
AFQT score below 10	475	0.3
Entry date missing	9	0.0
Outside cohort membership window	133	0.1
Entry and separation dates incompatible	2,036	0.1
Height less than 60 inches or over 78 inches, or Weight less than 100 pounds or over 275 pounds	5,335	1.3
Duplicate SSNs	6	3.4
TOE missing or illogical (e.g., < 1 year)		0.0

Cohort Year	# Before Deletions	% of Total	# After Deletions	% of Total After Deletions	% of Cohort Before Deletions
1977[a]	216,883	34.7	49,335	32.2	22.7
1978	122,399	19.6	30,159	19.7	24.6
1979	128,289	20.5	34,745	22.6	27.1
1980	157,211	25.2	39,176	25.5	24.9
Total	624,782	100.0	153,435	100.0	24.6

[a] extra quarter -- FY 1976T -- included

In the cohort database, we started with 624,782 cases (accessions in the four cohort years). We deleted almost 415,000 cases of soldiers whose enlistment or training MOS was not one of the selected 25, and over 21,000 female soldiers[8]. Nearly 2,200 cases with a missing, out-of-range, or illogical entry date were also deleted. The 153,435 cases in the resulting database represent a broad cross section of the 1977-1980 accessions. The sample is broken down by AFQT category and MOS in Table 6.

Table 6
AFQT Composition of Soldiers in the Database by Military Occupational Specialty (MOS)

MOS	AFQT Category I	AFQT Category II	AFQT Category IIIA	AFQT Category IIIB	AFQT Category IV	TOTAL
05H EW/SIGINT Morse Interceptor	108	569	257	207	122	1,263
11B Infantryman	959	6,989	5,919	11,077	27,669	52,613
12C Bridge Crewman	30	329	382	766	1,616	3,123
13B Cannon Crewman	149	1,580	1,887	4,433	13,990	22,039
15E Pershing Missile Crewmember	28	260	285	542	1,109	2,224
16R ADA Short Range Gunnery Crewman	15	124	136	314	1,695	2,284
27E Vulcan Repairer	14	120	97	147	241	619
31J Teletype Repairer	7	149	143	256	695	1,250
36C Wire System Installer/Operator	22	265	370	805	2,669	4,131
43E Parachute Rigger	33	261	279	515	1,102	2,190
51N Water Treatment Specialist	5	63	76	200	540	884
51R Interior Electrician	12	158	141	220	322	853
52D Power Generation Equipment Repairer	14	322	325	494	513	1,668
55G Nuclear Weapons Maintenance Specialist	14	121	86	83	121	425
61B Watercraft Operator	1	43	32	71	293	440

/ Continued /

[8] See Editor's Notes, Note 3.

Table 6
AFQT Composition of Soldiers in the Database
by Military Occupational Specialty (MOS) (continued)

MOS	AFQT Category I	AFQT Category II	AFQT Category IIIA	AFQT Category IIIB	AFQT Category IV	TOTAL
64C Motor Transport Operator	68	1,391	1,721	3,285	8,903	15,368
68B Aircraft Powerplant Repairer	10	122	95	114	6	501
71L Administrative Specialist	95	1,064	1,037	1,592	1,912	5,700
71N Traffic Management Coordinator	5	55	56	85	128	329
74D Computer/Machine Operator	14	102	60	61	87	324
82C Field Artillery Surveyor	48	606	478	717	954	2,803
84B Still Photographic Specialist	35	93	49	44	119	340
92B Medical Laboratory Specialist	69	266	85	72	57	549
94B Food Service Specialist	46	653	841	1,922	8,022	11,484
95B Military Police	548	6,056	4,325	4,970	4,058	19,957

Note: MOS numbers and titles are from the 1974 Army Regulation 611-201, "Enlisted Career Management Fields Occupational Specialties (with changes 1-19, September 1983).

Chapter 4

Empirical Results

Before describing the empirical relationships between the various predictors and criteria within and across the MOS under study, an overview of criterion performance by AFQT category is provided. Table 7 confirms the typical performance differences by AFQT: Higher category personnel generally outperformed lower category soldiers. There was an inverse monotonic relationship between the AFQT categorizations and SQT score ranging from a mean SQT of around 113 for Category I and II soldiers to a mean of 94 for those Category IVC personnel. The seemingly anomalous findings (i.e., a deviation from a monotonic pattern) for Category IVC personnel on attrition, promotion to E-4, reenlistment eligibility, and reenlistment may be partially explained by enlistment circumstances and policies. For example, enlistment policies stipulate that recruits in Category IV must be high school diploma graduates. The inadvertent ASVAB score inflation from FY 1977 to 1980 may have allowed IVA and IVB but not IVC recruits to skirt this requirement. Being overwhelmingly high school graduates, Category IVC recruits possessed a compensatory factor which contributed to their attrition, promotion, and reenlistment performance.

All in all, Category IV recruits as a whole had lower job knowledge scores, were more likely to leave service prematurely, were less likely to be promoted, and were less likely to be found eligible to reenlist than higher aptitude category soldiers. Actual reenlistment rates for Category IVs were similar to the rates found among higher category personnel. This finding is not necessarily indicative of comparable performance among the different aptitude categories but reinforces the notion that lower aptitude recruits not only have a greater propensity to enlist but also to remain in service.

These data support the Army's desire to enlist the highest quality recruits possible. Yet, the uncertainty of future recruiting contingencies as well as the Army's youth development activities (see Ondaatje, 1993) may lead to future influxes of below average recruits. To aid the Army in its foresighted manpower planning, the balance of this chapter highlights analyses of the performance of below average recruits (with particular emphasis on Category IV men) within and across the 25 MOS selected for study.

Table 7
Performance of FY 1977 Through FY 1980 Non-Prior Service Male Army Accessions Across 25 MOS by AFQT Category and Criterion Measure

Criterion	AFQT Category I & II		III		IIIB		IVA-IVB		IVC	
	N[a]	$\bar{Y}$(SD)	N[a]	$\bar{Y}$(SD)	N[a]	$\bar{Y}$(SD)	N[a]	$\bar{Y}$(SD)	N[a]	$\bar{Y}$(SD)
Attrition	23,305	26.8% (.44)	18,520	34.3% (.47)	31,847	38.4% (.49)	65,246	39.9% (.49)	9,389	28.4% (.45)
Promotion E-4	14,921	67.0% (.47)	12,638	59.9% (.49)	22,082	56.3% (.50)	45,436	54.7% (.50)	6,287	65.7% (.47)
Promotion E-5	14,919	15.3% (.36)	12,638	9.0% (.29)	22,079	7.2% (.26)	45,423	6.1% (.24)	6,284	4.3% (.20)
SQT	10,625	112.8 (16.6)	8,084	105.8 (17.3)	13,812	102.0 (17.6)	29.253	98.0 (17.8)	4,855	93.6 (18.4)
Reenlistment	23,071	27.5%(.45)	18,711	27.0%(.44)	32,298	26.1%(.44)	66,157	26.4%(.44)	9,492	32.1%(.47)

[a] Ns vary as a function of MOS definition and criterion data quality. For example, SQT analyses were performed using duty or SQT MOS to define the relevant sample whereas training MOS was used for the other criteria. Furthermore, data on FY 1977 accessions were unavailable for the promotion criteria.

The aim of these analyses was to determine whether there are factors that could be used to identify the "best" among the poorer performers.

The listing of several performance criteria in Table 8 brings to the fore that job performance in the Army, as in any work environment, is multidimensional. Preliminary analyses of these measures of success, reduced the set to three for further analytic work--attrition, promotion to E-4, and SQT. Reenlistment eligibility and actual reenlistment were dropped for the following reasons:

- Evidence suggests that after the discovery of the misnorming, efforts were made to bar from reenlisting those who were inadvertently admitted (Laurence & Ramsberger, 1991). Thus, smaller percentages of eligibles among the lower aptitude may be a function of policy rather than performance.

- There is a large degree of overlap between the operational definitions of attrition and reenlistment eligibility. Attrition is used as a screen to identify those ineligible, and the attrition logic is used to classify individuals who did not reenlist and had missing or bad eligibility codes. Therefore it is unclear how conceptually distinct the two measures are.

- As mentioned previously, past research has demonstrated that enlistment and reenlistment propensity are higher among less-qualified youth. Whether this is the result of a perceived lack of alternatives or some other cause, it suggests that the use of reenlistment rate as an indicator of successful performance is unwarranted.

- It is unclear whether a high rate of reenlistment among the low-aptitude should be a goal. That is, admitting lower ability men into the Army in the face of manpower shortages is one thing. Allowing those same individuals--even if carefully selected--to become a significant part of the career force (e.g., to assume leadership positions) is another.

Because one's standing on these two measures is a function of several external influences, and given their overlap with other criteria, and the lack of clarity in regard to the desirability of the outcomes they represent, they were dropped from further analyses.

Of the available predictor variables (see Table 3 in the preceding chapter), all except race and advanced enlistment grade were evaluated with regard to predicting attrition, promotion, and written SQT score. Race was never intended as a predictor

per se but was included in the dataset to gauge the fairness of selected predictor composites. Advanced enlistment grade was also not meant to be used as a predictor but served as a covariate in the promotion analyses as described below. Similarly, analyses were conducted by enlistment term (three or four years) when this variable was suspected to have an impact on the results. Finally, marital status and number of dependents were combined and dichotomized because number of dependents at enlistment could not be reliably determined from the data files.

The general analytic strategy consisted of first regressing our criteria (i.e., attrition, promotion, and SQT separately) on four hierarchical predictor sets. The first model comprised AFQT alone and the second added high school graduation status. These models provided a baseline assessment of the value of current screening practices in identifying the best of lower aptitude recruits. The third model incorporated ASVAB subtests and routinely collected demographics. The rationale for this model was to test for the predictive power and incremental validity of available information. Finally, the fourth model added interest measures to the predictor set. Following these specified model regressions, a strictly empirical approach to model building was adopted using "computer-driven" subsets of the available predictors. From the various equations generated by the empirical algorithm, best equations were then chosen on the basis of statistical criteria and rational judgment.

Attrition

Survival Analyses. Because the focus was on lower-aptitude soldiers, the first step in conducting attrition analyses was to identify those MOS-Term of Enlistment (TOE) categories containing at least 100 observations with complete predictor data in each of the groupings of interest (IV, IIIB/IV). Differences in the survivor and hazard (attrition rate) functions within MOS and TOE were then examined, with high school graduation status (grad-nongrad) entered as a covariate in the statistical tests. With the restrictions regarding number of cases, 27 tests were performed comparing Categories I-IIIB and IV. The MOS/TOE combinations, and their associated Ns are shown in Table 8.

Table 8
MOS/TOE Categories Meeting Size Requirements for AFQT Groupings

MOS	TOE	Category IV	Categories IIIB & IV	Categories I-IV
05H	3	*	135	453
05H	4	*	183	774
11B	3	20,434	27,560	34,056
11B	4	6,227	9,706	16,259
12C	3	1,550	2,274	2,933
13B	3	9,894	12,671	14,455
13B	4	3,682	5,169	6,800
15E	3	946	1,393	1,800
15E	4	139	213	338
16R	3	1,617	1,917	2,160
27F	4	224	368	589
31J	3	460	625	807
31J	4	221	306	417
36C	4	2,464	3,210	3,648
43E	3	954	1,393	1,828
43E	4	103	160	273
51N	4	505	691	826
51R	4	303	509	803
52D	3	487	953	1,556
55G	3	106	175	360
61B	3	*	113	144
61B	4	206	245	289
64C	3	8,481	11,618	14,612
64C	4	120	151	197
68B	4	144	249	460
71L	3	1,840	2,375	5,476
71N	4	117	195	302

/ Continued /

Table 8
MOS/TOE Categories Meeting Size Requirements for AFQT Groupings (continued)

MOS	TOE	Category IV	Categories IIIB & IV	Categories I-IV
74D	4	*	145	310
82C	3	871	1,156	2,465
84B	4	*	120	262
94B	3	7,693	9,511	10,964
94B	4	*	110	137
95B	3	3,859	8,491	18,561
95B	4	*	173	382

* N < 100

Only four of the 27 comparisons resulted in statistically significant differences ($p < .01$) between aptitude groups: 11B, 4-year TOE; 13B, 3-year TOE; 64C, 3-year TOE, and; 95B, 3-year TOE. The plots of the hazard functions through 18 months are shown in Figures 1 through 4.[7] As demonstrated in past research (Buddin, 1984), most attrition occurs in the first six months after enlistment. In fact, in all four cases shown here, the rate of separations peaked in the first two months. The aptitude group comparisons show a mixed bag, with the hazard rate for I-IIIB attrition equal to or higher than that of Category IVs at various times in all four MOS. Note that high school graduation status was a significant covariate in all of the statistical comparisons.

When Categories IIIB and IV were combined, the number of MOS/TOE groupings meeting the size requirement rose to 34 (Table 8). Eight of these comparisons were significant, as shown in Figures 5 through 12. Although the overall patterns were similar to those seen earlier, the addition of IIIBs to the IVs resulted in consistently higher rates of attrition among this group. The large jump in the hazard function at the end of the time period (e.g., 74D, 4 year TOE) may be spurious -- attributable to the reduced sample size.

[7] Note that these functions are unaffected by the covariate, which is taken into account only in the statistical tests of the differences between functions.

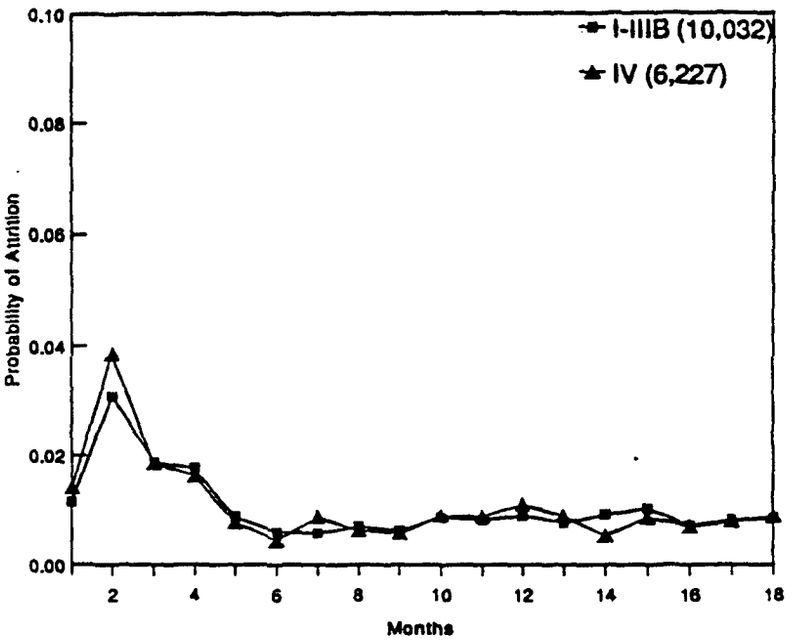


Figure 1. Hazard Function Comparisons -- Attrition 11B, 4YR TOE, I-IIIB vs. IV

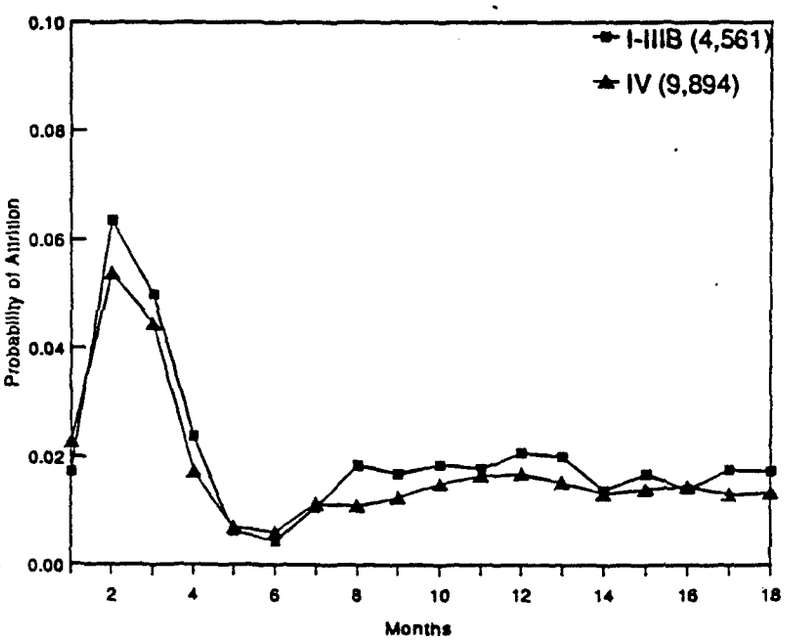


Figure 2. Hazard Function Comparisons -- Attrition 13B, 3YR TOE, I-IIIB vs. IV

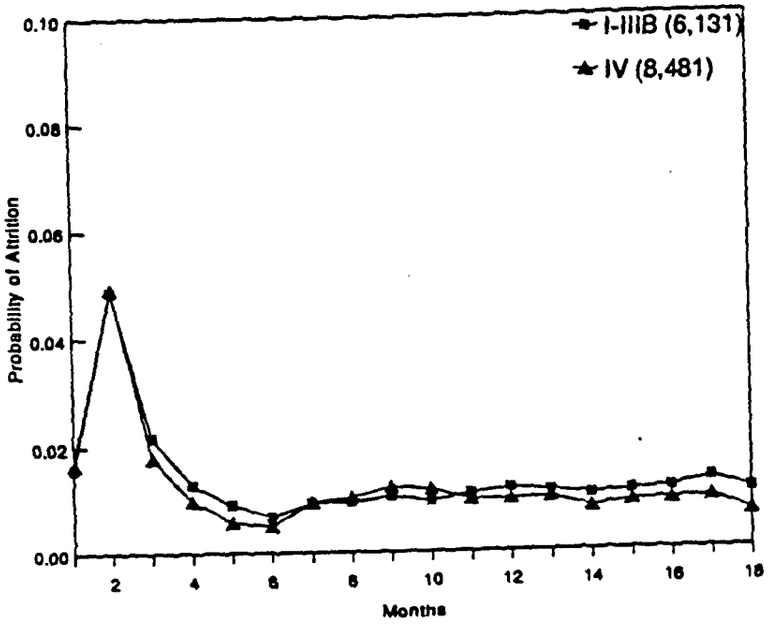


Figure 3. Hazard Function Comparisons -- Attrition
64C, 3YR TOE, I-IIIB vs. IV

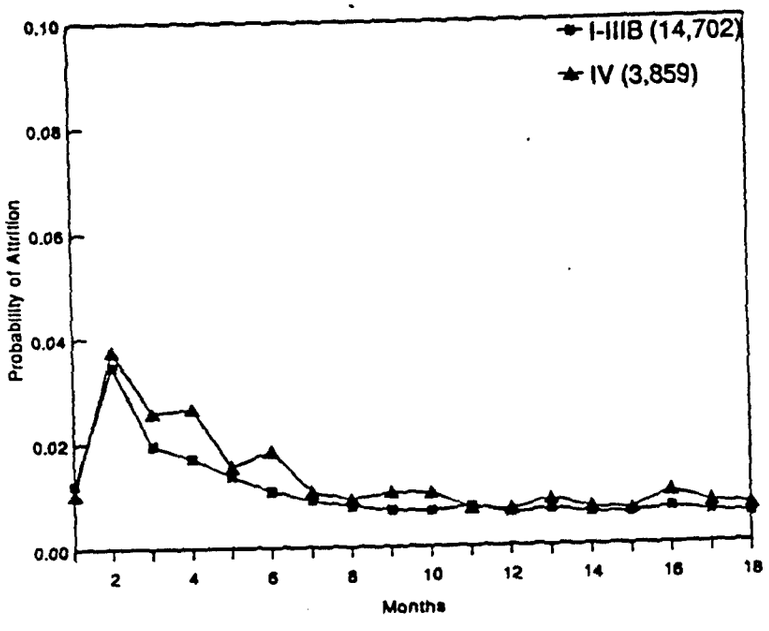


Figure 4. Hazard Function Comparisons -- Attrition
95B, 3YR TOE, I-IIIB vs. IV

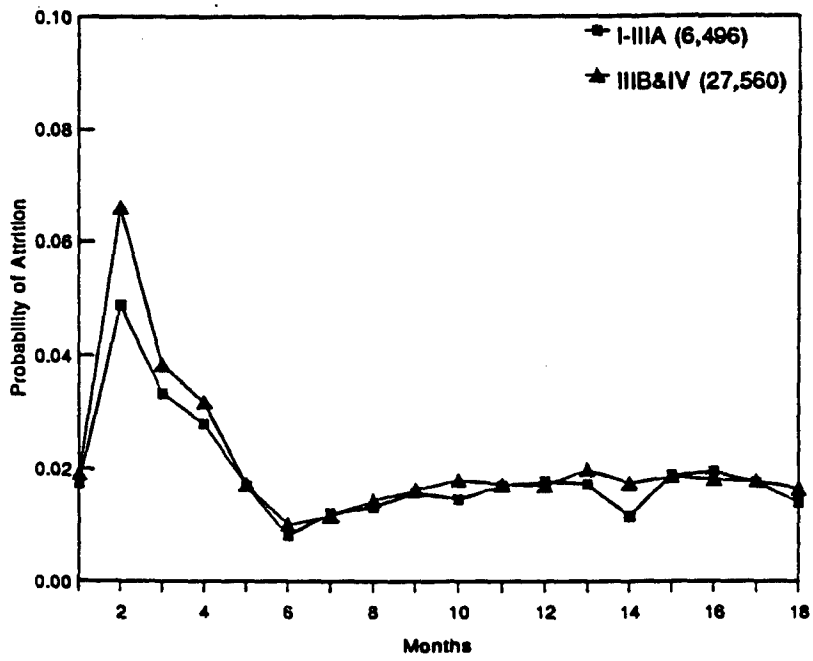


Figure 5. Hazard Function Comparisons -- Attrition 11B, 3YR TOE, I-IIIA vs. IIIB/IV

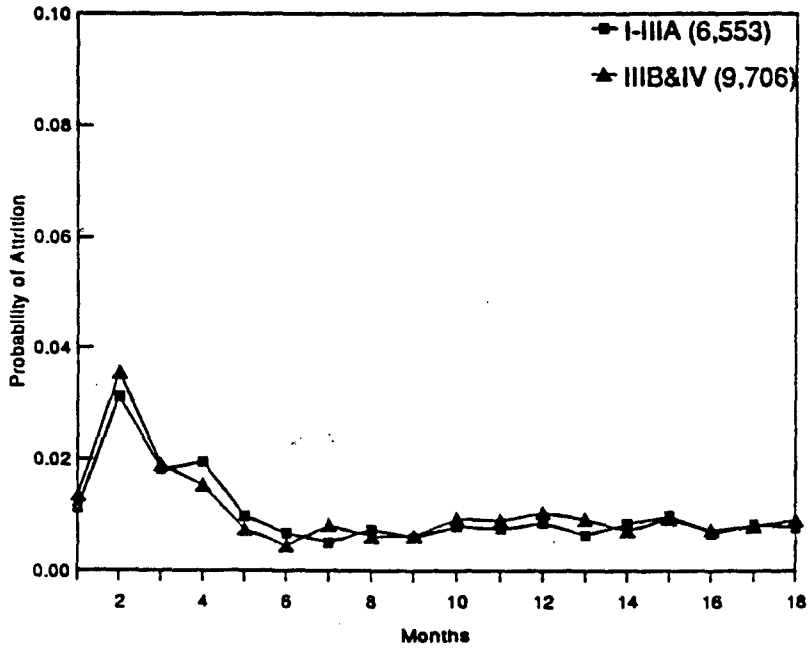


Figure 6. Hazard Function Comparisons -- Attrition 11B, 4YR TOE, I-IIIA vs. IIIB/IV

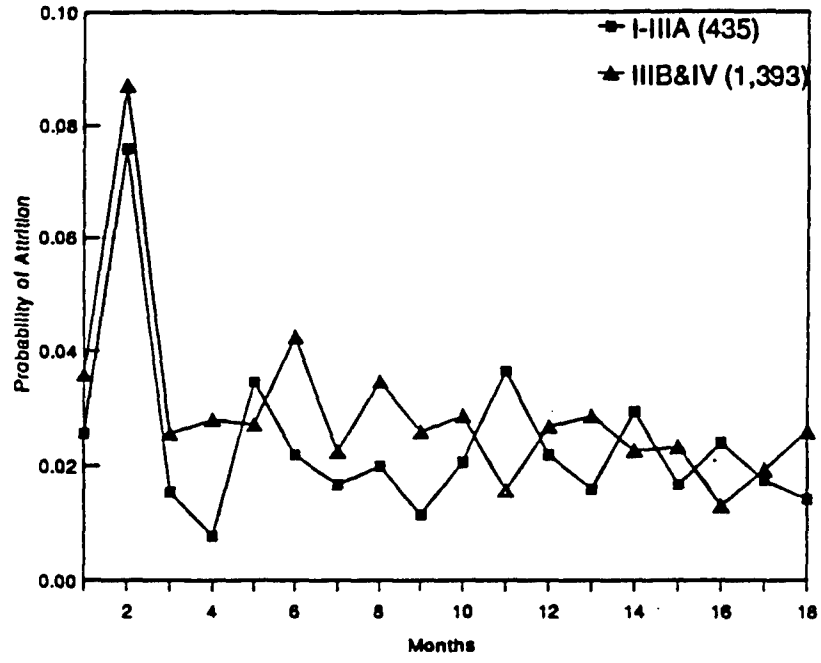


Figure 7. Hazard Function Comparisons -- Attrition 43E, 3YR TOE, I-IIIA vs. IIIB/IV

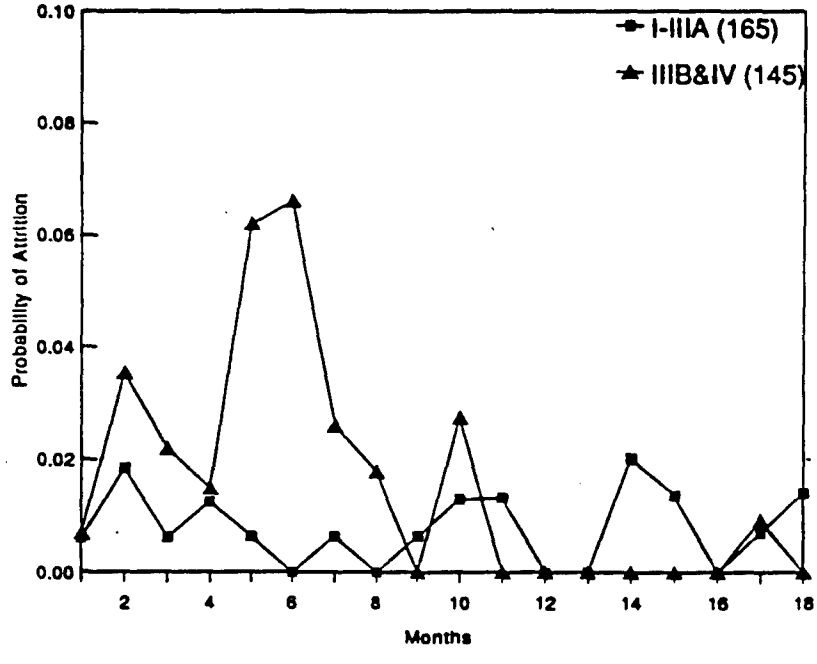


Figure 8. Hazard Function Comparisons -- Attrition 74D, 4YR TOE, I-IIIA vs. IIIB/IV

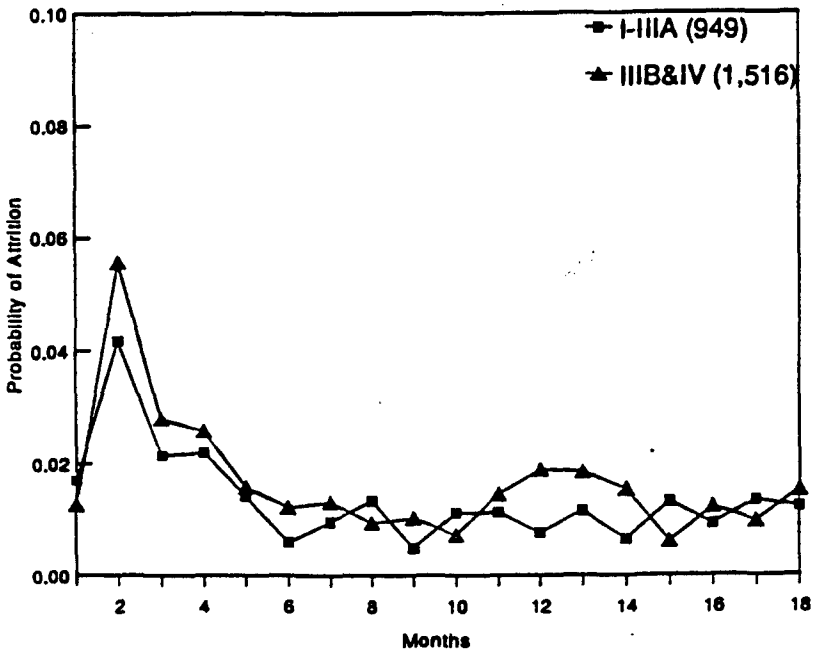


Figure 9. Hazard Function Comparisons -- Attrition 82C, 3YR TOE, I-IIIA vs. IIIB/IV

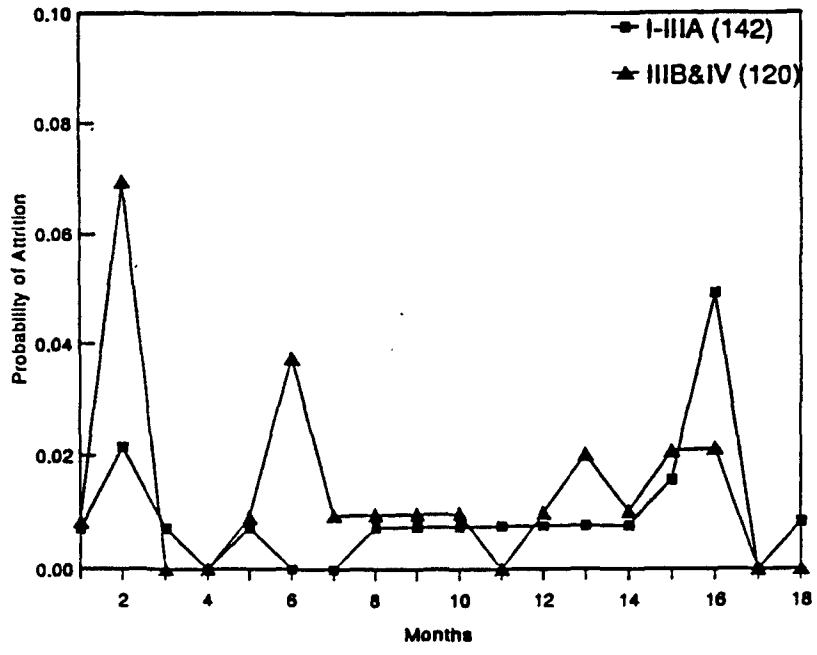


Figure 10. Hazard Function Comparisons -- Attrition 84B, 4YR TOE, I-IIIA vs. IIIB/IV

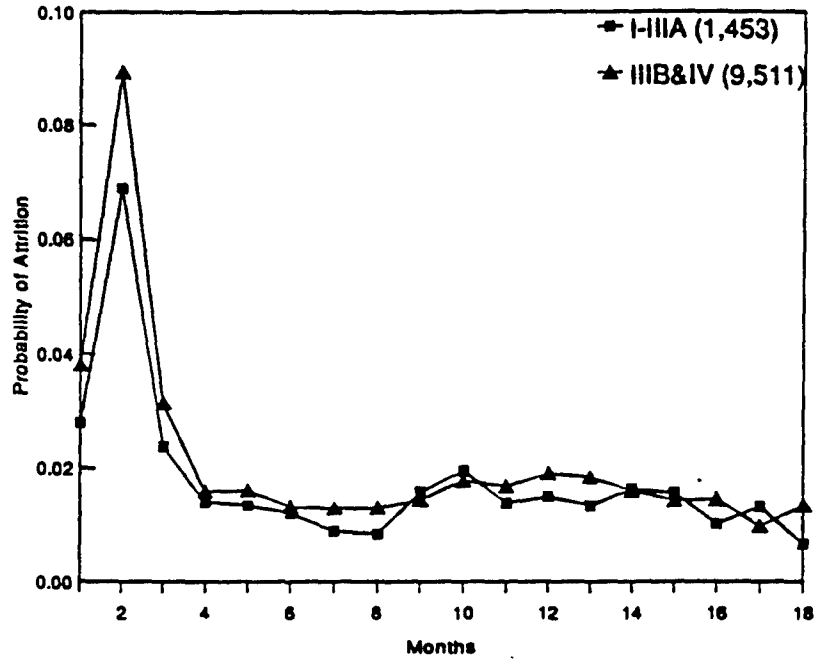


Figure 11. Hazard Function Comparisons -- Attrition 94B, 3YR TOE, I-IIIA vs. IIIB/IV

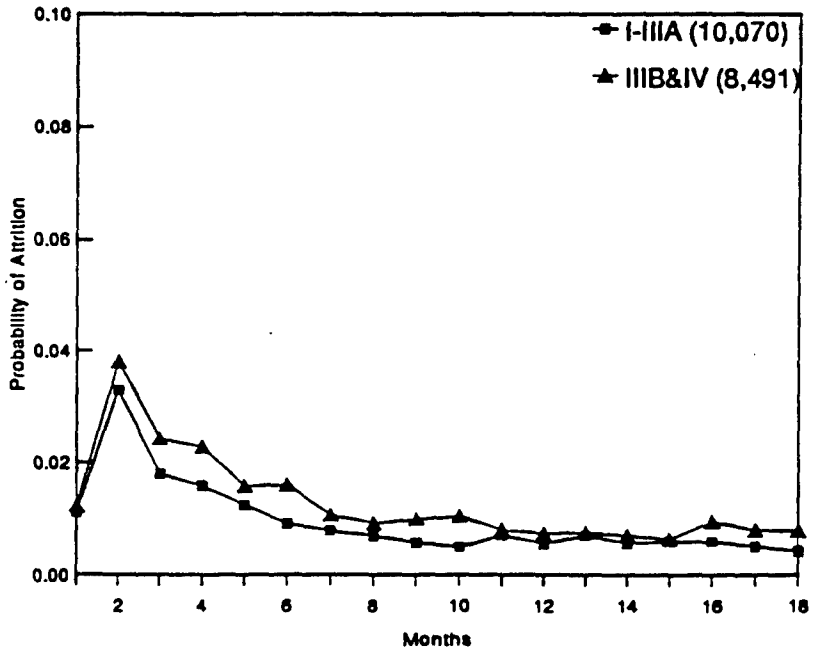


Figure 12. Hazard Function Comparisons -- Attrition 95B, 3YR TOE, I-IIIA vs. IIIB/IV

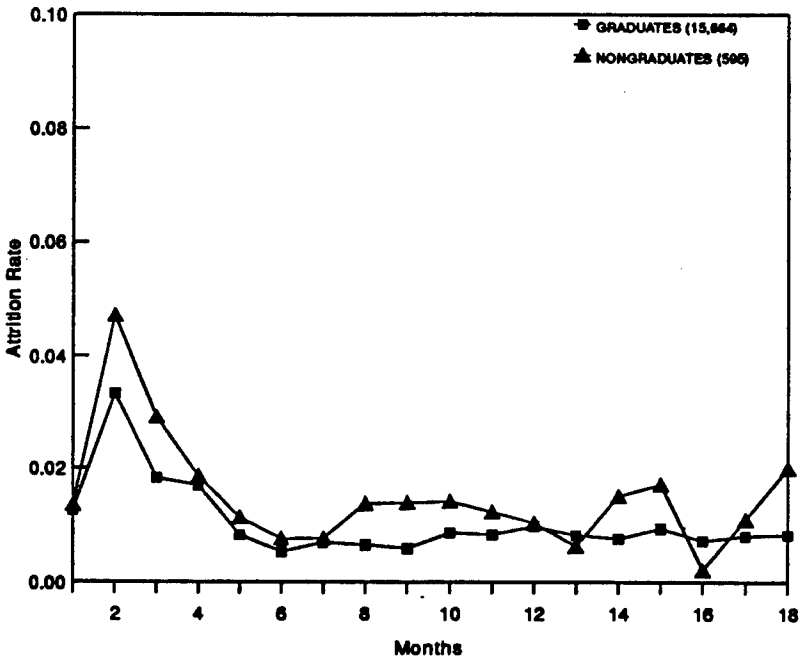


Figure 13. Hazard Function Comparisons -- Attrition 11B, 4YR, High School Graduate vs. Nongraduate

Education was a significant covariate in all cases except for 43E, 3-year TOE. To further demonstrate the strength of the high school diploma-attrition relationship, the hazard rates of graduates and nongraduates in 11B, 4-year TOE were compared (see Figure 13). These results clearly show what the results of many studies before have proven; high school graduation status is strongly related to attrition behavior. They may also serve to explain the relative lack of differences between the various aptitude groups. In general, those with lower AFQT scores were more likely to be required to have a high school diploma to be accepted into the Army. Thus a key attribute commonly linked to completion of first term was more prevalent among those of lower aptitude.

Proportional Hazard Regression Models. Proportional hazard regression (Cox, 1972) was used to model the relationship between first-term attrition behavior and the predictors described above. Again, MOS/TOE groups were included only if they contained more than 100 low-aptitude solders with complete predictor data. Two types of analyses were conducted.

First, the four rationally developed sets of predictors were entered hierarchically, with absolute and incremental fit statistics calculated at each point. The four models were the following:

Model	Variables
1	AFQT[8]
2	AFQT, High School Graduation Status (HS)
3	AFQT, HS, ASVAB subtests (General Science (GS), Mechanical Comprehension(MC), Spatial Perception (SP), Automotive Information (AI), Shop Information (SI), Electronics Information (EI), General Information (GI), Attention to Detail (AD), Numerical Operations (NO), Age at Entry (AGE), Have dependents at entry (NODEP), and Body Mass (BMASS) (height × weight)
4	AFQT, HS, ASVAB subtests, Interest Measures (Administrative Interest (CA), Outdoors Interest (CC), Electronics Interest (CE), and Mechanical Interest (CE))

The second set of analyses used the "best subset selection" option in the SAS procedure PHREG to generate empirically a set of models having the best fit to the data. Given a pre-specified number of equations, the procedure determines that number of best-fitting equations containing one predictor variable, two predictor variables, and so on, up to the single equation containing all predictors. In our analyses, we programmed the procedure to provide the three best models for each number of predictors. Thus, the best subset selection analyses resulted in the three best-fitting single-variable solutions, the three best-fitting two-variable solutions, and so on. The results of a typical run are given in Table 9.

[8] A constructed AFQT simulating the current operational AFQT and consisting of AR and WK, was used as a predictor in all cases. Aptitude categories, however, were based on the older AFQT score.

Table 9
Empirically Derived Best Models for Predicting Attrition
Among AFQT Category IIIB & IV Recruits

MOS 95B, 3-year TOE (N = 8,491)

# Variables in Model	Best Predictors	Score Value
1	HS	432.09
	NODEP	54.37
	GI	31.71
2	HS AGE	463.20
	HS NODEP	459.68
	HS GI	449.23
3	HS GI AGE	480.08
	HS GI NODEP	476.87
	HS AGE NODEP	475.51
4	HS GI AGE NODEP	492.50
	HS GI AGE CA	486.82
	HS AGE NODEP CC	486.50
5	HS GI AGE NODEP CA	498.97
	HS GI AGE NODEP CC	497.88
	HS MS GI AGE NODEP	496.48
6	HS SI GI AGE NODEP CA	504.05
	HS GI AGE NODEP CA CC	503.87
	HS MC GI AGE NODEP CA	503.61
7	HS SI EI GI AGE NODEP CA	507.97
	HS MC GI AGE NODEP CA CC	507.30
	HS SI GI AGE NODEP CA CC	507.25
8	HS MC SI EI GI AGE NODEP CA	511.70
	HS SI EI GI AGE NODEP CA CC	511.51
	HS MC EI GI AGE NODEP CA CC	510.71
9	HS MC SI EI GI AGE NODEP CA CC	514.75
	HS SP SI EI GI AGE NODEP CA CC	513.99
	HS MC AI SI EI GI AGE NODEP CA	513.58
10	HS MC AI SI EI GI AGE NODEP CA CM	516.76
	HS MC AI SI EI GI AGE NODEP CA CC	516.73
	HS MC SP SI EI GI AGE NODEP CA CC	516.28
11	HS MC AI SI EI GI AGE NODEP CA CC CM	519.33
	HS MC AI SI EI GI AGE NODEP BMASS CA CM	519.44
	HS MC SP AI SI EI GI AGE NODEP CA CC	518.23
12	HS MC AI SI EI GI AGE NODEP BMASS CA CC CM	520.77
	HS MC SP AI SI EI GI AGE NODEP CA CC CM	520.47
	HS MC AI SI EI GI AD AGE NODEP CA CC CM	519.79

Table 9
Empirically Derived Best Models for Predicting Attrition
Among Army Male AFQT Category IIIB & IV Recruits (continued)

# Variables in Model	Best Predictors	Score Value
13	HS MC SP AI SI EI GI AGE NODEP BMASS CA CC CM AFQT HS MC SP AI SI EI GI AGE NODEP CA CC CM HS MC AI SI EI GI AD AGE NODEP BMASS CA CC CM	521.96 521.22 521.21
14	AFQT HS MC SP AI SI EI GI AGE NODEP BMASS CA CC CM HS MC SP AI SI EI GI AD AGE NODEP BMASS CA CC CM HS MC SP AI SI EI GI AGE NODEP BMASS CA CC CE CM	522.68 522.53 522.32
15	AFQT HS MC SP AI SI EI GI AD AGE NODEP BMASS CA CC CM AFQT HS MC SP AI SI EI GI AGE NODEP BMASS CA CC CE CM AFQT HS MC SP AI SI EI GI NO AGE NODEP BMASS CA CC CM	523.29 523.04 523.02
16	AFQT HS MC SP AI SI EI GI AD AGE NODEP BMASS CA CC CE CM AFQT HS MC SP AI SI EI GI AD NO AGE NODEP BMASS CA CC CM AFQT HS MC SP AI SI EI GI NO AGE NODEP BMASS CA CC CE CM	523.62 523.41 523.36
17	AFQT HS MC SP AI SI EI GI AD NO AGE NODEP BMASS CA CC CE CM AFQT HS GS MC SP AI SI EI GI AD AGE NODEP BMASS CA CC CE CM AFQT HS GS MC SP AI SI EI GI AD NO AGE NODEP BMASS CA CC CM	523.73 523.63 523.41
18	AFQT HS GS MC SP AI SI EI GI AD NO AGE NODEP BMASS CA CC CE CM	523.74

The equations were selected based upon their value of the chi-square score statistic. When examining the models, we first looked for substantial jumps in the value of the score statistic. Large increases indicate likely significant increases in the fit of the associated model to the data. Unlike the chi-square statistics for nested structural equation models (such as those obtained using LISREL), however, the difference between score chi-square values for two models, one nested within the other, is not asymptotically distributed as chi-square. Thus, evaluating whether additional predictor variables significantly increased the fit of the prediction equation to the data required five steps:

1) Select a set of nested "best subset" models (this resulted in occasional selection of a second or third best equation to retain the nested property as predictors were added);

2) Estimate regression parameters for these equations using PHREG;

3) Record the values of -2 Log L (the log of the likelihood function for the regression model multiplied by-2) for each of the equations;

4) Obtain the differences between the -2 Log L for each of the nested equations; these differences are asymptotically distributed as chi-square with degrees of freedom equal to the difference between the number of parameters in the model, and;

5) Determine if the difference is significant as a chi-square statistic with the appropriate degrees of freedom (typically one).

In the example shown in Table 9, substantial increases in the score value obtained are seen through the six-variable models. The values of -2 Log L indicate that the four variable model (HS, GI, AGE, NODEP) is the last stage at which incremental fit is observed. Hence, this model is targeted as the "best" model.

Specified Models. Tables 10 through 12 present the results achieved when the four models were specified as described above for Category IV, IIIB and IV, and all soldiers in a given MOS, respectively. Statistics are also provided for each aptitude group collapsed across MOS. For model 1, significance of AFQT as a predictor of attrition was obtained. For the remaining models, the *incremental* significance over the previous model was indicated. As might be expected, model 2 (including high school graduation status) was the most uniformly significant across MOS, TOE, and aptitude groups. It provided incremental fit in 88% of the analyses, as compared to 55% for model 3 (AFQT, HS, and subtests) and 20% for model 4 (AFQT, HS, subtests, and interest measures). The fact that all models provided significant incremental fit when MOS were collapsed was most likely because of the large Ns involved.

Once again, high school graduation status was shown to have a strong relationship to attrition behavior. However, the fact that Model 3, in particular, was significant in a substantial number of cases suggests that other predictors may also be useful in distinguishing between those likely and unlikely to complete their first term of service. Therefore, the best models were investigated.

Table 10
Summary and Specified Model Results for Attrition by MOS
(Category IV)

ENLISTMENT TERM 3

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square*
Infantryman	11B	20,434	9,281	45.42	1	178,893.94***	
					2	178,182.85	711.09
					3	177,969.98	212.87
					4	177,949.89	20.09
Bridge Crewmember	12C	1,550	574	37.03	1	8,166.14	
					2	8,089.04	77.09**
					3	8,072.49	16.55
					4	8,070.87	1.62
Cannon Crewmember	13B	9,894	4,033	40.76	1	72,166.49***	
					2	71,625.82	540.67
					3	71,554.89	70.93**
					4	71,538.23	16.66**
Pershing Crewmember	15E	946	431	45.56	1	5,661.95*	
					2	5,631.59	30.36***
					3	5,596.08	35.51***
					4	5,592.37	3.72
ADA Crewmember	16R	1,617	615	38.03	1	8,768.50***	
					2	8,726.22	42.29***
					3	8,677.89	48.32***
					4	8,671.12	6.77
Teletypewriter Repairer	31J	460	141	30.65	1	1,676.75	
					2	1,665.74	11.01***
					3	1,637.43	28.31**
					4	1,632.03	5.40
Parachute Rigger	43E	954	491	51.47	1	6,409.57	
					2	6,377.90	31.67***
					3	6,358.67	19.24
					4	6,351.30	7.37
Power Generator Repairer	52D	487	153	31.42	1	1,835.97	
					2	1,810.02	25.95
					3	1,794.18	15.84
					4	1,788.82	5.36
Nuclear Weapons Specialist	55G	106	32	30.19	1	285.35	
					2	293.84	1.50
					3	273.62	10.23
					4	265.18	8.44

/ Continued /

Table 10
Summary and Specified Model Results for Attrition by MOS
(Category IV) (continued)

ENLISTMENT TERM 3, continued

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square*
Motor Transport Operator	64C	8,481	2,546	30.02	1	45,140.23***	
					2	44,732.76	407.47***
					3	44,675.33	57.43***
					4	44,662.19	13.16*
Admin Specialist	71L	1,840	569	30.92	1	8,349.37	
					2	8,281.99	67.38***
					3	8,240.44	41.55***
					4	8,235.05	5.39
Field Artillery Surveyor	82C	871	315	36.17	1	4,121.43**	
					2	4,079.46	41.97***
					3	4,062.04	17.42
					4	4,056.96	5.09
Food Service Specialist	94B	7,693	3,336	43.36	1	57,888.17***	
					2	57,412.31	475.86***
					3	57,305.21	107.10***
					4	57,291.25	13.96**
Military Police	95B	3,859	1,082	28.04	1	17,498.27*	
					2	17,362.07	136.20***
					3	17,310.19	51.88***
					4	17,300.35	9.85*

ENLISTMENT TERM 4

Infantryman	11B	6,227	1,926	30.93	1	32,928.408	
					2	32,908.744	19.67***
					3	32,837.073	71.67***
					4	32,832.188	4.89
Cannon Crewmember	13B	3,682	1,149	31.21	1	18,437.423	
					2	18,427.681	9.74**
					3	18,396.690	30.99**
					4	18,395.063	1.63
Pershing Crewmember	15E	139	50	35.97	1	471.903	
					2	471.604	0.30
					3	458.442	13.16
					4	454.123	4.32

/ Continued /

Table 10
Summary and Specified Model Results for Attrition by MOS
(Category IV) (continued)

ENLISTMENT TERM 4, continued

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square[a]
Vulcan Repairer	27F	224	100	44.64	1	1026.56	
					2	1011.99	14.60***
					3	1007.90	4.10
					4	1003.29	4.60
Teletypewriter Repairer	31J	221	80	36.20	1	827.73	
					2	808.08	19.65
					3	791.79	16.28
					4	781.12	10.67
Wire Systems Installer	36C	2,464	845	34.29	1	12,847.85	
					2	12,700.08	147.77***
					3	12,669.60	30.48**
					4	12,651.64	17.96**
Parachute Rigger	43E	103	40	38.83	1	347.03	
					2	345.89	1.13
					3	332.89	13.00
					4	328.61	4.29
Water Treatment Specialist	51N	505	206	40.79	1	2,456.94	
					2	2,414.35	42.59***
					3	2,395.61	18.75
					4	2,393.48	2.13
Interior Electrician	51R	303	99	32.67	1	1,091.57	
					2	1,062.97	28.60***
					3	1,040.56	22.42*
					4	1,034.34	6.21
Water Craft Operator	61B	206	102	49.51	1	1,023.10	
					2	1,018.12	4.99*
					3	995.18	22.94*
					4	994.22	0.97
Motor Transport Operator	64C	120	40	33.33	1	365.57	
					2	360.44	5.13*
					3	343.40	17.04
					4	335.84	7.57
Aircraft Powerplant Repairer	68B	144	36	25.00	1	345.67	
					2	330.35	15.32***
					3	319.84	10.51
					4	301.03	18.82***
Traffic Mgmt. Coordinator	71N	117	51	43.59	1	458.93	
					2	445.86	13.07
					3	421.90	23.96
					4	421.48	0.41

[a] DF = N of variables added to model; * p-value < .05; ** p-value < .01; *** p -value < .001.

Table 11
Summary and Specified Model Results for Attrition by MOS
(Categories IIIB & IV)

ENLISTMENT TERM 3

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square*
Morse Interceptor	05H	135	39	28.89	1	368.83	
					2	366.99	1.84
					3	348.82	18.17
					4	345.97	2.85
Infantryman	11B	27,560	12,691	46.05	1	252,135.20***	
					2	251,251.15	884.05***
					3	250,993.94	257.21***
					4	250,977.52	16.42**
Bridge Crewmember	12C	2,274	862	37.91	1	12,908.33	
					2	12,790.41	117.93***
					3	12,769.48	20.93
					4	12,768.02	1.46
Cannon Crewmember	13B	12,671	5,353	42.25	1	98,318.73***	
					2	97,682.17	636.56***
					3	97,587.63	94.54***
					4	97,571.76	15.87**
Pershing Crewmember	15E	1,393	659	47.31	1	9,148.56**	
					2	9,114.66	33.90***
					3	9,085.70	28.96**
					4	9,082.45	3.25
ADA Crewmember	16R	1,917	760	39.65	1	11,081.38***	
					2	11,029.88	51.49***
					3	10,972.69	57.19***
					4	10,966.40	6.29
Teletypewriter Repairer	31J	625	185	29.60	1	2,315.77	
					2	2,296.80	18.98***
					3	2,267.35	29.45**
					4	2,264.68	2.67
Parachute Rigger	43E	1,393	730	52.40	1	10,073.20*	
					2	10,048.88	24.32***
					3	10,031.76	17.12
					4	10,023.58	8.18
Power Generator Repairer	52D	953	324	34.00	1	4,308.70*	
					2	4,236.63	72.08***
					3	4,218.15	18.47
					4	4,214.67	3.49
Nuclear Weapons Specialist	55G	175	56	32.00	1	551.90	
					2	550.85	1.05
					3	534.47	16.39
					4	527.08	7.39

/ Continued /

Table 11
Summary and Specified Model Results for Attrition by MOS
(Categories IIIB & IV) (continued)

ENLISTMENT TERM 3, continued

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square[a]
Water Craft Operator	61B	113	47	41.59	1	421.91	
					2	413.40	8.51**
					3	390.31	23.09*
					4	381.95	8.35
Motor Transport Operator	64C	11,618	3,617	31.13	1	66,349.41***	
					2	65,742.97	606.44***
					3	65,678.50	64.47***
					4	65,658.50	20.00***
Admin Specialist	71L	3,375	1,043	30.90	1	16,572.81	
					2	16,443.23	129.58***
					3	16,381.09	62.14***
					4	16,376.77	4.32
Field Artillery Surveyor	82C	1,516	573	37.80	1	8,131.86	
					2	8,050.33	81.53***
					3	8,033.47	16.86
					4	8,031.78	1.70
Food Service Specialist	94B	9,511	4,169	43.83	1	74,107.24***	
					2	73,518.37	588.87***
					3	73,396.66	121.71***
					4	73,383.87	12.79*
Military Police	95B	8,491	2,371	27.92	1	42,079.23***	
					2	41,698.83	380.39***
					3	41,631.07	67.76***
					4	41,617.89	13.26*

ENLISTMENT TERM 4

Morse Interceptor	05H	183	50	27.32	1	505.49	
					2	504.53	0.96
					3	480.99	17.78
					4	486.75	5.76
Infantryman	11B	9,706	2,985	30.75	1	53,688.38	
					2	53,661.71	26.67***
					3	53,554.99	106.72***
					4	53,548.20	6.79
Cannon Crewmember	13B	5,169	1,641	31.75	1	27,436.53	
					2	27,424.02	12.51***
					3	27,378.98	45.04***
					4	27,377.20	1.78

/ Continued /

Table 11
Summary and Specified Model Results for Attrition by MOS
(Categories IIIB & IV) (continued)

ENLISTMENT TERM 4, Continued:

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square[a]
Pershing Crewmember	15E	213	83	38.97	1	850.18	
					2	848.98	1.2
					3	832.09	16.89
					4	829.50	2.59
Vulcan Repairer	27F	368	159	43.21	1	1,794.27	
					2	1,774.28	19.99***
					3	1,764.76	9.52
					4	1,758.45	6.32
Teletypewriter Repairer	31J	306	119	38.89	1	1,308.58	
					2	1,282.88	25.70***
					3	1,268.22	14.66
					4	1,257.79	10.43*
Wire Systems Installer	36C	3,201	1,098	34.30	1	17,267.34	
					2	17,062.34	205.00***
					3	17,020.33	42.00***
					4	16,995.68	24.66***
Parachute Rigger	43E	160	67	41.87	1	641.03	
					2	638.83	2.20
					3	618.01	20.82
					4	612.68	5.33
Water Treatment Specialist	51N	691	278	40.23	1	3,493.31	
					2	3,445.29	48.02***
					3	3,427.68	17.61
					4	3,422.47	5.20
Interior Electrician	51R	509	165	32.42	1	1,988.16	
					2	1,934.64	53.51***
					3	1,918.88	15.77
					4	1,915.69	3.18
Water Craft Operator	61B	245	114	46.53	1	1,188.43	
					2	1,178.81	9.62**
					3	1,148.13	30.68**
					4	1,146.94	1.19
Motor Transport Operator	64C	151	53	35.10	1	507.83	
					2	497.19	10.64**
					3	481.35	15.84
					4	478.41	2.95

/ Continued /

Table 11
Summary and Specified Model Results for Attrition by MOS
(Categories IIIB & IV) (Continued)

ENLISTMENT TERM 4, Continued

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square[a]
Aircraft Powerplant Repairer	68B	249	62	24.90	1 2 3 4	665.71 643.25 638.89 630.24	 22.47*** 4.36 8.65
Traffic Mgmt. Coordinator	71N	195	87	44.62	1 2 3 4	869.90 849.64 820.59 818.06	 20.27*** 29.05** 2.53
Computer/Machine Operator	74D	145	54	37.24	1 2 3 4	494.50*** 481.93 458.62 455.72	 12.57*** 23.32* 2.90
Still Photographic Specialist	84B	120	45	37.50	1 2 3 4	411.05 394.82 381.47 378.87	 16.23*** 13.35 2.60
Food Service Specialist	94B	110	42	38.18	1 2 3 4	373.47 363.33 338.47 335.24	 10.14** 24.87* 3.23
Military Police	95B	173	58	33.53	1 2 3 4	569.96 554.76 539.64 526.30	 15.20*** 15.13 13.34**

[a] DF = N of variables added to model; * p-value < .05; ** p-value < .01; *** p -value < .001.

Table 12
Summary and Specified Model Results for Attrition by MOS
(All Categories)

ENLISTMENT TERM 3

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square*
Morse Interceptor	05H	453	122	26.93	1	1,450.23	
					2	1,428.63	21.57***
					3	1,421.98	6.68
					4	1,414.12	7.86
Infantryman	11B	34,056	15,372	45.14	1	312,099.32***	
					2	310,828.73	1,270.6***
					3	310,538.34	290.39***
					4	310,521.51	16.83**
Bridge Crewmember	12C	2,933	1,092	37.23	1	16,914.99*	
					2	16,759.41	155.58***
					3	16,740.59	18.82
					4	16,739.77	0.82
Cannon Crewmember	13B	14,455	6,123	42.36	1	114,107.29***	
					2	113,356.10	751.19***
					3	113,261.99	94.11***
					4	113,247.17	14.82**
Pershing Crewmember	15E	1,800	853	47.39	1	12,279.00	
					2	12,231.66	47.34***
					3	12,199.30	32.36**
					4	12,194.17	5.13
ADA Crewmember	16R	2,160	852	39.44	1	12,656.98**	
					2	12,582.33	74.66***
					3	12,519.55	62.78***
					4	12,509.95	9.60*
Teletypewriter Repairer	31J	807	237	29.37	1	3,090.29	
					2	3,048.33	41.96***
					3	3,011.83	36.51***
					4	3,008.63	3.19
Parachute Rigger	43E	1,828	929	50.82	1	13,342.29*	
					2	13,304.24	37.95**
					3	13,284.24	20.09
					4	13,275.84	8.40
Power Generator Repairer	52D	1,556	505	32.46	1	7,223.40	
					2	7,108.27	115.13***
					3	7,078.22	30.06**
					4	7,077.54	0.67

/ Continued /

Table 12
Summary and Specified Model Results for Attrition by MOS
(All Categories) (Continued)

ENLISTMENT TERM 3, continued:

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square[a]
Nuclear Weapons Specialist	55G	360	96	26.67	1	1,092.61	
					2	1,090.87	1.74
					3	1,066.11	24.76*
					4	1,058.28	7.83
Watercraft Operator	61B	144	54	37.50	1	510.41	
					2	497.34	13.06***
					3	472.94	24.40*
					4	463.98	8.96
Motor Transport Operator	64C	14,612	4,533	31.02	1	85,254.82	
					2	84,444.50	810.32***
					3	84,363.23	81.27***
					4	84,346.41	16.82**
Admin Specialist	71L	5,476	1,669	30.48	1	28,134.05**	
					2	27,905.33	228.72***
					3	27,835.88	69.46***
					4	27,831.83	4.05
Field Artillery Surveyor	82C	2,465	873	35.42	1	13,251.85**	
					2	13,137.07	114.78***
					3	13,112.60	24.46*
					4	13,110.88	1.73
Food Service Specialist	94B	10,964	4,702	42.89	1	84,996.33**	
					2	84,273.76	722.58***
					3	84,129.80	143.96***
					4	84,115.02	14.78**
Military Police	95B	18,561	4,578	24.66	1	88,417.54***	
					2	87,673.46	744.08***
					3	87,481.14	192.32***
					4	87,461.96	19.19***

ENLISTMENT TERM 4

Morse Interceptor	05H	744	165	21.32	1	2,049.18	
					2	2,144.01	5.06*
					3	2,120.40	23.61*
					4	2,115.02	5.37
Infantryman	11B	16,259	4,774	29.36	1	90,781.69***	
					2	90,755.53	26.16***
					3	90,507.12	248.42***
					4	90,499.00	8.12

/ Continued /

Table 12
Summary and Specified Model Results for Attrition by MOS
(All Categories) (Continued)

ENLISTMENT TERM 4, continued:

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square*
Cannon Crewmember	13B	6,800	2,159	31.75	1	37,273.14	
					2	37,253.16	19.98***
					3	37,175.15	78.01***
					4	37,173.37	1.79
Pershing Crewmember	15E	338	138	40.83	1	1,537.11	
					2	1,535.24	1.88
					3	1,519.93	15.31
					4	1,517.44	2.49
Vulcan Repairer	27F	589	235	39.90	1	2,883.61	
					2	2,846.27	37.35***
					3	2,833.61	12.66
					4	2,831.17	2.44
Teletypewriter Repairer	31J	417	152	36.45	1	1,767.63	
					2	1,732.17	35.46***
					3	1,722.21	9.95
					4	1,716.89	5.33
Wire Systems Installer	36C	3,800	1,302	34.26	1	20,921.22	
					2	20,680.92	240.30***
					3	20,634.60	46.32***
					4	20,613.54	21.06***
Parachute Rigger	43E	273	110	40.29	1	1,175.14	
					2	1,172.37	2.77
					3	1,162.30	10.07
					4	1,157.50	4.81
Water Treatment Specialist	51N	826	327	39.59	1	4,226.84	
					2	4,173.80	53.04***
					3	4,160.59	13.21
					4	4,157.50	3.08
Interior Electrician	51R	803	238	29.64	1	3,087.22***	
					2	3,012.35	74.87***
					3	2,998.95	13.40
					4	2,995.99	2.96
Water Craft Operator	61B	289	134	46.37	1	1,439.88	
					2	1,428.77	11.11***
					3	1,404.17	24.60*
					4	1,400.51	3.65

/ Continued /

Table 12
Summary and Specified Model Results for Attrition by MOS
(All Categories) (Continued)

ENLISTMENT TERM 4, continued:

Name	MOS	N	# of Events	% Attrition	Model	-2 Log L	Chi Square[a]
Motor Transport Operator	64C	197	72	36.55	1	725.37	
					2	709.96	15.41***
					3	691.72	18.24
					4	689.24	2.48
Aircraft Powerplant Repairer	68B	460	110	23.91	1	1,314.83	
					2	1,276.14	38.69***
					3	1,260.50	15.64
					4	1,255.73	4.77
Traffic Mgmt. Coordinator	71N	302	129	42.72	1	1,405.12	
					2	1,386.13	18.99***
					3	1,359.44	26.68**
					4	1,358.40	1.04
Computer/Machine Operator	74D	310	95	30.64	1	1,033.19***	
					2	1,008.89	24.30***
					3	989.07	19.82
					4	985.99	3.08
Still Photographic Specialist	84B	262	78	29.77	1	834.15**	
					2	802.11	32.05**
					3	781.26	20.85
					4	775.15	6.12
Food Service Specialist	94B	137	52	37.96	1	482.74	
					2	467.86	14.88**
					3	439.95	27.91**
					4	436.03	3.92
Military Police	95B	382	120	31.41	1	1,371.12	
					2	1,352.42	18.70***
					3	1,347.11	5.31
					4	1,340.51	6.60

[a] DF = N of variables added to model. * p-value < .05 ** p-value < .01 *** p-value < .001

Best Models. Table 13 shows the best models by MOS and TOE for all soldiers, Category IIIB and IV, and Category IV soldiers alone where the N was sufficiently large (> 100). Of the 27 analyses run for Category IV MOS/TOE groups, 25 resulted in a best model with significant fit to the data; 33 (of 34) were found for CAT IIIBs and IVs, while 32 (of 34) were obtained when all soldiers with complete data were included in the analyses.

It should come as no surprise that high school graduation status was included in the best models far more often than any other predictor--about 90% of the time (Table 14). Other variables that emerged with some frequency include the spatial perception, attention to detail, and numerical operations subtests, as well as age and dependent status. For the ASVAB subtests, the direction of the relationship was as expected, with higher scorers less likely to leave service before completing their term. Dependent status was also positively related to attrition; if one had dependents, one was more likely to complete the first term. Somewhat surprising was the mixed bag concerning age; in 5 instances the results indicated that older soldiers were *less* likely to leave service prematurely. However in the 19 other cases where age was included in the best model, the opposite was true. There is no apparent pattern to these results that would serve to explain this variation.

Because of the mixed results concerning age and the possible controversy in using dependent status as a selection variable, a global best model was tested using high school graduation status, NO, AD, and SP scores. The predictive power of this model was tested by applying it to the data pooled across MOS with all recruits, Category IIIB plus IVs, and Category IVs only.

As seen in Table 15, HS was significantly related to attrition in all cases. Further, the addition of each subsequent variable resulted in significant increases in fit across aptitude groups. The smallest increase was that achieved when SP was added to the model for Category IVs with 4-year TOE, however even this was marginally significant.

Table 13
"Best Models" for Predicting Attrition by MOS
and Term of Enlistment (TOE)

MOS	TOE	AFQT Category	N	-2 Log L Chi Square*	BEST MODEL Variables
05H	3	ALL	453	24.6	HS
		IIIB & IV	135	No significant model	
	4	ALL	774	25.2	HS GS $AI^{(+)}$ CC
		IIIB & IV	183	8.2	$AI_{(+)}$
11B	3	ALL	34,056	1592.7	HS GS SP $SI_{(+)}$ GI AD NO AGE NODEP $BMASS_{(+)}$ CA
		IIIB & IV	27,560	1187.5	HS GS SP $SI_{(+)}$ AD NO AGE NODEP $BMASS_{(+)}$ CA
		IV	20,434	991.1	HS SP $AI_{(+)}$ AD NO AGE NODEP $BMASS_{(+)}$ CA
	4	ALL	16,259	295.1	AFQT HS MC SP $AI_{(+)}$ $SI_{(+)}$ GI $AGE_{(+)}$ NODEP
		IIIB & IV	9,706	107.5	HS MC $SI_{(+)}$ $AGE_{(+)}$ NODEP
		IV	6,227	76.4	HS MC $SI_{(+)}$ EI AD $AGE_{(+)}$
12C	3	ALL	2,933	165.9	HS NODEP
		IIIB & IV	2,274	126.0	HS NODEP
		IV	1,550	76.6	HS
13B	3	ALL	14,455	851.8	HS MC $SI_{(+)}$ AD NODEP $BMASS_{(+)}$
		IIIB & IV	12,671	793.2	HS MC SP $SI_{(+)}$ AD NODEP $CC_{(+)}$
		IV	9,894	646.0	HS $SI_{(+)}$ AD NODEP $CC_{(+)}$
	4	ALL	6,800	80.0	HS AD $AGE_{(+)}$ NODEP
		IIIB & IV	5,169	38.2	HS $AGE_{(+)}$
		IV	3,682	28.2	HS AD $AGE_{(+)}$

/ Continued /

Table 13
"Best Models" for Predicting Attrition by MOS and Term of Enlistment (TOE)
(Continued)

MOS	TOE	AFQT Category	N	-2 Log L Chi Square	BEST MODEL Variables
15E	3	ALL	1,800	68.1	HS $AD_{(+)}$ $AGE_{(+)}$
		IIIB & IV	1,393	58.9	HS AD $AGE_{(+)}$
		IV	946	53.8	HS AD
	4	ALL	338	No significant model	
		IIIB & IV	213	11.1	NODEP
		IV	139	6.9	AD NODEP
16R	3	ALL	2,160	125.6	$AFQT_{(+)}$ HS MC NO $CM_{(+)}$
		IIIB & IV	1,917	109.8	$AFQT_{(+)}$ HS NO
		IV	1,617	93.5	$AFQT_{(+)}$ HS NO
27F	4	ALL	589	38.4	HS
		IIIB & IV	368	20.8	HS
		IV	224	20.7	HS $CC_{(+)}$
31J	3	ALL	807	60.3	HS NO $AGE_{(+)}$
		IIIB & IV	625	27.6	HS NO
		IV	460	21.1	HS NO
	4	ALL	417	35.1	HS
		IIIB & IV	306	35.2	HS $CE_{(+)}$
		IV	221	33.5	HS GS $CE_{(+)}$
36C	4	ALL	3,800	279.4	HS NO $AGE_{(+)}$ CA
		IIIB & IV	3,201	249.9	HS SP NO NODEP CA
		IV	2,464	173.2	HS NO AGE
43E	3	ALL	1,828	55.4	HS NO NODEP
		IIIB & IV	1,393	32.8	HS NODEP
		IV	954	40.7	HS NODEP
	4	ALL	273	4.5	NO
		IIIB & IV	160	15.77	$AI_{(+)}$ NO
		IV	103	10.2	NO

/ Continued /

Table 13
"Best Models" for Predicting Attrition by MOS and Term of Enlistment (TOE)
(Continued)

MOS	TOE	AFQT Category	N	-2 Log L Chi Square	BEST MODEL Variables
51N	4	ALL	826	54.1	HS
		IIIB & IV	691	55.8	HS CA
		IV	505	48.9	HS NODEP
51R	4	ALL	803	81.4	HS
		IIIB & IV	509	54.9	HS
		IV	303	38.1	HS GI
52D	3	ALL	1,556	135.3	HS SP AI
		IIIB & IV	953	77.0	AFQT(+) HS
		IV	487	33.1	HS SP
55G	3	ALL	360	9.5	SP
		IIIB & IV	175	12.7	AFQT(+) NO AGE(+)
		IV	106	9.8	NO AGE(+) CA (+)
61B	3	ALL	144	21.0	HS NO
		IIIB & IV	113	25.8	HS GS EI(+) NO CE
	4	ALL	289	15.6	HS EI
		IIIB & IV	245	15.6	HS GS SP SI(+) GI NO
		IV	206	13.8	HS GS SP
64C	3	ALL	14,612	878.8	HS SP AI(+) NO NODEP BMASS(+)
		IIIB & IV	11,618	681.0	HS SP AI(+) AD NODEP CA
		IV	8,481	454.5	HS AI(+) AD NODEP
	4	ALL	197	29.3	HS AD NO(+) AGE(+)
		IIIB & IV	151	18.8	HS SP AD
		IV	120	7.2	CC(+)
68B	4	ALL	460	39.3	HS
		IIIB & IV	249	22.5	HS
		IV	144	32.1	HS CC(+) CE(+)

/ Continued /

Table 13
"Best Models" for Predicting Attrition by MOS and Term of Enlistment (TOE)
(Continued)

MOS	TOE	AFQT Category	N	-2 Log L Chi Square[1]	BEST MODEL Variables
71L	3	ALL	5,476	296.2	HS SP(+) AD AGE(+)
		IIIB & IV	3,375	188.3	AFQT HS SP AD AGE(+)
		IV	1,840	97.4	HS AD AGE(+)
71N	4	ALL	302	29.2	HS BMASS(+)
		IIIB & IV	195	35.5	HS AGE(+) BMASS(+)
		IV	117	20.6	HS AGE(+)
74D	4	ALL	310	46.8	HS GI
		IIIB & IV	145	44.1	HS EI GI AD
82C	3	ALL	2,465	131.7	HS SP
		IIIB & IV	1,516	82.4	HS
		IV	871	45.1	HS
84B	4	ALL	262	44.2	HS CC
		IIIB & IV	120	16.2	HS
94B	3	ALL	10,964	857.9	HS SP AD NO BMASS(+)
		IIIB & IV	9,511	714.0	HS SP AD NO BMASS(+)
		IV	7,693	604.5	HS SP AD NO BMASS(+)
	4	ALL	137	29.6	HS AD NO
		IIIB & IV	110	28.4	HS AD NO AGE
95B	3	ALL	18,561	1151.0	HS MC GI AGE(+) NODEP CA CC
		IIIB & IV	8,491	450.0	HS GI AGE(+) NODEP
		IV	3,859	163.8	HS GI NODEP
	4	ALL	382	21.2	HS
		IIIB & IV	173	21.3	HS MC

[a] Chi Square DF = number of variables in model. p-levels: .01 if N > 300; .05 if ≤ LE 300.

Table 14
Frequency of Variable Significance in Predicting Attrition
by AFQT Category

Predictor	Category IV (27 models)	Category IIIB & IV (34 models)	All (34 models)
HS	23	29	25
AFQT	1	3	2
GS	2	1	2
MC	1	3	4
SP	4	8	8
AI	2	3	4
SI	2	3	3
EI	1	1	1
GI	2	2	3
AD	9	9	7
NO	7	8	9
AGE	6	9	9
DEP	7	9	8
BMASS	2	3	5
CA	3	4	3
CC	4	1	2
CE	2	1	0
CM	0	0	1

Table 15
Model Fit/Incremental Fit of "Best" Models[a]
with Attrition Criteria

AFQT Category	TOE	N	# of Events	% Attrition	Model	-2 Log L	Chi Square[b]
ALL	4	33,885	10,572	31.20	1	215,754.91***	
					2	215,687.47	67.44***
					3	215,666.60	20.87***
					4	215,622.69	43.91***
IIIB & IV	4	22,185	7,256	32.71	1	141,809.84***	
					2	141,786.22	23.62***
					3	141,769.78	16.44***
					4	141,753.10	16.68***
IV	4	15,021	4,933	32.84	1	92,521.80***	
					2	92,493.66	28.14***
					3	92,473.32	20.34***
					4	92,464.85	8.47*
ALL	3	113,221	42,718	37.73	1	967,020.46***	
					2	966,630.63	389.83***
					3	966,580.75	49.88***
					4	966,388.84	191.91***
IIIB & IV	3	83,986	33,557	39.95	1	739,676.96***	
					2	739,487.07	189.89***
					3	739,425.08	61.99***
					4	739,340.57	84.51***
IV	3	59,509	23,708	39.84	1	506,364.75***	
					2	506,210.70	154.05***
					3	506,156.23	54.46***
					4	506,094.45	61.78***

[a] Model 1 = HS; Model 2 = HS, NO; Model 3 = HS, NO, AD; Model 4 = HS, NO, AD, SP.

[b] DF = 1.

Clearly, the very large number of cases in these analyses increased the likelihood that significant results would be found. To further test the applicability of our generalized model, therefore, it was applied within selected MOS. These were selected to represent varying levels of utility for low-aptitude soldiers as described previously. Table 16 presents these results, which tend to confirm the suggestion presented earlier. That is, that the strength of the relationship between high school graduation status and attrition is such that other variables add very little to our predictive ability. In fact, of the nine MOS included in these analyses, HS was significantly related to attrition for lower-aptitude personnel in all but one (15E). The addition of NO, AD, and SP, however, resulted in significant incremental validity in only two MOS (11B and 71L).

In sum, then, it appears that although there were other variables that made some contribution to our ability to predict first-term pejorative attrition, the only consistent result was one we have known all along. High school graduates, whatever their aptitude level, were less likely to leave service prematurely then were nongraduates. The instability in the remainder of the findings yields little information that will allow us to refine the selection process among lower-aptitude personnel so as to reduce further the incidence of attrition.

Fairness. Though high school graduation status has been used explicitly as a predictor for decades, particularly for below-average personnel, Table 17 provides a rare glimpse of its fairness (along with the lesser weighted NO, AD, and SP ASVAB subtests) for below-average white and black soldiers accessed during the misnorming. Generally, blacks were somewhat less likely than whites to be "excluded" at the various simulated cutting score levels. This finding coincides with the lower attrition rates for excluded blacks than for excluded whites. In fact, there was evidence of a degree of underprediction for blacks which is in keeping with the literature showing lower attrition and less validity of attrition screens for blacks (cf. Binkin & Eitelberg, 1982; Trent, 1993).

Table 16
Model Fit/Incremental Fit of "Best" Models[a] for Attrition by Selected MOS

MOS	TOE	AFQT Category	N	# of Events	% Attrition	Model	-2 Log L[b]	Chi Square
11B	3	ALL	34,056	15,372	45.14	1	310,862.80***	
						2	310,766.47	96.34***
						3	310,756.65	9.82**
						4	310,709.06	47.58***
		IIIB & IV	27,560	12,691	46.05	1	251,251.21***	
						2	251,197.51	53.70***
						3	251,180.02	17.48***
						4	251,150.06	29.97***
		IV	20,434	9,281	45.42	1	178,183.37***	
						2	178,130.00	53.37***
						3	178,110.91	19.09***
						4	178,087.34	23.57***
12C	3	ALL	2,933	1,092	37.23	1	16,760.79***	
						2	16,760.62	.16
						3	16,757.52	3.11
						4	16,757.25	.27
		IIIB & IV	2,274	862	37.91	1	12,791.20***	
						2	12,790.94	.26
						3	12,789.21	1.73
						4	12,789.12	.09
		IV	1,550	574	37.03	1	8,089.70***	
						2	8,089.43	.27
						3	8,089.13	.30
						4	8,088.35	.78
15E	4	ALL	338	138	40.83	1	1,535.34	
						2	1,535.32	.02
						3	1,532.95	2.36
						4	1,532.94	.01
		IIIB & IV	213	83	38.97	1	849.84	
						2	849.77	.07
						3	848.82	.95
						4	848.80	.02
		IV	139	50	35.97	1	472.12	
						2	472.12	.00
						3	467.78	4.34*
						4	467.12	.66

/ Continued /

Table 16
Model Fit/Incremental Fit of "Best" Models
for Attrition by Selected MOS (Continued)

MOS	TOE	AFQT Category	N	# of Events	% Attrition	Model	-2 Log L	Chi Square
27F	4	ALL	589	235	39.90	1	2,846.92***	
						2	2,846.84	.08
						3	2,846.52	.32
						4	2,843.26	3.26
		IIIB & IV	368	159	43.21	1	1,774.84***	
						2	1,774.81	.03
						3	1,774.65	.17
						4	1,773.08	1.57
		IV	224	100	44.64	1	1,012.54***	
						2	1,012.52	.01
						3	1,012.52	.00
						4	1,011.96	.56
51R	4	ALL	803	238	29.64	1	3,016.75***	
						2	3,014.65	2.10
						3	3,014.60	.05
						4	3,012.90	1.70
		IIIB & IV	509	165	32.42	1	1,935.65***	
						2	1,933.60	2.05
						3	1,933.56	.04
						4	1,932.84	.71
		IV	303	99	32.67	1	1,063.14***	
						2	1,062.31	.83
						3	1,060.50	1.81
						4	1,060.48	.02
64C	3	ALL	14,612	4,533	31.02	1	84,445.39***	
						2	84,433.81	11.57***
						3	84,425.99	7.82**
						4	84,418.77	7.22**
		IIIB & IV	11,618	3,617	31.13	1	65,743.71***	
						2	65,737.76	5.95*
						3	65,731.89	5.87*
						4	65,724.70	7.19**
		IV	8,841	2,546	28.80	1	44,732.80***	
						2	44,726.31	6.48*
						3	44,720.42	5.89*
						4	44,716.27	4.14*

/ Continued /

Table 16
Model Fit/Incremental Fit of "Best" Models
for Attrition by Selected MOS (Continued)

MOS	TOE	AFQT Category	N	# of Events	% Attrition	Model	-2 Log L	Chi Square
64C	4	ALL	197	72	36.55	1	710.35***	
						2	710.02	.32
						3	701.16	8.86**
						4	699.15	2.01
		IIIB & IV	151	53	35.10	1	497.31***	
						2	497.19	.12
						3	491.30	5.88*
						4	487.95	3.35
		IV	120	40	33.33	1	360.59*	
						2	360.47	.11
						3	356.13	4.34*
						4	354.46	1.67
71L	3	ALL	5,476	1,669	30.48	1	27,908.60***	
						2	27,896.21	12.39***
						3	27,883.35	12.86***
						4	27,870.32	13.03***
		IIIB & IV	3,375	1,043	30.90	1	16,443.99***	
						2	16,437.33	6.66**
						3	16,421.01	16.23***
						4	16,415.16	5.94*
		IV	1,840	569	30.92	1	8,283.14***	
						2	8,282.91	.23
						3	8,267.51	15.40***
						4	8,263.09	4.42*
95B	3	ALL	18,561	4,578	24.66	1	87,739.50***	
						2	87,726.15	13.35***
						3	87,726.01	.13
						4	87,700.69	25.32***
		IIIB & IV	8,491	2,371	27.92	1	41,703.93***	
						2	41,703.26	.66
						3	41,703.19	.08
						4	41,701.02	2.17
		IV	3,859	1,082	28.04	1	17,365.49***	
						2	17,361.72	3.77
						3	17,361.33	.39
						4	17,357.65	3.68

[a] Model 1 = HS; Model 2 = HS, NO; Model 3 = HS, NO, AD; Model 4 = HS, NO, AD, SP.

[b] DF = 1.

Table 17

Percentages of White and Black AFQT Category IIIB & IV Male Soldiers Excluded and Attrition Rates for Those Excluded at Various Best Attrition Model Cutting Score Levels by Term of Enlistment

Cutting Score Levels	Term of Enlistment 3				Term of Enlistment 4			
	% Excluded		% Attrition		% Excluded		% Attrition	
	White	Black	White	Black	White	Black	White	Black
95	95.0	94.9	46.3	33.0	93.6	96.2	39.3	28.3
90	90.5	89.2	47.4	33.9	87.7	92.0	39.9	28.5
85	86.4	82.8	48.4	34.8	82.1	87.5	40.5	28.6
80	82.4	76.0	49.3	36.0	76.7	82.7	41.1	28.9
75	78.7	69.0	50.4	37.5	71.5	77.9	41.9	29.2
Total N	**49,373**	**30,325**			**9,542**	**11,399**		
% HSDG	**32.0**	**55.3**			**81.4**	**88.7**		

Promotion

Survival Analyses. As with attrition, analyses were limited to subgroups with at least 100 members. In this case, another characteristic examined was Entry Grade (EG). Under the aegis of a number of programs in operation at the time, individuals were allowed to enlist at grades higher than E-1 based on relevant prior experience and/or education. Obviously this must be controlled for when examining time to achieve E-4, and therefore was included in the definition of adequate cell sizes as follows: Only those EGs with 100 or more soldiers were included, and EG was entered as a covariate in the analysis if there were two or more grades meeting this criterion. Table 18 summarizes the results when these criteria were applied.

Table 18
MOS/Term of Enlistment (TOE)/Entry Grade (EG)
Categories Meeting Size Requirements for AFQT Groupings

MOS	TOE	EG	Category IV	Category III & IV	Categories I - IV
05H	4	1		120	531
11B	3	1	13,301	18,068	22,236
11B	3	2	389	523	696
11B	3	3	116	134	252
11B	4	1	3,184	5,768	9,081
11B	4	2	397	644	1,094
11B	4	3	143	247	683
12C	3	1	904	1,339	1,674
13B	3	1	6,610	8,396	9,336
13B	3	2	236	295	322
13B	4	1	2,308	3,182	4,053
13B	4	2	239	346	436
13B	4	3	100	141	213
15E	3	1	612	886	1,136
15E	4	1	107	156	230

/ Continued /

Table 18
MOS/Term of Enlistment (TOE)/Entry Grade (EG)
Categories Meeting Size Requirements for AFQT Groupings (continued)

MOS	TOE	EG	Category IV	Category III & IV	Categories I - IV
16R	3	1	1,220	1,443	1,608
27F	4	1	138	224	333
31J	3	1	289	381	476
31J	4	1	199	278	374
36C	4	1	1,748	2,230	2,575
36C	4	2	150	187	211
43E	3	1	608	937	1,276
43E	4	1	*	111	187
51N	4	1	419	582	691
51R	4	1	167	281	470
52D	3	1	308	602	969
61B	4	1	197	231	269
64C	3	1	5,467	7,413	9,095
64C	3	2	450	605	744
64C	3	3	101	122	147
68B	4	1	103	173	324
71L	3	1	1,550	2,857	4,585
71L	3	2	136	235	365
71N	4	1	*	141	203
82C	3	1	441	779	1,244
94B	3	1	4,237	5,182	5,818
94B	3	2	217	260	320
95B	3	1	2,405	5,287	10,586
95B	3	2	283	674	1,474
95B	3	3	109	208	564
95B	4	1	*	119	214

* N < 100

In comparing Categories I-IIIB with IV, 23 MOS x TOE cells provided sufficient numbers of cases. Of these, 9 had multiple entry grades with more than 100 soldiers. (In the remaining 14 instances, only starting grade E-1 had sufficient cases.) Of the 23 analyses conducted, 6 yielded significant differences between the hazard functions for the two aptitude groups. These are presented graphically in Figures 14 through 20.

Keeping in mind that for the present purposes promotion prior to 12 months in service was considered to be unrelated to performance and therefore not counted, the first notable peak of promotion to E-4 was at 15 months across MOS/TOE. Thereafter, there was a cyclical pattern of peaks every three months, with the highest incidence occurring at two years. The differences between I-IIIBs and IVs tended to favor the former, particularly in the earlier time intervals. When Category IV promotion did exceed I-IIIBs, it was uniformly at or beyond the two-year mark. High school status was a significant covariate in five of the six cases. The one exception was 13B, 4-year TOE, where there were only three percent nongraduates. Entry grade was a significant covariate in all cases.

Much the same results were found when Category I-IIIAs were compared to Categories IIIB and IV. In this case 27 analyses were conducted, with enlistment grade as a covariate 9 times. A total of 8 significant differences were found, 6 being the same as discovered previously (Figures 21-28). Only in the case of MOS 12C and 13B, three year TOE, did the shift of Category IIIBs to the lower-aptitude group result in a change in outcomes. In both cases the patterns seen earlier were repeated, although the IIIB-IV group appeared to be better off as Cannon Crewmen in terms of being promoted earlier in their term of enlistment. The pattern of significance in the covariates was the same as described for the I-IIIB/IV comparisons.

Thus, as might be expected, where there were significant differences in time-to-promotion, brighter individuals were promoted to E-4 with greater frequency earlier in their terms of enlistment. This result supports earlier work that indicates that lower aptitude individuals can reach the same level of proficiency as those of higher aptitude, but that more time is often needed to do so (Vineberg, Sticht, Taylor, & Caylor, 1971).

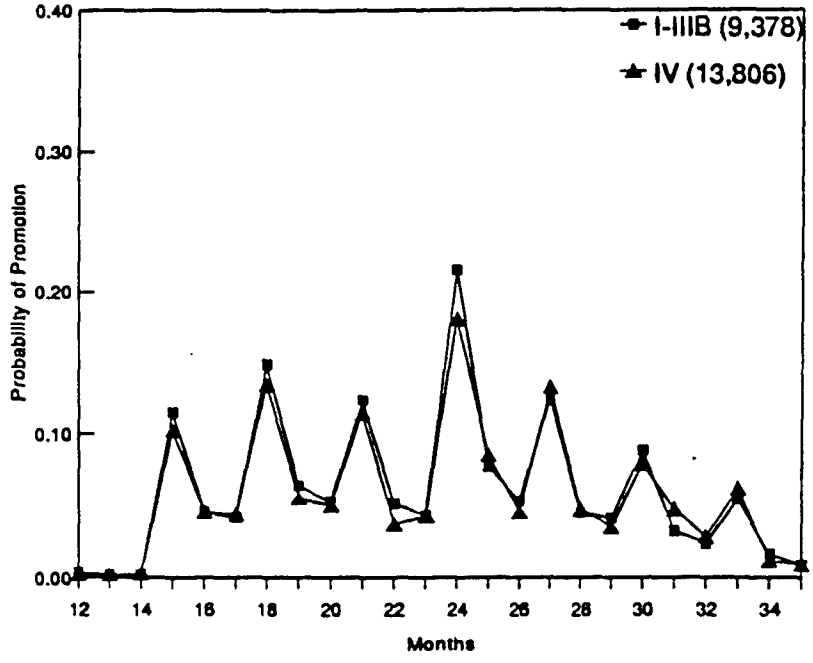


Figure 14. Hazard Function Comparisons -- Promotion 11B, 3YR TOE, I-IIIB vs. IV

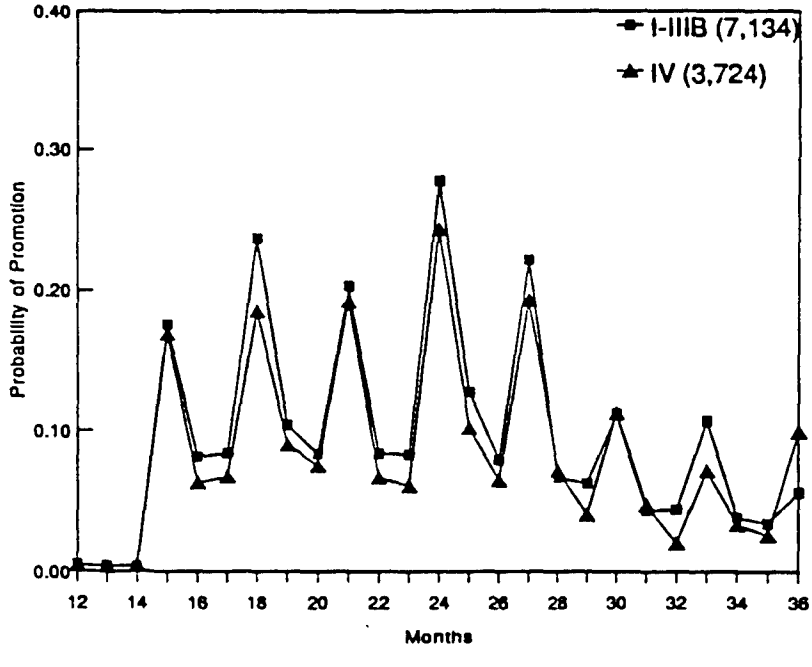


Figure 15. Hazard Function Comparisons -- Promotion 11B, 4YR TOE, I-IIIB vs. IV

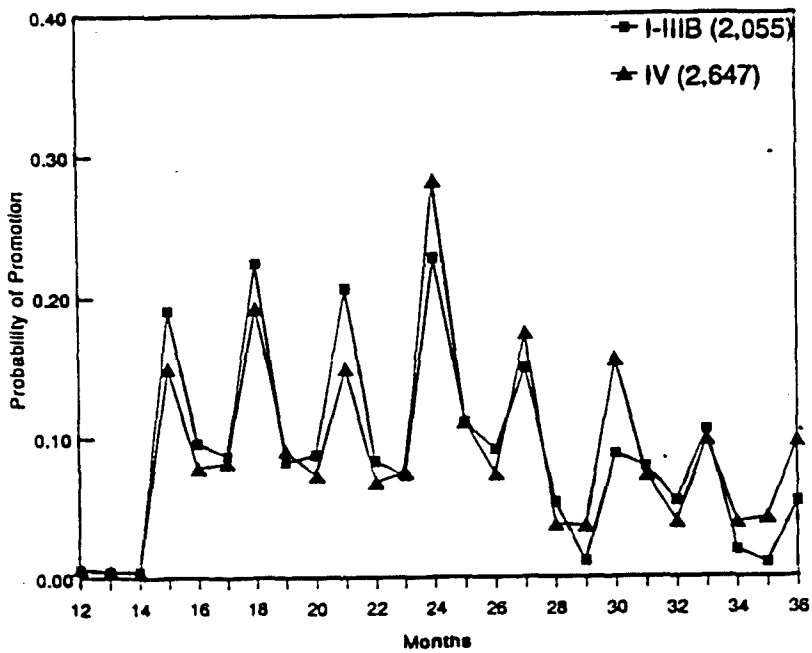


Figure 16. Hazard Function Comparisons -- Promotion 13B, 4YR TOE, I-IIIB vs. IV

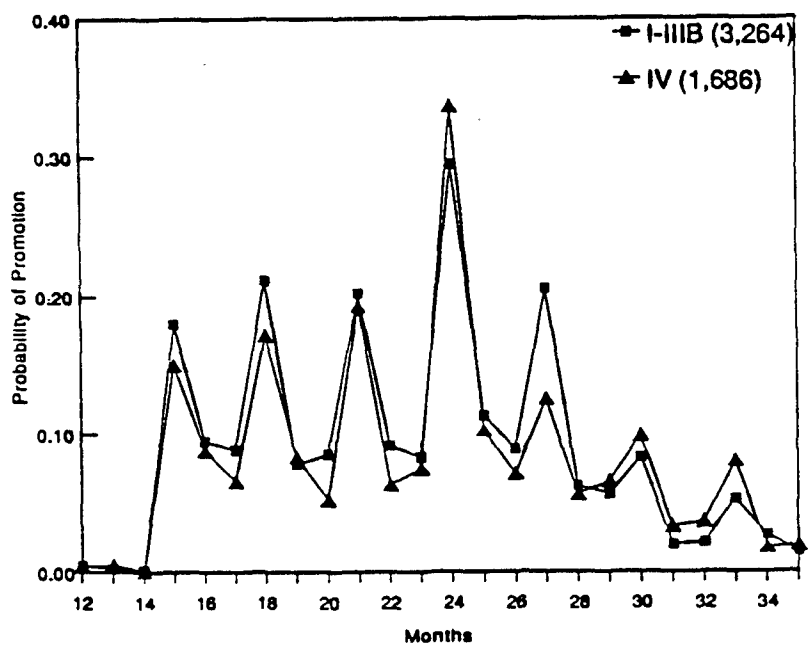


Figure 17. Hazard Function Comparisons -- Promotion 71L, 3YR TOE, I-IIIB vs. IV

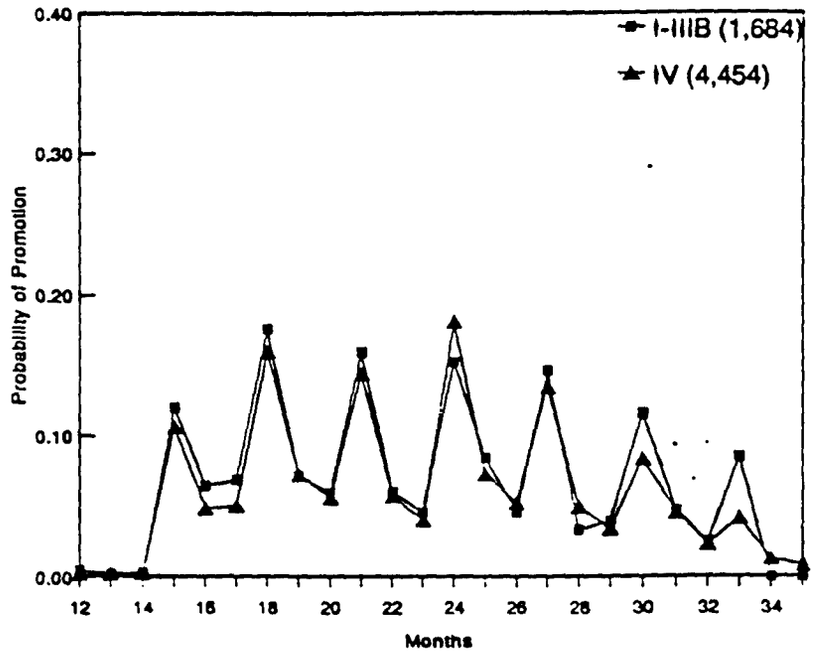


Figure 18. Hazard Function Comparisons -- Promotion 94B, 3YR TOE, I-IIIB vs. IV

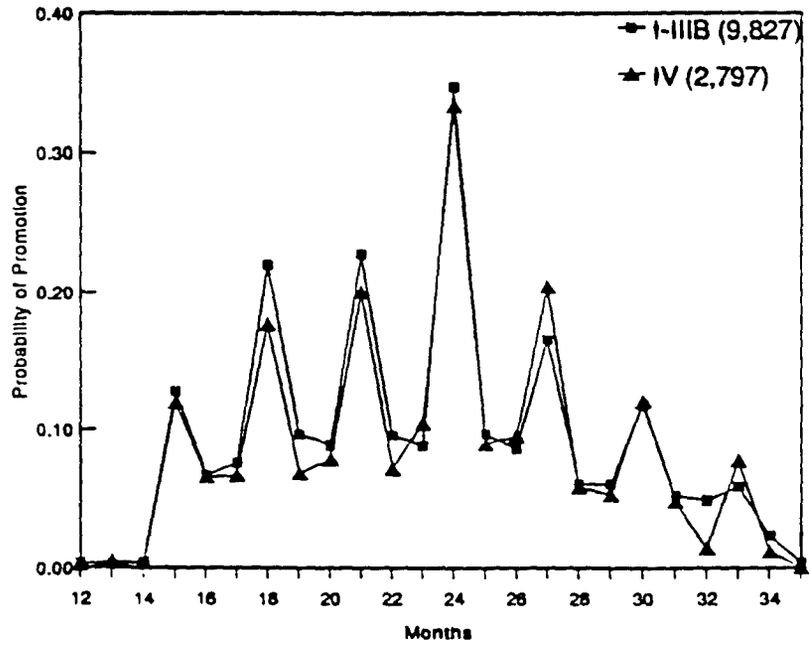


Figure 19. Hazard Function Comparisons -- Promotion 95B, 3YR TOE, I-IIIB vs. IV

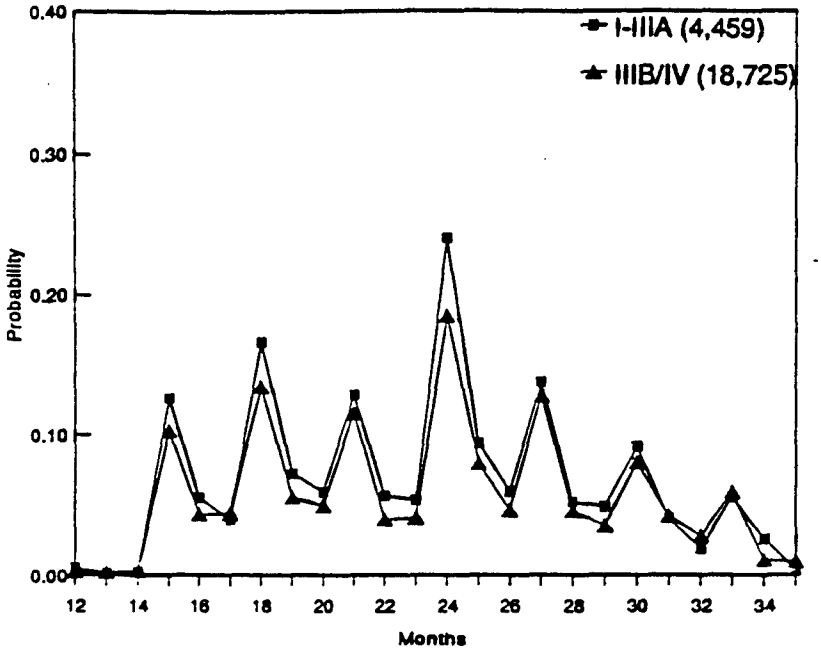


Figure 20. Hazard Function Comparisons -- Promotion 11B, 3YR TOE, I-IIIA vs. IIIB/IV

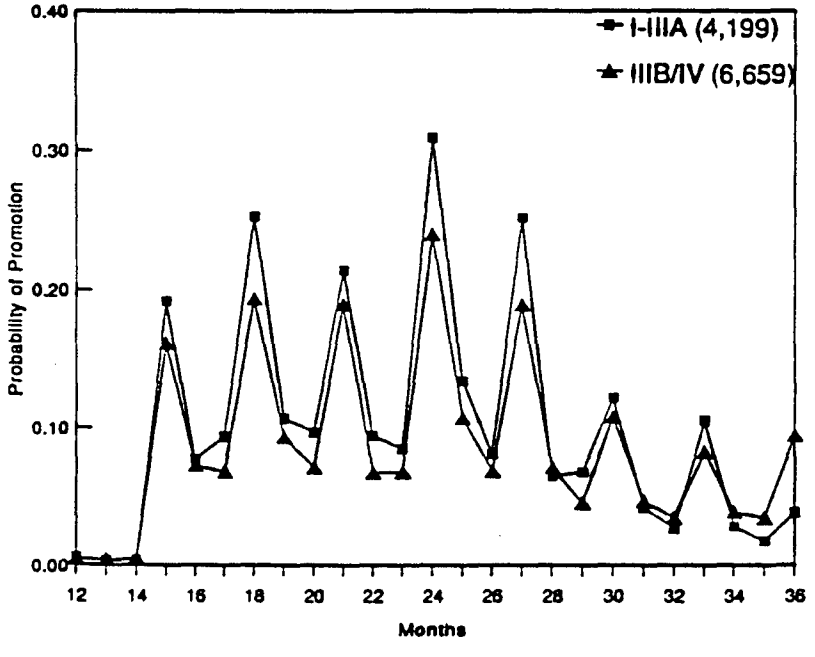


Figure 21. Hazard Function Comparisons -- Promotion 11B, 4YR TOE, I-IIIA vs. IIIB/IV

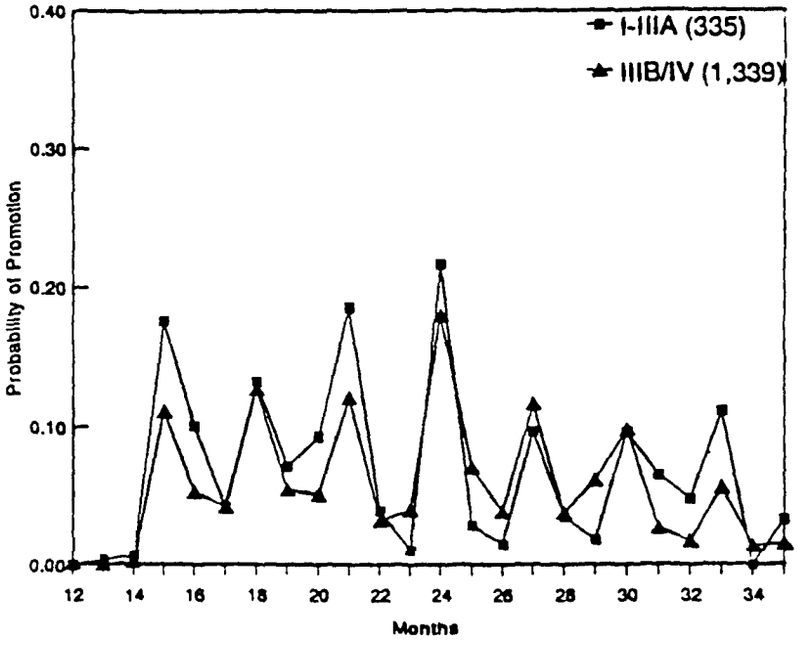


Figure 22. Hazard Function Comparisons -- Promotion 12C, 3YR TOE, I-IIIA vs. IIIB/IV

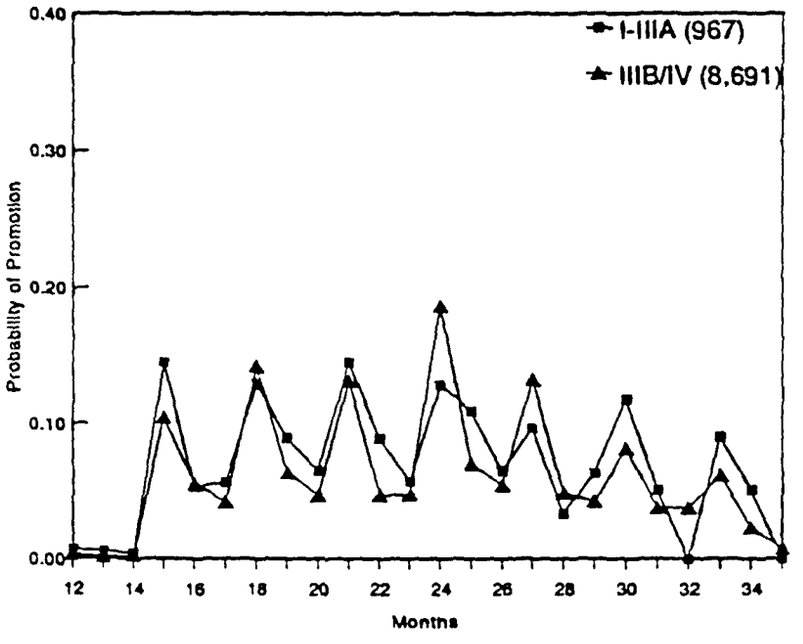


Figure 23. Hazard Function Comparisons -- Promotion 13B, 3YR TOE, I-IIIA vs. IIIB/IV

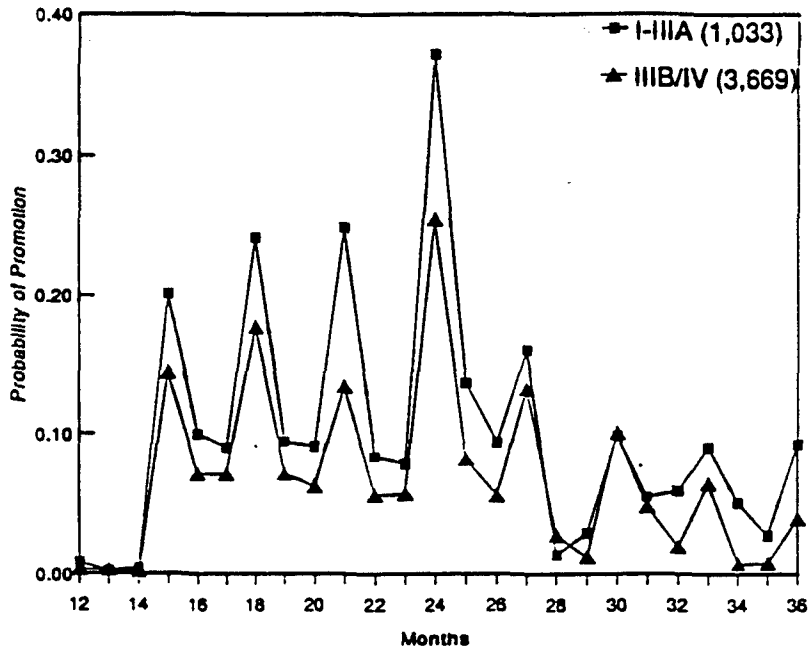


Figure 24. Hazard Function Comparisons -- Promotion 13B, 4YR TOE, I-IIIA vs. IIIB/IV

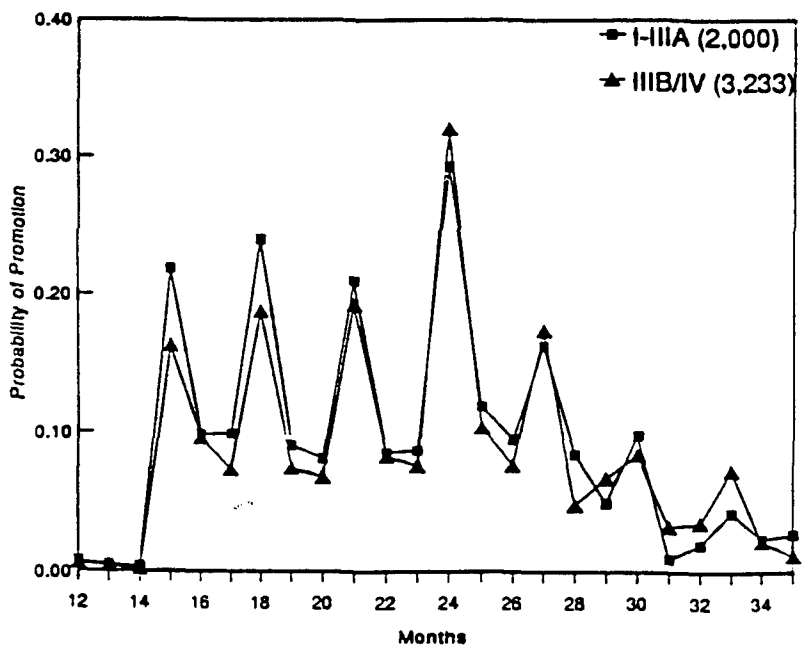


Figure 25. Hazard Function Comparisons -- Promotion 71L, 3YR TOE, I-IIIA vs. IIIB/IV

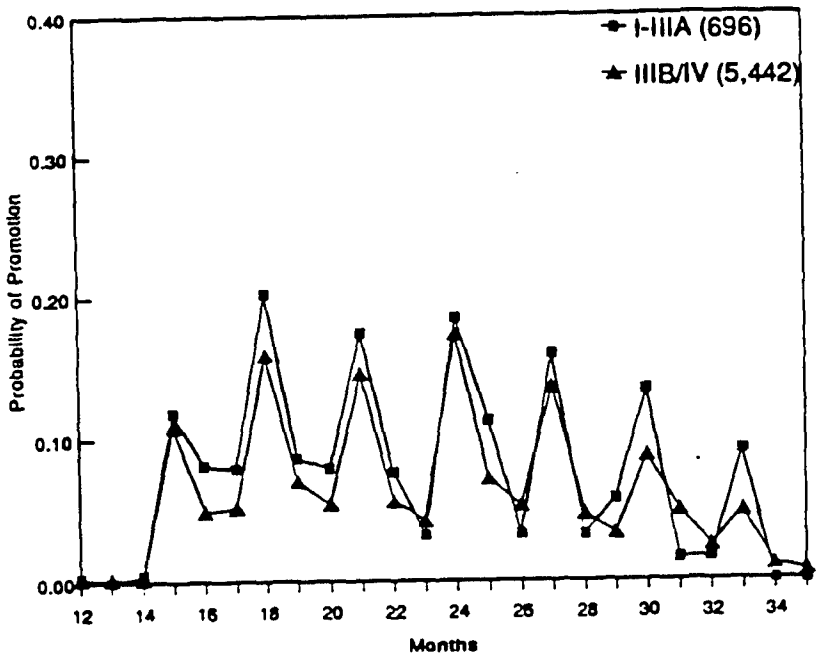


Figure 26. Hazard Function Comparisons -- Promotion 94B, 3YR TOE, I-IIIA vs. IIIB/IV

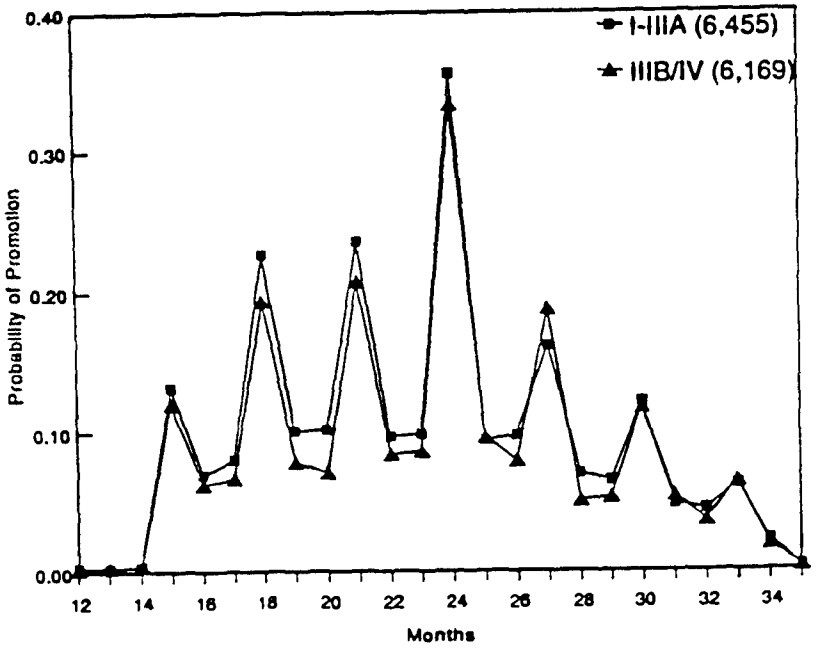


Figure 27. Hazard Function Comparisons -- Promotion 95B, 3YR TOE, I-IIIA vs. IIIB/IV

Proportional Hazard Regression Models

Specified Models. As with attrition, the first regression analyses conducted examined the validity of four conceptually derived models to predict promotion: AFQT only; AFQT and high school graduation status; AFQT, HS, and ASVAB subtests; and AFQT, HS, ASVAB subtests, and the four interest measures contained in the ASVAB during the period in question. These results are presented in Tables 19 through 21.

Once again, Model 2 (AFQT + HS) appeared to have the most predictive power across MOS/TOE groupings. This was particularly true for 3-year as opposed to 4-year TOE. In fact, for Category IV personnel, none of the models had much utility in predicting promotion to E-4 for those who enlisted for 4 years. The explanation for this (in terms of Model 2, at least) is that few lower-aptitude nongraduates were admitted to service. For instance, in MOS 11B, some 75% of the 3-year Category IV enlistees were nongraduates, as compared to 3.9% of the 4-year soldiers.

Best Models. Table 22 shows the best models for predicting promotion by MOS/TOE group. As might be expected given the results just described, high school graduation status emerged most frequently as a significant predictor of promotion to E-4 (Table 23). Obviously, this result did not hold in cases where there were few nongraduates (e.g., most of the Category IV, 4-year TOE groups). Two other variables that appeared to have some promise with this criterion were age at entry and Automotive Information (AI) subtest score. All three of these predictors were significant across aptitude groups for three MOS--11B, 13B, and 64C (3-year TOE). For lower-aptitude individuals (IVs, IIIB-IV), they also emerged in the case of 94B. Note that all of the MOS were judged to have high utility for lower aptitude soldiers.

We investigated the applicability of the HS, AGE, and AI model by first applying it to the data collapsed across MOS, including all recruits, Category IIIB & IVs, and Category IVs only. These results are shown in Table 24. As can be readily seen, all of the variables were significant, with AI and AGE incrementally significant in each case.

Table 19
Summary and Specified Model Results for Promotion to E-4 by MOS
(Category IV)

ENLISTMENT TERM 3

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
Infantryman[a]	11B	13,806	6,384	46.24	1	106,936.93**	
					2	106,658.20	278.73***
					3	106,568.39	89.81***
					4	106,559.00	9.39*
Bridge Crewmember	12C	904	489	54.09	1	5,897.78	
					2	5,888.06	9.72**
					3	5,864.03	24.02*
					4	5,859.86	4.18
Cannon Crewmember[a]	13B	6,846	3,455	50.47	1	53,360.64***	
					2	53,207.40	153.23***
					3	53,154.02	53.38***
					4	53,147.83	6.20
Pershing Crewmember	15E	612	315	51.47	1	3,441.95	
					2	3,441.04	0.90
					3	3,420.72	20.32
					4	3,419.09	1.63
ADA Crewmember	16R	1,220	657	53.85	1	8,133.43*	
					2	8,104.66	28.77***
					3	8,099.46	5.20
					4	8,096.26	3.20
Teletypewriter Repairer	31J	289	173	59.86	1	1,614.87	
					2	1,613.43	1.44
					3	1,598.41	15.01
					4	1,579.30	19.11***
Parachute Rigger	43E	608	252	41.45	1	2,677.43	
					2	2,675.54	1.89
					3	2,660.45	15.09
					4	2,651.03	9.42
Power Generator Repairer	52D	308	183	59.42	1	1,800.12	
					2	1,798.02	2.10
					3	1,781.12	16.91
					4	1,779.21	1.91
Motor Transport Operator[a]	64C	6,018	3,823	63.53	1	57,151.65	
					2	57,038.06	113.59***
					3	57,005.10	32.96***
					4	57,000.79	4.31

/ Continued /

Table 19
Summary and Specified Model Results for Promotion to E-4 by MOS
(Category IV) (continued)

ENLISTMENT TERM 3, continued:

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
Administrative Specialist[a]	71L	1,686	1,034	61.33	1	12,725.99**	
					2	12,692.49	33.50***
					3	12,673.76	18.72
					4	12,665.73	8.03
Field Artillery Surveyor	82C	441	245	55.56	1	2,534.10	
					2	2,522.20	11.89***
					3	2,510.53	11.67
					4	2,506.87	3.66
Food Service Specialist[a]	94B	4,454	2,196	49.30	1	31,724.93	
					2	31,623.10	101.83***
					3	31,581.06	42.04***
					4	31,578.32	2.74
Military Police[a]	95B	2,797	1,817	64.96	1	23,550.66	
					2	23,515.71	34.95***
					3	23,495.12	20.59
					4	23,483.70	11.42*

ENLISTMENT TERM 4

Infantryman[a]	11B	4,354	2,997	68.83	1	41,786.31	
					2	41,782.26	4.05*
					3	41,770.17	12.09
					4	41,769.40	0.78
Cannon Crewmember[a]	13B	2,647	1,860	70.27	1	24,014.24	
					2	24,014.24	0.00
					3	24,015.49	20.43
					4	23,987.93	5.89
Pershing Crewmember	15E	107	70	65.42	1	527.88	
					2	527.25	0.62
					3	518.08	9.17
					4	511.81	6.27
Vulcan Repairer	27F	138	90	65.22	1	718.69	
					2	714.29	4.40
					3	699.45	14.84
					4	697.83	1.62

/ Continued /

Table 19
Summary and Specified Model Results for Promotion to E-4 by MOS
(Category IV) (continued)

ENLISTMENT TERM 4, continued:

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
Teletypewriter Repairer	31J	199	126	63.32	1	1,078.62	
					2	1,075.60	3.02
					3	1,047.32	28.28**
					4	1,040.77	6.55
Wire Systems Installer[a]	36C	1,898	1,273	67.07	1	15,903.37*	
					2	15,858.78	44.59**
					3	15,840.09	18.69
					4	15,831.05	9.04
Water Treatment Specialist	51N	419	249	59.43	1	2,505.83	
					2	2,501.92	3.91*
					3	2,490.28	11.64
					4	2,487.16	3.12
Interior Electrician	51R	167	114	68.26	1	963.43	
					2	960.53	2.90
					3	950.56	9.97
					4	944.10	6.46
Watercraft Operator	61B	197	107	54.31	1	902.29	
					2	899.88	2.40
					3	885.68	14.20
					4	884.34	1.34
Aircraft Powerplant Repairer	68B	103	80	77.67	1	573.34*	
					2	571.88	1.45
					3	555.62	16.26
					4	554.48	1.14

[a] Entry grades combined and entered as covariate.

[b] DF model 1 = 1; model 2 = 1; model 3 = 12; model 4 = 4.

Table 20
Summary and Specified Model Results for Promotion to E-4 by MOS
(Categories IIIB & IV)

ENLISTMENT TERM 3

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
Infantryman[a]	11B	18,725	8,535	45.58	1	148,262.51	
					2	147,927.05	335.46***
					3	147,814.30	112.75***
					4	147,806.11	8.18
Bridge Crewmember	12C	1,339	699	52.20	1	8,950.37	
					2	8,935.98	14.39***
					3	8,898.61	37.36***
					4	8,893.44	5.17
Cannon Crewmember[a]	13B	8,691	4,270	49.13	1	68,008.31***	
					2	67,829.44	178.86***
					3	67,763.88	65.56***
					4	67,754.96	8.92
Pershing Crewmember	15E	886	437	49.32	1	5,085.52	
					2	5,082.83	2.68
					3	5,062.64	20.19
					4	5,062.36	0.28
ADA Crewmember	16R	1,443	756	52.39	1	9,606.86*	
					2	9,578.02	28.84***
					3	9,568.17	9.85
					4	9,566.68	1.49
Teletypewriter Repairer	31J	381	236	61.94	1	2,356.50	
					2	2,351.99	4.50*
					3	2,332.91	19.08
					4	2,315.98	16.93**
Parachute Rigger	43E	937	379	40.45	1	4,356.04	
					2	4,354.38	1.66
					3	4,343.96	10.42
					4	4,330.54	13.42**
Power Generator Repairer	52D	602	339	56.31	1	3,754.81	
					2	3,749.95	4.86*
					3	3,735.00	14.95
					4	3,731.23	3.77
Motor Transport Operator[a]	64C	8,140	5,086	62.48	1	79,015.63	
					2	78,846.75	168.88***
					3	78,804.42	42.33***
					4	78,803.29	1.13

/ Continued /

Table 20
Summary and Specified Model Results for Promotion to E-4 by MOS
(Categories IIIB & IV) (continued)

ENLISTMENT TERM 3, continued:

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
Administrative Specialist[a]	71L	3,233	2,010	62.17	1	26,722.91**	
					2	26,667.32	55.59***
					3	26,626.60	40.72***
					4	26,624.30	2.30
Field Artillery Surveyor	82C	779	433	55.58	1	4,977.80	
					2	4,969.88	7.92*
					3	4,944.48	25.40*
					4	4,942.75	1.72
Food Service Specialist[a]	94B	5,442	2,670	49.06	1	39,660.01	
					2	39,529.73	130.28***
					3	39,473.75	55.97***
					4	39,469.79	3.96
Military Police[a]	95B	6,169	4,024	66.30	1	58,423.20	
					2	58,341.04	82.17***
					3	58,296.54	44.50***
					4	58,291.34	5.17

ENLISTMENT TERM 4:

EW/SIGINT Interceptor-IMC	05H	120	91	75.83	1	685.62	
					2	685.19	0.43
					3	678.06	7.13
					4	669.92	8.13
Infantryman[a]	11B	6,659	4,582	68.81	1	67,421.17	
					2	67,412.77	8.40**
					3	67,393.25	19.52
					4	67,390.01	3.24
Cannon Crewmember[a]	13B	3,669	2,566	69.94	1	34,689.05	
					2	34,688.78	0.27
					3	34,669.84	18.94
					4	34,665.74	4.11
Pershing Crewmember	15E	156	98	62.82	1	796.99	
					2	796.32	0.68
					3	785.69	10.62
					4	781.64	4.05

/ Continued /

Table 20
Summary and Specified Model Results for Promotion to E-4 by MOS
(Categories IIIB & IV) (continued)

ENLISTMENT TERM 4, continued:

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
Vulcan Repairer	27F	224	140	62.50	1	1,256.97	
					2	1,248.58	8.38**
					3	1,229.55	19.03
					4	1,227.23	2.32
Teletypewriter Repairer	31J	278	174	62.59	1	1,614.40	
					2	1,612.85	1.55
					3	1,584.57	28.28**
					4	1,579.63	4.94
Wire Systems Installer[a]	36C	2,417	1,620	47.41	1	21,039.32**	
					2	20,096.70	62.62***
					3	20,948.14	28.55**
					4	20,941.17	6.98
Parachute Rigger	43E	111	60	54.05	1	429.13	
					2	429.11	0.02
					3	403.83	25.28*
					4	392.10	11.73*
Water Treatment Specialist	51N	582	345	59.28	1	3,706.67	
					2	3,698.17	8.50**
					3	3,681.44	16.73
					4	3,678.76	2.68
Interior Electrician	51R	281	193	68.68	1	1,829.80	
					2	1,822.07	7.73**
					3	1,802.64	19.44
					4	1,795.39	7.25
Watercraft Operator	61B	231	130	56.28	1	1,141.25	
					2	1,137.64	3.61
					3	1,117.10	20.54
					4	1,115.52	1.58
Aircraft Powerplant Repairer	68B	173	129	74.57	1	1,073.86	
					2	1,071.54	2.32
					3	1,060.24	11.30
					4	1,058.39	1.85
Traffic Management Coordinator	71N	141	84	59.57	1	669.02	
					2	662.10	6.92**
					3	644.23	17.86
					4	640.33	3.91
Military Police	95B	119	78	65.55	1	566.24	
					2	563.35	2.89
					3	555.78	7.57
					4	554.76	0.99

[a] Entry grades combined and entered as covariate.
[b] DF model 1 = 1; model 2 = 1; model 3 = 12; model 4 = 4.

Table 21
Summary and Specified Model Results for Promotion to E-4 by MOS
(All Categories)

ENLISTMENT TERM 3

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
EW/SIGINT Interceptor-IMC	05H	245	148	60.41	1	1,346.00	
					2	1,345.44	0.56
					3	1,332.97	12.47
					4	1,328.25	4.72
Infantryman[a]	11B	23,148	10,797	46.64	1	191,537.46***	
					2	191,044.81	492.65***
					3	190,906.20	138.61***
					4	190,891.14	15.06**
Bridge Crewmember	12C	1,674	894	53.40	1	11,826.96**	
					2	11,797.19	29.76***
					3	11,772.03	25.16*
					4	11,763.01	8.99
Cannon Crewmember[a]	13B	9,771	4,827	49.40	1	77,173.10	
					2	76,950.74	222.36***
					3	76,862.63	88.11***
					4	76,854.23	8.40
Pershing Crewmember	15E	1,136	539	47.45	1	6,528.84	
					2	6,524.85	3.99*
					3	6,503.71	21.14*
					4	6,502.63	1.07
ADA Crewmember	16R	1,608	849	52.80	1	10,978.97	
					2	10,945.37	33.60***
					3	10,929.93	15.44
					4	10,928.07	1.86
Teletypewriter Repairer	31J	476	299	62.81	1	3,103.40	
					2	3,097.12	6.28*
					3	3,078.41	18.71
					4	3,068.98	9.43
Parachute Rigger	43E	1,276	534	41.85	1	6,486.36*	
					2	6,477.82	8.54**
					3	6,468.86	8.95
					4	6,454.53	14.33**
Power Generator Repairer	52D	969	559	57.69	1	6,715.42	
					2	6,691.94	23.48***
					3	6,666.32	25.62*
					4	6,663.23	3.10

/ Continued /

Table 21
Summary and Specified Model Results for Promotion to E-4 by MOS
(All Categories) (continued)

ENLISTMENT TERM 3, continued:

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
Nuclear Weapons Maintenance	55G	111	78	70.27	1	598.81	
					2	598.67	0.13
					3	592.78	5.89
					4	585.91	6.87
Motor Transport Operator[a]	64C	9,986	6,265	62.74	1	99,794.33***	
					2	99,560.66	233.67***
					3	99,503.98	56.68***
					4	99,501.95	2.03
Administrative Specialist[a]	71L	5,233	3,277	62.62	1	46,552.07***	
					2	46,441.93	110.14***
					3	46,400.75	41.18***
					4	46,386.67	14.08**
Field Artillery Surveyor	82C	1,244	724	58.20	1	9,018.34***	
					2	9,001.93	16.41***
					3	8,977.46	24.47*
					4	8,972.87	4.59
Food Service Specialist[a]	94B	6,138	849	50.02	1	46,273.08**	
					2	46,116.93	156.14***
					3	46,058.88	58.05***
					4	46,053.52	5.36
Military Police[a]	95B	12,624	8,619	68.27	1	137,015.56***	
					2	136,897.82	117.74***
					3	136,812.88	84.94***
					4	136,793.15	19.73***

ENLISTMENT TERM 4

EW/SIGINT Interceptor-IMC	05H	531	414	77.97	1	4,383.66	
					2	4,383.66	0.00
					3	4,377.25	6.40
					4	4,375.09	2.15
Infantryman[a]	11B	10,858	7,578	69.79	1	117,889.40***	
					2	117,879.57	9.83**
					3	117,861.49	18.08
					4	117,857.33	4.12
Cannon Crewmember[a]	13B	4,702	3,277	69.69	1	45,761.21***	
					2	45,760.78	0.48
					3	45,737.84	22.94*
					4	45,732.51	5.34

/ Continued /

Table 21
Summary and Specified Model Results for Promotion to E-4 by MOS
(All Categories) (continued)

ENLISTMENT TERM 4, continued:

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
Pershing Crewmember	15E	230	144	62.61	1	1,292.07	
					2	1,291.34	0.70
					3	1,279.44	11.93
					4	1,274.38	5.06
Vulcan Repairer	27F	333	207	62.16	1	2,018.79	
					2	2,008.85	9.94**
					3	1,995.98	12.86
					4	1,992.37	3.61
Teletypewriter Repairer	31J	374	244	65.24	1	2,412.14	
					2	2,408.75	3.39
					3	2,385.20	23.54*
					4	2,376.92	8.29
Wire Systems Installer*	36C	2,786	1,868	67.05	1	24,790.55	
					2	24,706.49	84.06***
					3	24,663.42	43.06***
					4	24,658.11	5.31
Parachute Rigger	43E	187	102	54.54	1	843.74	
					2	843.74	0.00
					3	827.45	16.29
					4	821.84	5.61
Water Treatment Specialist	51N	691	410	59.33	1	4,546.92	
					2	4,536.84	10.07**
					3	4,518.32	18.52
					4	4,515.36	2.96
Interior Electrician	51R	470	324	68.94	1	3,394.89	
					2	3,379.37	15.52***
					3	3,367.88	11.49
					4	3,353.18	14.69**
Watercraft Operator	61B	269	153	56.88	1	1,397.51	
					2	1,391.95	5.56*
					3	1,371.97	19.97
					4	1,371.20	0.78
Motor Transport Operator	64C	110	72	65.45	1	531.25	
					2	528.82	2.43
					3	512.16	16.66
					4	509.91	2.25
Aircraft Powerplant Repairer	68B	324	241	74.38	1	2,313.89*	
					2	2,307.90	5.99*
					3	2,283.34	24.55*
					4	2,282.60	0.74

/ Continued /

Table 21
Summary and Specified Model Results for Promotion to E-4 by MOS
(All Categories) (continued)

ENLISTMENT TERM 4, continued:

Name	MOS	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
Traffic Management Coordinator	71N	203	118	58.13	1	1,020.10	
					2	1,008.99	11.12***
					3	992.70	16.28
					4	987.35	5.35
Computer/Machine Operator	74D	205	147	71.71	1	1,286.09	
					2	1,278.24	7.85**
					3	1,260.46	17.77
					4	1,257.03	3.43
Still Photographic Specialist	84B	128	83	64.84	1	643.51	
					2	653.16	8.35**
					3	620.47	14.68
					4	616.94	3.53
Medical Laboratory Specialist	92B	118	9681	81.34	1	739.35	
					2	735.61	3.73
					3	727.22	8.39
					4	718.87	8.34
Military Police	95B	214	134	62.62	1	1,126.51	
					2	1,124.45	2.06
					3	1,115.71	8.74
					4	1,113.69	2.01

[a] Entry grades combined and entered as covariate.

[b] DF model 1 = 1; model 2 = 1; model 3 = 12; model 4 = 4.

Table 22
"Best Models" of Promotion by MOS and Term of Enlistment

MOS	TOE	AFQT Category	N	-2 Log L Chi Square	BEST MODEL Variables
05H	4	ALL	531	No Significant Model	
		IIIB & IV	120	No Significant Model	
11B	3	ALL	23,184	667.47	HS AI NO AGE $DEP_{(-)}$ $CE_{(-)}$
		IIIB & IV	18,725	440.81	HS AI $SI_{(-)}$ NO AGE $DEP_{(-)}$
		IV	13,806	362.02	HS AI NO AGE
	4	ALL	10,858	58.93	AFQT HS
		IIIB & IV	6,659	8.39	HS
		IV	4,354	10.48	HS, SP, EI
12C	3	ALL	1,674	55.60	HS AGE CA
		IIIB & IV	1,339	37.69	HS AGE
		IV	904	23.87	HS AGE
13B	3	ALL	9,771	294.98	HS AI NO AGE
		IIIB & IV	8,691	251.22	HS AI AD AGE
		IV	6,846	207.72	HS AI AGE
	4	ALL	4,702	20.58	AI
		IIIB & IV	3,669	8.97	AI
		IV	2,647	8.86	AI
15E	3	ALL	1,136	11.47	AGE
		IIIB & IV	886	8.03	AGE
		IV	612	5.41	AGE
	4	ALL	230	No Significant Model	
		IIIB & IV	156	No Significant Model	
		IV	107	No Significant Model	
16R	3	ALL	1,608	32.93	HS
		IIIB & IV	1,443	34.01	HS
		IV	1,220	32.83	HS
27F	4	ALL	333	10.59	HS
		IIIB & IV	224	17.77	HS GS AGE
		IV	138	12.58	$SP_{(-)}$ AI

/ Continued /

Table 22
"Best Models" of Promotion by MOS and Term of Enlistment (Continued)

MOS	TOE	Population	N	-2 Log L Chi Square	BEST MODEL Variables
31J	3	ALL	476	11.60	NO
		IIIB & IV	381	8.96	NO
		IV	289	16.29	NO CC
	4	ALL	374	11.18	AGE
		IIIB & IV	278	20.35	HS AI $DEP_{(-)}$
		IV	199	19.16	AI $DEP_{(-)}$
36C	4	ALL	2,786	110.54	HS AI $DEP_{(-)}$
		IIIB & IV	2,417	73.68	HS $DEP_{(-)}$
		IV	1,898	54.06	HS $DEP_{(-)}$
43E	3	ALL	1,276	17.80	HS CC
		IIIB & IV	937	6.30	CC
		IV	608	No Significant Model	
	4	ALL	187	5.65	AD
		IIIB & IV	111	9.20	NO
51N	4	ALL	691	10.06	HS
		IIIB & IV	582	8.01	HS
		IV	419	No Significant Model	
51R	4	ALL	470	25.01	HS CE
		IIIB & IV	281	7.14	AGE
		IV	167	9.67	AGE CM
52D	3	ALL	969	33.97	HS $DEP_{(-)}$
		IIIB & IV	602	8.61	AGE
		IV	308	9.28	AGE, GS
61B	4	ALL	269	10.95	SP AGE
		IIIB & IV	231	10.98	SP AGE
		IV	197	4.43	AGE
64C	3	ALL	9,986	298.90	AFQT HS AI AGE $DEP_{(-)}$
		IIIB & IV	8,140	200.93	AFQT HS AI AGE
		IV	6,018	131.18	HS AI AGE

/ Continued /

Table 22
"Best Models" of Promotion by MOS and Term of Enlistment (Continued)

MOS	TOE	Population	N	-2 Log L Chi Square	BEST MODEL Variables
68B	4	ALL	324	8.80	GI
		IIIB & IV	173	No Significant Model	
		IV	103	7.64	SP, $DEP_{(-)}$
71L	3	ALL	5,233	186.60	HS AI NO $DEP_{(-)}$ $CM_{(-)}$
		IIIB & IV	3,233	90.06	HS AI NO
		IV	1,686	54.71	AFQT HS AI CA
71N	4	ALL	203	21.83	HS NO
		IIIB & IV	141	13.43	HS SI
82C	3	ALL	1,244	44.70	HS AI AGE
		IIIB & IV	779	16.12	HS AI
		IV	441	11.30	HS
94B	3	ALL	6,138	206.93	HS EI AGE $DEP_{(-)}$
		IIIB & IV	5,442	171.13	HS AI AGE
		IV	4,454	135.07	HS AI AGE
95B	3	ALL	12,624	261.87	HS EI NO AGE $DEP_{(-)}$ CA $CE_{(-)}$
		IIIB & IV	6,169	112.0	HS GS AGE
		IV	2,797	42.84	HS CA
	4	ALL	214	No Significant Model	
		IIIB & IV	119	No Significant Model	

Table 23
Frequency of Variable Significance in Predicting Promotion
by AFQT Grouping

Predictor	Category IV (23 models)	Category IIIB & IV (27 models)	All (27 models)
HS	11	15	17
AFQT	1	1	2
GS	1	2	0
MC	0	0	0
SP	3	1	1
AI	8	8	7
SI	0	2	0
EI	1	0	2
GI	0	0	1
AD	0	1	1
NO	2	4	6
AGE	9	11	10
DEP	3	3	7
BMASS	0	0	0
CA	2	0	2
CC	1	1	1
CE	0	0	3
CM	1	0	1

Table 24
Summary and Specified Model Results with Promotion to E-4 Criteria

AFQT Category	TOE	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
ALL	4	23,588	16,253	68.90	1 2 3	278,786.29*** 278,724.96 278,713.37	 61.34*** 11.59**
IIIB & IV	4	15,884	10,808	68.04	1 2 3	177,955.88*** 177,931.09 177,917.14	 24.79*** 13.95***
IV	4	10,963	7,466	68.10	1 2 3	117,738.34*** 117,721.32 117,710.10	 17.02*** 11.22**
ALL	3	76,594	42,112	54.98	1 2 3	835,188.34*** 834,780.51 834,629.95	 407.83*** 150.55***
IIIB & IV	3	57,614	30,440	52.83	1 2 3	589,205.72*** 589,017.18 588,896.26	 188.54*** 120.92***
IV	3	40,663	21,471	52.80	1 2 3	401,395.95*** 401,197.29 401,117.73	 118.66*** 79.57***

[a] Model 1 = HS; Model 2 = HS, AI; Model 3 = HS, AI, AGE.

[b] DF = number of variables in model -1.

To further investigate the generalizability of the model, we then applied it within MOS selected to represent various levels of utility for low-aptitude soldiers (see Table 25). Model 1, high school graduation status, was most uniformly significant across jobs. Perhaps the most noteworthy finding regarding the additional variables is that they uniformly failed to achieve incremental significance only for those MOS that have been judged to be of medium or low utility for lower aptitude personnel (15E, 27F, 51R). Beyond this, the pattern was somewhat mixed: AI alone emerged for Category IV soldiers in 64C and 71L, whereas both AI and age contributed significantly in 11B, 12C, and 94B.

It is clear once again that completion of high school was a key indicator of the likelihood of success in service. In this case, automotive information subtest score and age contributed to the prediction of promotion likelihood, particularly in those MOS that were of high utility for lower aptitude personnel. However, because of the variability of these findings, they must be evaluated in conjunction with the other performance criteria before making recommendations concerning a truly "best model."

Fairness. As was done for attrition, the "best" promotion composite of HS, AI, and age was evaluated for fairness by applying various cutting score levels (see Table 26). Emphasizing the results for soldiers in the three year term of enlistment group, blacks were somewhat less likely to be excluded by the application of the composite--owing to the greater proportion of high school graduates among blacks. However, excluded blacks were more likely to be promoted than excluded whites. In fact, one might have expected the disparity between white and black exclusion rates (in favor of the latter) to have been higher considering their relative promotion rates.

Table 25
Model Fit/Incremental Fit of "Best" Models[a]
for Promotion by Selected MOS

MOS	TOE	AFQT Category	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
11B	3	ALL	23,184	10,797	46.57	1	191,119.33***	
						2	191,014.79	104.54***
						3	190,991.56	23.23***
		IIIB & IV	18,725	8,535	45.58	1	147,938.51***	
						2	147,897.03	41.49***
						3	147,873.70	23.33***
		IV	13,806	6,384	46.24	1	106,661.27***	
						2	106,629.35	31.92***
						3	106,610.34	19.01***
12C	3	ALL	1,674	894	53.40	1	11,803.18***	
						2	11,799.06	4.12*
						3	11,783.25	15.81***
		IIIB & IV	1,339	699	52.20	1	8,936.01***	
						2	8,934.66	1.35
						3	8,913.15	21.51***
		IV	904	489	54.09	1	5,888.08***	
						2	5,887.58	.50
						3	5,874.09	13.49**
15E	4	ALL	230	144	62.61	1	1,535.34	
						2	1,535.32	.02
						3	1,532.95	2.36
		IIIB & IV	156	98	62.82	1	797.33	
						2	796.67	.66
						3	795.50	1.16
		IV	107	70	65.42	1	527.42	
						2	527.17	.25
						3	526.56	.61

/ Continued /

Table 25
Model Fit/Incremental Fit of "Best" Models[a]
for Promotion by Selected MOS (continued)

MOS	TOE	AFQT Category	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
27F	4	ALL	333	207	62.16	1	2,009.79***	
						2	2,006.17	3.62
						3	2,003.59	2.58
		IIIB & IV	224	140	62.50	1	1,248.82**	
						2	1,246.21	2.61
						3	1,241.57	4.64
		IV	138	90	65.22	1	718.04	
						2	713.50	4.54*
						3	713.10	.40
51R	4	ALL	470	324	68.94	1	3,380.32***	
						2	3,380.16	.15
						3	3,377.60	2.57
		IIIB & IV	281	193	68.68	1	1,822.73**	
						2	1,822.37	.35
						3	1,816.20	6.17*
		IV	167	114	68.26	1	961.06	
						2	961.03	.03
						3	955.57	5.46
64C	3	ALL	9,986	6,265	62.74	1	99,587.41***	
						2	99,547.58	39.83***
						3	99,527.79	19.79***
		IIIB & IV	8,140	5,086	62.48	1	78,860.10***	
						2	78,839.25	20.85***
						3	78,825.04	14.22***
		IV	6,018	3,823	63.53	1	57,043.82***	
						2	57,028.32	15.51***
						3	57,021.25	7.07*

/ Continued /

Table 25
Model Fit/Incremental Fit of "Best" Models[a]
for Promotion by Selected MOS (continued)

MOS	TOE	AFQT Category	N	# of Events	% Promotion	Model	-2 Log L	Chi Square[b]
71L	3	ALL	5,233	3,277	62.62	1 2 3	46,483.65*** 46,446.61 46,443.49	 37.04*** 3.11
		IIIB & IV	3,233	2,010	62.17	1 2 3	26,677.45*** 26,656.24 26,654.09	 21.20*** 2.15
		IV	1,686	1,034	61.33	1 2 3	12,701.08*** 12,691.24 12,687.65	 9.83** 3.59
94B	3	ALL	6,138	3,070	50.02	1 2 3	46,132.08*** 46,106.03 46,084.48	 26.04*** 21.55***
		IIIB & IV	5,442	2,670	49.06	1 2 3	39,534.20*** 29,517.11 39,488.95	 17.09*** 28.15***
		IV	4,454	2,196	49.30	1 2 3	31,624.30*** 31,611.26 31,591.38	 13.04*** 19.88***
95B	3	ALL	12,624	8,619	68.27	1 2 3	136,924.20*** 136,893.23 136,858.37	 30.97*** 34.86***
		IIIB & IV	6,169	4,024	65.23	1 2 3	58,341.35*** 58,335.60 58,317.69	 5.74 17.91***
		IV	2,797	1,817	64.96	1 2 3	23,516.04*** 23,515.97 23,510.99	 .06 4.99

[a] Model 1 = HS; Model 2 = HS, AI; Model 3 = HS, AI, AGE.

[b] DF = number of variables in model -1.

Table 26

Percentages of White and Black AFQT Category IIIB & IV Male Soldiers Excluded and Promotion Rates for Those Excluded at Various Best Promotion Model Cutting Score Levels by Term of Enlistment

Cutting Score Levels	Term of Enlistment 3				Term of Enlistment 4			
	% Excluded		% Attrition		% Excluded		% Attrition	
	White	Black	White	Black	White	Black	White	Black
95	94.8	95.0	63.8	71.2	92.9	96.9	47.6	57.6
90	89.7	89.9	63.7	71.2	86.0	93.9	46.4	57.0
85	85.3	83.8	63.5	71.0	78.6	90.5	45.5	56.3
80	80.8	77.9	63.0	70.9	71.9	87.0	44.3	55.3
75	77.7	71.5	62.9	71.0	65.7	82.7	43.5	54.1
Total N	**32,472**	**21,306**			**6,542**	**7,942**		
% HSDG	**32.0**	**55.3**			**81.4**	**88.7**		

SQT Performance

Specified Models. As with the other criterion measures, hierarchical sets were used to predict SQT performance. SQT was regressed on these *a priori* predictor sets by MOS among Category IV recruits alone, for Category IIIB and Category IV recruits combined, and for all male soldiers within the 22 MOS available for SQT analyses.[9] The results are displayed in Tables 27 through 29.

There are many notable points to be derived from inspection of these tables. Most broadly, the predictor sets were generally significant within MOS (significance was tempered mostly by number of MOS incumbents) with incremental validity maximized by model 3 containing AFQT, high school graduation status, ASVAB cognitive subtests, and a few demographics or background characteristics (i.e., presence of dependents, age, bodymass). Though the addition of interest measures via model 4 was often significant and sometimes incrementally valid over model 3, it generally showed little practical significance. That is, whereas there were at least moderate gains from model 3 in the percentage of variance accounted for, the addition of model 4 boosted the R^2 on average .01 or less. A tally of each of the model's standings is as follows:

	Category IV	Category IIIB+IV	Category I-IV
Number of MOS			
with N $\geq$ 100	14	15	21
Model 1 significant	10	13	21
Model 2 significant/ incrementally valid	11/2	12/2	20/3
Model 3 significant/ incrementally valid	12/9	13/10	19/14
Model 4 significant/ incrementally valid	11/5	13/5	18/5

Of course, by combining AFQT categories there were more MOS with sufficient numbers of soldiers (i.e., N $\geq$ 100) available for analyses and validity coefficients (or as tabulated, coefficients of determination) rose accordingly with the increase in range.

[9]SQT data were unavailable for MOS 51N, 61B, and 84B.

Table 27

Summary and Specified Model Results for SQT by MOS
(Category IV)

Name	MOS	N	$\bar{Y}$	(SD)	SQT Range	R^2 Model 1	Model 2	Model 3	Model 4
Morse Interceptor	05H	16	83.5	(21.7)	43.9 - 124.3	.26*	.26*	.98ns	1.00ns
Infantryman	11B	13,340	99.0	(17.5)	10.1 - 142.5	.02***	.02***	.08***[I]	.09***[I]
Bridge Crewmember	12C	479	97.5	(16.2)	19.9 - 132.8	.02**	.02**	.06**	.08**
Cannon Crewmember	13B	7,827	98.5	(18.3)	3.8 - 160.6	.002***	.002**	.04***[I]	.04***
Pershing Crewmember	15E	209	88.9	(17.6)	39.8 - 146.1	.003ns	.04*[I]	.26***[I]	.28***
ADA Crewmember	16R	545	94.4	(20.1)	10.0 - 133.8	.01ns	.02**[I]	.09***[I]	.10***
Vulcan Repairer	27F	44	93.5	(16.9)	44.6 - 128.2	.01ns	.03ns	.28ns	.38ns
Teletypewriter Repairer	31J	152	89.9	(17.9)	33.1- 124.3	.04*	.04ns	.21**[I]	.22**
Wire Systems Installer	36C	1,461	99.8	(19.5)	24.5 - 140.0	.0001ns	.004*[I]	.02**	.02*
Parachute Rigger	43E	182	91.7	(18.2)	42.0 - 146.0	.03*	.04*	.09ns	.12ns
Interior Electrician	51R	56	101.6	(15.0)	71.0 - 136.7	.01ns	.01ns	.24ns	.30ns
Power Generator Repairer	52D	115	96.3	(17.5)	44.2 - 142.2	.01ns	.02ns	.10ns	.12ns
Nuclear Weapons Specialist	55G	3	94.6	(6.6)	89.8 - 102.1	.40ns	.40ns	1.00ns	1.00ns
Motor Transport Operator	64C	4,179	94.8	(17.0)	11.0 - 157.0	.04***	.04***	.12***[I]	.13***[I]
Aircraft Powerplant Repair	68B	24	99.9	(21.0)	46.9 - 124.8	.14ns	.23ns	.75ns	.89ns
Admin Specialist	71L	667	92.0	(17.2)	18.5 - 145.6	.02***	.02**	.05***	.07***[I]
Traffic Mgmt. Coordinator	71N	42	98.0	(18.0)	51.7 - 129.4	.03ns	.06ns	.50ns	.63*
Computer Operator	74D	21	91.5	(22.8)	55.0 - 130.1	.14ns	.17ns	.71ns	.89ns
Field Artillery Surveyor	82C	481	94.6	(17.4)	24.1 - 141.6	.02**	.03**	.11***[I]	.12***
Medical Laboratory Specialist	92B	71	95.5	(21.1)	15.4 - 136.7	.02ns	.02ns	.18ns	.32ns
Food Service Specialist	94B	2,643	96.0	(18.2)	1.0 - 140.9	.03***	.03***	.12***[I]	.13***[I]
Military Police	95B	1,551	91.7	(18.0)	23.2 - 151.9	.01**	.01**	.05***[I]	.06***[I]

Notes: * = p<.05; ** = p<.01; *** = p<.001. [I] = Incremental Validity

Table 28

Summary and Specified Model Results for SQT by MOS
(Category IIIB & IV)

Name	MOS	N	$\bar{Y}$ (SD)	SQT Range	R^2 Model 1	R^2 Model 2	R^2 Model 3	R^2 Model 4
Morse Interceptor	05H	56	90.2 (21.3)	43.9 - 126.5	.003ns	.03ns	.39*	.44ns
Infantryman	11B	18,661	100.6 (17.3)	10.1 - 145.0	.04***	.04***	.11***[I]	.11***[I]
Bridge Crewmember	12C	675	98.7 (15.7)	19.9 - 132.8	.03***	.03***	.05**	.05**[I]
Cannon Crewmember	13B	10,185	99.3 (18.1)	3.8 - 165.0	.007***	.007***	.05***[I]	.05***
Pershing Crewmember	15E	302	90.7 (17.9)	39.8 - 151.2	.02*	.04**[I]	.25***[I]	.25***
ADA Crewmember	16R	628	95.8 (19.2)	10.0 - 136.6	.03***	.05***[I]	.12***[I]	.13***
Vulcan Repairer	27F	69	94.1 (17.1)	44.6 - 128.2	.0002ns	.004ns	.30ns	.37ns
Teletypewriter Repairer	31J	203	90.9 (19.1)	1.8 - 125.1	.03*	.03ns	.19***	.21***
Wire Systems Installer	36C	1,864	100.6 (19.2)	24.5 - 144.0	.002ns	.005**	.02***[I]	.03***
Parachute Rigger	43E	279	92.9 (18.0)	42.0 - 146.0	.03**	.03*	.08ns	.09ns
Interior Electrician	51R	89	102.3 (17.0)	40.2 - 154.0	.05*	.05ns	.19ns	.20ns
Power Generator Repairer	52D	234	97.2 (18.7)	40.0 - 142.2	.002ns	.01ns	.07ns	.09ns
Nuclear Weapons Specialist	55G	10	96.1 (15.5)	62.3 - 124.6	.02ns	.21ns	1.00ns	1.00ns
Motor Transport Operator	64C	5,522	96.8 (16.9)	11.0 - 167.2	.07***	.07***	.16***[I]	.16***[I]
Aircraft Powerplant Repair	68B	52	99.7 (18.5)	46.9 - 124.8	.03ns	.03ns	.35ns	.37ns
Admin Specialist	71L	1,257	93.5 (18.0)	18.5 - 166.7	.03***	.03***	.07***[I]	.08***
Traffic Mgmt. Coordinator	71N	69	100.8 (15.6)	51.7 - 129.4	.04ns	.07ns	.30ns	.42*
Computer Operator	74D	41	94.4 (22.5)	52.2 - 130.1	.07ns	.07ns	.45ns	.58ns
Field Artillery Surveyor	82C	824	96.9 (17.2)	15.3 - 145.1	.04***	.04***	.13***[I]	.14***
Medical Laboratory Specialist	92B	137	96.8 (20.7)	15.4 - 136.7	.04*	.04ns	.19*	.23*
Food Service Specialist	94B	3,224	97.4 (18.0)	1.0 - 140.9	.05***	.05***	.13***[I]	.14***[I]
Military Police	95B	3,537	94.8 (17.8)	12.0 - 151.9	.03***	.03***	.09***[I]	.10***[I]

Notes: * = $p<.05$; ** = $p<.01$; *** = $p<.001$. [I] = Incremental Validity

Table 29

Summary and Specified Model Results for SQT (Category I-IV)

Name	MOS	N	$\bar{Y}$	(SD)	SQT Range	R^2 Model 1	Model 2	Model 3	Model 4
Morse Interceptor	05H	284	101.6	(19.7)	26.1 - 134.5	.15***	.15***	.28***[I]	.30***
Infantryman	11B	25,815	104.2	(18.0)	10.1 - 147.9	.15***	.15***[I]	.20***[I]	.20***[I]
Bridge Crewmember	12C	865	100.9	(16.5)	19.9 - 144.9	.10***	.10***	.13***	.13***
Cannon Crewmember	13B	12,188	100.7	(18.3)	3.8 - 165.0	.03***	.04***[I]	.08***[I]	.08***
Pershing Crewmember	15E	444	95.9	(19.8)	39.8 - 151.2	.16***	.17***	.32***[I]	.33***
ADA Crewmember	16R	725	98.1	(20.2)	10.0 - 138.0	.11***	.12***	.19***[I]	.20***
Vulcan Repairer	27F	121	98.1	(19.2)	36.8 - 135.9	.06**	.06*	.22*	.26*
Teletypewriter Repairer	31J	269	95.4	(19.3)	1.8 - 126.9	.20***	.20***	.29***[I]	.29***
Wire Systems Installer	36C	2,159	101.1	(19.4)	24.5 - 150.0	.01***	.01***	.03***[I]	.03***
Parachute Rigger	43E	426	98.2	(20.0)	42.0 - 169.1	.17***	.17***	.21***	.22***
Interior Electrician	51R	155	105.0	(19.0)	40.2 - 167.3	.05**	.05*	.15*	.18ns
Power Generator Repairer	52D	412	100.4	(19.5)	40.0 - 153.9	.05***	.05***	.19***[I]	.19***
Nuclear Weapons Specialist	55G	26	98.2	(17.4)	57.6 - 124.6	.11ns	.11ns	.41ns	.72ns
Motor Transport Operator	64C	6,781	99.6	(18.2)	11.0 - 167.2	.16***	.16***	.24***[I]	.24***[I]
Aircraft Powerplant Repair	68B	101	101.9	(18.8)	35.8 - 124.8	.05*	.05ns	.21ns	.23ns
Admin Specialist	71L	2,149	99.0	(20.3)	18.5 - 169.0	.18***	.18***	.23***[I]	.24***[I]
Traffic Mgmt. Coordinator	71N	108	103.6	(16.6)	51.7 - 143.1	.09**	.11**	.21ns	.25ns
Computer Operator	74D	104	103.8	(20.6)	38.6 - 133.7	.18***	.20***	.32***	.33**
Field Artillery Surveyor	82C	1,477	102.7	(19.1)	15.3 - 178.4	.20***	.20***[I]	.26***[I]	.26***
Medical Laboratory Specialist	92B	426	102.3	(18.7)	15.4 - 139.8	.09***	.09***	.17***[I]	.18***
Food Service Specialist	94B	3,687	99.4	(18.5)	1.0 - 140.9	.12***	.12***	.20***[I]	.21***[I]
Military Police	95B	7,907	100.9	(18.3)	12.0 - 151.9	.13***	.13***	.19***[I]	.19***[I]

Notes: * = $p<.05$; ** = $p<.01$; *** = $p<.001$. [I] = Incremental Validity

More importantly, the 14 variable model 3 was significant in almost all of the "available" MOS and generally was at least equal to models 2 and 4 in terms of the number of MOS for which it was significant. Furthermore, it surpassed models 2 and 4 in terms of incremental validity. For example, among Category IV recruits alone, model 3 was significant in 12 of 14 MOS and in 9 of the 12 it significantly added to the prediction of SQT above AFQT and high school graduation status. There would appear to be additional variance accounted for by variables beyond AFQT and high school status for all soldiers but particularly for below average personnel. Among Category IV personnel only, by using the AFQT alone as a predictor (model 1), R^2 was at best .04 within MOS 31J and 64C whereas model 3 R^2s at .21 and .12, respectively, showed incremental validity over AFQT plus high school graduation status. For 15E which was associated with the highest proportion of SQT variance accounted for by Model 3 at .26, model 1 validity was less than .10 (R^2 = .003).

A rearrangement of the data in Tables 27 through 29 by ranking MOS in terms of model 3 validity and mean SQT scores is provided in Table 30 for the three AFQT groupings. Information regarding MOS utility for low aptitude personnel and training costs enriches the analyses.

Note the preponderance of high utility (H) MOS [9] among the top 10 in terms of SQT performance among both Category IV and Category IIIB plus IV groupings. As might be expected, higher average SQT results for below average aptitude soldiers were found in jobs which *a priori* were judged to be relatively good assignments for low aptitude personnel. Model 3 validity rankings provide complementary findings. There was, more or less, an inverse relationship between performance rankings and model 3 validity rankings: Jobs wherein lower aptitude personnel did relatively well tended not to be among those with the highest model 3 validities. Furthermore, MOS that were low in utility (L) for the below average, generally had the highest model 3 validities. Simply put, MOS in which lower aptitude incumbents were more in need of compensatory factors were those in which these factors proved more useful.

[9] See Editor's Notes, Note 4.

Table 30
Rankings and Characteristics of MOS Based on SQT Variance Accounted for and Mean SQT Score for AFQT Groupings

CATEGORY IV								
	Significant[a] Top 10 Validity (Model 3)				Top 10 Performance			
	MOS	Utility	Training Time	R^2	Mos	Utility	Training Time	Mean SQT Score
1	15E	L	L	.26	36C	H	ML	99.8
2	31J	L	MH	.21	11B	H	L	99.0
3	64C	H	H	.12	13B	H	L	98.5
4	94B	L	ML	.12	12C	H	ML	97.5
5	82C	L	ML	.11	52D	M	ML	96.3
6	16R	H	ML	.09	94B	H	ML	96.0
7	11B	H	L	.08	64C	H	H	94.8
8	12C	H	ML	.06	82C	L	ML	94.6
9	95B	L	H	.05	16R	H	ML	94.4
10	71L	H	L	.05	71L	H	L	92.0
CATEGORY IIIB+IV								
	MOS	Utility	Training Time	R^2	MOS	Utility	Training Time	Mean SQT
1	15E	L	L	.25	11B	H	L	100.6
2	31J	L	MH	.19	36C	H	ML	100.6
3	92B	L	MH	.19	13B	H	L	99.3
4	64C	H	H	.16	12C	H	ML	98.7
5	94B	L	ML	.13	94B	H	ML	97.4
6	82C	L	ML	.13	52D	M	ML	97.2
7	16R	H	ML	.12	82C	L	ML	96.9
8	11B	H	L	.11	92B	L	MH	96.8
9	95B	L	H	.09	64C	H	H	96.8
10	71L	H	L	.07	16R	H	ML	95.8
CATEGORY I-IV								
	MOS	Utility	Training Time	R^2	MOS	Utility	Training Time	Mean SQT
1	15E	L	L	.32	51R	M	L	105.0
2	74D	L	MH	.32	11B	H	L	104.2
3	31J	L	MH	.29	74D	L	MH	103.8
4	05H	L	H	.28	71N	L	H	103.6
5	82C	L	ML	.26	82C	L	ML	102.7
6	64C	H	H	.24	92B	L	MH	102.3
7	71L	H	L	.23	68B	L	H	101.9
8	27F	L	H	.22	05H	L	H	101.6
9	43E	L	MH	.21	36C	H	ML	101.1
10	94B	H	ML	.20	12C	H	ML	100.9
11	11B	H	L	.20	95B	L	H	100.9

[a] $N \leq 300$-$p \leq .05$
$N > 300$-$p \leq .01$

Key	
Utility for low aptitude personnel H = high M = medium L = low	Training Costs L = low ML = mid-low MH = mid-high H = high

More concretely, those in Category IIIB and IV performed relatively well as wire systems installers (36C) and infantrymen (11B). Within such MOS, the addition of ASVAB subtest or demographic information did not improve prediction greatly. Though those having below average general cognitive aptitude levels tended to perform poorly as Pershing crewmembers (13B) and teletypewriter repairers (31J), the addition of ASVAB subtest and demographics was particularly predictive in these MOS.

Regarding training costs, lower aptitude soldiers' performance tended to be higher in MOS with low or moderately low training costs. On the other hand, model 3 validities generally were most concentrated in moderately high and high cost MOS. Findings for all categories combined appear to be less complementary. However, performance rankings with "good" showings for low utility MOS no doubt were influenced by the underrepresentation of below-average personnel among these MOS. All in all, the relationships uncovered through this hierarchical analysis may prove useful in selecting and assigning the best of the below-average.

Best Models. Though the above hierarchical analyses were enlightening and provided useful guidance, a 14 variable model is rather cumbersome. Thus, generation of empirically derived best models proceeded in an iterative fashion for SQT as for attrition and promotion. However, given that this criterion lends itself to more traditional ordinary least squares regression analyses, a brief description and an example relative to SQT is warranted. Table 31 shows for Category IIIB plus IV recruits in MOS 11B the R^2 values for the three "best" models of increasing numbers of predictors up to the inclusion of all 18 predictors. The strategy for choosing "the" best model for the AFQT category/MOS group was to maximize R^2 parsimoniously. A first dividing line or stopping point delineating candidate best models was the point at which, when rounded

Table 31

Empirically Best Models for Predicting SQT Performance Among Army Male AFQT Category IIIB & IV Recruits

MOS 11B (N= 18,661)

# Variables in Model	Best Predictors	R^2
1	EI	.051
	SI	.043
	GI	.039
2	MC EI	.066
	EI GI	.065
	AFQT EI	.065
3	MC EI NO	.078
	MC EI GI	.077
	SI EI NO	.076
4	MC EI GI NO	.086
	MC SI EI NO	.085
	GS MC EI NO	.084
5	MC SI EI GI NO	.091
	AFQT SP SI EI NO	.090
	GS MC EI GI NO	.089
6	AFQT MC SP SI EI NO	.095
	AFQT SP SI EI GI NO	.094
	MC SP SI EI GI NO	.094
7	AFQT MC SP SI EI GI NO	.099
	AFQT GS MC SP SI EI NO	.097
	MC SP SI EI GI NO	.097
8	AFQT GS MC SP SI EI GI NO	.100
	AFQT MC SP SI EI GI NO AGE	.100
	AFQT HS MC SP SI EI GI NO	.100
9	AFQT HS MC SP SI EI GI NO AGE	.102
	AFQT GS MC SP SI EI GI NO AGE	.102
	AFQT HS GS MC SP SI EI GI NO	.102
10	AFQT HS GS MC SP SI EI GI NO AGE	.103
	AFQT HS MC SP AI SI EI GI NO AGE	.103
	AFQT HS MC SP SI EI GI NO AGE CE	.103

/ Continued /

Table 31

Empirically Best Models for Predicting SQT Performance Among Army Male AFQT Category IIIB & IV Recruits (Continued)

MOS 11B

# Variables in Model	Best Predictors	R^2
11	AFQT HS GS MC SP SI EI GI NO AGE CE	.104
	AFQT HS GS MC SP AI SI EI GI NO AGE	.104
	AFQT HS MC SP AI SI EI GI NO AGE CE	.104
12	AFQT HS GS MC SP AI SI EI GI NO AGE CE	.105
	AFQT HS GS MC SP AI SI EI GI NO AGE CM	.105
	AFQT HS GS MC SP SI EI GI NO AGE CC CE	.105
13	AFQT HS GS MC SP AI SI EI GI NO AGE CC CM	.106
	AFQT HS GS MC SP AI SI EI GI NO AGE CC CE	.106
	AFQT HS GS MC SP AI SI EI GI NO AGE NODEP CE	.106
14	AFQT HS GS MC SP AI SI EI GI NO AGE NODEP CC CM	.106
	AFQT HS GS MC SP AI SI EI GI NO AGE CC CE CM	.106
	AFQT HS GS MC SP AI SI EI GI NO AGE NODEP CC CE	.106
15	AFQT HS GS MC SP AI SI EI GI NO AGE NODEP CC CE CM	.107
	AFQT HS GS MC SP AI SI EI GI NO AGE NODEP CA CC CM	.106
	AFQT HS GS MC SP AI SI EI GI AD NO AGE NODEP CC CM	.106
16	AFQT HS GS MC SP AI SI EI GI AD NO AGE NODEP CC CE CM	.107
	AFQT HS GS MC SP AI SI EI GI NO AGE NODEP BMASS CC CE CM	.107
	AFQT HS GS MC SP AI SI EI GI NO AGE NODEP CA CC CE CM	.107
17	AFQT HS GS MC SP AI SI EI GI AD NO AGE NODEP BMASS CC CE CM	.107
	AFQT HS GS MC SP AI SI EI GI AD NO AGE NODEP CA CC CE CM	.107
	AFQT HS GS MC SP AI SI EI GI NO AGE NODEP BMASS CA CC CE CM	.107
18	AFQT HS GS MC SP AI SI EI GI AD NO AGE NODEP BMASS CA CC CE CM	.107

to the nearest hundredths, R^2 was not incremented by at least .01 (see step 12 in Table 31 after which point R^2 remains .11). Next, model significance and incremental validity of increasingly larger nested models up through a 12-variable model were tested. That is, the following models from Table 31 were tested:

EI
MC EI
MC EI NO
MC EI GI NO
MC SI EI GI NO
MC SP SI EI GI NO
AFQT MC SP SI EI GI NO
AFQT GS MC SP SI EI GI NO
AFQT GS MC SP SI EI GI NO AGE
AFQT HS GS MC SP SI EI GI NO AGE
AFQT HS GS MC SP SI EI GI NO AGE CE
AFQT HS GS MC SP AI SI EI GI NO AGE CE

Given the power of an almost 19,000 member sample, it was not surprising that all of the above models were significant and incrementally valid. To reduce the set of best predictors further (thereby avoiding an unwieldy and impractical prediction equation) informed judgement was invoked to stop the addition of variables when the F statistic decreased (and the standard error increased) precipitously--roughly analogous to a scree test employed in factor analysis. Ultimately, a 7-variable model--AFQT MC SP SI EI GI NO--with an R^2 value of .099 was chosen as the best for Category IIIB + IV soldiers in 11B. This model along with all of the similarly identified best models for Category IV alone, Categories IIIB + IV, and Categories I through IV in each MOS are shown in Table 32.

Some highlights from this table include the statistically obvious finding that models were stronger across all AFQT categories (with R^2 reaching .256 for MOS 82C) than within category subsets. Yet, the results for Categories IIIB plus IV and even for Category IV alone were not discouraging. For example, in MOS 15E, the three-variable best model accounted for 20% of the variance in SQT performance of those scoring within AFQT Categories IIIB and IV; and the two-variable model for Category IVs accounted for almost as much variance (R^2 = .197). These condensed best models

Table 32

"Best Models" of SQT Performance by MOS

MOS	AFQT Category	N	R^2	BEST MODEL Variables
11B	All	25,815	.197	AFQT MC SP SI EI GI NO
	III & IV	18,661	.099	AFQT MC SP SI EI GI NO
	IV	13,340	.078	AFQT MC SP SI EI GI NO
12C	ALL	865	.108	AFQT
	IIIB & IV	675	.037	AFQT SI
	IV	479	.022	SI
13B	ALL	12,188	.076	AFQT HS(+) MC SP SI EI NO
	IIIB & IV	10,185	.046	AFQT HS(+) MC SP SI EI NO
	IV	7,827	.036	AFQT HS(+) MC SP SI EI NO
15E	ALL	444	.293	AFQT MC SI EI
	IIIB & IV	302	.202	MC AI SI
	IV	209	.197	SI EI
16R	ALL	725	.173	AFQT MC SI AD
	IIIB & IV	628	.088	AFQT MC AD
	IV	545	.057	MC AD
31J	ALL	269	.226	AFQT EI BMASS(-)
	IIIB & IV	203	.088	GS EI BMASS(-)
	IV	152	.133	EI AGE(-) NODEP(-) BMASS(-)
36C	ALL	2,159	.024	SP SI EI
	IIIB & IV	1,864	.018	HS(-) SI EI
	IV	1,461	.008	EI
43E	ALL	426	.165	AFQT
	IIIB & IV	279	.057	EI NO
	IV	182	.052	AFQT SP
52D	ALL	412	.152	AI EI
	IIIB & IV	234	.033	EI
	IV	115	No significant model	
64C	ALL	6,781	.235	AFQT MC AI SI EI NO CC(+)
	IIIB & IV	5,522	.157	AFQT MC SI EI NO CC(+) CE(-)
	IV	4,179	.122	AFQT AI SI EI NO CC(+) CE(-)
71L	ALL	2,149	.227	AFQT SP EI AD NO CA(+)
	IIIB & IV	1,257	.055	AFQT NO
	IV	667	.059	AFQT SP NO CM(-)
82C	ALL	1,477	.256	AFQT HS(+) MC SP SI NO
	IIIB & IV	824	.119	AFQT HS(+) MC SP AI NO
	IV	481	.072	AFQT MC SP

/ Continued /

Table 32
"Best Models" of SQT Performance by MOS (continued)

MOS	AFQT Category	N	R^2	BEST MODEL Variables
92B	ALL	426	.142	AFQT MC AGE(+)
	IIIB & IV	137	.127	AFQT MC AGE(+)
94B	ALL	3,687	.195	AFQT SP SI EI NO CE(-)
	IIIB & IV	3,224	.124	AFQT SP SI EI NO CE(-)
	IV	3,643	.117	AFQT SP SI EI NO CC(+) CE(-)
95B	ALL	7,907	.184	AFQT GS MC SP SI GI NO
	IIIB & IV	3,537	.086	AFQT GS MC SP SI GI NO CC(+)
	IV	1,551	.046	GS MC NO AGE(-) CA(+)

tended to account for more variance in MOS that were best predicted from the specified 14-variable model 3 (see Table 30) and to almost the same degree as the overfitted model. The highest best model validities were found within MOS 15E, 64C, 92B, 94B, 11B, and 82C--a mix of low and high utility MOS.

Although identical best models occurred across AFQT groupings within MOS in a few instances, best models did not coincide across MOS. With the goal of a parsimonious selection solution in mind, the iterative process of searching for an efficient set of predictors continued. The pattern across MOS was not random and Table 33 brings order to the array of best models by providing a tally of each predictor's frequency of inclusion in a best model. From this frequency analysis, six variables appeared to be the most promising for selecting below-average aptitude recruits: AFQT, Mechanical Comprehension (MC), Space Perception (SP), Shop Information (SI), Electronics Information (EI), and Numerical Operations (NO). These same predictors were also the most popular best model components across categories.

It is notable that even within the narrower AFQT bands, the verbal and math AFQT composite entered as a significant predictor of SQT. The interest measures that were included in ASVAB 6/7 as well as the demographics proved weak in predictive power. Review of Appendix Table A-1 showing the bivariate correlations between each predictor and SQT (across MOS) shows the variables pulled out of Table 33 to be

Table 33

Frequency of Variable Significance in Predicting SQT Performance by AFQT Grouping

Predictor	Category IV (14 models)	Category IIIB & IV (15 models)	All (15 models)
AFQT	7	10	12
HS	1	3(1-)[a]	2
GS	1	2	1
MC	6	8	8
SP	6	5	7
AI	1	2	2
SI	6	8	8
EI	7	8	9
GI	1	2	2
AD	1	1	1
NO	6	8	7
AGE	2-	1	1
DEP	1-	0	0
BMASS	1-	1-	1-
CA	1+	0	1+
CC	2+	2+	1+
CE	2-	2-	1-
CM	1-	0	0

[a] "a" indicates that the β weight was negative, else there was a positive coefficient. In the case of high school graduation status (HS), one of the three models containing this variable contained a negative weight.

among those with the strongest simple relationship to the criterion of interest. Automotive Information and General Science, which were among the highest five in terms of correlations with SQT for Category IIIB & IV and Category IV alone, respectively, tended not to appear among the best model solutions. A cursory review of Appendix Tables A-2 through A-4 suggests that redundancy between AI and SI (r = .62 for Category I-IV) and between GS and AFQT (r = .70 for AFQT I-IV) may have

knocked the former member of each pair out of the running in favor of the more strongly criterion correlated latter variables. Note also that although SP was identified as a candidate predictor from Table 33, this variable's correlation with SQT was relatively small. Furthermore, although the correlation between AFQT and SP was around .18 across all aptitude categories, within the subsets of below average aptitude personnel there was a moderate negative correlation between these variables (e.g., r = -.52 for Category IV soldiers). This curious relationship between AFQT and SP may be explained by the fact that at the time of the misnorming, SP was a component of the AFQT and thus contributed to AFQT category definition then and for these analyses. The AFQT predictor in the present analyses, however, is a simulated AFQT composite comprising Word Knowledge and Arithmetic Reasoning subtests only. Thus, it is possible that individuals were "boosted" into Category IV and even higher categories by their showing on SP. Despite its relatively low simple correlation with SQT among below average aptitude personnel and its sizeable negative relationship with AFQT, SP along with the other five "best" model predictors (AFQT, MC, SI, EI, and NO) were put to further tests.

SQT was regressed on these eight variables as well as on various subsets of them for the same three AFQT groupings within and across MOS. Tables 34 through 36 show the R^2 values for each of eight different models for Category IV, Categories IIIB & IV, and Categories I through IV, respectively. Combined, these variables generally offered better prediction of SQT than smaller subsets of these six variables. However, models 4, 6, and 7, in addition to the full model 8, deserve further mention and scrutiny. Model 4 offers a look at a non-AFQT compensatory screen for below-average aptitude recruits. Model 6 substitutes AFQT for SI, which by itself no longer exists as an ASVAB subtest; rather it has been combined with the Automotive Information (AI) subtest since 1980 to produce an Auto and Shop Information (AS) test. On the basis of predictive power alone, model 8 edged out model 7 as the best; however, model 7 without the potentially troublesome SP subtest of yesteryear approached and within some MOS tied the R^2 values of model 8. These models were most effective in MOS such as 15E, 64C, 94B, 16R, and 11B, which tended to be filled with sizable proportions of below average recruits and have high utility for such personnel.

Table 34

R^2 Comparison of Models Containing "Best" Subset of Predictors by MOS

(Category IV)

	Model Composition and Number							
	MC NO	EI NO	MC EI NO	MC EI NO SI	MC EI NO SP AFQT	MC EI NO AFQT	MC EI NO SI AFQT	MC EI NO SI SP AFQT
MOS	1	2	3	4	5	6	7	8
11B	.038***	.045***	.057***	.065***	.061**	.060**	.068**	.070
12C	.024**	.015*	.024**	.040***	.034**	.032*	.047***	.048***
13B	.014***	.015***	.020***	.023***	.027***	.024***	.026***	.029***
15E	.078***	.111***	.138***	.216***	.140**	.139***	.216***	.216***
16R	.055***	.034***	.061***	.064***	.067***	.065***	.068***	.069***
31J	.063**	.066**	.086**	.086**	.090*	.090**	.090*	.090*
36C	.002ns	.009**	.009**	.012***	.011**	.009**	.013**	.037**
43E	.039ns	.037*	.039ns	.041ns	.054ns	.052*	.054ns	.056ns
52D	.019ns	.034ns	.036ns	.041ns	.048ns	.037ns	.041ns	.056ns
64C	.049***	.085***	.095***	.108***	.102***	.100***	.111***	.113***
71L	.029***	.032***	.033***	.033***	.041***	.040***	.040**	.041***
82C	.039***	.030***	.050***	.050***	.068***	.067***	.067***	.068***
94B	.038***	.074***	.081***	.102***	.087***	.086***	.106***	.106***
95B	.027***	.024***	.034***	.034***	.036***	.035***	.036***	.036***
ALL[a]	.024***	.032***	.039***	.045***	.044***	.042***	.047***	.050***

* = p<.05; ** = p<.01; *** = p<.001; ns = non significant

[a] All 22 MOS for which there were SQT scores were used.

Table 35

R^2 Comparison of Models Containing "Best" Subset of Predictors by MOS

(Category IIIB+IV)

	Model Composition and Number							
	MC NO	EI NO	MC EI NO	MC EI NO SI	MC EI NO SP AFQT	MC EI NO AFQT	MC EI NO SI AFQT	MC EI NO SI SP AFQT
MOS	1	2	3	4	5	6	7	8
11B	.055***	.064***	.078***	.085***	.083***	.083***	.089***	.090***
12C	.020***	.011*	.021**	.033***	.036***	.033***	.041***	.043***
13B	.024***	.023***	.031***	.035***	.037***	.035***	.037***	.040***
15E	.085***	.104***	.138***	.207***	.139***	.139***	.207***	.207***
16R	.071***	.050***	.081***	.089***	.094**	.093***	.098***	.099***
31J	.030*	.054**	.055**	.062**	.057**	.056*	.064*	.065*
36C	.003ns	.012***	.013***	.017***	.016***	.015**	.018***	.020***
43E	.031**	.057***	.059**	.063***	.060**	.060**	.065**	.065**
52D	.004ns	.033*	.034*	.034ns	.037ns	.034ns	.034ns	.037ns
64C	.078***	.106***	.123***	.137***	.136***	.134***	.145***	.146***
71L	.040***	.042***	.045***	.046***	.052***	.052***	.053***	.053***
82C	.076***	.051	.084***	.087***	.096***	.095***	.096***	.097***
92B	.054*	.040ns	.065*	.072*	.077ns	.070*	.081*	.096*
94B	.053***	.083***	.091***	.110***	.102***	.101***	.117**	.117***
95B	.049***	.041***	.060***	.067***	.068***	.067***	.073***	.073***
ALL[a]	.036***	.042***	.052***	.058***	.057***	.055***	.060***	.062***

* = p<.05; ** = p<.01; *** = p<.001; ns = non significant

[a] All 22 MOS for which there were SQT scores were used.

Table 36

R^2 Comparison of Models Containing "Best" Subset of Predictors by MOS (All Categories)

	Model Composition and Number							
	MC NO	EI NO	MC EI NO	MC EI NO SI	MC EI NO SP AFQT	MC EI NO AFQT	MC EI NO SI AFQT	MC EI NO SI SP AFQT
MOS	1	2	3	4	5	6	7	8
05H	.119•••	.107•••	.131•••	.140•••	.185•••	.184•••	.187•••	.188•••
11B	.149•••	.147•••	.173•••	.179•••	.184•••	.184•••	.189•••	.189•••
12C	.075•••	.061•••	.084•••	.094•••	.111•••	.110•••	.116•••	.116•••
13B	.051•••	.048•••	.061•••	.065•••	.068•••	.065•••	.068•••	.071•••
15E	.201•••	.214•••	.256•••	.292•••	.268•••	.267•••	.300•••	.300•••
16R	.133•••	.118•••	.153•••	.161•••	.168•••	.166•••	.172•••	.174•••
27F	.056•	.080••	.082•	.084•	.110•	.104••	.111•	.116•
31J	.136•••	.150•••	.166•••	.168•••	.209•••	.209•••	.217•••	.217•••
36C	.009•••	.018•••	.019•••	.023•••	.023•••	.021•••	.025•••	.026•••
43E	.120•••	.131•••	.142•••	.145•••	.185•••	.185•••	.193•••	.193•••
51R	.062••	.074••	.086••	.088••	.088••	.087••	.089•	.089•
52D	.073•••	.127•••	.141•••	.144•••	.141•••	.141•••	.144•••	.145•••
64C	.150•••	.171•••	.197•••	.210•••	.217•••	.216•••	.225•••	.226•••
68B	.111••	.105••	.111••	.111•	.111•	.111•	.112•	.112ns
71L	.144•••	.145•••	.163•••	.163•••	.203•••	.203•••	.204•••	.204•••
71N	.079••	.073•	.087•	.110•	.107•	.104•	.152••	.154••
74D	.135•••	.078•	.140••	.163•••	.200•••	.199•••	.213•••	.215•••
82C	.184•••	.153•••	.199•••	.204•••	.233•••	.233•••	.234•••	.234•••
92B	.077•••	.096•••	.102•••	.103•••	.109•••	.104•••	.107•••	.113•••
94B	.111•••	.139•••	.155•••	.176•••	.172•••	.172•••	.187•••	.187•••
95B	.122••	.108•••	.142•••	.151•••	.167•••	.166•••	.172•••	.173•••
ALL[a]	.105•••	.103•••	.124•••	.130•••	.134•••	.134•••	.137•••	.138•••

* = p<.05; ** = p<.01; *** = p<.001; ns = non significant

[a] All 22 MOS for which there were SQT scores were used.

Standardized regression coefficients and adjusted R^2 values (Wherry formula) are provided for models 4, 6, 7, and 8 in Tables 37 through 39. Again, model 8 was superior in terms of shrunken R^2 but model 7 was a very close second and in some MOS was equal or better than model 8. Model 7 may also be more attractive from the standpoint that it avoided negative coefficients to a greater degree (particularly negative weights for SP itself as in 64C) and increased the weight of AFQT. This endorsement of model 7 should be tempered until follow-up analyses are performed attesting to the stability of these variables (and today's variants of them) in predicting performance.

Fairness. In addition to addressing the question of which additional predictors would aid in the selection of below average aptitude recruits, the fairness of such a model is also of concern. More specifically, is there evidence of differential prediction for minority groups? Again, though fairness was approached in a theoretically similar manner for SQT as for attrition and promotion, separate group (i.e., black, white) OLS regression analyses as opposed to contingency tables were employed for SQT.

Fairness analyses for SQT were conducted using both the specified 14-variable model 3 and the reduced 5-variable model 7 derived from the best model analyses. For Category IIIB and IV, as well as Category IV soldiers alone, black-white regression slope and intercept differences were tested within MOS. Regression lines for white and black males were also plotted. Appendix B provides a tabulation of these analyses. There were few if any significant slope or intercept differences and where such differences were significant (e.g., 11B, 64C), whites generally had higher criterion scores and there was overprediction for blacks. Table 40 below summarizes the fairness results of model 7 (AFQT, MC, EI, NO, SI) across MOS for AFQT Category IIIB and IV recruits. Such results were typical within MOS using MOS-specific coefficients.

Table 37

β Weights and Adjusted R^2 Values for a Subset of Best Models by MOS

(Category IV)

MOS	Model 4					Model 6				
	MC	EI	NO	SI	AdjR²	MC	EI	NO	AFQT	AdjR²
11B	.096•••	.105•••	.101•••	.103••	.065	.105•••	.137•••	.095•••	.054•••	.059
12C	.079ns	-.015ns	.107•	.134••	.032	.089ns	.007ns	.096•	.090•	.024
13B	.057•••	.060•••	.069•••	.064•••	.023	.059•••	.076•••	.068•••	.064•••	.023
15E	.123ns	.188••	.074ns	.297•••	.201	.169•	.253•••	.074ns	.040ns	.123
16R	.160•••	.065ns	.116••	.056ns	.057	.159•••	.070ns	.115••	.066ns	.058
31J	.145ns	.157ns	.156•	-.002ns	.061	.138ns	.148ns	.145ns	.063ns	.065
36C	-.007ns	.074••	.036ns	.060•	.010	-.002ns	.085•••	.035ns	.014ns	.007
43E	.054ns	.159ns	.103ns	-.046ns	.019	.024ns	.131ns	.093ns	.120ns	.031
52D	.040ns	.097ns	-.119ns	.082ns	.006	.043ns	.131ns	-.109ns	.029ns	.002
64C	.069•••	.173•••	.103•••	.135•••	.107	.088•••	.212•••	.096•••	.077•••	.099
71L	.028ns	.054ns	.156•••	.021ns	.027	.022ns	.053ns	.152•••	.089•	.034
82C	.146••	.103•	.064ns	.014ns	.042	.129••	.089ns	.064ns	.004ns	.059
94B	.057••	.154•••	.110•••	.164•••	.101	.071••	.201•••	.110•••	.077•••	.085
95B	.097•••	.074••	.094•••	.028ns	.032	.097•••	.079••	.091•••	.039ns	.033
ALL	.071•••	.100•••	.078•••	.085•••	.045	.080•••	.121•••	.073•••	.058•••	.042

/ Continued /

Table 37, Continued:

MOS	Model 7						Model 8						
	MC	EI	NO	SI	AFQT	AdjR²	MC	EI	NO	SI	SP	AFQT	AdjR²
11B	.088***	.098***	.098***	.101***	.050***	.067	.084***	.103***	.103***	.109***	.049***	.038***	.069
12C	.069ns	-.024ns	.098*	.129**	.083ns	.037	.070ns	-.028ns	.095*	.124**	-.028ns	.092ns	.035
13B	.048***	.058***	.066***	.057***	.058***	.026	.043***	.057***	.066**	.059***	.040***	.040***	.029
15E	.124ns	.189**	.074ns	.298***	-.006ns	.197	.122ns	.191**	.076ns	.297***	.022ns	-.013ns	.193
16R	.149***	.056ns	.113**	.051ns	.063ns	.059	.139**	.058ns	.116**	.059ns	.046ns	.046ns	.059
31J	.139ns	.152ns	.144ns	-.013ns	.065ns	.059	.135ns	.158ns	.147ns	-.008ns	.028ns	.054ns	.053
36C	-.008ns	.073**	.035ns	.059*	.010ns	.009	-.012ns	.074**	.037ns	.062*	.043ns	-.004ns	.010
43E	.031ns	.152ns	.089ns	-.051ns	.122ns	.027	.022ns	.156ns	.095ns	-.044	.038ns	.109ns	.023
52D	.038ns	.097ns	-.200ns	.079ns	.011ns	.003	-.004	.116ns	-.086ns	.103ns	.138ns	-.026ns	.003
64C	.060***	.165***	.097***	.126***	.062***	.110	-.064***	.163***	.094***	.122***	-.041**	.075***	.111
71L	.020ns	.049ns	.153***	.012ns	.088*	.033	.018ns	.050ns	.153***	.014ns	.023ns	.082*	.032
82C	.131**	.093ns	.064ns	-.009ns	.004ns	.057	.127**	.097ns	.062ns	-.004ns	.037ns	.120*	.056
94B	.047*	.146***	.107***	.157***	.062***	.104	.049**	.145***	.106***	.157***	-.014ns	.066***	.104
95B	.093***	.071**	.091***	.022ns	.036ns	.033	.092***	.072**	.092***	.024ns	.018ns	.031ns	.032
ALL	.064***	.095***	.073***	.080***	.051***	.047	.058***	.101***	.078***	.083***	.051***	.037***	.050

Table 38

β Weights and Adjusted R^2 Values for a Subset of Best Models by MOS

(Category IIIB & IV)

MOS	Model 4					Model 6				
	MC	EI	NO	SI	AdjR²	MC	EI	NO	AFQT	AdjR²
11B	.106•••	.123•••	.111•••	.099•••	.085	.110•••	.146•••	.103•••	.074•••	.082
12C	.070ns	.001ns	.076•	.122••	.027	.071ns	.005ns	.055ns	.123••	.027
13B	.076•••	.067••	.081•••	.071•••	.035	.078•••	.084•••	.080•••	.062•••	.034
15E	.141•	.151••	.089ns	.287•••	.196	.185•••	.232•••	.098ns	.041ns	.128
16R	.165•••	.072ns	.120••	.093•	.082	.156•••	.069ns	.114••	.123••	.087
31J	.052ns	.202••	.125ns	-.096ns	.043	.024ns	.157•	.120ns	.036ns	.037
36C	-.006ns	.083•••	.039ns	.067••	.014	-.003ns	.091•••	.033ns	.048•	.012
43E	.059ns	.207••	.116•	-.075ns	.049	.035ns	.171••	.114ns	.034ns	.046
52D	.023ns	.170•	.026ns	.016ns	.017	.027ns	.176••	.029ns	-.006ns	.017
64C	.104•••	.173•••	.095•••	.147•••	.137	.113•••	.207•••	.083•••	.118•••	.134
71L	.048ns	.058ns	.168•••	.046ns	.043	.041ns	.057•	.160•••	.090••	.049
82C	.185•••	.070ns	.119•••	.069ns	.082	.168•••	.071ns	.118•••	.117••	.090
92B	.200*	.139ns	.013ns	-.095ns	.044	.172ns	.092ns	-.001ns	.079ns	.042
94B	.058•••	.144•••	.126•••	.162•••	.109	.071•••	.180•••	.119•••	.111•••	.100
95B	.125•••	.073•••	.103•••	.101•••	.066	.128•••	.094•••	.093•••	.092•••	.066
ALL	.085•••	.102•••	.082•••	.090•••	.058	.093•••	.122•••	.075•••	.062•••	.055

/ Continued /

Table 38, Continued:

MOS	Model 7						Model 8						
	MC	EI	NO	SI	AFQT	AdjR²	MC	EI	NO	SI	SP	AFQT	AdjR²
11B	.092•••	.110•••	.103•••	.093•••	.066•••	.089	.088•••	.114•••	.107•••	.098•••	.035•••	.058•••	.090
12C	.049ns	-.018ns	.061ns	.103•	.104•	.034	.051ns	-.024ns	.055ns	.095•	-.045ns	.125••	.034
13B	.064•••	.064•••	.077•••	.062•••	.053•••	.037	.057•••	.064•••	.078•••	.063•••	.057•••	.036•••	.040
15E	.143••	.153••	.093ns	.291•••	-.017ns	.194	.143••	.153••	.093ns	.291•••	.001ns	-.018ns	.191
16R	.142•••	.047ns	.110••	.076ns	.112••	.090	.133••	.048ns	.113••	.082ns	.039ns	.097•	.090
31J	.039ns	.191•	.118ns	-.107ns	.056ns	.040	.036ns	.191•	.119ns	-.103ns	.027ns	.045ns	.036
36C	-.013ns	.077••	.033ns	.063••	.042ns	.015	-.019ns	.078•••	.036ns	.064••	.042ns	.028ns	.017
43E	.045ns	.202••	.105ns	-.081ns	.045ns	.047	.040ns	.206••	.109ns	-.080ns	.027ns	.035ns	.044
52D	.024ns	.171•	.027ns	.016ns	-.008ns	.013	.007ns	.175•	.033ns	.025ns	.058ns	-.025ns	.012
64C	.083•••	.158•••	.083••	.129•••	.098•••	.144	.089•••	.156•••	.079•••	.125•••	-.043•••	.113•••	.145
71L	.034ns	.046ns	.161•••	.033ns	.086••	.049	.036ns	.045ns	.161•••	.032ns	-.016ns	.091••	.049
82C	.160•••	.051ns	.119•••	.048ns	.109••	.091	.155•••	.054ns	.118•••	.052ns	.033ns	.097••	.091
92B	.198•	.113ns	-.011ns	-.122ns	.110ns	.046	.243•	.129ns	-.013ns	-.164ns	-.137ns	.140ns	.055
94B	.042•	.130•••	.116•••	.147•••	.088•••	.116	.044•	.129••	.116•••	.146•••	-.011ns	.091•••	.115
95B	.109•••	.061••	.096•••	.089•••	.082•••	.072	.110•••	.060••	.096•••	.089•••	-.011ns	.085•••	.072
ALL	.074•••	.094•••	.075•••	.082•••	.051•••	.060	.068•••	.099•••	.079•••	.085•••	.043•••	.039•••	.062

Table 39

β Weights and Adjusted R^2 Values for a Subset of Best Models by MOS

(All Categories)

	Model 4					Model 6				
MOS	MC	EI	NO	SI	AdjR²	MC	EI	NO	AFQT	AdjR²
05H	.155•	.084ns	.138•	.129ns	.128	.093ns	.035ns	.064ns	.317•••	.173
11B	.169•	.147•	.135••	.106•••	.179	.135•••	.146•••	.106•••	.156•••	.184
12C	.139•••	.072ns	.087••	.122••	.090	.092•	.037ns	.044ns	.227•••	.106
13B	.102•••	.081•••	.092•••	.084•••	.065	.093•••	.093•••	.083•••	.085•••	.065
15E	.180•••	.194••	.111••	.234•••	.286	.173••	.238•••	.092••	.155••	.261
16R	.185•••	.119••	.125•••	.116••	.157	.151•••	.114••	.100••	.164•••	.162
27F	.062ns	.184ns	.173ns	-.043ns	.052	-.002ns	.121ns	.135ns	.179ns	.073
31J	.171•	.236••	.171••	-.066ns	.156	.021ns	.122ns	.114ns	.301•••	.197
36C	.013ns	.082•••	.040ns	.075••	.021	.011ns	.089•••	.031ns	.063•	.020
43E	.142••	.212•••	.187•••	-.068ns	.137	.022ns	.111•	.108•	.284•••	.178
51R	.114ns	.169ns	.050ns	.052ns	.064	.117ns	.173ns	.039ns	.041ns	.063
52D	.117•	.263•••	.054ns	.065ns	.136	.123•	.281•••	.053ns	.026ns	.133
64C	.150•••	.198•••	.102•••	.148•••	.209	.117•••	.212•••	.075•••	.185•••	.215
68B	.084ns	-.007ns	.292••	.025ns	.074	.104	.006ns	.294••	-.026ns	.074
71L	.160•••	.159•••	.205•••	.019ns	.162	.060•	.090•••	.171•••	.267•••	.202
71N	.216ns	.180ns	.155•••	-.197ns	.075	.013ns	.088ns	.139ns	.197ns	.070
74D	.228ns	.037ns	.078ns	.191ns	.129	.144ns	-.004ns	.010ns	.343••	.167
82C	.244•••	.110•••	.167•••	.094••	.202	.150•••	.073•	.135•••	.264•••	.230
92B	.118ns	.217•••	.107•	-.046ns	.095	.067ns	.179••	.093ns	.072ns	.096
94B	.091•••	.162•••	.137•••	.184•••	.175	.077•••	.188•••	.115•••	.172•••	.171
95B	.185•••	.120•••	.117•••	.117•••	.150	.131•••	.110•••	.077•••	.210•••	.166
ALL	.144•••	.127•••	.104•••	.100•••	.129	.115•••	.128•••	.078•••	.142•••	.133

Table 39, Continued:

MOS	Model 7						Model 8						
	MC	EI	NO	SI	AFQT	AdjR²	MC	EI	NO	SI	SP	AFQT	AdjR²
05H	.072ns	.005ns	.068ns	.079ns	.303•••	.173	.067ns	.006ns	.068ns	.077ns	.034ns	.285•••	.171
11B	.113•••	.109•••	.108•••	.092•••	.144•••	.188	.109•••	.111•••	.110•••	.094•••	.019••	.135•••	.189
12C	.069ns	.012ns	.049ns	.090•	.209•••	.110	.071ns	.010ns	.046ns	.087•	-.017ns	.219•••	.110
13B	.075•••	.069•••	.081•••	.072•••	.072•••	.068	.066•••	.070•••	.082•••	.072•••	.063•••	.045•••	.071
15E	.125•	.164••	.086•	.222•••	.127•	.292	.122•	.164••	.088•	.221•••	.019ns	.117ns	.290
16R	.132••	.086•	.097••	.092•	.145••	.166	.120••	.086•	.102••	.100•	.056ns	.119•	.167
27F	.013ns	.141ns	.119ns	-.096ns	.209ns	.073	.007ns	.141ns	.132ns	-.091ns	.076ns	.175ns	.070
31J	.044ns	.162•	.109ns	-.111ns	.322•••	.202	.046ns	.162•	.108ns	-.111ns	-.009ns	.326•••	.199
36C	-.004ns	.071••	.031ns	.068••	.052•	.023	-.011ns	.072••	.033ns	.069••	.046ns	.033ns	.024
43E	.039ns	.158••	.097•	-.110•	.303•••	.183	.039ns	.158••	.097ns	-.110•	-.002ns	.304•••	.181
51R	.104ns	.164ns	.043ns	.046ns	.031ns	.058	.109ns	.161ns	.043ns	.047ns	-.022ns	.042ns	.052
52D	.109•	.258•••	.049ns	.065ns	.024ns	.134	.105ns	.260•••	.050ns	.066ns	.016ns	.016ns	.132
64C	.085•••	.162•••	.075•••	.127•••	.168•••	.224	.092•••	.160•••	.071•••	.124•••	-.044•••	.189•••	.225
68B	.099ns	-.002ns	.297••	.027ns	-.030ns	.065	.098ns	-.002ns	.299••	.029ns	.014ns	-.039	.055
71L	.066••	.098•••	.170•••	-.021ns	.270•••	.202	.068••	.097•••	.170•••	-.021ns	-.012ns	.276•••	.201
71N	.042ns	.185ns	.085ns	-.308•	.335•	.110	.064ns	.172ns	.086ns	-.307•	-.057ns	.354•	.103
74D	.095ns	-.035ns	.008ns	.147ns	.317••	.172	.104ns	-.037ns	-.001ns	.154ns	-.006ns	.354•	.166
82C	.140•••	.051ns	.136•••	.052ns	.254•••	.231	.135•••	.054ns	.137•••	.053ns	.030ns	.237•••	.231
92B	.085ns	.198••	.085ns	-.073ns	.097ns	.096	.120ns	.196••	.080ns	-.090ns	-.112ns	.163•	.100
94B	.043•	.131•••	.114•••	.160•••	.142•••	.186	.044•	.131•••	.113•••	.160•••	-.005ns	.144•••	.186
95B	.107•••	.073•••	.081•••	.097•••	.199•••	.172	.112•••	.070•••	.078•••	.097•••	-.032•	.217•••	.172
ALL	.094•••	.097•••	.078•••	.084•••	.130•••	.137	.087•••	.101•••	.082•••	.085•••	.034•••	.113•••	.138

Table 40

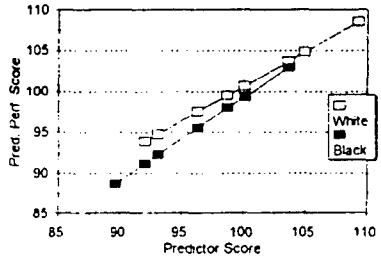
Fairness Analyses of Model 7 (AFQT, MC, EI, NO, SI) for Category IIIB & IV Soldiers Across MOS

SPA Fairness Analyses — **White/Black Subgroups**
Across All SQT MOS — **Test:** SQT Prediction Composite – Reduced Model
Sample: Category IIIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	46005	98.734	4.435	98.622	18.015	0.998	0.059	0.060	0.245
White	24069	100.661	4.316	101.178	17.556	0.849	15.711	0.044	0.210
Black	21936	96.620	3.503	95.820	18.096	1.019	-2.628	0.039	0.197
Effect Size		0.911							
P value						0.0001	0.0001		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
89.614	NA	88.689	NA	0.268	NA	NA
92.029	93.844	91.150	0.247	0.197	2.694	Over
93.117	94.767	92.258	0.223	0.169	2.509	Over
96.345	97.508	95.548	0.156	0.120	1.960	Over
98.734	99.536	97.982	0.121	0.140	1.554	Over
100.123	100.715	99.397	0.111	0.169	1.318	Over
103.626	103.689	102.967	0.134	0.268	0.723	Over
104.977	104.836	NA	0.156	NA	NA	NA
109.293	108.501	NA	0.247	NA	NA	NA



Chapter 5

Expert Judgment Study

Background

The focus of the current study concerns the selection and classification of lower aptitude soldiers. As previously explained, due to a generally favorable recruiting environment the Services have not had to access such individuals in some time. In fact, the last period when significant numbers of Category IIIB and IV personnel were admitted to the Army was 1976-1980, when the ASVAB was inadvertently misnormed.

A dependence on historical data presents some limitations, however, that the expert judgment portion of this study sought to overcome. For one thing, in the dozen-plus years since the misnorming, the ASVAB has evolved so that a number of the measures included at that time are no longer part of the test. Correspondingly, there are elements in the current ASVAB that were not in existence at the time of the misnorming. A means must be found, then, to capitalize on all of the available data while also addressing the current realities of selection and classification. Expert judgments offer the possibility of evaluating performance predictors even when empirical data are lacking.

Expert judgments concerning criterion-related validity are collected by presenting descriptive information about a set of predictors and job performance criterion variables to a panel of persons familiar with personnel selection and classification. These experts then assess the relationships between the variables by estimating the value of the correlation coefficients. Studies have shown that pooled expert judgments can be as accurate as empirical research using samples of hundreds of subjects in evaluating the validity of tests (Schmidt, Hunter, Croll, & McKenzie, 1983).

In those cases where there *is* validity information on performance predictors for lower ability men, the accuracy of expert judgments can be assessed. Correspondence between the actual and estimated values, provides evidence to support the use of the expert judgment results for predictors for which little or no empirical data are available. Thus we can evaluate the whole range of predictors for lower-ability men, and provide the Army with a comprehensive assessment of their usefulness.

Method

Participants. The judges in this study were 15 test and measurement experts; 7 from the U.S. Army Research Institute for Behavioral and Social Sciences (ARI), and 8 from the Human Resources Research Organization (HumRRO). In addition to being knowledgeable about test development and validation, participants were selected based on their familiarity with Army policies pertinent to the present study (i.e., early separations, SQT development and administration, and promotion and reenlistment procedures).

Procedures. Participants were given summary information concerning the 19 predictor constructs and the 4 criterion factors. For each predictor, the information consisted of a name, definition or explanation, brief summary of the typical measures, reliability and validity synopses of the measure, and one or more sample items (see Figure 28). For the criterion factors, a name and definition or description were provided, as shown in Figure 29. Appendix C contains the complete summary package.

Judges were asked to provide "true" validity estimates; therefore, a review of applicable validity issues was presented. Specifically, participants were reminded of the effects of criterion unreliability, range restriction, and sample size on the relationship between observed and true validity.

In making their judgments, the experts were asked to follow these steps:

1) Review the summary information concerning the first predictor construct and first criterion factor.

2) Provide an estimate of the "true" validity (rounded to the nearest .05 interval) of the first predictor as it relates to the first criterion for Category IIIB and IV personnel.

3) Repeat step two for Category I-IIIA personnel.

4) After reviewing the summary information for the second criterion, repeat steps two and three for the first predictor and the second criterion. Continue with the third and fourth criteria.

5) Repeat all steps for the next (and subsequent) predictors.

CONSTRUCT NAME: Biographical Information CONSTRUCT NUMBER: 7

DEFINITION: Measures an individual's background and life experiences

MEASURES: Pencil and paper forms that require open-ended or yes/no responses to inquiries about an individual's background and life experiences. Biographical Information forms may also use a multiple choice format. Sample assessments include the Biographical Information Form (BIF), the Biographical Information Questionnaire (BIQ), the Military Applicant Profile (MAP), and the Armed Services Applicant Profile (ASAP).

RELIABILITY: Correlations of .94 have been found between self-reported biodata responses and later verified answers to the same questions.

VALIDITY: Overall median validity coefficients for the following criteria:

- Training performance .25
- Job proficiency .32
- Job involvement .30
- Adjustment .26

SAMPLE ITEMS: *Military Applicant Profile*

- From the time you first started school, how many times did your family move from one house to another?
  a. None b. 1
  c. 2 d. 3
  e. 4 or more

- How old were you when you first began to support yourself without any help from anyone else?
  a. 16 or younger
  b. 17
  c. 18
  d. 19 or older
  e. I have never supported myself

Figure 28. Predictor Construct Summary Information

Attrition

Attrition is defined as separating from the Army before completion of the contracted term of service for pejorative reasons. Attrition for nonpejorative reasons such as disability, death, entry into officer programs, retirement, secretarial authority, sole surviving son, or breach of contract by the Army are *not* included in this criterion factor.

Early separation may be initiated by the soldier or by the Army. A solider may initiate separation procedures through administrative procedures (e.g., pregnancy) or by deserting. The Army may discharge a soldier through administrative (i.e., medical, homosexual, or disciplinary chapters) or judicial (i.e., court martial) actions.

Skill Qualification Test (SQT) Score

The SQT is a written, multiple-choice test used to evaluate a soldier's technical knowledge of his or her Military Occupational Specialty (MOS) and skill level proficiency. Depending on the MOS, the test takes approximately two hours to complete, and all soldiers in Skill Levels 1 through 4 are tested annually in their primary MOS. The SQT is scheduled in advance, and soldiers are allowed to study for the test.

Promotion

Advancement in the Army depends on factors that are both internal and external to a soldier's control. Internal control factors include SQT performance and, to some extent, supervisory ratings. External control factors include time in grade (e.g., soldiers are generally awarded the rank of E2 upon completion of basic training), manpower needs, policy decisions, and the number of openings within an MOS.

Reenlistment Eligibility

Reenlistment eligibility is a soldier's suitability for extending his or her time in the Army beyond the initial commitment. It is often used as a summary indicator of success in the Army. Individual achievements as measured by SQT performance, supervisor ratings, and promotions influence reenlistment eligibility. However, factors outside a soldier's control also affect reenlistment eligibility including manpower needs, policy decisions, and the number of openings within an MOS.

Figure 29. Criterion Factor Summary Information

After providing initial validity estimates, judges were asked to estimate the "true" incremental validity, over the AFQT, for each predictor-criterion pair. They were instructed to follow the same steps outlined above. Finally, participants were asked to rank order the top 10 predictors for each criterion. Rankings were to be made regardless of aptitude level. In ranking the predictors, judges were asked to assume that: (a) 10 separate regression equations would be written for each criterion factor, (b) only two predictors would be entered in each equation--AFQT and one other predictor, and (c) AFQT would always be entered first.

Results and Discussion

Validity Estimates. Descriptive statistics for initial and incremental validity estimates are presented in Tables 41 and 42, respectively. Although participants were asked to round their estimates to .05 intervals, two participants did not do so in a few cases. Therefore, we conducted our analyses using their unmodified raw data.

Overall, the standard deviations in Tables 41 and 42 are small, which indicates agreement among the judges. To assess this directly, interrater reliability was calculated. First, a 15 x 15 Pearson correlation matrix of the judges' responses was computed. The values were then converted to Fisher z correlations, averaged, and converted back to Pearson coefficients. The resulting values are similar to single-rater reliabilities obtained in generalizability reliability analyses (Brennan, 1983). Using the Spearman-Brown formula, the single-rater reliability coefficient was stepped-up by 15 raters to obtain the interrater reliability coefficient for the present sample. Using this procedure, interrater reliability is .96 for the initial estimates and .92 for the incremental estimates, indicating a high level of expert agreement.

Perhaps the most striking observation from Table 41 is that the validity estimates were low, ranging from .01 to .36. Acceptable validity coefficients from criterion-related validation studies range from .30 to .40 (Muchinsky, 1983)[10]. Further, recall that experts were asked to provide "true" validity estimates, which tend to be larger than observed validities (Callender & Osburn, 1981; Pearlman, Schmidt, & Hunter, 1980; Schmidt & Hunter, 1977). Given these considerations, the mean estimates were quite low.

[10] See Editor's Notes, Note 5.

Table 41
Mean Initial Validity Judgments

Predictor Constructs		Criterion Factors							
		Attrition		SQT Score		Promotion		Reenlistment Eligibility	
		CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA
Education	Mean	-.34	-.29	.28	.26	.26	.24	.22	.21
	SD	.13	.14	.16	.16	.14	.14	.18	.18
Age at Enlistment	Mean	-.18	-.16	.10	.08	.15	.14	.11	.11
	SD	.12	.13	.08	.08	.12	.12	.10	.10
Marital Status/	Mean	-.01	-.03	.02	.03	.07	.07	.07	.07
Number of Dependents	SD	.19	.15	.07	.05	.09	.08	.11	.10
Geographic Region	Mean	-.03	-.02	.04	.03	.04	.02	.03	.03
	SD	.08	.06	.08	.06	.08	.05	.06	.05
Psychomotor Abilities	Mean	-.09	-.08	.16	.15	.10	.10	.09	.08
	SD	.11	.09	.12	.12	.11	.11	.09	.09
Psychological Variables	Mean	-.25	-.26	.13	.13	.23	.23	.20	.20
	SD	.19	.17	.09	.09	.08	.08	.07	.07
Biographical Information	Mean	-.28	-.26	.15	.15	.19	.18	.17	.16
	SD	.14	.14	.10	.11	.09	.09	.10	.09
Interests	Mean	-.24	-.20	.18	.17	.18	.16	.15	.14
	SD	.14	.13	.08	.08	.11	.09	.13	.12
Numerical Operations	Mean	-.08	-.07	.30	.29	.13	.13	.12	.12
	SD	.11	.10	.23	.22	.16	.18	.17	.16
Mathematical Knowledge	Mean	-.11	-.09	.36	.36	.18	.17	.14	.14
	SD	.10	.08	.19	.18	.15	.15	.17	.17

/ Continued /

Table 41
Mean Initial Validity Judgments, (continued)

Predictor Constructs		Criterion Factors							
		Attrition		SQT Score		Promotion		Reenlistment Eligibility	
		CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA
Mechanical Comprehension	Mean	-.09	-.09	.32	.31	.17	.17	.12	.13
	SD	.07	.08	.18	.17	.16	.15	.16	.16
General Science	Mean	-.07	-.06	.25	.25	.14	.13	.09	.09
	SD	.10	.10	.12	.12	.11	.09	.11	.09
Perceptual Speed and Accuracy	Mean	-.09	-.08	.21	.20	.13	.13	.10	.10
	SD	.10	.09	.10	.10	.09	.09	.07	.07
General Information	Mean	-.08	-.08	.22	.22	.14	.15	.11	.11
	SD	.07	.07	.11	.11	.07	.07	.12	.12
Electronics Information	Mean	-.10	-.09	.24	.23	.13	.13	.09[a]	.09[a]
	SD	.12	.09	.15	.13	.10	.10	.13	.13
Automotive Information	Mean	-.08	-.07	.23	.22	.12	.12	.08	.08
	SD	.12	.10	.15	.13	.11	.11	.11	.11
Shop Information	Mean	-.08	-.06	.21	.19	.11	.11	.08	.08
	SD	.09	.07	.14	.12	.12	.12	.10	.10
Spatial Ability	Mean	-.10	-.09	.30	.28	.15	.14	.11	.11
	SD	.10	.09	.18	.18	.09	.08	.11	.10
Physical Fitness	Mean	-.21	-.19	.11	.11	.26	.24	.23	.22
	SD	.16	.15	.12	.12	.13	.11	.13	.13

Note. N = 15.

[a]N = 14.

Table 42
Mean Incremental Validity Judgments

Predictor Constructs		Criterion Factors							
		Attrition		SQT Score		Promotion		Reenlistment Eligibility	
		CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA
Education	Mean	.19	.17	.11	.09	.11	.10	.10	.10
	SD	.13	.13	.14	.12	.12	.10	.10	.10
Age at Enlistment	Mean	.13	.12	.05	.04	.10	.09	.08	.08
	SD	.12	.11	.10	.09	.14	.14	.13	.13
Marital Status/	Mean	.10	.08	.01	.01	.05	.05	.04	.05
Number of Dependents	SD	.13	.11	.05	.05	.09	.09	.07	.07
Geographic Region	Mean	.02	.02	.00	.00	.00	.00	.00	.00
	SD	.05	.05	.03	.03	.01	.01	.01	.01
Psychomotor Abilities	Mean	.06	.05	.08	.06	.04	.03	.03	.03
	SD	.08	.06	.08	.05	.06	.04	.04	.05
Psychological Variables	Mean	.21	.19	.09	.07	.15	.14	.13	.12
	SD	.09	.08	.06	.05	.07	.07	.06	.06
Biographical Information	Mean	.21	.19	.08	.07	.11	.10	.09	.08
	SD	.09	.08	.09	.07	.06	.06	.07	.07
Interests	Mean	.17	.13	.10	.10	.09	.09	.08	.08
	SD	.12	.08	.09	.08	.09	.08	.09	.09
Numerical Operations	Mean	.03	.02	.04	.04	.01	.01	.01	.01
	SD	.07	.05	.05	.05	.03	.03	.03	.03
Mathematical Knowledge	Mean	.03	.02	.07	.07	.03	.03	.03	.03
	SD	.04	.03	.08	.08	.04	.04	.04	.04

/ Continued /

Table 42
Mean Incremental Validity Judgements (Continued)

Predictor Constructs		Criterion Factors							
		Attrition		SQT Score		Promotion		Reenlistment Eligibility	
		CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA
Mechanical Comprehension	Mean	.02	.02	.09	.08	.03	.03	.02	.02
	SD	.04	.03	.08	.06	.04	.04	.03	.03
General Science	Mean	.02	.01	.05	.04	.02	.02	.01	.01
	SD	.05	.04	.05	.05	.04	.04	.02	.02
Perceptual Speed and Accuracy	Mean	.03	.02	.11	.09	.05	.05	.03	.03
	SD	.06	.05	.09	.07	.07	.06	.05	.05
General Information	Mean	.02	.02	.05	.05	.03	.02	.02	.02
	SD	.03	.03	.08	.05	.05	.03	.05	.03
Electronics Information	Mean	.02	.02	.07	.07	.02	.02	.02	.02
	SD	.04	.03	.06	.06	.03	.03	.03	.03
Automotive Information	Mean	.02	.02	.07	.06	.03	.02	.02	.01
	SD	.05	.04	.08	.07	.03	.03	.03	.02
Shop Information	Mean	.02	.01	.06	.06	.02	.02	.02	.02
	SD	.04	.03	.08	.06	.03	.03	.03	.02
Spatial Ability	Mean	.05	.04	.10	.09	.05	.04	.04	.03
	SD	.07	.05	.07	.07	.07	.04	.05	.04
Physical Fitness	Mean	.16	.13	.07	.07	.16	.15	.15	.14
	SD	.11	.09	.07	.07	.11	.11	.11	.10

Note. N = 15.

The fact that the *incremental* validity estimates were also low (Table 42) was not unexpected. This result indicates that, in the view of the judges, factors tapped by the AFQT explain much of the relationship between the predictors and the criteria.

A repeated measures ANOVA was done to test the mean differences between aptitude levels in terms of estimated predictor-criterion differences. The concern here was with differences in the *strength* of the relationships more than the direction. Therefore, absolute values of the validity estimates were used to calculate the ANOVAS. Tables 43 and 44 present the results for the initial and incremental estimates, respectively.

The results showed that significant differences were indeed found for all of the main, and most of the interaction effects. This was not surprising given that for the most part the various criteria tap into divergent domains. With this in mind, it should be noted that our primary concern was with the aptitude by criterion by predictor interactions. That is, we were interested in differences between aptitude groups in terms of each performance measure as related to each of the predictors (e.g., are education estimates for attrition significantly different for Categories IIIB-IV and Category I-IIIA individuals?).

In order to more exactly specify the effects found, critical Tukey values were calculated for the aptitude by criteria by predictor interactions for both the initial and incremental estimates. These results are presented in Appendix D. Overall, very few differences in validity estimates were found. For the initial estimates, such differences were significant for only three predictors (education, interests, and marital status/number of dependents) as related to attrition. For the incremental estimates, five predictors (biographical information, education, interests, physical fitness, and marital status/number of dependents) showed significant aptitude level differences for attrition, and two (education and perceptual speed and accuracy) for SQT score. Overall, however, these differences were rather modest, ranging from .02 to .05. Where validities were judged different across aptitude groups for a given predictor, they tended to be slightly higher for below-average recruits.

Table 43
Repeated Measures ANOVA Results for
Initial Validity Estimates

Source	SS	df	F	p
Aptitude	393.68	1	5.23	0.03
Rater x Aptitude	1053.35	14		
Criterion	16853.22	3	8.57	0.00
Rater x Criterion	27532.75	42		
Predictor	59606.18	18	8.34	0.00
Rater x Predictor	100074.22	252		
Aptitude x Criterion	128.16	3	6.12	0.00
Rater x Aptitude x Criterion	293.14	42		
Aptitude x Predictor	233.33	18	2.15	0.00
Rater x Aptitude x Predictor	1518.00	252		
Criterion x Predictor	56493.12	54	11.80	0.00
Rater x Criterion x Predictor	66914.52	755		
Aptitude x Criterion x Predictor	157.38	54	0.93	0.62
Rater x Aptitude x Criterion x Predictor	2371.43	755		

Table 44
Repeated Measures ANOVA Results for
Incremental Validity Estimates

Source	SS	df	F	p
Aptitude	278.60	1	6.60	0.02
Rater x Aptitude	590.66	14		
Criterion	2073.56	3	4.05	0.01
Rater x Criterion	7175.79	42		
Predictor	37440.43	18	10.76	0.00
Rater x Predictor	48719.68	252		
Aptitude x Criterion	59.10	3	3.22	0.03
Rater x Aptitude x Criterion	256.91	42		
Aptitude x Predictor	108.95	18	1.29	0.19
Rater x Aptitude x Predictor	1181.39	252		
Criterion x Predictor	14210.01	54	7.61	0.00
Rater x Criterion x Predictor	26155.50	756		
Aptitude x Criterion x Predictor	166.37	54	1.49	0.01
Rater x Aptitude x Criterion x Predictor	1558.48	756		

Given the relative absence of judged aptitude differences, validity estimates across AFQT categories (Categories I-IV) were used to identify the best predictors for each criterion. Table 45 presents Tukey tests of differences among initial estimated validities for each of the 19 predictors for attrition, SQT score, promotion, and reenlistment eligibility. Table 46 presents Tukey tests for the incremental validity estimates for the four criterion factors.

A few observations based on these tables warrant mention. Within each criterion, ranking the predictors in descending order of mean validity estimates resulted in approximately the same order for both the initial and incremental validities. For SQT score, however, there was some flip-flopping. Specifically, ASVAB subtests ranked highest for the initial estimates, whereas non-cognitive predictors ranked highest for the incremental estimates.

With the exception of SQT noted above, non-cognitive predictors ranked in the top five for all criteria for both initial and incremental estimates. Geographic region consistently ranked at or near the bottom in all cases.

Predictor Rank Orders. For the *rank order* task, recall that participants were to identify and rank the 10 constructs that they felt were most predictive of each of the four criterion factors. In some cases, judges provided tied rankings (e.g., two or more predictors were labeled "7"), which yielded more than 10 ranked predictors. When this happened, these predictors were coded the midpoint between the assigned and the next higher rank (e.g., two predictors ranked "7" were rescored 7.5). The remaining predictors were coded as though the ties never occurred (e.g., a predictor ranked "8" was recoded "9", a predictor ranked "9" was recoded "10"). The unselected predictors were coded "15", the midpoint between the remaining available ranks had those ranks been used.

Table 47 presents the mean predictor rankings for attrition, SQT score, promotion, and reenlistment eligibility. A close examination of these data reveals three commonalities. First, biographical information, education, psychological variables, physical fitness, and interests consistently ranked among the top five. Second, predictors such as psychomotor abilities, spatial ability, and perceptual speed and accuracy rounded out the top 10. And finally, geographic region and ASVAB subtests were consistently ranked the lowest among the predictors (i.e., outside of the top 10).

Table 45
Tukey Tests of Criterion by Predictor Interactions
Initial Validity Estimates

Predictor	Attrition		Promotion		Reenlistment		SQT	
	Rank	Tukey	Rank	Tukey	Rank	Tukey	Rank	Tukey
Education	1	.316	1	.256	1	.248	5	.275
Biographical Info	2	.290	4	.190	4	.168	14	.153
Psychological	3	.281	3	.233	3	.200	15	.136
Interests	4	.233	5	.176	6	.148	12	.175
Physical Fitness	5	.203	2	.253	2	.228	16	.116
Enlistment Age	6	.192	8	.145	11	.112	17	.090
Marital Status/ Dependents	7	.124	16	.076	17	.085	19	.033
Spatial Ability	8	.101	7	.148	10	.116	4	.290
Math Knowledge	9	.100	5	.176	5	.152	1	.365
Mech. Comprehend	10	.095	6	.173	7	.138	2	.318
Electronics Info	11	.092	11	.133	12	.108	7	.235
Psychomotor	12	.087	15	.103	16	.086	13	.158
Perceptual Speed	13	.086	9	.135	14	.100	10	.208
Automotive Info	13	.086	13	.126	15	.096	8	.230
General Info	14	.082	7	.148	8	.126	9	.226
Shop Information	15	.080	14	.116	16	.086	11	.205
General Science	16	.079	10	.134	13	.106	6	.251
Numerical Ops	17	.078	12	.129	9	.121	3	.300
Geographic	18	.042	17	.031	18	.031	18	.041

NOTE: Tukey = .0855, Alpha = .05, K = 19, MSE = 88.628, DFE = 755, N = 30
Within-criterion differences $\geq$ .085 significant.

Table 46
Tukey Tests of Criterion by Predictor Interactions
Incremental Validity Estimates

Predictor	Attrition Rank	Attrition Tukey	Promotion Rank	Promotion Tukey	Reenlistment Rank	Reenlistment Tukey	SQT Rank	SQT Tukey
Biographical Info	1	.206	4	.106	4	.091	5	.081
Psychological	2	.203	2	.148	2	.128	5	.081
Education	3	.185	3	.107	3	.105	2	.102
Interests	4	.156	6	.093	5	.081	1	.103
Physical Fitness	5	.148	1	.158	1	.150	8	.070
Enlistment Age	6	.128	5	.098	6	.080	12	.048
Marital Status/ Dependents	7	.094	8	.053	7	.048	14	.013
Psychomotor	8	.054	10	.037	10	.031	6	.075
Spatial Ability	9	.046	9	.048	8	.040	3	.098
Perceptual Speed	10	.031	7	.055	9	.038	1	.103
Math Knowledge	11	.029	12	.032	10	.031	8	.070
Numerical Ops	12	.028	17	.015	16	.015	13	.043
Automotive Info	13	.025	14	.029	15	.018	9	.066
Electronics Info	14	.021	15	.026	14	.021	7	.071
Shop Information	15	.020	15	.026	13	.023	10	.063
Mechanical Comprehension	15	.020	11	.034	11	.026	4	.086
General Info	15	.020	13	.030	12	.024	11	.053
Geographic	15	.020	18	.003	18	.003	15	.006
General Science	16	.018	16	.023	17	.013	12	.048

NOTE: Tukey = .0534, Alpha = .05, K = 19, MSE = 34.597, DFE = 756, N = 30
Within-criterion differences $\geq$ .055 significant.

Table 47
Mean Predictor Rankings

Predictor	Attrition			SQT Score			Promotion			Reenlist Elig		
	Rank	Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank	Mean	SD
Biographical Info	1	2.87	1.46	1	5.20	3.59	1	3.47	2.20	3	3.90	3.47
Education	2	3.07	2.43	3	6.67	6.53	4	5.07	3.99	2	3.8	2.86
Psychological Variables	3	3.37	2.13	2	6.27	4.84	5	6.60	5.73	5	6.27	5.68
Interests	4	4.60	2.53	4	6.73	4.00	3	5.07	3.49	4	5.73	3.34
Physical Fitness	5	5.26	3.73	12	11.1	5.63	2	3.60	2.41	1	3.47	2.32
Age at Enlistment	6	6.33	3.74	17	12.5	4.51	6	8.47	5.10	6	8.93	4.85
Marital Status/No. Dependents	7	9.23	4.97	18	13.9	2.84	9	10.5	5.19	8	10.0	5.06
Psychomotor Abilities	8	9.4	3.80	10	10.5	5.84	7	9.13	5.48	7	9.13	5.45
Spatial Ability	9	10.3	3.41	6	8.00	5.21	10	11.0	4.76	9	10.2	4.63
Perceptual Speed/Accuracy	10	12.6	3.77	7	9.00	4.91	8	10.5	4.58	11	11.7	4.41
Math Knowledge	11	12.9	3.91	9	10.4	5.38	14	13.2	3.78	14	12.6	4.37
Mechanical Comprehension	12	13.1	3.33	5	7.20	2.62	11	11.3	3.77	12	11.7	3.81
Geographic Region	13	13.1	3.45	19	15.0	0.00	18	13.4	3.46	19	14.2	2.11
Automotive Information	14	13.3	2.90	13	11.2	5.11	16	13.4	2.82	16	13.5	3.09
Shop Information	15	13.6	2.41	11	11.0	4.87	17	13.4	2.89	15	13.1	2.77
General Information	16	13.7	2.68	14	11.5	4.47	12	11.9	3.47	10	11.3	3.71
Numerical Operations	17	14.1	2.49	15	11.9	4.85	19	13.9	3.00	17	14.0	2.64
Electronics Information	18	14.6	1.54	8	9.53	4.45	13	12.7	2.89	13	12.5	3.40
General Science	19	14.7	1.29	16	12.3	3.63	15	13.3	3.58	18	14.0	2.64

Note: N = 15

The rank orders were consistent with the initial and incremental validity estimates presented in Tables 41 and 42 and Tables 45 and 46. Specifically, the non-cognitive predictors with the highest-ranked orders also tended to have the highest mean initial validity estimates, as well as the highest incremental validity estimates. A number of points are worth making in this regard. First, marital status/number of dependents tended to be ranked higher than it was rated as a predictor of attrition, promotion and reenlistment eligibility. Overall there was less agreement concerning "good" predictors of SQT performance, with ASVAB subtests receiving higher ratings. In general, though, there was substantial agreement between the predictor ratings and ranks. As initial validity estimates, incremental validity estimates, and rank orders are related yet different methods of obtaining the same information, it was encouraging that the three methods yielded similar results.

Estimated Compared to Empirical Validities. To make the study results generalizable, recall that judges were asked to estimate the validity of predictors that were available in the study data files as well as some that were not. Of the predictor constructs in the expert judgment study, only five were not included in the database--geographic region, psychomotor abilities, psychological variables, and biographical information. Therefore, to compare estimated validities with actual criterion-related validities, correlations were computed between the 4 criterion factors and the 15 predictors available on the databases for Categories I-IV. These correlations are presented in Table 48 along with the mean estimates of the judges. Overall it was clear that the experts' validity estimates were inflated when compared with the actual correlations. Again, the exception to this rule was the SQT. In this case, although some of the estimates were higher, the judges actually underestimated in the case of some of the ASVAB subtests (e.g., EI, GI, and GS). There is clear agreement represented in the two sets of figures that education was the best predictor for the remaining three criteria. Even here, however, with the exception of reenlistment eligibility (where the two values are nearly identical), the estimates provided by the judges were substantially higher than the actual validities.

Table 48
Comparison of Expert Validity Estimations and
Actual Predictor/Criteria Correlations (Absolute Values)

Predictor[a]	Attrition		Promotion[b]		Reenlistment Eligibility		SQT	
	Experts	Actual	Experts	Actual	Experts	Actual	Experts	Actual
Education	.32	.24	.26	.18	.25	.26	.27	.04
Enlistment Age	.19	.01	.14	.04	.11	.03	.09	.01
Marital Status	.12	.04	.08	.03	.08	.02	.03	.03
Electronics Information	.09	.04	.13	.08	.11	.07	.23	.29
General Info	.08	.07	.15	.09	.13	.09	.23	.26
General Science	.08	.07	.13	.10	.11	.10	.25	.29
Mechanical Comprehension	.09	.06	.17	.08	.14	.08	.32	.30
Math Knowledge	.10	.13	.18	.13	.15	.15	.36	.28
Numerical Ops	.08	.09	.13	.10	.12	.10	.30	.20
Shop Information	.08	.01	.12	.06	.09	.03	.20	.28
Spatial Perception	.10	.02	.15	.05	.10	.03	.29	.18
Automotive Info	.09	.02	.13	.06	.10	.04	.23	.25
Attention to Detail	.09	.05	.13	.05	.10	.05	.21	.08
Interests	.23	.01	.18	.05	.15	.02	.17	.07
Physical Fitness	.20	.01	.25	.02	.23	.02	.12	.03

[a] Education = High School Grad/Nongrad; AD = Attention to Detail (actual), Perceptual Speed and Accuracy (Judges); Interests = Sum of Administrative, Electronics, Mechanical, and Outdoors Interest measures; Physical = Body Mass (actual), Physical Fitness (Judges).
[b] Actual criterion = ever promoted to E-5.

Two of the constructs--physical fitness and interests--were consistently judged to have substantially more predictive power than they appear to have in "real life." In both of these cases this may result from the fact that there is some disparity between the data element on the cohort file and the construct as presented to the judges. Body mass may be an indicator of how physically fit one is, but it also does not cover the entire domain

of fitness as presented to the judges. Similarly, the general concept of "interests" may not be adequately represented by the available data, which is restricted to measures of attitudes towards administrative, electronics, mechanical, and outdoor pursuits. Thus two conclusions concerning the use of expert judgments as substitutes for actual validity data seem warranted. First, there needs to be a high degree of correspondence between the construct as presented to the judges and the way in which it is to be operationalized for such estimates to have value. Additionally, to the extent that other studies have demonstrated a tendency for expert judgments to be inflated, those estimates should be either subject to some correction for inflation or used in a relative, rather than absolute, fashion (e.g., rank orders).

Chapter 6

Summary and Conclusions

From these many analyses, a few general patterns emerged. As volumes of research have shown, the best single predictor of attrition is high school diploma status. The present study was no exception to this long standing rule. Not only was diploma status best at predicting attrition for below average aptitude personnel, but this demographic or background variable was the leading contender for predicting promotion to E-4 as well. Age at entry also tended to add significantly to the prediction of both attrition and promotion (particularly the latter), albeit not nearly so strong as high school graduation status. Generally, the ASVAB cognitive subtests were not strongly related to either leaving service prematurely or advancement to E-4, although the speeded subtests (AD, NO) and less "g" laden measures (AI) were helpful in predicting attrition and promotion, respectively, in a multivariate framework. Education credential, together with the few additional significant predictors of attrition and promotion, had greater utility for those occupations in which the performance of lower aptitude individuals has been judged to have high utility (e.g., 11B, 12C, 64C, 71L, and 94B). This can be attributed to the generally higher rates of attrition (and lower promotion rates) in these MOS. Such performance patterns are generally found in jobs of low complexity, high clerical content, high stress, high routinization, and low variety and change, regardless of aptitude category (see Rosenthal & Laurence, 1988).

Unlike the more "will do" criterion measures of attrition and promotion, SQT performance was more readily predicted by cognitive subtests; noncognitive measures and demographics served as poor predictors of this "can do" criterion. Even for lower aptitude soldiers, AFQT emerged as a significant predictor, attesting to its importance for selection. However, for below average aptitude personnel, other ASVAB subtests made even more of a contribution to SQT prediction. In particular, an equation comprising EI, SI, MC (cognitive yet vocationally oriented subtests) NO, and AFQT was shown to be significant across and within all MOS (with sufficient sample size) under study. Furthermore, this model accounted for, on average, 10 % of the variance across MOS. A larger predictive effect was found in MOS such as 15E, 64C, and 94B. Two of these

(15E and 94B) can be expected to have relatively low utility for below average aptitude personnel and the third (64C) is a high density MOS that can be expected to have high utility for below average aptitude soldiers. The additional ASVAB information was rather weak (accounting for 5 % or less of the variance) within MOS 36C, 52D, 13B, 12C, and 71L, even though the individual "best" models for these MOS included some or most of the predictors in the overall five-variable best model. The poor predictive showing for the composite of MC, EI, NO, SI, and AFQT is mitigated to some extent by the fact that these MOS had high utility for poorer performers and were among those where below-average aptitude personnel performed best in terms of SQT. In other words, there was less variance in performance to be accounted for in such occupations.

The empirical results were corroborated to some extent by the results of the expert judgment study. What was comforting was that expert opinion and empirical data agreed that high school graduation status was a prime predictor of attrition and promotion. Furthermore, age at entry was among the best predictors according to both experts and empirical results; however validity estimates were much higher among the former than the latter source for this variable. In general, higher validity coefficients were expected and obtained from expert judgments, in keeping with their task of providing "true" (i.e, corrected for unreliability and range restriction) rather than actual validities. Given the difference between some of the construct measures judged by the experts and those used in empirical analyses (e.g., physical fitness and body mass; Army Vocational Interest-Career Examination (AVOICE) and Army Classification Inventory (ACI)), the lack of congruence between experts and actual data is quite understandable. Physical fitness and interest measures may have had a better showing in the empirical data had current day measures been used rather than our surrogate measure of fitness (body mass). Similarly, the AVOICE (with a multiple choice format) might have provided better results for an interest measure than the ACI (with a "yes/no" format). Furthermore, had a biographical inventory or temperament instrument been available for empirical analyses in this data set, they might have replaced the cognitive measures that appeared in many of the best empirical models for predicting attrition and promotion. The experts' confidence in biographical and temperament measures for predicting attrition and promotion was notably strong.

There was also a degree of convergence between expert judgment and empirical data in the case of SQT, though expert-provided "true" initial validity estimates again were considerably higher than actual simple correlation coefficients. MC, NO, EI, and SI were among the top ten in terms of estimated validity (excluding expert-rated measures that were not used in the empirical analyses such as MK). A major divergent finding was that experts expected high school graduation status to be more highly related to SQT than was found to be the case. Expert judgments for high school status seem erroneous in light of policy constraints. Perhaps the experts did not consider (and were not explicitly asked to consider) that those of lower cognitive ability are required to possess a high school diploma whereas higher AFQT personnel may be enlisted without one. However, even the experts judged cognitive ability as the best predictor of SQT (surmised from the drop in validity estimates for high school graduation status when AFQT was taken into account). In sum, non-cognitive variables were judged the best predictors of attrition and promotion, whereas cognitive measures received the most support (from both judges' ratings and empirical results) as predictors of SQT performance.

Relating the results described above to the MOS clustering analyses summarized in Chapter 2 and detailed in a previous project report (cf, McCloy et. al, 1992) is somewhat risky, because the jobs selected for study are spread across the 23 Project A clusters and the 20 clusters devised from the DOT worker traits and characteristics, with some clusters having no representation. Thus, it is difficult to discern trends in these data. However, the types of MOS in which lower aptitude soldiers performed relatively well or acceptably were in keeping with expectations and findings from previous studies (e.g., Greenberg, 1980; Shields & Grafton, 1983; also cf. McCloy et al., 1992). Although combat MOS and jobs involving low complexity and difficult working conditions were found to have high attrition and low promotion rates, these findings were consistent across AFQT categories, rather than being limited to lower aptitude soldiers.

Results for the SQT indicated that lower aptitude personnel were better suited for jobs such as infantryman (11B), weapons crewmember (13B), and food service specialist (94B). In contrast, these soldiers exhibited relatively poor performance in MOS demanding a great deal of reading or computation such as administrative specialist (71L),

military police (95B), or jobs involving complex equipment operation or repair (05H, 27F, 31J, 74D). Though a definitive pattern across clusters was difficult to discern, MOS within clusters characterized by low cognitive complexity, difficult working conditions, and a somewhat high stress component were among those where Category IIIB and IV personnel had their highest standings on the SQT (i.e., 11B, 13B, 12C, 36C). These results are concordant with those of Shields and Grafton (1983) who found lower aptitude soldiers performed best in MOS 11B, 16P, 19E, and 13B and Greenberg (1980) who showed 11B, 11C, 16P, 12B, 13B, and 62B as better for lower aptitude men. There was also agreement among these three studies that certain administrative (e.g., 71L, 75D), communications (05C, 05H, 72E), and computer operator (74D) jobs were among those in which the lower aptitude did not fair well. These occupations fell in a single cluster characterized by moderate complexity and stress levels, more or less pleasant working conditions, but somewhat high or sophisticated human interaction (e.g., instructing). In contrast such job characteristics as moderate complexity and pleasant working conditions were associated with lower attrition and higher promotion; however this was the case across the categories. Thus, it seems prudent to let SQT performance provide overriding guidance for assignment.

Though decades of research point to the value of selecting quality recruits, the present study provides optimistic suggestions regarding the selection and placement options for below average aptitude recruits, should the Army need or wish to increase their enlistment. To a limited degree, certain types of MOS emerged as more suitable for lower aptitude soldiers. Further, the DOT clusters based on worker traits and characteristics appeared useful for guiding such placement decisions. Low cognitive complexity would appear to be the major placement factor. Such MOS also tend to be characterized by difficult working conditions. Though the DOT clustering shows some promise, it does not seem to be fine enough to make unambiguous placement decisions. As a case in point, cluster 17 comprises jobs that were among the best (36C) and worst (31J) risks for lower aptitude personnel. The MOS in this cluster tend to involve dealing with things more than people, are moderately complex, have difficult working conditions, and involve at least a moderate degree of stress or decision making. One could speculate that though there are a few exceptions to the rule, the moderate complexity

coupled with the above average stress levels in cluster 17 (which is dominated by repair occupations) detract from their suitability for below average soldiers. More intensive analyses of a wider range of MOS and/or additional clustering strategies are required before firm conclusions can be reached concerning the assignment of lower-aptitude personnel based on the job-clustering results.

The results of the present examination of predictors also provide a starting point for selecting the best performing lower aptitude soldiers. There is room for additional variables to improve the prediction of performance from this demand-constrained group. The existing screen of high school graduation status shines as the best predictor of both attrition and promotion. Though other demographic variables entered the best equations for some MOS, they added little incremental prediction and their inclusion may stir controversy (e.g., dependents) if used in an operational selection mode. Temperament or biodata, according to expert opinion, are also indicated as viable predictors that may add incremental validity over and above graduation status for such "will do" criteria as attrition and promotion.

Though demographics did not predict job knowledge, additional ASVAB information showed promise in this domain. More specifically, subtests such as Numerical Operations, Mechanical Comprehension, Electronics Information, and Shop Information along with AFQT seem to be especially attractive predictors. Together with graduation status and temperament, these variables offer a good starting point for developing a compensatory screening model for use with below average personnel that is fair for minority group members.

From an historical vantage point, this study provided a wealth of information to inform selection and placement decisions regarding those of below average aptitude. Though there may be questions concerning the use of yesterday's predictors and criteria to make selection decisions for today, these data offer valuable lessons from a period in Army history when lower aptitude soldiers were not a possibility but a reality. In contrast, Annex B offers a glimpse of selection and classification decisions for lower aptitude recruits on the basis of a simulated sample using not only today's but tomorrow's measures which were unavailable for direct analysis in the present study. From all of this information, the Army is indeed in a better position for making practical decisions for the selection and placement of the best lower aptitude personnel.

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EDITOR'S NOTES

1. "Below-average" refers in this context to someone who receives a below average score on the AFQT. No broader meaning is intended.

2. See Preface for a discussion of the use of the expression "low aptitude personnel" in this report.

3. Policies on the admission of females has changed substantially since the time these data were gathered. Thus, there was a concern that any conclusions drawn from the female soldiers included in this database would not be easily generalizable to the female soldiers of today. Accordingly, the analyses were conducted only on males, and the conclusions drawn apply only to males.

4. The terms "high utility MOS" and "low utility MOS" have a strict meaning, described on page 14 on the paragraph headed "Project A Utility Values." No broader statement about the utility of these MOS is intended.

5. This statement is intended to provide broad guidance for interpreting validity coefficients. It should be understood, however, that the absolute level of a validity coefficient should not be the only consideration in judging the utility of a predictor. Under the appropriate circumstances, measures with lower validity coefficients may well be desirable candidates for operational use.

MICHAEL G. RUMSEY

Appendix A

PREDICTOR/CRITERION CORRELATIONS AND PREDICTOR INTERCORRELATIONS

Table A-1

Bivariate Predictor/Criterion Correlations Across 25 MOS

	Attrition			Promotion						SQT		
	IV	IIIB + IV	I-IV	IV 3yr	IV 4yr	IIIB + IV 3yr	IIIB + IV 4yr	I-IV 3yr	I-IV 4yr	IV	IIIB + IV	I-IV
AFQT	.01*	-.01	-.09	-.01ns	-.00ns	.02	.01ns	.09	.03	.09	.14	.31
HS	-.23	-.23	-.25	.25	.14	.25	.14	.26	.14	-.03	-.02	.04
GS	.00ns	-.01	-.07	.00ns	.01ns	.02	.01ns	.07	.03	.10	.14	.29
MC	.02	.01*	-.06	-.01**	.01ns	.00ns	.01ns	.06	.03	.13	.17	.30
SP	.02	.02	-.02	-.04	.02*	-.04	.02*	-.00ns	.03	.05	.06	.18
AI	.04	.02	-.02	-.00ns	-.01ns	.01ns	-.02**	.05	-.01ns	.11	.14	.25
SI	.05	.04	-.01	-.04	-.03**	-.03	-.03	.02	.00ns	.15	.18	.28
EI	.02	.01	-.04	-.01*	.01ns	-.00ns	.01ns	.05	.02	.16	.18	.29
GI	-.01**	-.02	-.07	.02	.01ns	.03	.01ns	.08	.03	.09	.13	.26
AD	-.05	-.04	-.05	.04	.04	.04	.03	.04	.04	.04	.05	.08
NO	-.06	-.06	-.09	.06	.05	.06	.04	.09	.05	.09	.11	.20
Age	-.03	-.02	-.01	.03	-.04	.02	-.04	.01**	-.07	-.05	-.05	-.01
Dep	-.04	-.05	-.05	.03	.04	.03	.04	.03	.04	-.01ns	-.01	-.03
BMass	-.00ns.	-.01ns	-.01	.00ns	-.01ns	.01ns	-.02**	.02	-.02	.01ns	.01ns	.03
CC	.04	.04	-.00ns	-.04	-.01ns	-.04	-.00ns	-.00ns	.02**	.09	.12	.19
CE	-.01**	-.01*	-.00ns	.00ns	-.01ns	-.01ns	-.01ns	-.02	-.01ns	-.05	-.06	-.04
CA	-.06	-.06	-.06	.06	.02ns	.06	.02**	.06	.01ns	-.07	-.07	-.03
CM	.01ns	.01	.02	-.00ns	.00ns	-.01*	-.01ns	-.02	-.01ns	.00ns	.01	.02

Unmarked r s are significant at $p < .001$; * = $p < .05$; ** = $p < .01$; ns = not significant

Table A-2

Intercorrelation Matrix of Predictors Across 25 MOS

(Category IV)

	AFQT	HS	GS	MC	SP	AI	SI	EI	GI	AD	NO	AGE	DEP	BMASS	CC	CE	CA	CM
AFQT	-	-.058	.326	.121	-.518	.157	.168	.227	.292	-.021	.257	-.041	.010**	.010**	.134	-.102	.004ns	-.073
HS		-	-.023	-.121	-.188	-.088	-.156	-.086	.004ns	.030	.050	.161	.034	.068	-.147	.032	.161	-.051
GS			-	.200	-.178	.237	.293	.298	.253	-.027	.084	-.032	.000ns	.014	.150	-.075	-.036	.000ns
MC				-	.102	.292	.323	.276	.132	.053	.062	-.092	-.018	-.008*	.164	-.061	-.144	.110
SP					-	-.066	-.025	-.060	-.182	.094	-.071	-.045	-.005	-.032	-.037	.082	-.070	.065
AI						-	.482	.411	.226	-.046	.010**	.059	-.119	.052	.173	-.100	-.171	.277
SI							-	.415	.237	.006ns	.042	-.081	-.045	.022	.245	-.151	-.207	.174
EI								-	.274	-.025	.079	.005ns	-.058	.015	.175	-.058	-.099	.141
GI									-	.035	.122	-.016	-.000ns	.057	.162	-.140	-.068	-.008*
AD										-	.301	-.039	.004ns	-.028	.044	.026	-.003ns	.001ns
NO											-	-.103	.037	-.007ns	.061	-.011**	.051	-.048
AGE												-	-.368	.144	-.091	.116	.124	.043
DEP													-	-.080	-.016	-.039	-.014	-.071
BMASS														-	.022	-.016	-.000ns	.016
CC															-	-.003ns	-.052ns	.185
CE																-	.335	.468
CA																	-	.059
CM																		-

Unmarked r s are significant at p < .001; * = p < .05; ** = P < .01; ns = not significant

Table A-3

Intercorrelation Matrix of Predictors Across 25 MOS

(Categories IIIB & IV)

	AFQT	HS	GS	MC	SP	AI	SI	EI	GI	AD	NO	AGE	DEP	BMASS	CC	CE	CA	CM
AFQT	-	-.003ns	.440	.252	-.318	.242	.265	.318	.388	.021	.311	-.021	-.003ns	.032	.190	-.110	.019	-.065
HS		-	-.002ns	-.100	-.188	-.075	-.134	-.073	-.017	.033	.067	.157	.034	.075	-.131	.022	.154	-.061
GS			-	.293	-.117	.299	.359	.373	.342	-.007**	.134	-.028	-.005	.027	.197	-.086	-.031	.001
MC				-	.161	.370	.398	.358	.216	.070	.110	-.092	-.022	-.002	.205	-.063	-.139	.132
SP					-	-.003ns	.038	.004ns	-.124	.094	-.045	-.058	-.004ns	-.037	-.008**	.072	-.077	.083
AI						-	.532	.466	.285	-.031	.050	.062	-.125	.055	.204	-.090	-.165	.301
SI							-	-.007*	-.013	.023	.085	-.073	-.051	.029	.279	-.142	-.196	.194
EI								-	.331	-.007*	.117	.009**	-.066	.022	.210	-.054	-.093	.157
GI									-	.013	.160	-.008**	-.008**	.070	.210	-.145	-.065	-.003ns
AD										-	.317	-.035	.000ns	-.023	.052	.023	.005ns	.002ns
NO											-	-.091	.029	.007*	.088	-.019	.058	-.049
AGE												-	-.370	.147	-.095	.118	.141	.037
DEP													-	-.081	-.013	-.045	-.024	-.076
BMASS														-	.031	-.018	-.005ns	.012
CC															-	-.017	-.053	.184
CE																-	.330	.460
CA																	-	.046
CM																		-

Unmarked r s are significant at, p < .001; * = p < .05; ** = P < .01; ns = not significant

Table A-4

Intercorrelation Matrix of Predictors Across 25 MOS

(ALL)

	AFQT	HS	GS	MC	SP	AI	SI	EI	GI	AD	NO	AGE	DEP	BMASS	CC	CE	CA	CM
AFQT	-	.175	.703	.573	.177	.447	.472	.556	.609	.112	.462	.084	-.031	.081	.308	-.022	.111	-.044
HS		-	.138	.049	-.076	.025	-.015	.050	.132	.062	.151	.170	.022	.094	-.048	.020	.161	-.067
GS			-	.555	.194	.469	.516	.573	.556	.062	.310	.056	-.022	.069	.304	-.019	.054	.004ns
MC				-	.388	.527	.549	.550	.445	.121	.273	-.012	-.038	.041	.302	.001ns	-.044	.133
SP					-	.205	.238	.235	.136	.125	.110	-.029	-.013	-.007**	.108	.080	-.031	.095
AI						-	.622	.584	.435	.015	.176	.112	-.132	.081	.276	-.024	-.089	.313
SI							-	.587	.452	.063	.210	-.000ns	-.066	.058	.345	-.078	-.116	.206
EI								-	.499	.047	.257	.075	-.076	.058	.294	.011	-.014	.160
GI									-	.052	.308	.067	-.027	.101	.310	-.087	.012	.004
AD										-	.347	-.018	-.006	-.013	.074	.030	.025	-.005*
NO											-	-.024	.009	.038	.166	.009	.110	-.054
AGE												-	-.375	.163	-.064	.121	.173	.031
DEP													-	-.088	-.012	-.053	-.046	-.082
BMASS														-	.051	-.012	.020	.009
CC															-	-.010	-.031	.172
CE																-	.321	.457
CA																	-	.025
CM																		-

Unmarked r s are significant at p < .001; * = p < .05; ** = P < .01; ns = not significant

Appendix B

FAIRNESS ANALYSES
14-VARIABLE MODEL 3 AND
5-VARIABLE REDUCED MODEL 7

SPA FAIRNESS ANALYSES

CATEGORY IV SOLDIERS

Model 3

SPA Fairness Analyses — White/Black Subgroups

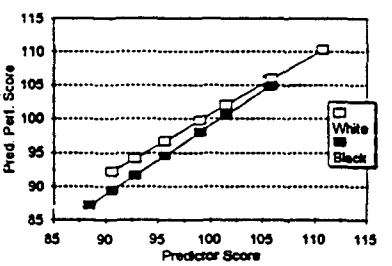
SQT MOS = 11B — Test: SQT Prediction Composite -- Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	12441	99.013	5.053	98.814	17.501	1.007	-0.884	0.085	0.292
White	6632	100.654	5.036	101.204	16.934	0.900	10.662	0.072	0.268
Black	5809	97.139	4.375	96.086	17.740	1.015	-2.496	0.063	0.251
Effect Size		0.698		0.292					
P value						0.0745	0.0001		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
88.389	NA	87.219	NA	0.504	NA	NA
90.582	92.186	89.445	0.448	0.406	2.741	Over
92.764	94.150	91.659	0.372	0.319	2.490	Over
95.618	96.718	94.556	0.283	0.239	2.162	Over
99.013	99.774	98.002	0.211	0.245	1.772	Over
101.514	102.025	100.541	0.203	0.319	1.484	Over
105.690	105.783	104.779	0.283	0.495	1.004	Over
105.889	105.962	104.981	0.289	0.504	0.981	Over
110.726	110.315	NA	0.448	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

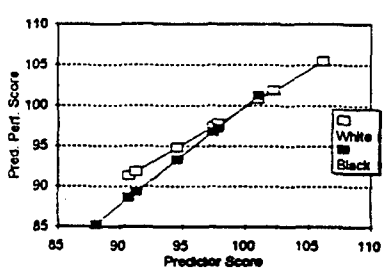
SQT MOS = 12C — Test: SQT Prediction Composite -- Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	454	97.470	4.090	97.070	16.420	1.034	-3.746	0.066	0.257
White	337	98.475	3.863	98.374	15.905	0.918	7.976	0.050	0.224
Black	117	94.586	3.270	93.301	17.356	1.218	-21.932	0.053	0.230
Effect Size		0.951		0.309					
P value						0.5520	0.4985		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
88.046	NA	85.308	NA	3.492	NA	NA
90.749	91.284	88.600	1.888	2.408	2.683	Over
91.316	91.804	89.291	1.778	2.209	2.513	Over
94.612	94.830	93.305	1.194	1.562	1.524	Over
97.470	97.453	96.786	0.873	2.082	0.667	Over
97.856	97.808	97.257	0.855	2.209	0.551	Over
101.126	100.810	101.239	1.024	3.492	-0.430	Under
102.338	101.922	NA	1.194	NA	NA	NA
106.201	105.469	NA	1.888	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

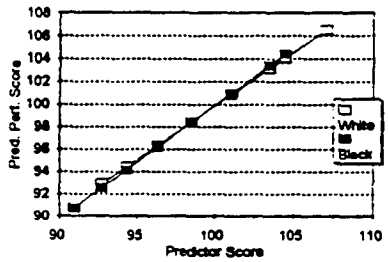
SQT MOS = 13B — Test: SQT Prediction Composite -- Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	7567	98.509	3.573	98.399	18.273	0.986	1.242	0.037	0.192
White	2781	99.900	3.587	99.781	18.350	0.946	5.238	0.034	0.184
Black	4786	97.701	3.391	97.596	18.182	1.012	-1.306	0.034	0.184
Effect Size		0.615		0.120					
P value						0.5922	0.9669		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
90.919	NA	90.704	NA	0.578	NA	NA
92.726	92.957	92.533	0.765	0.459	0.424	Over
94.310	94.455	94.136	0.633	0.365	0.320	Over
96.313	96.350	96.163	0.484	0.279	0.187	Over
98.509	98.428	98.385	0.367	0.268	0.042	Over
101.092	100.871	100.999	0.360	0.365	-0.128	Under
103.487	103.137	103.423	0.484	0.511	-0.286	Under
104.483	104.079	104.430	0.555	0.578	-0.352	Under
107.074	106.530	NA	0.765	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

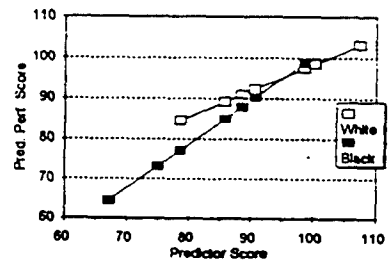
SQT MOS = 15E — Test: SQT Prediction Composite -- Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	201	88.639	9.056	88.578	17.577	0.969	2.667	0.249	0.499
White	113	93.117	7.197	93.967	16.923	0.649	33.500	0.076	0.276
Black	88	82.889	7.896	81.658	15.980	1.088	-8.505	0.289	0.538
Effect Size		1.129		0.700					
P value						0.1280	0.1827		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
67.097	NA	64.497	NA	3.212	NA	NA
74.993	NA	73.087	NA	2.031	NA	NA
78.723	84.591	77.146	3.422	1.624	7.446	Over
85.920	89.262	84.976	2.164	1.539	4.286	Over
88.639	91.027	87.934	1.802	1.777	3.092	Over
90.785	92.419	90.269	1.609	2.031	2.150	Over
98.681	97.544	98.860	1.934	3.212	-1.316	Under
100.314	98.604	NA	2.164	NA	NA	NA
107.511	103.275	NA	3.422	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

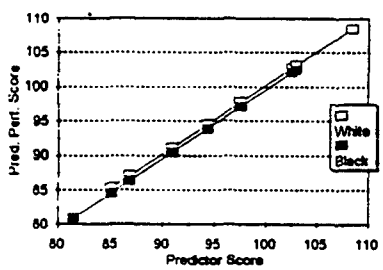
SQT MOS = 16R — Test: SQT Prediction Composite -- Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	532	94.357	6.051	94.245	20.160	1.017	-1.714	0.093	0.305
White	254	96.730	5.848	96.995	19.902	0.990	1.187	0.085	0.292
Black	278	92.189	5.390	91.731	20.101	0.997	-0.193	0.072	0.268
Effect Size		0.750		0.261					
P value						0.9822	0.6768		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
81.409	NA	80.972	NA	2.597	NA	NA
85.034	85.371	84.586	2.671	1.930	0.785	Over
86.799	87.118	86.346	2.354	1.642	0.772	Over
90.882	91.160	90.416	1.689	1.195	0.744	Over
94.357	94.600	93.881	1.289	1.252	0.720	Over
97.579	97.790	97.093	1.207	1.642	0.697	Over
102.578	102.739	102.077	1.689	2.522	0.662	Over
102.969	103.126	102.467	1.747	2.597	0.659	Over
108.426	108.529	NA	2.671	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

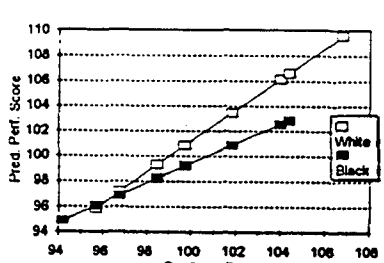
SQT MOS = 36C — Test: SQT Prediction Composite -- Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	1356	99.723	2.736	99.786	19.606	0.992	0.910	0.019	0.138
White	312	101.221	2.778	102.737	17.935	1.231	-21.887	0.036	0.190
Black	1044	99.273	2.559	98.904	20.002	0.777	21.759	0.010	0.100
Effect Size		0.712		0.196					
P value						0.3244	0.1118		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
94.155	NA	94.917	NA	1.377	NA	NA
95.665	95.877	96.091	2.229	1.065	-0.214	Under
96.714	97.168	96.906	1.900	0.871	0.262	Over
98.443	99.296	98.249	1.410	0.648	1.047	Over
99.723	100.872	99.244	1.133	0.625	1.628	Over
101.832	103.468	100.882	1.021	0.871	2.586	Over
103.999	106.136	102.566	1.410	1.294	3.570	Over
104.391	106.618	102.871	1.513	1.377	3.748	Over
106.777	109.555	NA	2.229	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

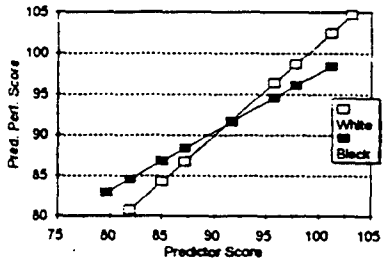
SQT MOS = 43E — Test: SQT Prediction Composite -- Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	174	91.691	5.424	91.902	18.574	0.966	3.342	0.080	0.283
White	105	92.538	5.306	92.701	18.268	1.130	-11.829	0.108	0.329
Black	69	90.403	5.385	90.686	19.099	0.725	25.154	0.042	0.205
Effect Size		0.394		0.108					
P value						0.4399	0.9860		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
79.633	NA	82.888	NA	5.032	NA	NA
81.926	80.747	84.550	3.765	4.197	-3.803	Under
85.018	84.241	86.792	2.921	3.183	-2.551	Under
87.232	86.743	88.397	2.381	2.612	-1.654	Under
91.691	91.782	91.630	1.705	2.314	0.152	Over
95.788	96.411	94.600	1.975	3.183	1.811	Over
97.844	98.735	96.091	2.381	3.839	2.644	Over
101.173	102.496	98.504	3.216	5.032	3.992	Over
103.150	104.730	NA	3.765	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

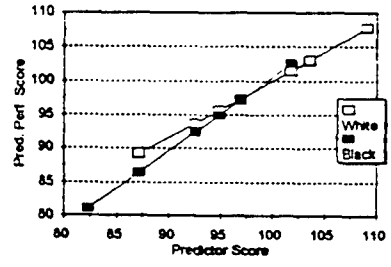
SQT MOS = 64C — Test: SQT Prediction Composite -- Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	4089	94.872	5.997	94.925	16.966	0.998	0.198	0.125	0.354
White	1920	98.069	5.513	98.431	16.929	0.844	15.643	0.076	0.276
Black	2169	92.042	4.881	91.822	16.389	1.103	-9.657	0.108	0.329
Effect Size		1.005		0.390					
P value						0.0071	0.1702		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
82.280	NA	81.098	NA	0.743	NA	NA
87.043	89.107	86.351	0.830	0.476	2.756	Over
87.161	89.207	86.482	0.823	0.470	2.725	Over
92.556	93.760	92.432	0.525	0.334	1.328	Over
94.872	95.715	94.987	0.429	0.384	0.728	Over
96.923	97.446	97.249	0.379	0.470	0.197	Over
101.804	101.566	102.633	0.449	0.743	-1.067	Under
103.582	103.066	NA	0.525	NA	NA	NA
109.095	107.719	NA	0.830	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

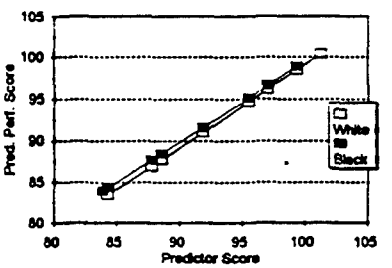
SQT MOS = 71L — Test: SQT Prediction Composite – Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	626	91.907	3.996	91.532	17.252	0.966	2.766	0.050	0.224
White	137	92.813	4.261	91.963	18.303	0.997	-0.599	0.054	0.232
Black	489	91.653	3.886	91.411	16.963	0.965	2.982	0.049	0.221
Effect Size		0.290		0.032					
P value						0.9340	0.7257		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
83.881	NA	83.927	NA	1.673	NA	NA
84.291	83.439	84.323	3.401	1.603	-0.884	Under
87.767	86.905	87.677	2.357	1.058	-0.772	Under
88.552	87.687	88.435	2.151	0.957	-0.747	Under
91.907	91.032	91.672	1.555	0.760	-0.640	Under
95.539	94.653	95.177	1.806	1.058	-0.524	Under
97.074	96.184	96.658	2.151	1.284	-0.475	Under
99.425	98.528	98.927	2.808	1.673	-0.399	Under
101.335	100.432	NA	3.401	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

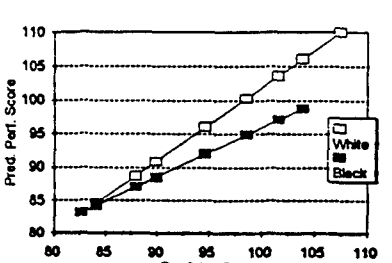
SQT MOS = 82C — Test: SQT Prediction Composite – Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	447	94.633	5.757	94.504	17.059	1.021	-2.118	0.119	0.345
White	250	95.734	5.854	97.250	17.021	1.087	-6.801	0.140	0.374
Black	197	93.235	5.326	91.020	16.502	0.738	22.224	0.057	0.239
Effect Size		0.434		0.385					
P value						0.2043	0.0135		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
82.583	NA	83.170	NA	2.553	NA	NA
84.026	84.535	84.235	2.232	2.280	0.300	Over
87.909	88.756	87.101	1.667	1.615	1.655	Over
89.880	90.899	88.555	1.412	1.349	2.343	Over
94.633	96.065	92.063	1.016	1.180	4.002	Over
98.561	100.335	94.962	1.109	1.615	5.373	Over
101.588	103.625	97.196	1.412	2.124	6.429	Over
103.887	106.124	98.893	1.712	2.553	7.232	Over
107.442	109.988	NA	2.232	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

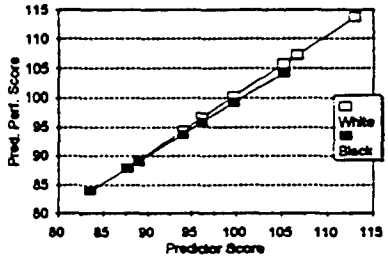
SQT MOS = 94B — **Test:** SQT Prediction Composite – Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	2531	96.165	6.350	96.199	18.262	0.994	0.576	0.120	0.346
White	781	100.310	6.330	100.851	17.414	1.014	-0.866	0.136	0.369
Black	1750	94.315	5.419	94.123	18.254	0.934	6.023	0.077	0.277
Effect Size		0.944		0.368					
P value						0.5158	0.2483		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
83.477	NA	83.991	NA	0.937	NA	NA
87.650	88.011	87.888	1.295	0.665	0.123	Over
88.896	89.275	89.052	1.194	0.593	0.223	Over
93.980	94.430	93.800	0.819	0.420	0.629	Over
96.165	96.645	95.841	0.692	0.443	0.804	Over
99.734	100.264	99.175	0.582	0.593	1.090	Over
105.153	105.759	104.236	0.729	0.937	1.523	Over
106.640	107.267	NA	0.819	NA	NA	NA
112.970	113.686	NA	1.295	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

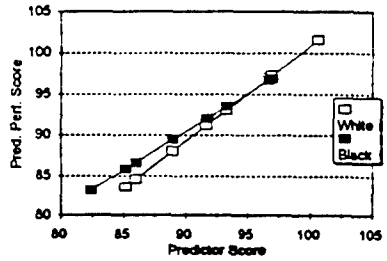
SQT MOS = 95B — **Test:** SQT Prediction Composite – Model 3

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	1500	91.734	4.108	91.717	18.132	1.041	-3.777	0.056	0.237
White	969	92.875	3.886	92.596	18.430	1.158	-14.970	0.060	0.245
Black	531	89.651	3.666	90.113	17.479	0.936	6.198	0.039	0.197
Effect Size		0.785		0.137					
P value						0.3833	0.3228		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
82.319	NA	83.249	NA	1.663	NA	NA
85.103	83.579	85.854	1.284	1.185	-2.275	Under
85.985	84.601	86.680	1.168	1.052	-2.079	Under
88.989	88.079	89.492	0.812	0.756	-1.412	Under
91.734	91.258	92.061	0.598	0.855	-0.803	Under
93.317	93.091	93.543	0.578	1.052	-0.452	Under
96.761	97.079	96.766	0.812	1.623	0.313	Over
96.983	97.336	96.974	0.835	1.663	0.362	Over
100.647	101.579	NA	1.284	NA	NA	NA



SPA FAIRNESS ANALYSES

CATEGORY IIIB & IV SOLDIERS

Model 3

SPA Fairness Analyses — White/Black Subgroups

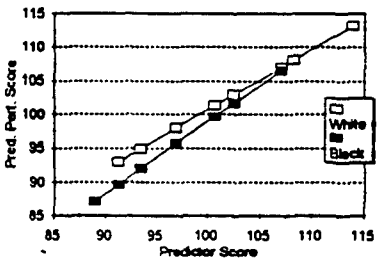
SQT MOS = 11B — **Test:** SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	17550	100.680	5.699	100.495	17.579	1.012	-1.397	0.108	0.329
White	10275	102.591	5.663	103.102	16.915	0.891	11.665	0.089	0.298
Black	7275	97.981	4.542	96.813	17.840	1.065	-7.509	0.074	0.271
Effect Size		0.809		0.358					
P value						0.0008	0.0001		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
88.897	NA	87.166	NA	0.450	NA	NA
91.265	92.982	89.688	0.356	0.359	3.294	Over
93.439	94.919	92.004	0.303	0.285	2.916	Over
96.928	98.028	95.719	0.225	0.207	2.309	Over
100.680	101.371	99.715	0.168	0.234	1.656	Over
102.523	103.013	101.678	0.159	0.285	1.335	Over
107.065	107.060	106.515	0.203	0.450	0.545	Over
108.254	108.119	NA	0.225	NA	NA	NA
113.917	113.165	NA	0.356	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

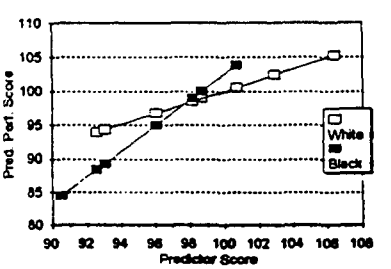
SQT MOS = 12C — **Test:** SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	642	98.697	3.644	98.506	16.098	1.033	-3.468	0.055	0.235
White	510	99.498	3.454	99.620	15.479	0.817	18.356	0.033	0.182
Black	132	95.605	2.547	94.202	17.709	1.909	-88.303	0.075	0.274
Effect Size		1.068		0.337					
P value						0.0569	0.3117		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
90.511	NA	84.482	NA	3.315	NA	NA
92.590	94.002	88.451	1.507	2.297	5.551	Over
93.058	94.384	89.345	1.426	2.096	5.040	Over
96.044	96.824	95.045	0.953	1.504	1.779	Over
98.697	98.991	100.110	0.692	2.332	-1.118	Under
98.152	98.546	99.069	0.723	2.096	-0.523	Under
100.699	100.627	103.931	0.714	3.315	-3.304	Under
102.952	102.468	NA	0.953	NA	NA	NA
106.406	105.290	NA	1.507	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

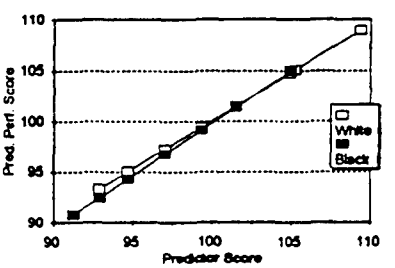
SQT MOS = 13B — **Test:** SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	9868	99.348	4.012	99.237	18.176	1.001	-0.230	0.049	0.221
White	4036	101.139	4.122	101.148	18.161	0.944	5.675	0.046	0.214
Black	5832	98.109	3.425	97.914	18.071	1.037	-3.864	0.039	0.197
Effect Size		0.755		0.178					
P value						0.3298	0.5527		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
91.259	NA	90.772	NA	0.519	NA	NA
92.895	93.368	92.468	0.624	0.423	0.900	Over
94.684	95.057	94.323	0.519	0.328	0.733	Over
97.017	97.259	96.743	0.395	0.243	0.516	Over
99.348	99.460	99.160	0.304	0.247	0.300	Over
101.534	101.523	101.427	0.280	0.328	0.096	Over
104.959	104.756	104.978	0.381	0.519	-0.222	Under
105.261	105.041	NA	0.395	NA	NA	NA
109.383	108.933	NA	0.624	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

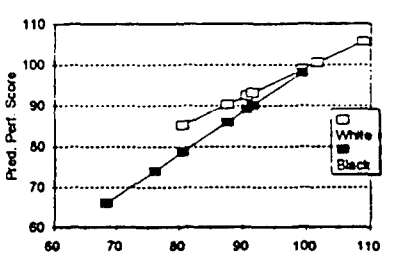
SQT MOS = 15E — **Test:** SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	293	90.699	9.008	90.600	18.127	0.978	1.887	0.236	0.486
White	186	94.666	7.080	95.488	17.202	0.722	27.110	0.088	0.297
Black	107	83.802	7.772	82.102	16.551	1.031	-4.263	0.234	0.484
Effect Size		1.205		0.738					
P value						0.2308	0.0781		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
68.258	NA	66.111	NA	3.131	NA	NA
76.030	NA	74.124	NA	1.980	NA	NA
80.506	85.235	78.739	2.693	1.521	6.497	Over
87.586	90.347	86.038	1.703	1.558	4.309	Over
90.699	92.595	89.248	1.381	1.872	3.347	Over
91.574	93.226	90.150	1.314	1.980	3.077	Over
99.346	98.838	98.163	1.444	3.131	0.675	Over
101.746	100.571	NA	1.703	NA	NA	NA
108.826	105.682	NA	2.693	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

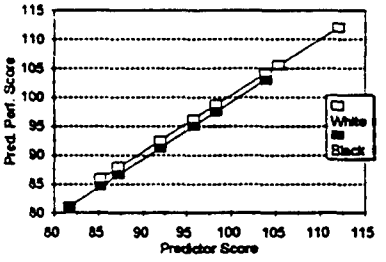
SQT MOS = 16R — Test: SQT Prediction Composite -- Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	615	95.826	6.834	95.699	19.705	1.014	-1.460	0.124	0.352
White	318	98.654	6.707	99.040	18.994	0.972	3.123	0.118	0.344
Black	297	92.798	5.561	92.122	19.856	0.982	0.952	0.076	0.276
Effect Size		0.857		0.351					
P value						0.9371	0.4667		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
81.676	NA	81.158	NA	2.476	NA	NA
85.240	85.976	84.658	2.237	1.869	1.319	Over
87.237	87.917	86.619	1.975	1.566	1.299	Over
91.947	92.495	91.244	1.415	1.120	1.252	Over
95.826	96.266	95.053	1.086	1.261	1.213	Over
98.359	98.728	97.541	1.001	1.566	1.187	Over
103.920	104.133	103.001	1.272	2.476	1.132	Over
105.361	105.534	NA	1.415	NA	NA	NA
112.068	112.053	NA	2.237	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

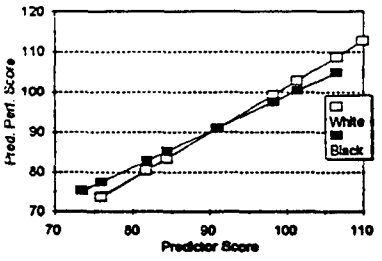
SQT MOS = 31J — Test: SQT Prediction Composite -- Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	198	90.935	8.436	91.184	19.236	0.985	1.635	0.187	0.432
White	66	92.886	8.500	93.263	22.780	1.146	-13.217	0.183	0.428
Black	132	89.959	8.264	90.145	17.195	0.897	9.493	0.186	0.431
Effect Size		0.347		0.162					
P value						0.4280	0.9273		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
73.431	NA	75.361	NA	3.019	NA	NA
75.886	73.748	77.563	5.667	2.667	-3.814	Under
81.695	80.405	82.773	4.190	1.910	-2.368	Under
84.386	83.489	85.187	3.584	1.629	-1.698	Under
90.935	90.995	91.062	2.600	1.360	-0.067	Under
98.223	99.347	97.599	2.993	1.910	1.748	Over
101.386	102.971	100.436	3.584	2.304	2.535	Over
106.487	108.817	105.012	4.782	3.019	3.805	Over
109.886	112.712	NA	5.667	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

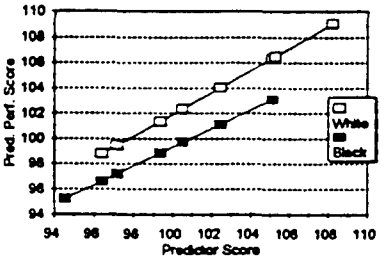
SQT MOS = 36C — **Test:** SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	1742	100.517	2.957	100.528	19.353	0.946	5.432	0.021	0.145
White	483	102.324	2.960	103.979	17.394	0.865	15.425	0.022	0.148
Black	1259	99.823	2.647	99.204	19.483	0.746	24.729	0.010	0.100
Effect Size		0.848		0.247					
P value						0.7389	0.0111		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
94.529	NA	95.248	NA	1.222	NA	NA
96.404	98.814	96.646	1.750	0.892	2.168	Over
97.176	99.482	97.222	1.570	0.773	2.260	Over
99.364	101.375	98.855	1.107	0.554	2.520	Over
100.517	102.372	99.715	0.917	0.565	2.658	Over
102.470	104.062	101.172	0.784	0.773	2.890	Over
105.117	106.351	103.146	1.076	1.222	3.205	Over
105.284	106.496	NA	1.107	NA	NA	NA
108.244	109.056	NA	1.750	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

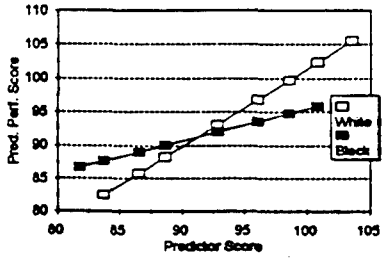
SQT MOS = 43E — **Test:** SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	263	92.878	5.011	93.182	18.257	0.967	3.385	0.070	0.265
White	180	93.608	4.964	94.009	18.211	1.160	-14.575	0.100	0.316
Black	83	91.296	4.768	91.388	18.336	0.482	47.347	0.016	0.126
Effect Size		0.461		0.144					
P value						0.1655	0.8659		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
81.760	NA	86.755	NA	4.464	NA	NA
83.680	82.494	87.681	2.879	3.762	-5.187	Under
86.528	85.797	89.053	2.243	2.823	-3.256	Under
88.644	88.252	90.073	1.821	2.285	-1.821	Under
92.878	93.163	92.114	1.302	2.103	1.049	Over
96.064	96.859	93.650	1.437	2.823	3.209	Over
98.572	99.769	94.859	1.821	3.643	4.910	Over
100.832	102.390	95.948	2.274	4.464	6.442	Over
103.536	105.527	NA	2.879	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

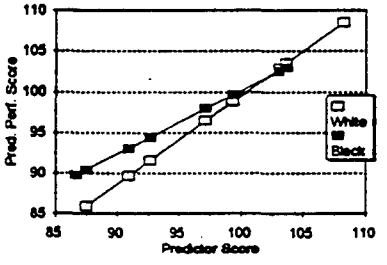
SQT MOS = 52D — **Test:** SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	223	97.199	5.112	97.004	18.873	0.997	0.111	0.073	0.270
White	170	97.845	5.197	97.203	19.152	1.087	-9.158	0.087	0.295
Black	53	95.129	4.249	96.366	18.109	0.777	22.465	0.033	0.182
Effect Size		0.531		0.044					
P value						0.6361	0.5040		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
86.631	NA	89.777	NA	5.470	NA	NA
87.451	85.901	90.414	3.138	5.052	-4.513	Under
90.880	89.629	93.079	2.347	3.459	-3.450	Under
92.648	91.550	94.452	1.985	2.833	-2.902	Under
97.199	96.497	97.989	1.414	2.721	-1.491	Under
99.378	98.866	99.682	1.463	3.459	-0.816	Under
103.042	102.849	102.529	1.985	5.171	0.320	Over
103.627	103.485	102.983	2.100	5.470	0.501	Over
108.239	108.498	NA	3.138	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

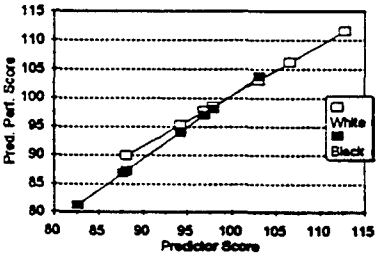
SQT MOS = 64C — **Test:** SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	5419	96.926	6.852	96.994	17.256	1.001	-0.074	0.158	0.397
White	2931	100.419	6.172	100.817	16.925	0.876	12.821	0.102	0.319
Black	2488	92.811	5.106	92.489	16.543	1.105	-10.048	0.116	0.341
Effect Size		1.110		0.483					
P value						0.0035	0.0482		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
82.599	NA	81.224	NA	0.697	NA	NA
87.705	NA	86.866	NA	0.441	NA	NA
88.075	89.975	87.275	0.662	0.425	2.700	Over
94.247	95.381	94.095	0.419	0.324	1.286	Over
96.926	97.728	97.055	0.340	0.400	0.673	Over
97.917	98.596	98.150	0.320	0.441	0.446	Over
103.023	103.069	103.792	0.322	0.697	-0.723	Under
106.591	106.195	NA	0.419	NA	NA	NA
112.763	111.601	NA	0.662	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

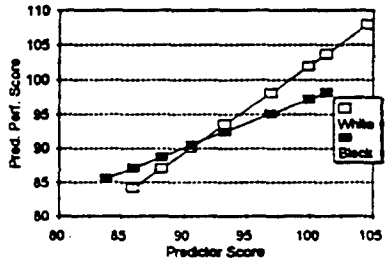
SQT MOS = 71L — Test: SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	1170	93.348	4.621	93.137	17.958	0.945	4.928	0.059	0.243
White	342	95.261	4.659	96.025	18.665	1.277	-25.624	0.102	0.319
Black	828	92.558	4.370	91.944	17.531	0.726	24.737	0.033	0.182
Effect Size		0.585		0.227					
P value						0.0247	0.1573		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
83.818	NA	85.589	NA	1.340	NA	NA
85.943	84.125	87.132	2.139	1.087	-3.006	Under
88.188	86.992	88.761	1.739	0.847	-1.769	Under
90.602	90.075	90.514	1.353	0.656	-0.439	Under
93.348	93.581	92.508	1.034	0.609	1.074	Over
96.928	98.153	95.107	1.018	0.847	3.046	Over
99.920	101.974	97.279	1.353	1.174	4.695	Over
101.298	103.734	98.279	1.565	1.340	5.454	Over
104.579	107.923	NA	2.139	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

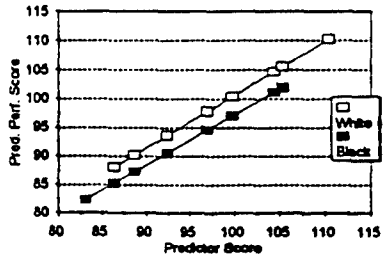
SQT MOS = 82C — Test: SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	781	96.920	6.167	96.769	17.118	0.993	0.517	0.128	0.358
White	510	98.360	5.997	99.206	16.899	0.926	8.097	0.108	0.329
Black	271	94.210	5.549	92.183	16.607	0.884	8.915	0.087	0.295
Effect Size		0.673		0.410					
P value						0.8406	0.0107		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
83.112	NA	82.386	NA	2.155	NA	NA
86.366	88.072	85.263	1.580	1.669	2.809	Over
88.661	90.197	87.291	1.344	1.363	2.906	Over
92.363	93.625	90.564	0.999	1.016	3.061	Over
96.920	97.845	94.592	0.727	1.073	3.253	Over
99.759	100.474	97.102	0.726	1.363	3.372	Over
104.357	104.732	101.167	0.999	2.009	3.565	Over
105.308	105.612	102.007	1.082	2.155	3.605	Over
110.354	110.285	NA	1.580	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

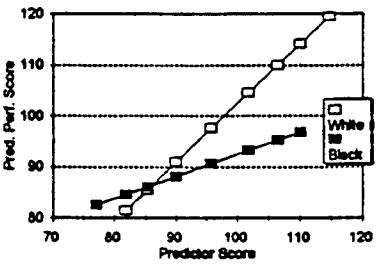
SQT MOS = 92B — Test: SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	115	95.783	8.534	94.882	20.709	0.893	9.350	0.135	0.367
White	55	98.241	8.215	100.519	24.002	1.156	-13.072	0.157	0.396
Black	60	93.531	8.257	89.715	15.639	0.433	49.240	0.052	0.228
Effect Size		0.552		0.522					
P value						0.0981	0.0569		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
77.017	NA	82.588	NA	4.396	NA	NA
81.811	81.502	84.664	6.645	3.413	-3.163	Under
85.274	85.505	86.164	5.552	2.780	-0.659	Under
90.026	90.998	88.221	4.202	2.136	2.777	Over
95.783	97.653	90.714	3.102	2.038	6.939	Over
101.788	104.595	93.314	3.237	2.780	11.281	Over
106.456	109.991	95.335	4.202	3.651	14.656	Over
110.045	114.140	96.889	5.202	4.396	17.251	Over
114.671	119.488	NA	6.645	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

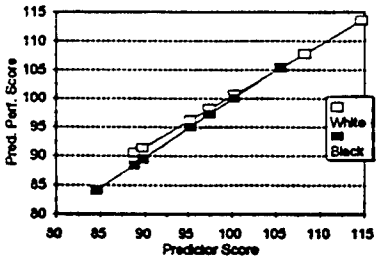
SQT MOS = 94B — Test: SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	3091	97.448	6.572	97.458	18.323	0.991	0.932	0.126	0.355
White	1126	101.735	6.478	102.070	17.498	0.892	11.294	0.109	0.330
Black	1965	94.991	5.228	94.816	18.266	1.025	-2.586	0.086	0.293
Effect Size		1.026		0.396					
P value						0.2182	0.3030		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
84.535	NA	84.062	NA	0.881	NA	NA
88.779	90.485	88.412	1.101	0.612	2.072	Over
89.763	91.363	89.421	1.034	0.557	1.942	Over
95.257	96.263	95.052	0.696	0.394	1.211	Over
97.448	98.218	97.298	0.590	0.435	0.919	Over
100.219	100.689	100.138	0.506	0.557	0.551	Over
105.447	105.353	105.497	0.567	0.881	-0.144	Under
108.213	107.820	NA	0.696	NA	NA	NA
114.691	113.598	NA	1.101	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

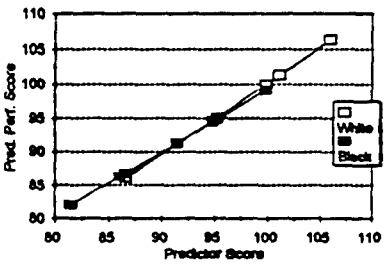
SQT MOS = 95B — **Test:** SQT Prediction Composite – Model 3

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	3469	94.868	5.379	94.855	18.100	1.017	-1.628	0.091	0.302
White	2604	96.272	4.860	96.272	18.044	1.046	-4.448	0.079	0.281
Black	865	90.642	4.602	90.588	17.602	0.927	6.548	0.059	0.243
Effect Size		1.047		0.314					
P value						0.4128	0.9459		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
81.438	NA	82.041	NA	1.298	NA	NA
86.040	NA	86.307	NA	0.821	NA	NA
86.552	86.085	86.782	0.759	0.777	-0.696	Under
91.412	91.169	91.287	0.480	0.589	-0.118	Under
94.868	94.784	94.491	0.353	0.788	0.293	Over
95.244	95.177	94.839	0.347	0.821	0.338	Over
99.846	99.991	99.105	0.421	1.298	0.886	Over
101.132	101.336	NA	0.480	NA	NA	NA
105.992	106.420	NA	0.759	NA	NA	NA



SPA FAIRNESS ANALYSES

CATEGORY IV SOLDIERS

Reduced Model

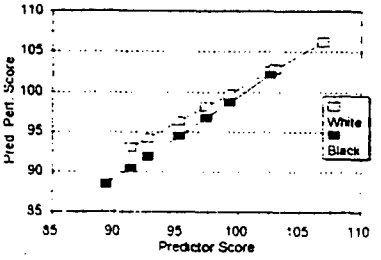
SPA Fairness Analyses
Across All SQT MOS

White/Black Subgroups
Test: SQT Prediction Composite -- Reduced Model
Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	32427	97.388	3.926	97.262	17.990	0.996	0.258	0.047	0.217
White	14830	99.073	3.914	99.559	17.624	0.840	16.383	0.035	0.187
Black	17597	95.969	3.329	95.326	18.068	1.032	-3.728	0.036	0.190
Effect Size		0.791							
P value						0.0004	0.0001		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
89.311	NA	88.441	NA	0.299	NA	NA
91.245	93.029	90.437	0.318	0.232	2.592	Over
92.640	94.201	91.876	0.274	0.189	2.324	Over
95.159	96.317	94.476	0.201	0.138	1.840	Over
97.388	98.189	96.776	0.155	0.145	1.413	Over
99.298	99.793	98.748	0.142	0.189	1.046	Over
102.627	102.590	102.183	0.192	0.299	0.407	Over
102.987	102.892	NA	0.201	NA	NA	NA
106.901	106.180	NA	0.318	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

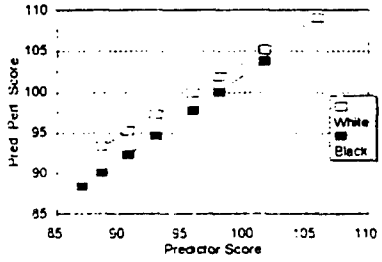
SQT MOS = 11B — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	12441	95.901	4.291	98.814	17.501	1.054	-2.227	0.067	0.259
White	6632	97.261	4.334	101.204	16.934	0.905	13.159	0.054	0.232
Black	5809	94.348	3.669	96.086	17.740	1.054	-3.313	0.047	0.217
Effect Size		0.679							
P value						0.0541	0.0001		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
87.010	NA	88.396	NA	0.508	NA	NA
88.593	93.336	90.064	0.452	0.423	3.272	Over
90.679	95.223	92.263	0.368	0.321	2.961	Over
92.927	97.258	94.632	0.286	0.244	2.626	Over
95.901	99.949	97.767	0.212	0.247	2.183	Over
98.017	101.864	99.997	0.205	0.321	1.867	Over
101.595	105.102	103.768	0.286	0.503	1.334	Over
101.686	105.185	103.864	0.289	0.508	1.321	Over
105.929	109.025	NA	0.452	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

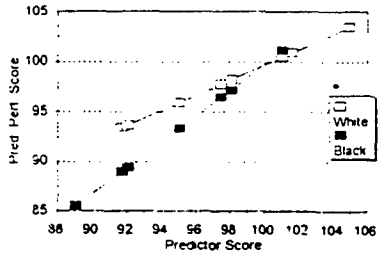
SQT MOS = 12C — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	454	97.479	3.528	97.067	16.423	0.989	0.644	0.045	0.212
White	337	98.324	3.300	98.374	15.905	0.759	23.778	0.025	0.158
Black	117	95.044	3.001	93.301	17.356	1.298	-30.049	0.050	0.224
Effect Size		0.930							
P value						0.3391	0.2459		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
89.042	NA	85.528	NA	3.497	NA	NA
91.724	93.397	89.009	1.913	2.332	4.388	Over
92.043	93.639	89.423	1.839	2.212	4.216	Over
95.024	95.901	93.292	1.210	1.564	2.609	Over
97.479	97.765	96.479	0.883	2.014	1.286	Over
98.045	98.194	97.213	0.859	2.212	0.981	Over
101.046	100.472	101.109	1.109	3.497	-0.637	Under
101.624	100.911	NA	1.210	NA	NA	NA
104.924	103.415	NA	1.913	NA	NA	NA



SPA Fairness Analyses

SQT MOS = 13B

White/Black Subgroups

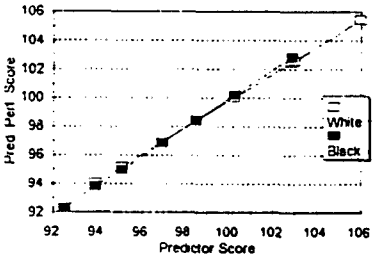
Test: SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	7567	98.516	2.967	98.399	18.273	0.977	2.187	0.025	0.158
White	2781	99.952	3.019	99.781	18.350	0.938	6.003	0.024	0.155
Black	4786	97.681	2.593	97.596	18.182	1.011	-1.161	0.021	0.145
Effect Size		0.765							
P value						0.6311	0.9333		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
92.495	NA	92.351	NA	0.581	NA	NA
93.914	94.094	93.786	0.769	0.459	0.308	Over
95.088	95.196	94.973	0.652	0.368	0.223	Over
96.933	96.926	96.838	0.486	0.271	0.088	Over
98.516	98.411	98.439	0.381	0.273	-0.028	Under
100.274	100.060	100.216	0.346	0.368	-0.156	Under
102.867	102.492	102.838	0.478	0.581	-0.345	Under
102.971	102.590	NA	0.486	NA	NA	NA
105.990	105.422	NA	0.769	NA	NA	NA



SPA Fairness Analyses

SQT MOS = 15E

White/Black Subgroups

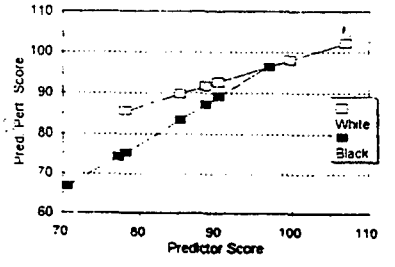
Test: SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	201	88.720	8.200	88.578	17.577	0.966	2.866	0.203	0.451
White	113	92.555	7.224	93.967	16.923	0.576	40.634	0.060	0.245
Black	88	83.796	6.617	81.658	15.979	1.127	-12.741	0.218	0.467
Effect Size		1.068							
P value						0.0904	0.0420		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
70.562	NA	66.782	NA	3.368	NA	NA
77.179	NA	74.240	NA	2.130	NA	NA
78.107	85.624	75.286	3.451	1.986	10.338	Over
85.331	89.785	83.427	2.183	1.546	6.358	Over
88.720	91.737	87.246	1.747	1.878	4.490	Over
90.413	92.712	89.154	1.610	2.130	3.557	Over
97.030	96.523	96.612	1.816	3.368	-0.089	Under
99.779	98.107	NA	2.183	NA	NA	NA
107.003	102.268	NA	3.451	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

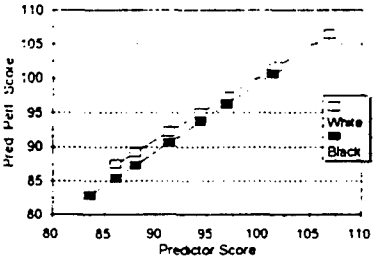
SQT MOS = 16R — Test: SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	532	94.363	5.232	94.245	20.160	1.005	-0.561	0.068	0.261
White	254	96.485	5.211	96.995	19.902	0.911	9.094	0.057	0.239
Black	278	92.424	4.447	91.731	20.101	1.006	-1.209	0.049	0.221
Effect Size		0.776							
P value						0.7891	0.4477		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
83.530	NA	82.822	NA	2.629	NA	NA
86.063	87.497	85.370	2.712	2.052	2.127	Over
87.977	89.241	87.296	2.322	1.663	1.945	Over
91.274	92.245	90.613	1.715	1.214	1.632	Over
94.363	95.059	93.720	1.309	1.283	1.339	Over
96.871	97.343	96.243	1.216	1.663	1.100	Over
101.318	101.395	100.717	1.654	2.629	0.678	Over
101.696	101.739	NA	1.715	NA	NA	NA
106.907	106.486	NA	2.712	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

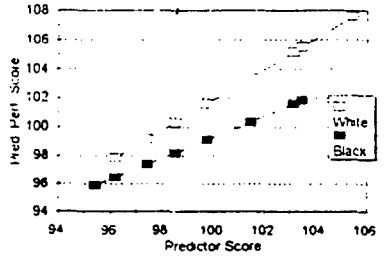
SQT MOS = 36C — Test: SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	1356	99.761	2.170	99.786	19.606	0.968	3.199	0.011	0.105
White	312	100.824	2.318	102.737	17.935	1.050	-3.145	0.018	0.134
Black	1044	99.443	2.020	98.904	20.002	0.741	25.184	0.006	0.077
Effect Size		0.636							
P value						0.5830	0.0395		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
95.403	NA	95.878	NA	1.380	NA	NA
96.188	97.852	96.459	2.250	1.170	1.393	Over
97.423	99.149	97.374	1.787	0.873	1.775	Over
98.506	100.286	98.177	1.423	0.680	2.109	Over
99.761	101.604	99.107	1.107	0.625	2.497	Over
101.463	103.391	100.368	1.044	0.873	3.023	Over
103.142	105.154	101.612	1.423	1.288	3.542	Over
103.483	105.512	101.865	1.531	1.380	3.647	Over
105.460	107.588	NA	2.250	NA	NA	NA



SPA Fairness Analyses

SQT MOS = 43E

White/Black Subgroups

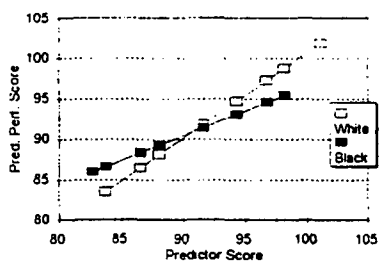
Test: SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	174	91.637	4.273	91.902	18.574	0.912	8.301	0.044	0.210
White	105	92.425	4.351	92.701	18.268	1.061	-5.394	0.064	0.253
Black	69	90.439	3.884	90.686	19.099	0.610	35.530	0.015	0.122
Effect Size		0.465							
P value						0.5225	0.9416		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
82.671	NA	85.959	NA	5.103	NA	NA
83.723	83.436	86.601	3.857	4.558	-3.165	Under
86.555	86.441	88.329	2.896	3.227	-1.888	Under
88.074	88.053	89.255	2.439	2.672	-1.203	Under
91.637	91.833	91.429	1.753	2.388	0.404	Over
94.323	94.683	93.067	1.882	3.227	1.616	Over
96.776	97.285	94.563	2.439	4.367	2.722	Over
98.207	98.804	95.436	2.869	5.103	3.367	Over
101.127	101.902	NA	3.857	NA	NA	NA



SPA Fairness Analyses

SQT MOS = 64C

White/Black Subgroups

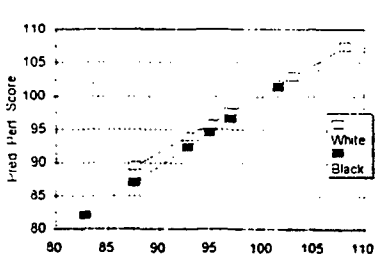
Test: SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	4089	94.851	5.677	94.925	16.966	1.001	-0.007	0.112	0.335
White	1920	97.873	5.141	98.431	16.929	0.874	12.899	0.070	0.265
Black	2169	92.177	4.706	91.822	16.389	1.025	-2.673	0.087	0.295
Effect Size		1.003							
P value						0.1373	0.0361		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
82.765	NA	82.161	NA	0.752	NA	NA
87.471	NA	86.985	NA	0.476	NA	NA
87.591	89.454	87.108	0.833	0.470	2.346	Over
92.732	93.947	92.377	0.527	0.339	1.569	Over
94.851	95.799	94.549	0.432	0.387	1.249	Over
96.883	97.575	96.632	0.379	0.476	0.943	Over
101.589	101.688	101.456	0.460	0.752	0.232	Over
103.014	102.933	NA	0.527	NA	NA	NA
108.155	107.426	NA	0.833	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

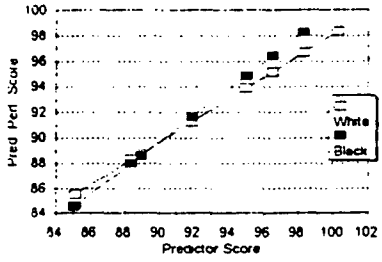
SQT MOS = 71L — Test: SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	626	91.902	3.450	91.532	17.252	0.978	1.692	0.038	0.195
White	137	92.718	3.787	91.963	18.303	0.844	13.708	0.030	0.173
Black	489	91.673	3.318	91.411	16.963	1.036	-3.546	0.041	0.202
Effect Size		0.303							
P value						0.6689	0.7728		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
85.037	NA	84.552	NA	1.680	NA	NA
85.144	85.570	84.663	3.444	1.658	0.906	Over
88.355	88.280	87.990	2.350	1.062	0.290	Over
88.931	88.766	88.587	2.178	0.975	0.179	Over
91.902	91.273	91.664	1.575	0.753	-0.391	Under
94.991	93.880	94.865	1.796	1.062	-0.984	Under
96.505	95.158	96.433	2.178	1.327	-1.275	Under
98.309	96.681	98.302	2.746	1.680	-1.621	Under
100.292	98.354	NA	3.444	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

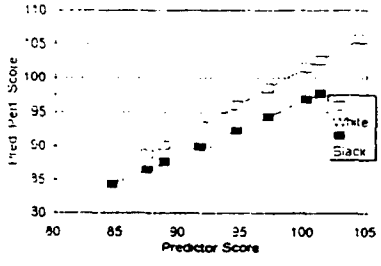
SQT MOS = 82C — Test: SQT Prediction Composite -- Reduced Model

Sample: Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	447	94.612	4.469	94.504	17.059	1.041	-4.027	0.074	0.272
White	250	95.928	4.264	97.250	17.021	0.993	2.024	0.062	0.249
Black	197	92.942	4.164	91.020	16.502	0.804	16.263	0.041	0.202
Effect Size		0.668							
P value						0.6127	0.0344		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
84.614	NA	84.293	NA	2.575	NA	NA
87.400	88.812	86.533	2.331	1.917	2.280	Over
88.778	90.181	87.641	2.036	1.628	2.540	Over
91.664	93.046	89.961	1.474	1.204	3.085	Over
94.612	95.974	92.331	1.091	1.241	3.643	Over
97.106	98.450	94.336	1.082	1.628	4.114	Over
100.192	101.515	96.817	1.474	2.312	4.697	Over
101.270	102.585	97.684	1.671	2.575	4.901	Over
104.456	105.749	NA	2.331	NA	NA	NA



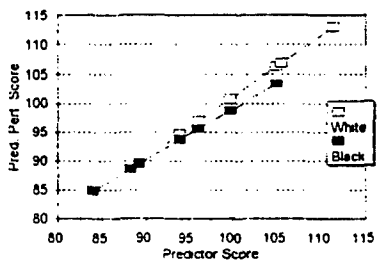
SPA Fairness Analyses — White/Black Subgroups

SQT MOS = 94B — **Test:** SQT Prediction Composite -- Reduced Model — **Sample:** Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	2531	96.123	5.956	96.199	18.262	0.996	0.465	0.105	0.324
White	781	99.802	5.779	100.851	17.414	1.054	-4.352	0.122	0.349
Black	1750	94.481	5.261	94.123	18.254	0.880	10.995	0.064	0.253
Effect Size		0.893							
P value						0.1890	0.0348		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
83.959	NA	84.879	NA	0.944	NA	NA
88.244	88.657	88.650	1.306	0.655	0.007	Over
89.220	89.686	89.509	1.218	0.597	0.177	Over
94.023	94.748	93.735	0.826	0.424	1.013	Over
96.123	96.962	95.583	0.692	0.442	1.378	Over
99.742	100.776	98.768	0.584	0.597	2.008	Over
105.003	106.321	103.398	0.786	0.944	2.924	Over
105.581	106.930	NA	0.826	NA	NA	NA
111.360	113.021	NA	1.306	NA	NA	NA



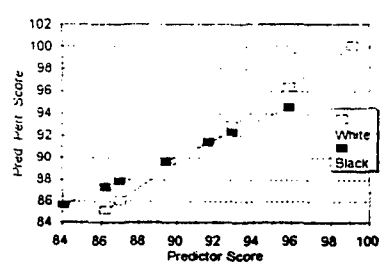
SPA Fairness Analyses — White/Black Subgroups

SQT MOS = 95B — **Test:** SQT Prediction Composite -- Reduced Model — **Sample:** Category IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	1500	91.709	3.391	91.717	18.132	1.014	-1.232	0.036	0.190
White	969	92.672	3.220	92.596	18.430	1.159	-14.793	0.041	0.202
Black	531	89.951	2.964	90.113	17.479	0.755	22.173	0.016	0.126
Effect Size		0.802							
P value						0.2015	0.7566		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
84.023	NA	85.610	NA	1.682	NA	NA
86.232	85.150	87.278	1.296	1.207	-2.128	Under
86.987	86.025	87.848	1.176	1.064	-1.823	Under
89.452	88.882	89.709	0.820	0.763	-0.827	Under
91.709	91.498	91.413	0.605	0.875	0.084	Over
92.915	92.895	92.324	0.581	1.064	0.572	Over
95.879	96.331	94.562	0.818	1.682	1.769	Over
95.892	96.346	NA	0.820	NA	NA	NA
99.112	100.078	NA	1.296	NA	NA	NA



SPA FAIRNESS ANALYSES

CATEGORY IIIB & IV SOLDIERS

Reduced Model

SPA Fairness Analyses — White/Black Subgroups

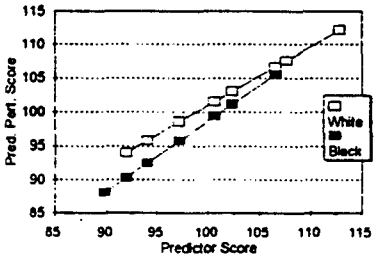
SQT MOS = 11B — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	17635	100.641	5.258	100.486	17.581	1.011	-1.246	0.108	0.329
White	10322	102.392	5.233	103.101	16.914	0.866	14.431	0.072	0.268
Black	7313	98.170	4.193	96.794	17.842	1.043	-5.556	0.060	0.245
Effect Size		0.803							
P value						0.0017	0.0001		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
89.784	NA	88.089	NA	0.452	NA	NA
91.926	94.039	90.323	0.359	0.363	3.716	Over
93.977	95.815	92.462	0.304	0.286	3.353	Over
97.159	98.571	95.781	0.227	0.208	2.790	Over
100.641	101.586	99.413	0.169	0.235	2.174	Over
102.363	103.077	101.209	0.160	0.286	1.869	Over
106.556	106.708	105.582	0.205	0.452	1.127	Over
107.625	107.634	NA	0.227	NA	NA	NA
112.858	112.166	NA	0.359	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

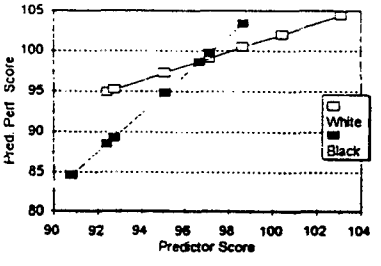
SQT MOS = 12C — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	645	97.133	2.828	98.462	16.135	1.129	-19.996	0.046	0.214
White	512	97.762	2.674	99.628	15.469	0.886	13.040	0.023	0.152
Black	133	94.712	1.972	93.973	17.839	2.382	-131.632	0.069	0.263
Effect Size		1.079							
P value						0.0440	0.1611		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
90.768	NA	84.577	NA	3.337	NA	NA
92.414	94.919	88.498	1.511	2.292	6.421	Over
92.740	95.208	89.275	1.438	2.111	5.933	Over
95.088	97.288	94.868	0.956	1.519	2.420	Over
97.133	99.100	99.739	0.694	2.363	-0.639	Under
96.684	98.702	98.669	0.729	2.111	0.033	Over
98.656	100.449	103.367	0.712	3.337	-2.917	Under
100.436	102.026	NA	0.956	NA	NA	NA
103.110	104.395	NA	1.511	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

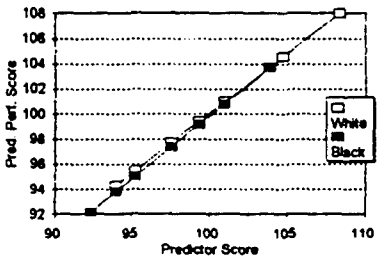
SQT MOS = 13B — **Test:** SQT Prediction Composite – Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	9916	99.341	3.536	99.231	18.165	0.986	1.276	0.037	0.192
White	4052	101.146	3.604	101.138	18.152	0.949	5.158	0.036	0.190
Black	5864	98.093	2.891	97.913	18.059	0.994	0.428	0.025	0.158
Effect Size		0.863							
P value						0.6889	0.0001		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
92.311	NA	92.185	NA	0.521	NA	NA
93.938	94.305	93.802	0.626	0.408	0.503	Over
95.202	95.505	95.059	0.540	0.329	0.446	Over
97.542	97.725	97.385	0.396	0.237	0.341	Over
99.341	99.433	99.173	0.313	0.254	0.260	Over
100.984	100.992	100.806	0.280	0.329	0.186	Over
103.875	103.735	103.680	0.351	0.521	0.056	Over
104.750	104.566	NA	0.396	NA	NA	NA
108.354	107.986	NA	0.626	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

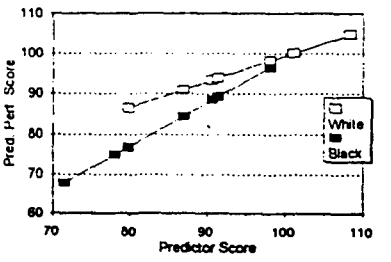
SQT MOS = 15E — **Test:** SQT Prediction Composite – Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	294	90.660	8.280	90.699	18.177	0.981	1.775	0.199	0.446
White	187	94.049	7.134	95.619	17.249	0.641	35.329	0.070	0.265
Black	107	84.749	6.686	82.102	16.551	1.073	-8.792	0.188	0.434
Effect Size		1.123							
P value						0.1328	0.0079		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
71.377	NA	67.796	NA	3.224	NA	NA
78.063	NA	74.970	NA	2.039	NA	NA
79.781	86.469	76.813	2.720	1.796	9.656	Over
86.915	91.042	84.468	1.720	1.516	6.574	Over
90.660	93.442	88.486	1.347	1.924	4.956	Over
91.435	93.939	89.318	1.296	2.039	4.621	Over
98.121	98.225	96.492	1.401	3.224	1.733	Over
101.183	100.187	NA	1.720	NA	NA	NA
108.317	104.760	NA	2.720	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

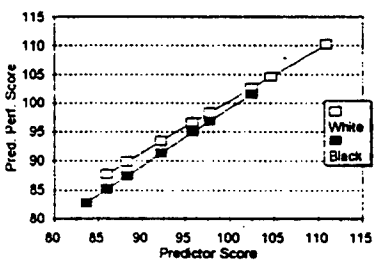
SQT MOS = 16R — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	617	95.828	6.159	95.709	19.679	0.999	-0.069	0.098	0.313
White	319	98.437	6.214	99.015	18.969	0.902	10.200	0.087	0.295
Black	298	93.034	4.710	92.171	19.841	0.998	-0.708	0.056	0.237
Effect Size		0.877							
P value						0.7369	0.2868		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
83.614	NA	82.739	NA	2.497	NA	NA
86.009	87.780	85.129	2.269	2.005	2.651	Over
88.324	89.868	87.439	1.938	1.579	2.429	Over
92.223	93.385	91.331	1.435	1.133	2.055	Over
95.828	96.637	94.928	1.101	1.298	1.709	Over
97.744	98.365	96.841	1.021	1.579	1.525	Over
102.454	102.614	101.541	1.208	2.497	1.072	Over
104.651	104.595	NA	1.435	NA	NA	NA
110.865	110.200	NA	2.269	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

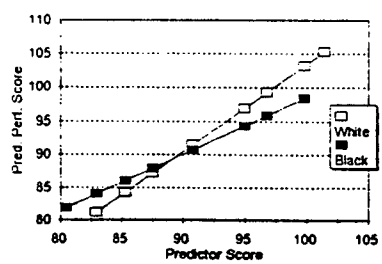
SQT MOS = 31J — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	198	90.795	4.866	91.184	19.236	1.014	-0.874	0.066	0.257
White	66	92.156	4.637	93.263	22.780	1.305	-26.985	0.071	0.266
Black	132	90.115	4.852	90.145	17.195	0.852	13.409	0.058	0.241
Effect Size		0.419							
P value						0.4532	0.7043		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
80.411	NA	81.919	NA	3.248	NA	NA
82.882	81.176	84.024	6.043	2.607	-2.848	Under
85.263	84.283	86.053	4.842	2.054	-1.770	Under
87.519	87.227	87.975	3.822	1.647	-0.748	Under
90.795	91.502	90.766	2.817	1.467	0.736	Over
94.967	96.947	94.321	3.160	2.054	2.626	Over
96.793	99.330	95.877	3.822	2.471	3.453	Over
99.819	103.279	98.455	5.220	3.248	4.824	Over
101.430	105.381	NA	6.043	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

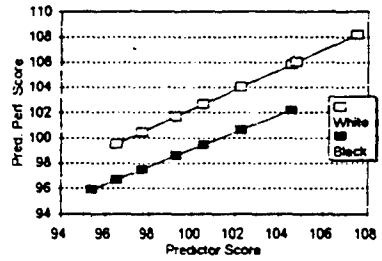
SQT MOS = 36C — Test: SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	1752	100.544	2.598	100.438	19.386	0.923	7.618	0.015	0.122
White	486	102.022	2.752	103.883	17.386	0.785	23.778	0.015	0.122
Black	1266	99.977	2.297	99.116	19.950	0.689	30.192	0.006	0.077
Effect Size		0.787							
P value						0.8082	0.0027		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
95.383	NA	95.911	NA	1.250	NA	NA
96.518	99.545	96.693	1.750	1.011	2.852	Over
97.680	100.457	97.494	1.462	0.791	2.963	Over
99.270	101.705	98.589	1.107	0.585	3.116	Over
100.544	102.705	99.467	0.888	0.576	3.238	Over
102.274	104.063	100.659	0.786	0.791	3.404	Over
104.571	105.866	102.241	1.067	1.250	3.625	Over
104.774	106.026	NA	1.107	NA	NA	NA
107.526	108.186	NA	1.750	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

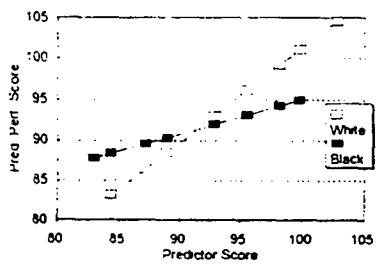
SQT MOS = 43E — Test: SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	264	92.876	4.610	93.106	18.264	0.966	3.404	0.059	0.243
White	181	93.569	4.626	93.893	18.227	1.158	-14.500	0.086	0.293
Black	83	91.365	4.220	91.388	18.336	0.425	52.545	0.010	0.100
Effect Size		0.478							
P value						0.1801	0.8696		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
82.925	NA	87.788	NA	4.478	NA	NA
84.317	83.139	88.380	2.896	3.898	-5.241	Under
87.145	86.414	89.582	2.216	2.832	-3.168	Under
88.943	88.496	90.346	1.832	2.309	-1.850	Under
92.876	93.050	92.017	1.310	2.127	1.033	Over
95.585	96.187	93.169	1.413	2.832	3.019	Over
98.195	99.210	94.278	1.832	3.810	4.932	Over
99.805	101.074	94.962	2.174	4.478	6.112	Over
102.821	104.567	NA	2.896	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

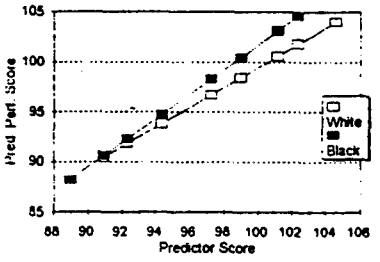
SQT MOS = 52D — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	223	97.244	3.509	97.004	18.873	0.999	-0.154	0.035	0.187
White	170	97.744	3.415	97.203	19.152	0.989	0.540	0.031	0.176
Black	53	95.643	3.352	96.366	18.109	1.217	-20.015	0.051	0.226
Effect Size		0.599							
P value						0.7957	0.6563		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
88.939	NA	88.224	NA	5.418	NA	NA
90.914	90.454	90.627	3.233	4.190	-0.173	Under
92.291	91.816	92.303	2.724	3.427	-0.487	Under
94.329	93.831	94.783	2.045	2.603	-0.952	Under
97.244	96.714	98.331	1.461	2.685	-1.617	Under
98.995	98.446	100.462	1.540	3.427	-2.016	Under
101.159	100.586	103.096	2.045	4.666	-2.509	Under
102.347	101.761	104.541	2.427	5.418	-2.780	Under
104.574	103.964	NA	3.233	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

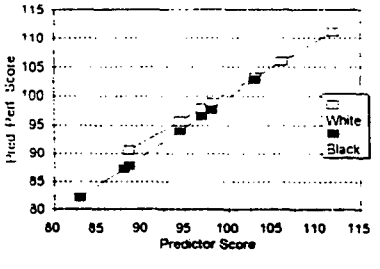
SQT MOS = 64C — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	5442	96.894	6.580	96.989	17.262	1.000	0.030	0.145	0.381
White	2942	100.226	5.864	100.827	16.935	0.876	13.017	0.092	0.303
Black	2500	92.972	5.033	92.471	16.539	1.030	-3.268	0.098	0.313
Effect Size		1.102							
P value						0.0573	0.0025		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
82.906	NA	82.125	NA	0.702	NA	NA
87.939	NA	87.309	NA	0.444	NA	NA
88.498	90.541	87.885	0.665	0.420	2.656	Over
94.362	95.678	93.925	0.421	0.326	1.753	Over
96.894	97.896	96.533	0.342	0.398	1.363	Over
98.005	98.869	97.677	0.318	0.444	1.192	Over
103.038	103.278	102.861	0.330	0.702	0.417	Over
106.090	105.952	NA	0.421	NA	NA	NA
111.954	111.089	NA	0.665	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

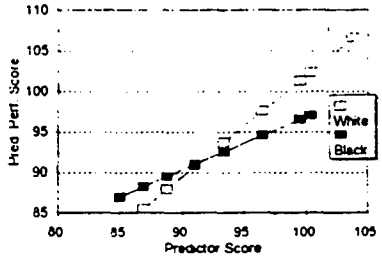
SQT MOS = 71L — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	1177	93.417	4.146	93.164	17.925	0.912	7.983	0.045	0.212
White	343	95.305	4.225	96.043	18.640	1.251	-23.144	0.080	0.283
Black	834	92.640	3.856	91.980	17.497	0.660	30.876	0.021	0.145
Effect Size		0.643							
P value						0.0309	0.1291		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
84.928	NA	86.928	NA	1.340	NA	NA
86.855	85.512	88.200	2.159	1.081	-2.689	Under
88.784	87.925	89.473	1.775	0.848	-1.549	Under
91.080	90.797	90.989	1.365	0.647	-0.192	Under
93.417	93.721	92.531	1.057	0.612	1.189	Over
96.496	97.572	94.563	1.003	0.848	3.009	Over
99.530	101.368	96.566	1.365	1.227	4.802	Over
100.352	102.396	97.108	1.504	1.340	5.288	Over
103.755	106.654	NA	2.159	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

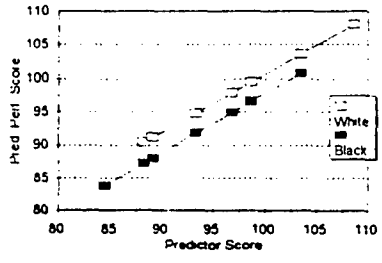
SQT MOS = 82C — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	788	96.857	5.413	96.841	17.098	0.978	2.150	0.096	0.310
White	514	98.426	5.075	99.229	16.856	0.867	13.942	0.068	0.261
Black	274	93.915	4.769	92.362	16.672	0.895	8.300	0.066	0.257
Effect Size		0.833							
P value						0.9090	0.0277		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
84.377	NA	83.817	NA	2.177	NA	NA
88.276	90.477	87.307	1.605	1.507	3.170	Over
89.146	91.232	88.086	1.496	1.377	3.146	Over
93.351	94.877	91.849	1.015	0.980	3.028	Over
96.857	97.917	94.987	0.751	1.144	2.930	Over
98.684	99.501	96.622	0.719	1.377	2.879	Over
103.453	103.636	100.890	1.010	2.177	2.745	Over
103.501	103.677	NA	1.015	NA	NA	NA
108.576	108.077	NA	1.605	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

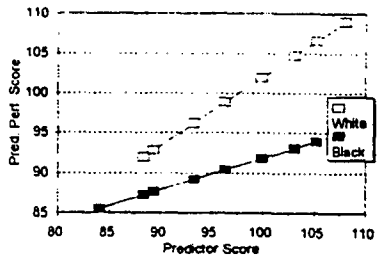
SQT MOS = 92B — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	115	96.345	5.392	94.882	20.709	0.872	10.904	0.052	0.228
White	55	98.199	4.912	100.519	24.002	0.868	15.241	0.032	0.179
Black	60	94.646	5.287	89.715	15.639	0.398	52.069	0.018	0.134
Effect Size		0.659							
P value						0.5263	0.0302		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
84.072	NA	85.530	NA	4.474	NA	NA
88.375	91.951	87.242	7.120	3.104	4.708	Over
89.359	92.805	87.634	6.556	2.829	5.171	Over
93.287	96.214	89.197	4.503	2.066	7.017	Over
96.345	98.868	90.414	3.403	2.102	8.454	Over
99.933	101.983	91.842	3.377	2.829	10.141	Over
103.111	104.741	93.107	4.503	3.777	11.634	Over
105.220	106.572	93.947	5.555	4.474	12.625	Over
108.023	109.005	NA	7.120	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

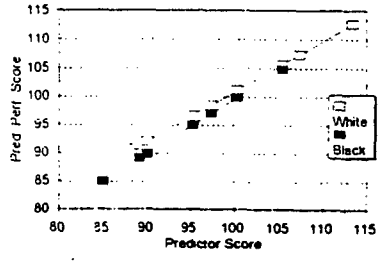
SQT MOS = 94B — **Test:** SQT Prediction Composite -- Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	3104	97.382	6.236	97.468	18.304	0.987	1.352	0.113	0.336
White	1128	101.310	6.072	102.069	17.486	0.883	12.564	0.094	0.307
Black	1976	95.140	5.121	94.841	18.246	0.973	2.299	0.075	0.274
Effect Size		0.989							
P value						0.4319	0.0443		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
84.898	NA	84.905	NA	0.883	NA	NA
89.166	91.298	89.058	1.108	0.607	2.240	Over
90.019	92.051	89.887	1.046	0.558	2.163	Over
95.238	96.659	94.966	0.701	0.395	1.694	Over
97.382	98.552	97.052	0.590	0.431	1.501	Over
100.261	101.094	99.853	0.503	0.558	1.242	Over
105.382	105.616	104.836	0.597	0.883	0.781	Over
107.382	107.382	NA	0.701	NA	NA	NA
113.454	112.744	NA	1.108	NA	NA	NA



SPA Fairness Analyses — White/Black Subgroups

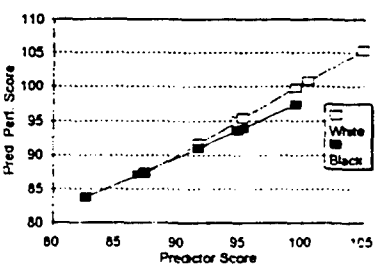
SQT MOS = 95B — **Test:** SQT Prediction Composite – Reduced Model

Sample: Category IIIB & IV Soldiers

Standardized Written SQT Score

Group	N	Test MN	Test SD	Criterion MN	Criterion SD	Slope	Intercept	R-Square	R
Total	3476	94.853	4.883	94.849	18.105	1.009	-0.854	0.074	0.272
White	2609	96.116	4.409	96.283	18.038	1.030	-2.726	0.063	0.251
Black	867	91.052	4.225	90.532	17.623	0.803	17.428	0.037	0.192
Effect Size		1.037							
P value						0.1558	0.2931		

Predictor Score	Predicted Performance Score		Standard Error		W-B Score Difference	
	White	Black	White	Black	Value	Under/Over
82.602	NA	83.757	NA	1.313	NA	NA
86.827	NA	87.150	NA	0.831	NA	NA
87.298	87.191	87.528	0.764	0.786	-0.337	Under
91.707	91.732	91.069	0.483	0.594	0.663	Over
94.853	94.973	93.595	0.356	0.790	1.378	Over
95.277	95.409	93.935	0.348	0.831	1.474	Over
99.502	99.761	97.328	0.431	1.313	2.433	Over
100.525	100.815	NA	0.483	NA	NA	NA
104.934	105.356	NA	0.764	NA	NA	NA



Appendix C

EXPERT JUDGEMENT STUDY MATERIALS

Background

We are interested in developing selection criteria for below-average men who may want to enter the Army. As you know, Category IIIBs and IVs typically do not perform as well as average and above-average recruits. However, this doesn't mean that they all do poorly. In fact, some do quite well. One goal of this research is to determine if there are individual characteristics which, if measured prior to accession into the Army, would allow us to identify below-average individuals who will make good soldiers.[1] In this judgment task we are attempting to capitalize on your knowledge and experience to help us answer this question.

We are going to be performing a wide range of analyses investigating the relationship between background and performance variables. As a first step, though, we need to identify the individual characteristics (or predictors) to be evaluated. We have already surveyed past research to see what relationships others have found between pre-service characteristics and in-service performance. The resulting list of variables has been expanded to include other logical attributes that we might want to take a look at. The final list we came up with has 19 variables on it. In essence this is the pool of all viable predictors, and we'd like to narrow it down somewhat before beginning any extensive data analysis. Towards that end we are asking for your input regarding the merit of these performance predictors.

What we are asking you to do here is provide estimates of how strong the relationship is between each of the 19 predictor variables and each of the four performance criteria: Attrition, Promotion, Skill Qualification Test (SQT) Score, and Reenlistment Eligibility. These estimates will take the form of validity coefficients. If you are familiar with the concept of validity, you can skip to the section labeled "General Instructions for Making Judgments", and continue with the task. For those who may be unsure of how to estimate validities, the next section is provided for your guidance.

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[1] Obviously, one major factor that effects performance is the individual's MOS. We will be controlling for this in other phases of the study, so it is not a concern here. For the purposes of this task, try to think in terms of the performance of general military duties, such as those found in the Soldier's Manual of Common Tasks (e.g., navigation, use/maintain weapon, camouflage).

Validity

What is validity? In this context, it is the strength of the relationship between two variables--a predictor and a performance measure. The value of a validity can range from zero to one. The closer to zero, the less the relationship. An example might clarify this concept as well as the estimation task. Say we are trying to predict rifle range test scores at the end of marksmanship training. There are three predictors available:

- Marital Status--Never Been Married, Married, Divorced, Separated, Widowed
- Control Precision--the ability to make controlled muscular movements in adjusting machines or equipment.
- Mean marksmanship scores from the final two weeks of training.

Your estimate of the validity of these three predictors would be based on your perception of how directly each is related to the criteria--number of targets hit during the test--and what percentage of the variation in performance it is likely to account for.

In all likelihood, there will be little relationship between marital status and performance on the marksmanship test; that is, the correlation would be close to zero. Correspondingly, your estimate of the validity of this variable in predicting performance on the test would also be at or near zero.

The control precision measure, however, may be related to the ability to hold and aim a rifle. You would have to make a judgment as to how important this aspect of the task is relative to the other skills and factors involved (eyesight, ability to handle stress, weather conditions), and assign a corresponding validity value. In the end you may decide that this is an important factor, but given the other characteristics that are involved it would probably only correlate moderately with performance. In that case, a value somewhere in the .3 to .4 range would be the best validity estimate.

Finally, you have the practice performance variable. Clearly, this is one element that we would expect to be highly related to performance on the test. Of course no predictor is perfect, and other factors can come into play that weaken the relationship between practice and test performance. For instance, how people feel on any given day, the degree to which stress effects performance, and so on. Still, it would be reasonable to expect a fairly strong relationship between practice and test performance, with a validity value in the .6 to .8 range.

As you do this task, there are undoubtedly other factors that will come to mind that could cause you to adjust your estimates. There are three in particular that we would prefer you ignore to the extent possible.

First there is the problem of the criterion not being "perfect." An example might be if you were trying to predict bowling or golf ability. The criterion used is the score for a given game, and the predictor is number of years playing. It might occur to you that one game may not be a true indicator of how well an individual actually bowls or plays golf. Therefore, even if you think there is probably a strong overall relationship between number of *years* played and how *well* one plays, you might be tempted to lower your estimate under the assumption that the persons' score in a single game may not be representative of their overall ability. For the purpose of this task, we want you to assume that each criterion is a true indicator of the construct it represents. In other words, in our hypothetical example you would assume that each persons' one-game score was exactly their average; that it was a true and reliable indicator of their ability. In terms of the present task, this would mean you should put aside any questions you may have about, for instance, SQT, as a performance measure and assume that they are true indicators of ability.

A second problem may come about if there is something unique or different about the sample for which you are making estimates. For instance, if we were making validity estimates about the number of years bowling/golfing as a predictor of ability based on a sample of *professionals*, the relationship would probably be weaker. This is because they wouldn't *be* professionals if they didn't play at a unusually high level. So, their scores are all likely to be high regardless of the number of years they have played. For the purposes of this task, we would like you to assume that the entire range of values are found for both the criterion and predictor variables. People who have never bowled and those who have done so for years. Individuals who score 0, and those who score 200.

The final issue concerns sample sizes. As you could probably guess, if we were to try to establish validity based on a sample of only five people the relationship would probably not be the same as if we had a much larger sample. With a large sample the averages more closely reflect what would be found in the population, and the full range of "scores" on the predictor variable can be found. Therefore, for this task we would like you to assume that the estimates are for the entire population.

In summary, we would like you to estimate the "true validities"--the real relationship between predictors and criteria without such potentially attenuating influences as unreliable criterion, a restriction in the range of predictor scores (beyond that resulting from the restriction to below-average personnel), or small sample sizes.

A final concept you need to know to do this task is that of *incremental validity*. This refers to the predictive power of a given variable above and beyond that of another variable. In this task you will be asked to provide validity estimates for the 19 predictors individually, and then to make a second set of estimates of their predictive power *after taking AFQT score into account*. If, in your judgment, the predictor in question is unrelated to AFQT, then your validity estimate will be the same as it was without this factor included. But, there may be cases where you feel that AFQT and the predictor *are* related, and if you "subtract out" the

effect of aptitude the validity of the new predictor would be decreased. To return to our earlier example, let's say that one of the predictors for ability to bowl or play golf was age. You might assume that an older person has played longer and, therefore, probably is better. Taking all other factors into account, you assign a value of .5 as the validity estimate. Now if we were to ask for an estimate of the validity of age as a predictor *after taking into account years played*, your estimate would probably be a good deal lower. In fact, unless you feel that there is some other association between age and ability, your estimate of incremental validity might drop to zero. This is because the primary association between age and ability is accounted for by the number of years one has played the game. Age itself contributes nothing beyond this.

To summarize, the terms you need to know to perform this task are:

Validity--	The power of one variable to predict another as represented by the strength of the relationship (or correlation) between the two. Values range from .0 (no validity) to 1.0 (perfect correlation).
True Validity--	The validity of a predictor when the criteria are true indicators of ability, when the entire range of predictor/criteria scores are included, and when the sample is representative of the population as a whole.
Incremental Validity--	The predictive power of a variable after the effects of another predictor have been taken into account. Incremental validity will be lower to the extent that the two predictors are related and, therefore, account for the same sources of variation in performance.

General Instructions for Making Judgments

Descriptions of 19 predictor constructs and four criterion factors have been prepared for your use in this task. The term construct is used to signify that the predictors often represent a general concept (e.g., physical conditioning) rather than a specific measure (e.g., Army Physical Readiness Test score). To the extent that you can disassociate the two, we are interested in your estimates of the validity of the construct rather than specific measures of it. Generally, we are asking you to answer three types of questions for below-average aptitude individuals:

1. What is the degree of relationship between 19 predictor constructs and four criterion factors?

2. Given the relationship between Armed Forces Qualification Test (AFQT) score and each criterion factor, what is the degree of relationship between the predictor constructs and criterion factors? That is, what additional or incremental validity above AFQT would each predictor contribute?

3. What are the "best" 10 constructs for predicting each criterion factor given the predictive power of AFQT?

Background Information

Please complete the enclosed Background Information form. This data will be used to describe the judges' experience regarding testing issues.

Judgment Materials

1. To the extent information was available and relevant, the following is provided for each predictor construct:
   - name;
   - definition or explanation;
   - brief summary of the typical measures;
   - reliability synopsis of the measures;
   - validity synopsis of the measures; and
   - sample items from one or more measures.

2. The name and definition or description of each criterion factor is provided.

3. Enclosed is an Initial Validity Judgment Record Sheet, an Incremental Validity Judgment Record Sheet, and a Rank Order Record Sheet on which you should make and record your judgments. You have four (4) sets of sheets to record the various estimates for below-average aptitude Army personnel.

Instructions for Making Your Judgments

Carefully review the definitions and/or descriptions associated with each predictor construct and each criterion factor so that you are familiar with the enclosed materials before making your judgments. As a word of caution, some of the constructs are not typically used as predictors. However, in identifying potential predictors for below-average aptitude recruits, we did not want to prematurely omit any predictor constructs that might be useful. Several of these potential constructs are categorical rather than continuous variables. In making judgments about categorical variables, you may find it helpful to think in terms of the "relationship" between the variable and the criterion rather than the "validity" of the predictor for the criterion. Also, please note that the scales included in the predictor construct descriptions are intended to provide examples of ways that the construct has been measured rather than restrict the way the construct is or can be measured.

Because one of the purposes of this project is to select most and least appropriate MOS for lower-aptitude soldiers, make sure that each of your judgments (Initial Validity, Incremental Validity, and Rank Ordering) reflects the relationship between the predictor constructs and criterion factors for persons of below-average ability (i.e., AFQT Categories IIIB and IV). Therefore, for each of the different types of judgments discussed below, you are to provide estimates for CAT IIIB and CAT IV level Army personnel, focussing on the latter. Recall that CAT IV personnel have AFQT scores in the 10 to 30 percentile range and CAT IIIBs score from 31 through 49.

A. Initial Validity Judgments. After you have a grasp of the descriptions for the first predictor construct and the first criterion factor, estimate the true validity of the construct for that criterion factor. (Keep in mind that we are asking you to estimate the true validity and not the observed validity between the two, as was discussed in document two.) Write your estimate in the appropriate cell on the record sheet, limiting your responses to .05 intervals of the .00 to 1.00 validity coefficient range (i.e., .00, .05, .10, . . ., .95, 1.00) and rounding to the nearest .05 interval, as necessary.

   Next, think about the direction of the relationship between the two variables. If you think there is a positive relationship, you do not need to enter a "+" in front of the scale value; however, if you think there is a negative relationship be sure to put a "-" in front of the value (lack of a negative sign will be taken to mean a positive value). Caution is given for entering negative signs due to the fact that the descriptions for some of the predictor constructs and criterion factors are a bit ambiguous about the meaning of high scores; for the most part, the name and definition make clear what a high score represents. Repeat this procedure, estimating separately the true validity for the first predictor construct and each of the three criterion factors remaining.

Move to the second predictor construct and, following the procedures above, make and record your estimates between this construct and each criterion factor. Continue in this manner until you have estimated separately the true validity between the 19 predictor constructs and the four criterion factors.

Please estimate validities for below-average (Categories IIIB-IV) and above-average (Categories I-IIIA) Army personnel separately. If you believe that the coefficients for these two groupings are the same please indicate so by repeating your estimate.

B. Incremental Validity Judgments. Based on an understanding of the descriptions of the first predictor construct and the first criterion factor, estimate the true incremental validity over the validity of the AFQT of the construct for that criterion factor. (Remember to estimate the true validity and not the observed validity between the two variables.) Write your estimate in the appropriate cell on the record sheet, and as when making your initial validity judgments, limit your responses to .05 intervals of the .00 to 1.00 validity coefficient range.

Repeat this procedure, estimating separately the true incremental validity over the validity of the AFQT for the first predictor construct and each of the three remaining criterion factors.

Move to the second predictor construct, and following the procedures above, make and record your incremental estimates over the validity of the AFQT for this construct and each criterion factor. Continue in this manner until you have estimated separately the true incremental validity over the validity of the AFQT between the 19 predictor constructs and the four criterion factors.

Again, as with the initial validity judgments, please enter a value for both below-average (Categories IIIB and IV) and above-average (Categories I-IIIA) Army personnel.

C. Rank Ordering the Predictor Constructs. For each criterion factor, decide which 10 constructs are the best predictors. In ranking the predictors, assume that: (a) 10 separate regression equations will be written for each criterion factor, (b) only two predictors will be entered in each equation--AFQT and one other predictor, and (c) AFQT will always be entered first.

For the first criterion factor, write the number "1" in the blank to the left of the construct that you feel is "the best" incremental predictor (i.e., the predictor that explains the greatest amount of variance over AFQT). Write a number "2" for the construct you feel is the "second best" predictor (i.e., the predictor that, when entered after AFQT and without "the best" predictor, explains the next greatest amount of remaining variance over AFQT). Continue with this process until you have identified the 10 "best" predictors for that criterion factor.
Move to the second criterion factor, and following the procedures above, decide

which 10 constructs are the "best" predictors. Continue in this manner until you have identified separately the 10 "best" predictors for each of the four criterion factors.

In finishing, check to be sure you have completed all the judgments and that you have put your name on each Record Sheet. Please return all materials to Janice Laurence by May 15, 1992 at the following address:

HumRRO
66 Canal Center Plaza, Suite 400
Alexandria, VA 22314
Fax: 703-

CONSTRUCT NAME: Education CONSTRUCT NUMBER: 1

DEFINITION: Successful completion of formal training through four years of high school

MEASURES: High School Diploma or High School Transcripts

RELIABILITY: Reliability is extremely high--around .99.

VALIDITY: Education has been shown to be related to many performance outcomes including turnover, promotion, and supervisory ratings of job performance.

CONSTRUCT NAME: Age at Enlistment CONSTRUCT NUMBER: 2

DEFINITION: Age at which an individual joins the Army, typically 17 to 21 years of age

MEASURES: Birthdate as shown on a Birth Certificate compared against Enlistment Date

RELIABILITY: Reliability is almost perfect--about .99.

VALIDITY: Age has been shown to be related to intentions to leave an organization with younger employees tending to change jobs more readily than older workers. It has also been shown that age is related to absenteeism with higher absentee rates reported among younger workers.

CONSTRUCT NAME: Marital Status/ Number of Dependents CONSTRUCT NUMBER: 3

DEFINITION: Having a spouse and/or one or more dependent children

MEASURES: Marriage License; Children's Birth Certificates; Adoption Certificates; Court degree identifying custodial parent

RELIABILITY: Reliability is very high--around .99.

VALIDITY: Validity evidence is contradictory. In some studies, it has been shown that individuals with dependents are more likely to separate prematurely from military service. In other studies, the reverse has been found.

CONSTRUCT NAME: Geographic Region CONSTRUCT NUMBER: 4

DEFINITION: State or region in which one was born or in which one considers home

MEASURES: Pencil and paper; self-report

RELIABILITY: Self-report measures tend to be quite accurate with reliabilities around .94.

VALIDITY: Few studies have looked at the relationship between geographic region and job performance factors.

CONSTRUCT NAME: Psychomotor Abilities CONSTRUCT NUMBER: 5

DEFINITION: Motor actions directly resulting from mental activity. For example,

- Multilimb Coordination
- Manual Dexterity
- Finger Dexterity
- Aiming
- Arm-Hand Steadiness
- Wrist-Finger Speed

MEASURES: Computerized or device-administered tests that require the respondent to perform some manipulations. For example, the examinee may be required to manipulate one or more controls to track a stimulus object. The examinee's score is time on target, root-mean-square deviation, or another related measure. For other tasks, the respondent may be asked to insert pins or blocks into holes on a pegboard. The respondent's score is determined by the number of pins or blocks inserted within a given amount of time.

RELIABILITY: Reliability coefficients range from .70 to .90.

VALIDITY: There is a dearth of validity information for many psychomotor constructs and an abundance of information for other constructs. Using pilot performance as the criterion, validity coefficients range from .05 to .25. Against academic success, coefficients fall between .05 and .20. In predicting job performance in non-professional occupations, coefficients range from -.23 to .60, with most occurring between .20 and .30.

CONSTRUCT NAME: Psychological Variables (Temperament) CONSTRUCT NUMBER: 6

DEFINITION: Characteristic tendencies of emotional responses. For example,

- Need for Achievement
- Altruism
- Adjustment
- Dependability
- Cooperativeness
- Dominance
- Sociability
- Conscientiousness

MEASURES: Self-report pencil and paper measures using a multiple choice, True/False, or "indicate the most/least descriptive statement" format. Examples include the Recruit Temperament Survey (RTS), Rotter I-E Scale, Gordon Personal Profile-Inventory (GPPI), the California Psychological Inventory, and the Assessment of Background and Life Experiences (ABLE).

RELIABILITY: Internal consistencies range from .57 to .91, with most values in the .80s. Test-retest reliabilities are around .90 at 30-day intervals and around .50 at four-year intervals.

VALIDITY: Median validity ranges for the following criteria:

• Education - grade point average	-.16 to .32
• Training grades	.08 to .33
• Job proficiency	-.02 to .25
• Job involvement/Withdrawal	-.09 to .17

SAMPLE ITEMS: *California Psychological Inventory - Dominance*

Items keyed "True" (i.e., High Dominance)

- I think I would enjoy having authority over other people.
- I have a natural talent for influencing people.
- When the community makes a decision, it is up to a person to help carry it out even if he had been against it.

Items keyed "False" (i.e., Low Dominance)

- I doubt whether I would make a good leader.
- I must admit I try to see what others think before I take a stand.
- A person does not need to worry about other people if only he looks after himself.

CONSTRUCT NAME: Psychological Variables (Temperament) (continued)

Gordon Personal Profile-Inventory - Personal Relations

(Cooperativeness)
Alternatives keyed "Least Descriptive":

- becomes irritated by faults in others
- doesn't trust people until they prove themselves
- takes offense when subjected to criticism

Gordon Personal Profile-Inventory - Personal Relations

(Cooperativeness)
Alternatives keyed "Most Descriptive":

- accepts criticism with good grace
- very tactful and diplomatic
- has great faith in people

CONSTRUCT NAME: Biographical Information CONSTRUCT NUMBER: 7

DEFINITION: Measures an individual's background and life experiences

MEASURES: Pencil and paper forms that require open-ended or yes/no responses to inquiries about an individual's background and life experiences. Biographical Information forms may also use a multiple choice format. Sample assessments include the Biographical Information Form (BIF), the Biographical Information Questionnaire (BIQ), the Military Applicant Profile (MAP), and the Armed Services Applicant Profile (ASAP).

RELIABILITY: Correlations of .94 have been found between self-reported biodata responses and later verified answers to the same questions.

VALIDITY: Overall median validity coefficients for the following criteria:

- Training performance .25
- Job proficiency .32
- Job involvement .30
- Adjustment .26

SAMPLE ITEMS: *Military Applicant Profile*

- From the time you first started school, how many times did your family move from one house to another?

  a. None
  b. 1
  c. 2
  d. 3
  e. 4 or more

- How old were you when you first began to support yourself without any help from anyone else?

  a. 16 or younger
  b. 17
  c. 18
  d. 19 or older
  e. I have never supported myself

CONSTRUCT NAME: Interests CONSTRUCT NUMBER: 8

DEFINITION: Preference for various activities, characteristics, and tasks (e.g., routine work, manipulation of machines, and analytical tasks)

MEASURES: Pencil and paper assessments that require preference ratings for activities, occupations, school subjects, and types of people. Example inventories include the Army Classification Inventory, the Army Vocational Interest-Career Examination, the Job Check List, the Strong-Campbell Interest Inventory, the Holland Self-Directed Inventory, and the Performance Index.

RELIABILITY: Reliabilities of various inventories range from .69 to .98.

VALIDITY: Occupational scores on various scales are as predicted. For example, artists and musicians score high on Artistic Interest Scales and low on Realistic Interest Scales, whereas the reverse pattern is found for carpenters and foresters. Hit rates are acceptable--25% to 58%--between interest inventories and occupational choice. Correlations with job satisfaction are around .30; around .20 with job proficiency; and around .25 with training performance.

SAMPLE ITEMS: *Army Classification Inventory*
(indicate yes or no)

- I like to play baseball.
- I like keeping records.
- I like repairing mechanical toys.
- I would like being an explorer.
- I would like driving a truck.

Army Vocational Interest-Career Examination
(for which degree of liking is indicated)

- Jobs
  - Computer operator
  - Highway patrol officer

- Work Tasks
  - Take blood pressure readings
  - Deliver cargo on time

CONSTRUCT NAME: Interests (continued)

SAMPLE ITEMS: *Army Vocational Interest-Career Examination*

- Spare Time Activities
  - Tune-up a car
  - Go skydiving

- Desired Learning Experiences
  - Telecommunications
  - How different aircraft look

CONSTRUCT NAME: Numerical Operations CONSTRUCT NUMBER: 9

DEFINITION: Speed and accuracy in performing simple arithmetic operations (i.e., addition, subtraction, multiplication, and division)

MEASURES: Pencil and paper tests that require the examinee to perform simple arithmetic computations and to record the answer or select the correct answer from among several alternatives.

RELIABILITY: Alternate forms reliability estimates range from .75 to .87, with a median of .84. Test-retest reliability over a two-year interval has been estimated at .75.

VALIDITY: Correlations with supervisory ratings of job performance for clerical, skilled, and semi-skilled personnel center around .25; validity has been estimated at .41 for technical personnel. Correlations with training outcome scores for skilled, semi-skilled, and technical personnel center around .41. The median correlation with scores on the Skill Qualifications Test for eight Army MOS is .52.

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - Numerical Operations*

- 7 + 6 =
  a. 11
  b. 13
  c. 15
  d. 19

- 9 x 1 =
  a. 0
  b. 10
  c. 1
  d. 9

- 12 ÷ 4 =
  a. 3
  b. 8
  c. 16
  d. 2

CONSTRUCT NAME: Mathematical Knowledge CONSTRUCT NUMBER: 10

DEFINITION: Ability to use simple algebra and geometry along with arithmetic skills and reasoning power

MEASURES: Pencil and paper multiple choice tests. Items present a word problem. The respondent must determine how to solve the problem and identify the correct solution from among a set of alternatives

RELIABILITY: Internal consistency reliability estimate for a sample of Air Force recruits was .85. Test-retest reliability estimates were .92 and .99.

VALIDITY: Correlations with training outcome scores are .50 for four Army MOS. Correlations with the Skill Qualifications Test for eight Army MOS center around .53.

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - Mathematics Knowledge*

- A section of pavement which is 10 feet long and 8 feet wide contains how many square feet?

  a. 80 sq. ft.
  b. 92 sq. ft.
  c. 800 sq. ft.
  d. 18 sq. ft.

- When 2x - 1 is multiplied by 10 the result is 70. What is the value of x?

  a. 2
  b. 12
  c. 3
  d. 4

- If an engine pumps G gallons of water per minute, then the number of gallons pumped in half an hour may be found by

  a. taking one-half of G
  b. dividing 60 by G
  c. multiplying G by 30
  d. dividing 30 by G

CONSTRUCT NAME: Mechanical Comprehension CONSTRUCT NUMBER: 11

DEFINITION: Ability to learn, comprehend, and reason with mechanical terms. More specifically, the ability to perceive and understand the relationships of physical forces and mechanical elements in practical situations.

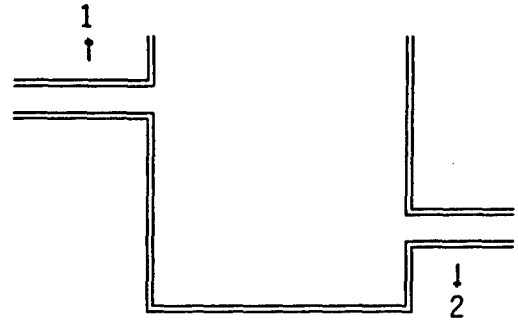
MEASURES: Pencil and paper multiple choice tests. Items often contain pictures or diagrams depicting mechanical relationships, and respondents choose one correct response from among a set of alternatives.

RELIABILITY: Ranges from .79 to .86, with a median value of .83.

VALIDITY: Median validities for the following criteria:

- Supervisory ratings .34
- Training grades .32
- Written achievement test grades .40

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - Mechanical Comprehension*



- The figure above represents a water tank containing water. The number 1 indicates an intake pipe and 2 indicates a discharge pipe. Of the following, the statement which is *least* accurate is that the
  a. tank will eventually overflow if water flows through the intake pipe at a faster rate than it flows out through the discharge pipe
  b. tank will empty completely if the intake pipe is closed and the discharge pipe is allowed to remain open
  c. water in the tank will remain at a constant level if the rate of intake is equal to the rate of discharge
  d. water in the tank will rise if the intake pipe is operating when the discharge pipe is closed

CONSTRUCT NAME: Mechanical Comprehension (continued)

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - Mechanical Comprehension*

- Sweating usually occurs on pipes that
  a. contain cold water
  b. contain hot water
  c. are chrome plated
  d. require insulation

- If all of the following objects are at room temperature, which will feel coldest?

  a. book
  b. metal spoon
  c. wooden chest
  d. blanket

CONSTRUCT NAME: General Science CONSTRUCT NUMBER: 12

DEFINITION: Knowledge of basic scientific principles

MEASURES: Multiple choice pencil and paper tests that assess knowledge of physical, biological, and earth sciences

RELIABILITY: Internal consistency reliability is .77.

VALIDITY: Average validity for time to complete training in nine Navy jobs is -.06. Average correlation with final course grade across 38 military jobs is .28.

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - General Science*

- The chief nutrient in lean meat is

  a. fat
  b. starch
  c. protein
  d. carbohydrates

- Substances which hasten chemical reaction time without themselves undergoing change are called

  a. buffers
  b. colloids
  c. reducers
  d. catalysts

- An eclipse of the sun throws the shadow of the

  a. moon on the sun
  b. moon on the earth
  c. earth on the sun
  d. earth on the moon

CONSTRUCT NAME: Perceptual Speed and Accuracy

CONSTRUCT NUMBER: 13

DEFINITION: Ability to perceive visual information quickly and accurately and to perform simple processing tasks with it (e.g., comparisons)

MEASURES: Speed tests that involve visual stimuli. The respondent may be asked to follow one of a set of lines to identify the endpoint. Another task is to compare two numbers or figures to determine whether they are identical or different. Other tasks present a table or graph which contains the responses to multiple choice questions.

RELIABILITY: Ranges from .80 to .91, with a median of .86.

VALIDITY: Median values for the following criteria:

- Instructor rating .26
- Supervisory rating .26
- Training grades .24
- Written job performance test .21
- Hire vs. not hire decision .48

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - Coding Speed*

Key

bay.....7100	dark.....1872	mole.....4386
brain.....3600	half.....1492	nest.....6663
calf.....9012	igloo.....1776	shoe.....8080

Answers

	A	B	C	D	E
1. brain	1776	3600	4386	6663	8080
2. igloo	1492	1776	1872	7100	9012
3. shoe	3600	4386	5486	6663	8080

CONSTRUCT NAME: General Information CONSTRUCT NUMBER: 14

DEFINITION: General knowledge of a variety of subjects

MEASURES: Pencil and paper multiple choice tests of previously acquired general knowledge of an assortment of topics ranging from sports, geography, mechanics, weapons, etc.

RELIABILITY: Internal consistency reliability is .67.

VALIDITY: Average validity for time to complete training in nine Navy jobs is -.10. Average correlation with final course grade is .22 across 38 military jobs.

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - General Information*

- The "No. 00 Buck" is correctly used in a
  a. .30-06 rifle against a moose at long range
  b. 16-gauge shotgun against pheasants
  c. 20-inch barrel carbine against a deer in dense cover
  d. 12-gauge shotgun against a bear

- A regulation baseball diamond is a 90-foot square; a softball diamond is a
  a. 60-foot square
  b. 75-foot square
  c. 90-foot square
  d. 120-foot square

- The intake and exhaust valve stems in an automobile engine are driven by the
  a. transmission
  b. crankshaft
  c. camshaft
  d. drive shaft

CONSTRUCT NAME: Electronics Information CONSTRUCT NUMBER: 15

DEFINITION: Knowledge of electrical or electronic systems and operations

MEASURES: Pencil and paper measures of the ability to apply previously acquired knowledge in the areas of electricity and electronics toward the solution of problems in practical situations. Also assesses knowledge of electricity, radio principles, and electronics.

RELIABILITY: Internal consistency reliability is .87.

VALIDITY: Median correlations across military and civilian jobs with the following criteria:

- Education .22
- Training outcomes .38
- Job proficiency .21

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - Electronics Information*

- What does the abbreviation AC stand for?
  a. additional charge
  b. alternating coil
  c. alternating current
  d. ampere current

- Which of the following has the *least* resistance?
  a. rubber
  b. silver
  c. wood
  d. iron

- Flux is used in the process of soldering together two conductors in order to
  a. provide a luster finish
  b. prevent oxidation when the connection is heated
  c. maintain the temperature of the soldering iron
  d. prevent the connection from becoming overheated

CONSTRUCT NAME: Automotive Information CONSTRUCT NUMBER: 16

DEFINITION: Knowledge of maintenance and repair of automotive equipment

MEASURES: Pencil and paper multiple choice tests that measure general knowledge of automobiles and automobile engines

RELIABILITY: Internal consistency reliability .85.

VALIDITY: Average correlation with final course grade across 38 military jobs is .21. Average validity for time to complete training is -.12 in nine Navy jobs.

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - Automotive Information*

- A fuel injection system on an automobile engine eliminates the necessity for
  a. a manifold
  b. a carburetor
  c. spark plugs
  d. a distributor

- A torsion bar might be found in the
  a. transmission
  b. distributor
  c. speedometer
  d. suspension

- In an automobile air-conditioning system fails to cool, the first check to make is for
  a. leaks in the hoses
  b. malfunction in the compressor
  c. low oil level
  d. storage of refrigerant

CONSTRUCT NAME: Shop Information CONSTRUCT NUMBER: 17

DEFINITION: Knowledge of shop terminology and practices and the use of tools

MEASURES: Pencil and paper multiple choice tests that measure general knowledge and familiarity with tools and practices in shop activities

RELIABILITY: Internal consistency reliability .81.

VALIDITY: Mean correlation across 38 military jobs with final course grade is .21. Average validity for time to complete training in nine Navy jobs is -.10.

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - Shop Information*

- The cut of a file refers to the
  a. shape of its handle
  b. shape of its edge
  c. kind of metal it is made of
  d. kind of teeth it has

- The tip of a soldering iron is usually made of
  a. iron
  b. steel
  c. lead
  d. copper

- A lathe would normally be used in making which of the following items?
  a. a baseball bat
  b. a bookcase
  c. a hockey stick
  d. a picture frame

CONSTRUCT NAME: Spatial Ability CONSTRUCT NUMBER: 18

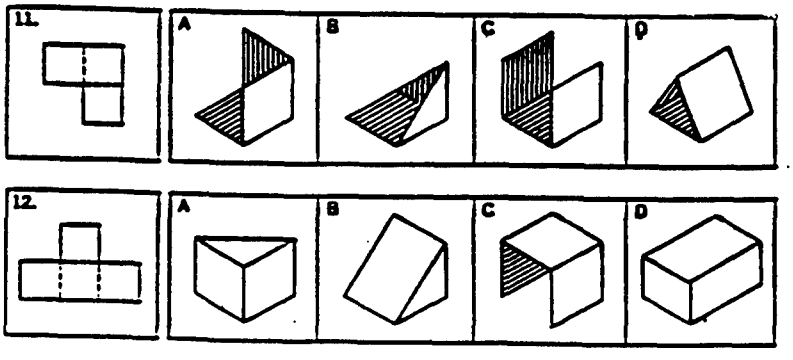
DEFINITION: Ability to visualize or rotate objects and figures in space

MEASURES: Pencil and paper tests that require the respondent to: (a) determine whether two drawings represent the same figure which has been rotated to different orientations or essentially different figures; (b) mentally restructure a figure into its components for manipulation; (c) identify a figure that is embedded within a pattern; or (d) recall the locations of objects on a rotated map.

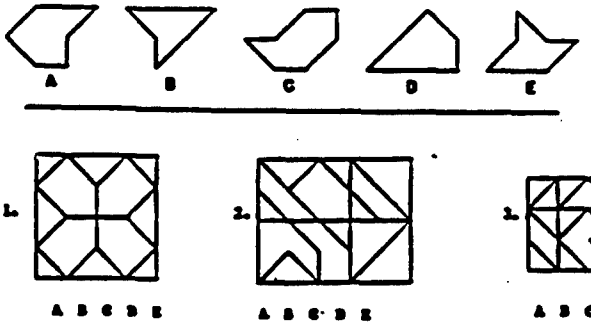
RELIABILITY: Internal consistency reliability estimates range from .77 to .91. Test-retest reliabilities, over a one-year period, are in the low .80s.

VALIDITY: Correlations with supervisory ratings range from .16 to .48, with most around .20. Correlations with high school course grades range from -.12 to .69, with a median value of .24.

SAMPLE ITEMS: *Armed Services Vocational Aptitude Battery - Space Perception*



Hidden Figures Test



CONSTRUCT NAME: Physical Fitness CONSTRUCT NUMBER: 19

DEFINITION: Physical capacity to perform exercise. Comprised of three components: (a) strength - ability to lift heavy objects once (e.g., lift a full 55 gal. drum onto a truck); (b) aerobic capacity - cardiovascular endurance; and (c) muscular endurance - ability to lift heavy objects over time (e.g., carry a 70 lb. rucksack on a 10 mile hike).

MEASURES: Measures of body fat or lean body mass (e.g., skinfold). Physical ability tests that require the examinee to lift various amounts of weight (e.g., incremental dynamic lift test). Tests of cardiovascular endurance (e.g., step test). Military Entrance Physical Strength Capacity Test (MEPSCAT) measures lean body mass, strength, and endurance.

RELIABILITY: Reliability is extremely high--about .99.

VALIDITY: Strength and endurance tests predict performance in common soldiering tasks with multiple *R*s ranging from .45 to .67. Correlations of physical ability tests with job sample tests range from .50 to .80. Lean body mass correlates .20 with Basic Training attrition for males. Leg and trunk strength correlate .50 with Basic Training attrition for females.

SAMPLE ITEMS: *Military Entrance Physical Strength Capacity Test*

- Step Test - measures aerobic capacity
  - Examinees step 25 times per minute for three minutes at three step heights: 10 cm, 20 cm, and 30 cm for females; and 20 cm, 30 cm, and 40 cm for males.
  - Score is maximal oxygen consumption corrected for examinee size, examinee age, step height, and stepping frequency.

- Incremental Dynamic Lift Test - measures strength
  - Examinees use an overhand grip to lift increasing amounts of weight from the floor to 72 inches and to 60 inches. Examinees must keep their backs straight, knees bent, and feet flat on the floor. Examinees must lift the weight in one smooth motion and need not hold the weight at the 72 or 60 inch markers. No rests are allowed.

  - Two scores: weight successfully lifted to 72 and 60 inches.

CONSTRUCT NAME: Physical Fitness (continued)

- Lean Body Mass
  - Score is sum of four skinfold measures (biceps, triceps, subscapular, and suprailiac) measured in millimeters and corrected for age and gender.

Attrition

Attrition is defined as separating from the Army before completion of the contracted term of service for pejorative reasons. Attrition for nonpejorative reasons such as disability, death, entry into officer programs, retirement, secretarial authority, sole surviving son, or breach of contract by the Army are *not* included in this criterion factor.

Early separation may be initiated by the soldier or by the Army. A solider may initiate separation procedures through administrative procedures (e.g., pregnancy) or by deserting. The Army may discharge a soldier through administrative (i.e., medical, homosexual, or disciplinary chapters) or judicial (i.e., court martial) actions.

Skill Qualification Test (SQT) Score

The SQT is a written, multiple-choice test used to evaluate a soldier's technical knowledge of his or her Military Occupational Specialty (MOS) and skill level proficiency. Depending on the MOS, the test takes approximately two hours to complete, and all soldiers in Skill Levels 1 through 4 are tested annually in their primary MOS. The SQT is scheduled in advance, and soldiers are allowed to study for the test.

Promotion

Advancement in the Army depends on factors that are both internal and external to a soldier's control. Internal control factors include SQT performance and, to some extent, supervisory ratings. External control factors include time in grade (e.g., soldiers are generally awarded the rank of E-2 upon completion of basic training), manpower needs, policy decisions, and the number of openings within an MOS.

Reenlistment Eligibility

Reenlistment eligibility is a soldier's suitability for extending his or her time in the Army beyond the initial commitment. It is often used as a summary indicator of success in the Army. Individual achievements as measured by SQT performance, supervisor ratings, and promotions influence reenlistment eligibility. However, factors outside a soldier's control also affect reenlistment eligibility including manpower needs, policy decisions, and the number of openings within an MOS.

Background Information

Name _____ Date _____

Education:

Undergraduate

Years Completed _____
Degree Received _____
Major Area _____

Graduate

Years Completed _____
Degree Received _____
Major Area _____

Psychological Testing Training/Experience:
Please indicate your experience with the following psychological testing tasks. Response by circling Yes or No after each experience statement.

Development/	Heard about this task in undergraduate course(s) or general sources	Yes	No
Design of Cognitive	Studied this task in graduate course(s) or studied in depth on my own	Yes	No
Tests	Performed parts of this task under supervision	Yes	No
	Performed this task without supervision	Yes	No
	Supervised others performing this task	Yes	No
	Taught this task to others	Yes	No
	Wrote a scholarly article or book about this task	Yes	No
Development/	Heard about this task in undergraduate course(s) or general sources	Yes	No
Design of Physical	Studied this task in graduate course(s) or studied in depth on my own	Yes	No
Ability Tests	Performed parts of this task under supervision	Yes	No
	Performed this task without supervision	Yes	No
	Supervised others performing this task	Yes	No
	Taught this task to others	Yes	No
	Wrote a scholarly article or book about this task	Yes	No

Development/ Design of Psychomotor Tests	Heard about this task in undergraduate course(s) or general sources	Yes	No
	Studied this task in graduate course(s) or studied in depth on my own	Yes	No
	Performed parts of this task under supervision	Yes	No
	Performed this task without supervision	Yes	No
	Supervised others performing this task	Yes	No
	Taught this task to others	Yes	No
	Wrote a scholarly article or book about this task	Yes	No
Development/ Design of Interest Inventories	Heard about this task in undergraduate course(s) or general sources	Yes	No
	Studied this task in graduate course(s) or studied in depth on my own	Yes	No
	Performed parts of this task under supervision	Yes	No
	Performed this task without supervision	Yes	No
	Supervised others performing this task	Yes	No
	Taught this task to others	Yes	No
	Wrote a scholarly article or book about this task	Yes	No
Research on the Relationship of Cognitive Tests to Other Variables	Heard about this task in undergraduate course(s) or general sources	Yes	No
	Studied this task in graduate course(s) or studied in depth on my own	Yes	No
	Performed parts of this task under supervision	Yes	No
	Performed this task without supervision	Yes	No
	Supervised others performing this task	Yes	No
	Taught this task to others	Yes	No
	Wrote a scholarly article or book about this task	Yes	No
Research on the Relationship of Physical Ability Tests to Other Variables	Heard about this task in undergraduate course(s) or general sources	Yes	No
	Studied this task in graduate course(s) or studied in depth on my own	Yes	No
	Performed parts of this task under supervision	Yes	No
	Performed this task without supervision	Yes	No
	Supervised others performing this task	Yes	No
	Taught this task to others	Yes	No
	Wrote a scholarly article or book about this task	Yes	No

Research on the Relationship of Psychomotor Tests to Other Variables	Heard about this task in undergraduate course(s) or general sources	Yes	No
	Studied this task in graduate course(s) or studied in depth on my own	Yes	No
	Performed parts of this task under supervision	Yes	No
	Performed this task without supervision	Yes	No
	Supervised others performing this task	Yes	No
	Taught this task to others	Yes	No
	Wrote a scholarly article or book about this task	Yes	No

Research on the Relationship of Interest Inventories to Other Variables	Heard about this task in undergraduate course(s) or general sources	Yes	No
	Studied this task in graduate course(s) or studied in depth on my own	Yes	No
	Performed parts of this task under supervision	Yes	No
	Performed this task without supervision	Yes	No
	Supervised others performing this task	Yes	No
	Taught this task to others	Yes	No
	Wrote a scholarly article or book about this task	Yes	No

Military Task Experience:
Please indicate your knowledge of and experience with the military.

Have you learned about the military through close family members?	Yes	No
Have you done consulting work with the military?	Yes	No
Have you served in the military?	Yes	No

Please indicate your knowledge of and experience with the following Army activities. Use the following rating scale to indicate your responses.

0 = I am not at all familiar with this activity.

1 = I am somewhat familiar with this activity.

2 = I am very familiar with this activity.

____ Conditions under which a soldier may initiate early separation procedures from the Army

____ Conditions under which the Army may initiate early separation procedures against a soldier

____ Skill Qualifications Test development

____ Skill Qualifications Test administration

____ Promotion eligibility requirements

____ Reenlistment eligibility requirements

Name:_____

INITIAL VALIDITY JUDGMENT RECORD SHEET

Criterion Factors

Predictor Constructs	Attrition		SQT Score		Promotion		Reenlistment Eligibility	
	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA
1. Education								
2. Age at Enlistment								
3. Marital Status/ Number of Dependents								
4. Geographic Region								
5. Psychomotor Abilities								
6. Psychological Variables								
7. Biographical Information								
8. Interests								
9. Numerical Operations								
10. Mathematical Knowledge								

INITIAL VALIDITY JUDGMENT RECORD SHEET

Predictor Constructs	Criterion Factors							
	Attrition		SQT Score		Promotion		Reenlistment Eligibility	
	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CAT IIIB-IV	CAT I-IIIA	CATS IIIB-IV	CATS I-IIIA
11. Mechanical Comprehension								
12. General Science								
13. Perceptual Speed and Accuracy								
14. General Information								
15. Electronics Information								
16. Automotive Information								
17. Shop Information								
18. Spatial Ability								
19. Physical Fitness								

Name:_____

INCREMENTAL VALIDITY JUDGMENT RECORD SHEET

Predictor Constructs	Criterion Factors: Attrition CAT IIIB-IV	Attrition CAT I-IIIA	SQT Score CAT IIIB-IV	SQT Score CAT I-IIIA	Promotion CAT IIIB-IV	Promotion CAT I-IIIA	Reenlistment Eligibility CAT IIIB-IV	Reenlistment Eligibility CAT I-IIIA
1. Education								
2. Age at Enlistment								
3. Marital Status/ Number of Dependents								
4. Geographic Region								
5. Psychomotor Abilities								
6. Psychological Variables								
7. Biographical Information								
8. Interests								
9. Numerical Operations								
10. Mathematical Knowledge								

INCREMENTAL VALIDITY JUDGMENT RECORD SHEET

Predictor Constructs	Criterion Factors: Attrition CAT IIIB-IV	Attrition CAT I-IIIA	SQT Score CAT IIIB-IV	SQT Score CAT I-IIIA	Promotion CAT IIIB-IV	Promotion CAT I-IIIA	Reenlistment Eligibility CAT IIIB-IV	Reenlistment Eligibility CAT I-IIIA
11. Mechanical Comprehension								
12. General Science								
13. Perceptual Speed and Accuracy								
14. General Information								
15. Electronics Information								
16. Automotive Information								
17. Shop Information								
18. Spatial Ability								
19. Physical Fitness								

Name:_____

Rank Order Record Sheet
Estimates for Below-Average Aptitude Army Personnel

Attrition	**SQT Score**
____ Education	____ Education
____ Age at Enlistment	____ Age at Enlistment
____ Marital Status/ Number of Dependents	____ Marital Status/ Number of Dependents
____ Geographic Region	____ Geographic Region
____ Psychomotor Abilities	____ Psychomotor Abilities
____ Psychological Variables	____ Psychological Variables
____ Biographical Information	____ Biographical Information
____ Interests	____ Interests
____ Numerical Operations	____ Numerical Operations
____ Mathematical Knowledge	____ Mathematical Knowledge
____ Mechanical Comprehension	____ Mechanical Comprehension
____ General Science	____ General Science
____ Perceptual Speed and Accuracy	____ Perceptual Speed and Accuracy
____ General Information	____ General Information
____ Electronics Information	____ Electronics Information
____ Automotive Information	____ Automotive Information
____ Shop Information	____ Shop Information
____ Spatial Ability	____ Spatial Ability
____ Physical Fitness	____ Physical Fitness

Rank Order Record Sheet
Estimates for Below-Average Aptitude Army Personnel

Promotion

____ Education

____ Age at Enlistment

____ Marital Status/ Number of Dependents

____ Geographic Region

____ Psychomotor Abilities

____ Psychological Variables

____ Biographical Information

____ Interests

____ Numerical Operations

____ Mathematical Knowledge

____ Mechanical Comprehension

____ General Science

____ Perceptual Speed and Accuracy

____ General Information

____ Electronics Information

____ Automotive Information

____ Shop Information

____ Spatial Ability

____ Physical Fitness

Reenlistment Eligibility

____ Education

____ Age at Enlistment

____ Marital Status/ Number of Dependents

____ Geographic Region

____ Psychomotor Abilities

____ Psychological Variables

____ Biographical Information

____ Interests

____ Numerical Operations

____ Mathematical Knowledge

____ Mechanical Comprehension

____ General Science

____ Perceptual Speed and Accuracy

____ General Information

____ Electronics Information

____ Automotive Information

____ Shop Information

____ Spatial Ability

____ Physical Fitness

Appendix D

Initial and Incremental Validity Estimates
Tukey Tests of Aptitude by Criterion by Predictor Interactions

Table D-1
Tukey Tests of Aptitude by Criterion by Predictor Interactions
Initial Validity Estimates: Attrition

Predictor	CAT IIIB-IV	Predictor	CAT I-IIIA
Education	.340	Education	.293[a]
Biographical Information	.300[a]	Biographical Information	.280[a]
Psychological Variables	.283[a]	Psychological Variables	.280[a]
Interests	.253	Interests	.213[b]
Physical Fitness	.216	Physical Fitness	.190[bc]
Age at Enlistment	.197	Age at Enlistment	.186[c]
Marital Status/ Number of Dependents	.137	Marital Status/ Number of Dependents	.110[d]
Mathematical Knowledge	.110[b]	Spatial Ability	.096[de]
Spatial Ability	.106[bc]	Mechanical Comprehension	.095[de]
Electronics Information	.097[bcd]	Mathematical Knowledge	.090[de]
Mechanical Comprehension	.096[bcd]	Electronics Information	.087[de]
Psychomotor Abilities	.094[bcd]	Automotive Information	.083[e]
Perceptual Speed and Accuracy	.093[bcd]	General Information	.083[e]
Automotive Information	.090[bcd]	Psychomotor Abilities	.080[e]
Shop Information	.086[cd]	Perceptual Speed and Accuracy	.080[e]
General Information	.084[cd]	General Science	.077[e]
Numerical Operations	.084[cd]	Shop Information	.073[e]
General Science	.080[d]	Numerical Operations	.071[e]
Geographic Region	.047	Geographic Region	.037

Tukey = .0250, Alpha = .05, K = 38, MSE = 3.141, DFE = 755, N = 15

Note. Within-AFQT Category values with same letter not significantly different.
Significant differences between aptitude levels:

	CAT IIIB-IV	CAT I-IIIA
Education	.340	.293
Interests	.253	.213
Marital Status/ Number of Dependents	.137	.110

Table D-2
Tukey Tests of Aptitude by Criterion by Predictor Interactions
Initial Validity Estimates: SQT Score

Predictor	CAT IIIB-IV	Predictor	CAT I-IIIA
Mathematical Knowledge	.363	Mathematical Knowledge	.366
Mechanical Comprehension	.320[a]	Mechanical Comprehension	.316[a]
Numerical Operations	.306[ab]	Numerical Operations	.293[ab]
Spatial Ability	.300[ab]	Spatial Ability	.280[bc]
Education	.286[b]	Education	.263[cd]
General Science	.253[c]	General Science	.250[de]
Electronics Information	.240[cd]	Electronics Information	.230[ef]
Automotive Information	.236[cd]	General Information	.226[fg]
General Information	.226[de]	Automotive Information	.223[g]
Perceptual Speed and Accuracy	.213[e]	Perceptual Speed and Accuracy	.203[h]
Shop Information	.213[e]	Shop Information	.196[h]
Interests	.180[f]	Interests	.170[i]
Psychomotor Abilities	.163[f]	Psychomotor Abilities	.153[ij]
Biographical Information	.156[f]	Biographical Information	.150[ij]
Psychological Variables	.136	Psychological Variables	.136[ik]
Physical Fitness	.116[g]	Physical Fitness	.116[k]
Age at Enlistment	.097[g]	Age at Enlistment	.084
Geographic Region	.046[h]	Geographic Region	.036[l]
Marital Status/ Number of Dependents	.036[h]	Marital Status/ Number of Dependents	.030[l]

Tukey = .0250, Alpha = .05, K = 38, MSE = 3.141, DFE = 755, N = 15

Note. Within-AFQT category values with same letter not significantly different. No significant differences between aptitude levels.

Table D-3
Tukey Tests of Aptitude by Criterion by Predictor Interactions
Initial Validity Estimates: Promotion

Predictor	CAT IIIB-IV	Predictor	CAT I-IIIA
Education	.266[a]	Education	.246[a]
Physical Fitness	.260[a]	Physical Fitness	.246[a]
Psychological Variables	.233	Psychological Variables	.233[a]
Biographical Information	.193	Biographical Information	.186[b]
Interests	.186[b]	Interests	.166[bc]
Mathematical Knowledge	.180[b]	Mathematical Knowledge	.173[bc]
Mechanical Comprehension	.173[bc]	Mechanical Comprehension	.173[bc]
Spatial Ability	.156[cd]	General Information	.150[cd]
Age at Enlistment	.150[cde]	Spatial Ability	.140[d]
General Information	.146[de]	Age at Enlistment	.140[d]
General Science	.137[def]	General Science	.130[de]
Perceptual Speed and Accuracy	.136[def]	Perceptual Speed and Accuracy	.133[de]
Electronics Information	.133[def]	Electronics Information	.133[de]
Numerical Operations	.127[efg]	Numerical Operations	.130[de]
Automotive Information	.126[efg]	Automotive Information	.126[de]
Shop Information	.116[fg]	Shop Information	.116[ef]
Psychomotor Abilities	.106[g]	Psychomotor Abilities	.100[f]
Marital Status/ Number of Dependents	.080	Marital Status/ Number of Dependents	.073
Geographic Region	.040	Geographic Region	.023

Tukey = .0250, Alpha = .05, K = 38, MSE = 3.141, DFE = 755, N = 15

Note. Within-AFQT category values with same letter not significantly different. No significant differences between aptitude levels.

Table D-4
Tukey Tests of Aptitude by Criterion by Predictor Interactions
Initial Validity Estimates: Reenlistment Eligibility

Predictor	CAT IIIB-IV	Predictor	CAT I-IIIA
Education	.253	Education	.243[a]
Physical Fitness	.230	Physical Fitness	.226[a]
Psychological Variables	.200	Psychological Variables	.200
Biographical Information	.170[a]	Biographical Information	.166[b]
Interests	.156[ab]	Mathematical Knowledge	.150[bc]
Mathematical Knowledge	.154[ab]	Mechanical Comprehension	.143[bc]
Mechanical Comprehension	.134[bc]	Interests	.140[c]
General Information	.123[cd]	General Information	.130[cd]
Numerical Operations	.120[cd]	Numerical Operations	.123[cde]
Spatial Ability	.118[cde]	Spatial Ability	.114[def]
Age at Enlistment	.114[cdef]	Age at Enlistment	.110[defg]
General Science	.110[cdefg]	Electronics Information	.108[defgh]
Electronics Information	.108[defg]	General Science	.103[efgh]
Perceptual Speed and Accuracy	.100[defg]	Perceptual Speed and Accuracy	.100[efgh]
Automotive Information	.096[efg]	Automotive Information	.096[fgh]
Psychomotor Abilities	.090[fg]	Shop Information	.086[gh]
Marital Status/ Number of Dependents	.086[g]	Psychomotor Abilities	.083[h]
Shop Information	.086[g]	Marital Status/ Number of Dependents	.083[h]
Geographic Region	.033	Geographic Region	.030

Tukey = .0250, Alpha = .05, K = 38, MSE = 3.141, DFE = 755, N = 15

Note. Within-AFQT category values with same letter not significantly different. No significant differences between aptitude levels.

Table D-5
Tukey Tests of Aptitude by Criterion by Predictor Interactions
Incremental Validity Estimates: Attrition

Predictor	CAT IIIB-IV	Predictor	CAT I-IIIA
Biographical Information	.216[a]	Biographical Information	.196[a]
Psychological Variables	.210[ab]	Psychological Variables	.196[a]
Education	.196[bc]	Education	.173
Interests	.178[cd]	Physical Fitness	.136[b]
Physical Fitness	.160[d]	Interests	.134[b]
Age at Enlistment	.133	Age at Enlistment	.123
Marital Status/ Number of Dependents	.104	Marital Status/ Number of Dependents	.084
Psychomotor Abilities	.060[e]	Psychomotor Abilities	.047[c]
Spatial Ability	.053[ef]	Spatial Ability	.040[cd]
Perceptual Speed and Accuracy	.036[fg]	Mathematical Knowledge	.028[cde]
Numerical Operations	.033[gh]	Perceptual Speed and Accuracy	.026[de]
Mathematical Knowledge	.030[gh]	Numerical Operations	.023[de]
Automotive Information	.026[gh]	Automotive Information	.023[de]
Mechanical Comprehension	.023[h]	Electronics Information	.020[e]
Electronics Information	.023[h]	General Information	.020[e]
Shop Information	.023[h]	Geographic Region	.020[e]
General Information	.020[h]	Shop Information	.018[e]
Geographic Region	.020[h]	Mechanical Comprehension	.017[e]
General Science	.020[h]	General Science	.016[e]

Tukey = .0202, Alpha = .05, K = 38, MSE = 2.061, DFE = 756, N = 15

Note. Within-AFQT category values with same letter not significantly different.
Significant differences between aptitude levels:

	CAT IIIB-IV	CAT I-IIIA
Biographical Information	.216	.196
Education	.196	.173
Interests	.178	.134
Physical Fitness	.160	.136
Marital Status/Num Depend	.104	.084

Table D-6
Tukey Tests of Aptitude by Criterion by Predictor Interactions
Incremental Validity Estimates: SQT Score

Predictor	CAT IIIB-IV	Predictor	CAT I-IIIA
Education	.114[a]	Interests	.100[a]
Perceptual Speed and Accuracy	.110[ab]	Perceptual Speed and Accuracy	.096[ab]
Interests	.106[abc]	Spatial Ability	.093[abc]
Spatial Ability	.103[abc]	Education	.090[abcd]
Mechanical Comprehension	.093[bcd]	Mechanical Comprehension	.080[abcd]
Psychological Variables	.090[bcde]	Biographical Information	.076[bcde]
Biographical Information	.086[cde]	Psychological Variables	.073[cde]
Psychomotor Abilities	.082[de]	Electronics Information	.070[def]
Electronics Information	.073[def]	Mathematical Knowledge	.070[def]
Mathematical Knowledge	.070[efg]	Physical Fitness	.070[def]
Physical Fitness	.070[efg]	Psychomotor Abilities	.068[ef]
Automotive Information	.070[efg]	Automotive Information	.063[efg]
Shop Information	.066[fg]	Shop Information	.060[efg]
General Information	.056[fgh]	General Information	.050[fg]
Age at Enlistment	.053[fgh]	General Science	.046[g]
General Science	.050[gh]	Age at Enlistment	.043[g]
Numerical Operations	.043[h]	Numerical Operations	.043[g]
Marital Status/ Number of Dependents	.013[i]	Marital Status/ Number of Dependents	.013[h]
Geographic Region	.006[i]	Geographic Region	.006[h]

Tukey = .0202, Alpha = .05, K = 38, MSE = 2.061, DFE = 756, N = 15

Note. Values within AFQT category with same letter not significantly different.
Significant differences between aptitude levels:

	CAT IIIB-IV	CAT I-IIIA
Education	.114	.090
Perceptual Speed and Accuracy	.110	.096

Table D-7
Tukey Tests of Aptitude by Criterion by Predictor Interactions
Incremental Validity Estimates: Promotion

Predictor	CAT IIIB-IV	Predictor	CAT I-IIIA
Physical Fitness	.166[a]	Physical Fitness	.150[a]
Psychological Variables	.150[a]	Psychological Variables	.146[a]
Education	.114[b]	Biographical Information	.103[b]
Biographical Information	.110[b]	Education	.100[b]
Age at Enlistment	.103[b]	Age at Enlistment	.093[b]
Interests	.094[b]	Interests	.093[b]
Perceptual Speed and Accuracy	.056[c]	Perceptual Speed and Accuracy	.053[c]
Spatial Ability	.056[c]	Marital Status/	.053[c]
Marital Status/	.053[cd]	Number of Dependents	
Number of Dependents	.053[cd]	Spatial Ability	.040[cd]
Psychomotor Abilities	.042[cde]	Mechanical Comprehension	.034[d]
Mechanical Comprehension	.034[de]	Psychomotor Abilities	.032[d]
Mathematical Knowledge	.034[def]	Mathematical Knowledge	.030[de]
General Information	.033[def]	Automotive Information	.028[de]
Automotive Information	.031[ef]	General Information	.026[de]
Electronics Information	.028[ef]	Electronics Information	.024[de]
Shop Information	.028[ef]	Shop Information	.024[de]
General Science	.023[efg]	General Science	.023[def]
Numerical Operations	.016[fg]	Numerical Operations	.013[ef]
Geographic Region	.003[g]	Geographic Region	.003[f]

Tukey = .0202, Alpha = .05, K = 38, MSE = 2.061, DFE = 756, N = 15

Note. Within-AFQT category values with same letter not significantly different. No significant differences between aptitude levels.

Table D-8
Tukey Tests of Aptitude by Criterion by Predictor Interactions
Incremental Validity Estimates: Reenlistment Eligibility

Predictor	CAT IIIB-IV	Predictor	CAT I-IIIA
Physical Fitness	.156	Physical Fitness	.143
Psychological Variables	.130	Psychological Variables	.126
Education	.106[a]	Education	.103[a]
Biographical Information	.094[ab]	Biographical Information	.088[ab]
Interests	.081[b]	Interests	.081[b]
Age at Enlistment	.080[b]	Age at Enlistment	.080[b]
Marital Status/ Number of Dependents	.046[c]	Marital Status/ Number of Dependents	.050[c]
Spatial Ability	.043[c]	Perceptual Speed and Accuracy	.038[cd]
Perceptual Speed and Accuracy	.038[cd]	Spatial Ability	.036[cde]
Psychomotor Abilities	.033[cde]	Psychomotor Abilities	.030[cde]
Mathematical Knowledge	.033[cde]	Mathematical Knowledge	.030[cde]
General Information	.028[cde]	Mechanical Comprehension	.026[de]
Mechanical Comprehension	.026[cde]	General Information	.021[def]
Shop Information	.024[de]	Shop Information	.021[def]
Electronics Information	.023[def]	Electronics Information	.020[def]
Automotive Information	.020[def]	Automotive Information	.016[ef]
Numerical Operations	.016[ef]	Numerical Operations	.013[f]
General Science	.013[ef]	General Science	.013[f]
Geographic Region	.003[f]	Geographic Region	.003[f]

Tukey = .0202, Alpha = .05, K = 38, MSE = 2.061, DFE = 756, N = 15

Note. Within-AFQT category values with same letter not significantly different. No significant differences between aptitude levels.