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STUDY REPORT
CAA-SR-85-23

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EVALUATION OF THE MILITARY ENTRANCE PHYSICAL STRENGTH CAPACITY TEST (E-MEPSCAT)

OCTOBER 1985



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PREPARED BY
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10 MAR 1986

CSCA-FSP

SUBJECT: Evaluation of the Military Entrance Physical Strength Capacity
Test (E-MEPSCAT)

Deputy Chief of Staff for Personnel
Department of the Army
ATTN: DAPE-MPA
Washington, D.C. 20310-0300

1. Reference:

- a. Letter, HQDA, DAPE-MPA-CS, 12 June 1985, subject: Military Entrance Physical Strength Capacity Test (MEPSCAT) Evaluation, with enclosed study directive.
- b. Letter, U.S. Army Concepts Analysis Agency, CSCA-FSP, 27 November 1985, subject: Military Physical Strength Capacity Test (MEPSCAT) Evaluation.
- c. Letter, HQDA, DAPE-MPA-CS, 13 February 1986, subject: Evaluation of the Military Strength Capacity Test

2. The Deputy Chief of Staff for Personnel requested that the U.S. Army Concepts Analysis Agency do a study to evaluate the effectiveness of the MEPSCAT. The study examined the relationship between an individual's physical strength, measured through MEPSCAT, and those aspects of the soldier's duty environment in which physical strength capabilities could have an impact. The results are contained in this volume. In response to our request, your critique of this study effort is included at Appendix J.

3. This Agency expresses appreciation to all commands and agencies which have contributed to this product. Inquiries should be directed to the Chief, Personnel Systems Analysis Division (ATTN: CSCA-FSP), Force Systems Directorate, U.S. Army Concepts Analysis Agency, 8120 Woodmont Avenue, Bethesda, MD 20814-2797, AUTOVON 295-5289.

E. B. Vandiver III

E. B. VANDIVER III
Director



**EVALUATION OF THE MILITARY ENTRANCE
PHYSICAL STRENGTH CAPACITY TEST
(E-MEPSCAT)**

**STUDY
SUMMARY
CAA-SR-85-23**

THE REASON FOR PERFORMING THE STUDY was to evaluate the effectiveness of the Army's Military Entrance Physical Strength Capacity Test (MEPSCAT).

THE PRINCIPAL FINDINGS of this study are:

- (1) If MEPSCAT had been a mandatory selection requirement during 1984, the Army would have created a substantial shortfall in the moderately heavy category (required lift is 80 pounds) by rejecting 32 percent of the female accessions.
- (2) MEPSCAT did not predict female training completion in the heavy and very heavy categories (required lift 100 pounds and >100 pounds respectively). The male training attrition rate was significantly higher in the group that was unable to lift the required amount for all categories with sufficient data.
- (3) Based on the number of discharges found, there will never be enough data to analyze the medium and light categories (required lift is 50 pounds and 20 pounds respectively) for men.
- (4) The Physical Strength Test (PST), administered at the end of training, cannot be related to MEPSCAT weights lifted.
- (5) MOS migration during training is not related to physical strength.
- (6) Based on results of this study, a predictive model for determining cutoff scores for MOS selection can not be developed.
- (7) Differences in strength requirements between Army and Air Force are related to mission differences. Other services did not have data to analyze.

THE MAIN ASSUMPTIONS upon which this study was based are:

- (1) MOS have been clustered into the proper weight categories.
- (2) Results for an MOS with insufficient data would be the same as the category results.
- (3) The MEPSCAT was administered to all recruits under the same conditions.
- (4) Physical strength has an effect on all aspects of a soldier's duty environment.

THE PRINCIPAL LIMITATION of the study is that MEPSCAT has only been in effect on for a little over a year; therefore, data for all areas of interest for all MOS were not available.

BACKGROUND. The Army MEPSCAT program was implemented in January 1984 as a voluntary screening tool. Its purpose is to match prospective soldiers' strength capabilities to the physical demands of the MOS for which they are contracting. This study evaluated the effectiveness of the program during its first year of implementation. The sponsor will use results of the study to determine whether the program: (1) should continue as is; (2) should be changed to a mandatory selection requirement; or (3) should be eliminated from the enlistment qualification process.

THE SCOPE OF THE STUDY focused on analyzing amounts lifted on the MEPSCAT by gender and it considered enlisted personnel only. The study evaluated only those impact areas and MOS for which data had been collected and which were available to the study effort. Since data for individual MOS were limited, the study primarily focused on the five physical demand categories into which all MOS are classified. These classifications are light, medium, moderately heavy, heavy, and very heavy.

THE STUDY OBJECTIVES were to:

- (1) Develop quantitative evaluation procedures to measure effects of physical strength.
- (2) If it is not now available, determine the types of data to be collected to ascertain success of the program.
- (3) Develop a longitudinal data collection plan to support future evaluation.
- (4) Develop an initial predictive model of success, by MOS weight category, based on weight lifted on the MEPSCAT.
- (5) Determine how Army physical strength requirements compare to those of other services.

THE BASIC APPROACH was to determine what data were available and usable. Where appropriate information existed, a statistical analysis was performed. A statistical analysis was applied to the training attrition data. Other impact areas, such as MOS migration, enlistment, follow-on physical strength testing, and utilization, required an enumerative analysis. To compare Army physical standards with those of other Services, a review of appropriate regulations and other publications was made.

THE STUDY SPONSOR was the Deputy Chief of Staff for Personnel, who established the objectives and monitored study activities.

THE STUDY EFFORT was directed by Ms Sally J. Van Nostrand, Force Systems Directorate.

COMMENTS AND QUESTIONS may be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-FS, 8120 Woodmont Avenue, Bethesda, Maryland 20814-2797.

Tear-out copies of this synopsis are at back cover.

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STUDY SUMMARY (tear-out copies)

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EVALUATION OF THE MILITARY ENTRANCE PHYSICAL STRENGTH CAPACITY TEST (E-MEPSCAT)

CHAPTER 1

INTRODUCTION

1-1. STUDY PURPOSE. The purpose of this study was to provide the Deputy Chief of Staff for Personnel (DCSPER) with an initial evaluation of the Military Entrance Physical Strength Capacity Test (MEPSCAT). Results of the evaluation will be used to answer the following questions:

- How effective is MEPSCAT as a predictor of performance?
- What is its utility for the Army?

The study directive for this study is reproduced in Appendix B.

1-2. BACKGROUND. In 1981, Headquarters, Department of the Army (HQDA) established a Women in the Army Policy Review Group (WITAPRG) to evaluate policies and programs impacting on the successful employment of women. This group concluded that gender-free physical standards would reduce turbulence and enhance operational readiness, and that all soldiers would be physically capable of performing in their military occupational specialties (MOS). Therefore, the Army MEPSCAT was developed and subsequently implemented in January 1984. This mandatory physical test is taken at the Military Entrance Processing Station as part of the enlistment process. The test measures the dynamic lift capability of each individual on an incremental lift device. Each applicant begins lifting a 40-pound weight and continues to lift in 10-pound increments to his/her maximum capability. The lift device does not measure weights lifted under 40 pounds nor those over 110 pounds. The MEPSCAT results are used as a counseling tool to assist enlistees in selecting an MOS which matches their physical capabilities. All MOS are classified according to their major strength demands. There are five categories: light, medium, moderately heavy, heavy, and very heavy. The Department of Labor Occupational Classification methodology formed the basis for the Army's classification rationale. Although the MEPSCAT has been implemented, the attrition rate for first-term soldiers still appears high. The physical demands of Army jobs may be an important factor in this attrition. This may be particularly true if soldiers do not have the physical strength required by their jobs. Other areas that may be impacted by a mismatch between soldier strength and MOS requirements include enlistment, performance in training, MOS migration, malutilization or underutilization, reenlistment, and job satisfaction. However, there has not been any empirical investigation of the actual effects of the program.

1-3. PROBLEM. The specific issue being addressed is the effect of MEPSCAT on the Army. Should it:

- Continue to be administered as a counseling tool with voluntary MOS selection.
- Be introduced as a mandatory screening device.
- Be eliminated from enlistment testing.

To address MEPSCAT's effectiveness, it is necessary to determine whether physical strength is an important factor in the enlistment process, performance in training, MOS migration, malutilization or underutilization, attrition, reenlistment, or job satisfaction (to include harassment due to inability to perform the MOS tasks).

1-4. SCOPE

a. Although analyses for individual MOS are desired, this study clustered MOS as necessary to obtain sufficient data. Since specialty proponents and ODCSPER have already classified the MOS using the five categories defined by the WITAPRG, these categories were used for clustering the MOS.

b. Analyses were by amount lifted, by gender.

c. This study considered enlisted personnel only.

d. This study evaluated only those impact areas and only those MOS for which the data was collected and available.

e. This study did not intend to address impact on job satisfaction or harassment. These are inappropriate areas of study for CAA.

1-5. OBJECTIVES

a. Develop a quantitative evaluation procedure for measuring the impact of the MEPSCAT program. Areas in which a quantitative evaluation is required include enlistment, performance in training, MOS migration, utilization, attrition, and reenlistment.

b. Investigate available data sources to determine whether appropriate and sufficient data for the evaluation have been or are being collected.

c. Evaluate impact areas for which the data are available and develop an initial predictive model by MEPSCAT weight category. Data used for this evaluation will be provided to ODCSPER for use in the longitudinal data collection and analysis.

d. Assist ODCSPER in developing a data collection plan for those impact areas in which appropriate or sufficient data are not presently collected.

e. Compare Army physical strength capacity standards with those of other Services. Determine whether there are differences among the Services within the same occupational specialty or career management field.

1-6. ASSUMPTIONS

a. The five MOS categories of light, medium, moderately heavy, heavy, and very heavy are appropriate categories for this study, and the MOS have been clustered correctly.

b. An MOS that is not large enough to evaluate separately is assumed to have results similar to the MEPSCAT weight category to which it belongs.

c. The MEPSCAT was administered to all recruits under the same conditions.

d. Physical strength has an effect on all aspects of a soldier's duty environment.

1-7. LIMITATIONS. MEPSCAT has not been in place long enough to evaluate:

- First term attrition and migration.
- Utilization.
- Reenlistment.
- All MOS except as part of the weight category.

1-8. ESSENTIAL ELEMENTS OF ANALYSIS. Specific questions to be answered by this study are:

a. How would use of MEPSCAT results for mandatory MOS selection affect recruit rejection rates?

b. How important a factor is physical strength in training base attrition?

c. What is the relationship between the passes and failures on the Physical Strength Test and:

- The amount lifted on the MEPSCAT?
- MOS migration?

d. What is the impact of physical strength (or lack thereof) on MOS migration?

e. What significant differences in the strength requirements of similar specialties now exist among the military services?

CHAPTER 2

APPROACH

2-1. INTRODUCTION. This chapter describes the approach for evaluating the success of the MEPSCAT program. To test whether MEPSCAT has had an impact in the expected areas, an evaluation approach was developed for each. In order to assure that the evaluation was not unnecessarily constrained by the lack of appropriate data, the evaluation plan presented in this chapter was developed without regard to whether the data were already collected and available. Then, as data availability was ascertained, the plan was modified to show which analyses would be incorporated in this study and which will require a long-term effort. Data for some impact areas, e.g., enlistment, were available for this study. The results of these analyses are presented in Chapter 3. Other data will not be available for 2 to 3 years, e.g., reenlistment. A data collection plan has been developed for the data required for these longer term analyses and is described in Appendix D, Longitudinal Data Collection Plan.

2-2. EVALUATION PLAN. The purpose of this evaluation plan is to establish a systematic approach for the evaluation of the MEPSCAT program. An evaluation approach is developed for each of the areas of enlistment and MOS selection, performance in training, MOS migration, malutilization or underutilization, attrition during the first term, job satisfaction, harassment due to physical inability to perform the job, and reenlistment. Each area must be analyzed to determine whether the weight lifted during MEPSCAT has any relationship to it. The plan specifies the data that are required for each area, whether or not the data are available, and the statistical tests to be used. Each of the impact areas is addressed separately. Although separate analyses by MOS are desired, some of the MOS are so small that it would take many years to accumulate sufficient data. Therefore, all MOS are clustered into the five weight categories defined by the Women in the Army Policy Review Group (WITAPRG) in 1982. The analysis of the MEPSCAT category should be sufficient for an analysis of those small MOS. The MEPSCAT weight categories and the weight requirements are shown in Table 2-1.

Table 2-1. MEPSCAT Weight Categories

Category	Pounds lifted occasionally (≤20% of time)	Pounds lifted frequently (>20% of time)
Light	20	10
Medium	21-50	11-25
Moderately heavy	51-80	26-40
Heavy	81-100	41-50
Very heavy	>100	>50

2-3. ENLISTMENT AND MOS SELECTION

a. The assumptions used in the analysis of this impact area are:

(1) Many of the recruits have no MEPSCAT weight entered in the file; therefore, the number of recruits that have MEPSCAT scores is assumed a representative sample of the distribution required by MOS.

(2) The weights lifted by those recruits is representative of the actual capability distribution by MOS.

(3) Assignment to an MOS with a lighter requirement than the recruit's capability will not cause a performance problem.

b. **Total Enlistment.** In order to show the recruit physical qualifications, the actual MEPSCAT distribution by MOS will be computed on the sample. After summing the number of recruits who lifted each weight across all MOS, the recruits will be redistributed using weight lifted as the sole criteria. Redistribution will begin with the very heavy category and end with the light category; first priority for males is always the MOS that are closed to females.

(1) **Data Required.** Data are records from the Recruit Quota System (REQUEST) on each individual recruit which shows the weight lifted on the MEPSCAT, the recruit's gender, and the MOS selected. Data on all Army recruits from January 1984 through March 1985 will be adequate.

(2) **Use of Results.** If the redistribution shows that by using a mandatory system the Army would be able to retain all (or nearly all) of the recruits that were accepted, the analysis could continue with the next phase, MOS selection. However, if the results show a substantial shortfall

in one or more of the MEPSCAT weight categories, a further analysis by MOS will be impossible. This study will not be able to identify which specific MOSs within a category would be most affected by either a shortfall or a high rejection rate of a specific group of recruits.

c. **MOS Selection.** If the first redistribution which was based on physical criteria only (male for MOS closed to female, weight lifted) shows that mandatory use of MEPSCAT for MOS selection may be feasible, an expected distribution by MOS will be useful. This redistribution should include all criteria required for MOS selection such as mental category and aptitude area scores.

(1) **Data Required.** For the short term, only the data used for enlistment will be needed. In the longer term, the model developed by the project sponsored by the Army Research Institute for the Behavioral and Social Sciences (ARI) known as Project B should be modified to include physical strength capacity scores. In addition to data required for total enlistment, all data needed by Project B will be required for the long-term analysis.

(2) **Use of Results.** The short-term results will provide a picture in physical terms only (gender and lifting capability) of new recruits in each MOS or MEPSCAT weight category. The longer term results will show whether recruiting goals could still be met when all factors required for MOS selection are incorporated.

2-4. PERFORMANCE IN TRAINING

a. The assumptions necessary for this impact area analysis are:

(1) Recruits who were not discharged prior to the end of the training period are assumed to be successful.

(2) Recruits who are discharged during the training period are assumed to be failures.

(3) Performance on the Physical Strength Test (PST) will be analyzed, but success on the PST will not be required to be considered a success in training.

b. **Training Attrition.** In this analysis, each gender will be treated separately within each MEPSCAT weight category and within each MOS with sufficient data. Sufficient data will mean that there must be recruits who were unable to lift the required weight and within that group there must have been some discharges. Both the frequent lift weight and the occasional lift weight will be used to define the data sets with sufficient data. The data will be analyzed in two ways. The first is to determine whether there is more attrition from the unqualified group than from the other. The second analysis will determine whether there is a trend for the attrition to decrease as the physical strength increases.

(1) Within each data set, the trainees will be separated into two groups: (a) those who were able to lift the required weight (MEPSCAT successes); and (b) those who were not able to lift the required weight (MEPSCAT failures). Within each group, the ratio of number of trainees discharged to the total number will be computed. A one-sided statistical test of hypothesis will be used to compare the two ratios. From a practical standpoint, the Army is interested in evidence which shows that the MEPSCAT weight lifted is a good predictor of training success (not being discharged). This is indicated by a large positive difference when the MEPSCAT failure ratio is subtracted from the MEPSCAT success ratio. The mathematics of the statistical test used are described in Appendix E.

(2) To test the possibility that there may be a trend for the highest rate of attrition to be from the recruits who lifted the lightest weights and the lowest rate of attrition to be from those who lifted the heaviest weights without an actual dividing point at the weight specified for the MEPSCAT category, a regression analysis will be performed on all categories and subcategories with sufficient data. The percent attrition for each weight is computed, then assumed plotted on a graph. The t test is used to determine whether the slope of the line is significantly different from zero. For this analysis it is necessary that the category or subcategory have soldiers in all (or most) of the cells of the weight range i.e. in <40, 40, 50, 60, 70, 80, 90, and >90. Weights >90 were not separated in the data.

(3) **Data Required.** For each trainee, data on gender, training MOS, whether the trainee was discharged prior to training completion or not, and the weight lifted on the MEPSCAT will be required. Since some items of data will be from the Automated Control of Trainees (ACT) and the gender and MEPSCAT score will be from REQUEST, the social security number (SSAN) will be required from both systems to use as the matching field.

(4) **Use of Results.** Finding that the MEPSCAT weight is a good predictor of training success would provide impetus for mandatory use of MEPSCAT for MOS selection. If MEPSCAT is not a good predictor of training success, it is not necessarily true that MEPSCAT is not worthwhile, but these results will not be particularly useful in making the decision to continue MEPSCAT. During this study, there should be enough data to analyze each MEPSCAT weight category and some of the larger MOS within each. If some MOS differ from the MEPSCAT category, then another effort concentrating on additional MOSs may be necessary.

c. **Physical Strength Test (PST).** The Physical Strength Test is administered to each soldier toward the end of training. It was designed to show that soldiers are physically capable of performing the task that placed the MOS in the documented weight category. The PST is currently administered on a pass (GO) or fail (NO-GO) basis. Passing the PST is not a requirement for graduation. Prior to an analysis of the PST results, it is necessary to ensure that at least face-validity exists, i.e., the PST seems to require the soldier to perform the same task as was documented on the Physical Demands Analysis (PDA). The validation of the PSTs as

description and the Physical Demands Analysis (PDA) will be administratively compared. If the PSTs seem to match the PDAs, the relationship of the results of the physical strength tests to the MEPSCAT score and the relationship of the PST results to MOS migration will be measured by a comparative analysis. First, to determine whether the MEPSCAT score is a valid predictor of PST success, the physical attributes (gender and MEPSCAT score) of the GOs will be compared with the NO-GOs using the statistical test described for training attrition. Next, the trainees who migrate to another MOS will be compared with those who failed the PST to determine whether there is any relationship.

(1) **Assumptions.** The assumptions used in this impact area analysis are:

(a) The strength demands of the MOS have been correctly documented on the PDA.

(b) Successful completion of a physically demanding MOS task is related to training success and to performance on the job.

(c) Face-validity is a necessary requirement for further analysis.

(2) **Data Required.** For the short-term analysis, descriptions of the PST and the PDA for each MOS with an indication of GO or NO-GO for all trainees will be required. Social security number is required to match with automated files to determine MEPSCAT score and migration. GO scores as well as NO-GOs are required to assure that trainees are not incorrectly categorized as GOs. If face-validity does not exist, a long-term analysis which includes a complete redefinition of PST procedures, and PST development will be required.

(3) **Use of Results.** A positive relationship between soldiers' performance on the PST and the MEPSCAT weights, or a positive relationship between PST failures and migration to an MOS in a lighter category will provide ODCSPER with additional assurance that the MEPSCAT may be related to soldiers' job performance. However, no relationship or a negative relationship will not imply that the MEPSCAT score is not a predictor of job performance. This outcome could be a result of an incorrect weight categorization of the MOS, an incorrect procedure used for the development of the PSTs, or an invalid assumption of a correlation between PST performance and job performance.

2-5. MOS MIGRATION. MOS migration will be defined as soldiers receiving different MOSs from that in which they originally enlisted. This can occur during training or during the first term prior to the reenlistment point.

a. **Assumptions.** The assumptions used in this analysis are:

(1) MOS migrations are caused by soldiers' failures to successfully perform the tasks of the original MOS.

(2) MOS migrations caused by deleting an MOS should not be considered in this analysis.

b. MOS Migration During Training. In this analysis, each MEPSCAT weight category will be treated separately to determine the amount of migration within that category. Within each data set, the trainees will be separated into four groups: (1) Those who remained in their MOS; (2) those who changed to a lighter category MOS; (3) those who changed to an MOS in the same weight category; and (4) those who changed to an MOS in a heavier weight category. Within each weight category, the proportion of soldiers who migrate to a lighter MOS will be evaluated for statistical significance. This will be a short-term analysis.

c. Migration During the First Term. Those personnel who migrate to a different MOS during their first term will be analyzed to determine if there is a trend towards migrating to MOS that require lighter physical capabilities. The analysis will be similar to that performed for MOS migration during training but cannot be performed during the short-term phase. All soldiers must first complete their first term.

d. Data Required. For the short-term analysis of migration during training, the data required for each trainee is gender, enlistment MOS, MOS awarded upon completion of training, and the MEPSCAT weight lifted. Portions of the data are contained in both the ACT and REQUEST data bases. The social security number will be needed from both systems to use as the matching field. Finding that MOS migration is a problem in training would indicate that it could also be a problem during the first term. This long-term effort would require that data be collected for those individuals who migrate during their first term. Data required are the original MOS, new MOS, and the social security number for matching with the existing data to determine the MEPSCAT weight.

2-6. MALUTILIZATION OR UNDERUTILIZATION. The Army is interested in whether soldiers are malutilized or underutilized when they are physically incapable of performing their MOS tasks. The first question that must be answered is whether soldiers who cannot lift the amount specified for their MOS are actually performing different tasks than are the others. If tasks performed are different only because of differences related to assignment location or type of unit, then the only question is whether particular locations or unit types are mal- or underutilizing their soldiers. If the tasks performed are different within the same type of unit and location or major command, the question of whether that difference is mal- or underutilization is a policy determination. Hereinafter, this impact area will be referred to as utilization.

a. Physical Capacity by Gender. Previous research by civilian and defense organizations in the physical strength capacity area has shown that the median maximum lift for female recruits is about one-half of the male recruit median maximum lift of about 135 pounds and that there is very little overlap in the weightlifting capacity distributions by gender.

Since most females lift less than 80 pounds, females will be treated as the group who are unable to lift the required amount in all MOS which require a lift of 80 pounds or more.

b. Army Occupational Surveys. The Army Occupational Survey Program (AOSP) of the Soldier Support Center-National Capital Region (SSC-NCR) provides specialty proponents with information needed for conducting job and training analysis. Data provided by the AOSP are used for developing training and training evaluation programs, and for personnel management. An example of the questionnaire for relative time spent for MOS 63B, Light-Wheel Vehicle Mechanic, is at Figure 2-1. Recent AOSP surveys will be reviewed to determine whether all soldiers are performing the same tasks and duties within an MOS. Selected MOS from each physical demand category will be examined. If disparities exist in the tasks performed, MOS proponents may be required to conduct a physical demands analysis to determine the weight categories of individual tasks. The major problem that will be encountered with this approach is that the low density of women in many MOS will not provide a large enough sample unless an intentional oversampling of women is performed. SSC-NCR recently surveyed Military Police, MOS 95B and oversampled females in order to provide gender analyses. This MOS will be included in the short-term analysis. A possible long-term analysis could include grouping data on common soldier tasks from all MOS in each weight category. This should provide a large enough sample to partition it by unit type and location or major command.

c. Assumptions. The assumptions used in this impact area are:

- (1) Females can be classified as light lifters and males as the heavy lifters.
- (2) Enough females can be surveyed from each MOS to generate a sample for analysis.
- (3) A statistical computation of significance of between gender percentages of tasks performed is not required.

d. Data Required. Printed outputs from recent survey data will be provided by SSC-NCR for the short-term analysis. For the long-term analysis, ODCSPER can task SSC-NCR to oversample females as necessary to perform routine analyses of gender differences and to notify ODCSPER when significant differences exist. A one time analysis that SSC-NCR could provide is the analysis of common soldier tasks by weight category, type of unit and location or major command. Since SSC-NCR frequently surveys supervisors using MOS task lists, an additional supervisor survey to determine whether males and females are assigned to the same tasks and why could be created and administered for a few MOS. It should not become a standard requirement unless the results provide useful information.

IF YOU DON'T DO IT - DON'T RATE IT!

SECTION II - TASKS

A - LIGHT WHEEL VEHICLE ENGINE MAINTENANCE

- 001 TROUBLESHOOT ENGINE MALFUNCTIONS
- 002 INSPECT ENGINE OIL PAN
- 003 INSPECT ENGINE EXPANSION PLUGS
- 004 INSPECT ENGINE ROCKER ARM GASKETS
- 005 SERVICE ENGINE CRANKCASE BREATHER ELEMENT
- 006 SERVICE ENGINE ASSEMBLY
- 007 ADJUST ENGINE ROCKER ARM VALVE CLEARANCE
- 008 ADJUST IGNITION TIMING
- 009 REPLACE ENGINE OIL
- 010 REPLACE ENGINE OIL FILTER/OIL FILTER ELEMENT
- 011 REPLACE ENGINE OIL DIPSTICK
- 012 REPLACE ENGINE OIL COOLER
- 013 REPLACE ENGINE CRANKCASE BREATHER ELEMENT/ SHUTOFF VALVES
- 014 POWER TEST FAULT ISOLATION USING SIMPLIFIED TEST EQUIPMENT FOR INTERNAL COMBUSTION ENGINE (STE/ICE)

B - LIGHT WHEEL VEHICLE POWER TRAIN MAINTENANCE

- 015 TROUBLESHOOT CLUTCH MALFUNCTIONS
- 016 ADJUST CLUTCH PEDAL FREE TRAVEL
- 017 ADJUST CLUTCH CONTROLS AND LINKAGES
- 018 REPAIR CLUTCH CONTROL LINKAGE
- 019 REPLACE CLUTCH LINKAGES
- 020 TEST OPERATE CLUTCH
- 021 TROUBLESHOOT TRANSMISSION MALFUNCTIONS
- 022 TROUBLESHOOT TRANSFER ASSEMBLY MALFUNCTIONS
- 023 INSPECT TRANSMISSION ASSEMBLY
- 024 INSPECT TRANSFER ASSEMBLY
- 025 ADJUST TRANSMISSION CONTROLS/LINKAGES
- 026 SERVICE AUTOMATIC TRANSMISSION ASSEMBLY

RELATIVE TIME SPENT

- 1 - VERY MUCH BELOW AVERAGE
- 2 - BELOW AVERAGE
- 3 - SLIGHTLY BELOW AVERAGE
- 4 - AVERAGE TIME SPENT
- 5 - SLIGHTLY ABOVE AVERAGE
- 6 - ABOVE AVERAGE
- 7 - VERY MUCH ABOVE AVERAGE

Figure 2-1. Relative Time Spent Sample Questions

e. Use of Results. Finding that there is a major disparity between the jobs that men and women perform is not necessarily a clear indication of the strength required to do the job. Many factors such as whether the soldier's unit is a table of organization and equipment (TOE) unit or whether it is a table of distribution and allowances (TDA) unit, the geographic location of the unit and the major command (MACOM) assigned influence the jobs people do. Proponents may want to closely monitor when differences are occurring and take corrective action to eliminate unexplained discrepancies. Since occupational survey data is already routinely provided to proponents, very little additional effort should be involved.

2-7. ATTRITION DURING THE FIRST TERM. Attrition during the first term will be defined as during the period from the time the soldier completes training and is awarded an MOS up to the point of reenlistment or normal separation. First-term attrition rates will be determined by collecting data from the Enlisted Master File for personnel who left the service without completing their enlistment contract. A coding system and reporting method must be established that indicates when physical strength was either the major factor or a contributing factor to the discharge. The attrition will be analyzed using the same method previously discussed for training attrition. This impact area is necessarily a long-term analysis effort.

a. Assumption. The assumption for this impact area is that soldiers discharged during the first term were unsuccessful in their job performance.

b. Data Required. The data required are social security number, name, type of discharge, and code or reason for separation (i.e., desertion, death, etc., to include the coding for the physical strength factor). The social security number is required to serve as the matching field to determine the MEPSCAT scores.

c. Use of Results. Finding that the MEPSCAT score is a good predictor of attrition during the first term would provide impetus for mandatory use of MEPSCAT. The results of the performance in training and training attrition will serve as an indication of whether this long-term analysis would provide useful information.

2-8. JOB SATISFACTION. Although job satisfaction is not within the scope of this study, it will be considered for the long-term study effort. Job satisfaction questions are included in the questionnaires for the Army Occupational Survey Program. The surveys do not currently have questions specifically linking job satisfaction with the ability to meet the physical demands of the MOS. Additional questions which will enable relating job satisfaction to physical capability to perform in the MOS should be added to the occupational surveys. The long-term analysis will compare the frequencies of the job satisfaction responses to those pertaining to physical strength. In order to apply to all MOS, the responses may be clustered according to the MOS weight categories. Figure 2-2 is a sample of job satisfaction questions currently in the surveys.

INSTRUCTIONS FOR SECTION V - JOB SATISFACTION/RETENTION

JOB SATISFACTION

- Read items 001-055 and rate them in terms of your SATISFACTION based on your current job and/or military life using the following scale:

1. Extremely dissatisfied
2. Very dissatisfied
3. Moderately dissatisfied
4. Neither dissatisfied nor satisfied
5. Moderately satisfied
6. Very satisfied
7. Extremely satisfied

- Record your answers beginning with item 001 on page 19 in the Answer Booklet.

-
- 001 NUMBER OF HOURS YOU WORK PER WEEK FOR THE ARMY
 - 002 ATTENTION GIVEN TO SAFETY IN YOUR WORK ENVIRONMENT
 - 003 HOW WELL YOUR ARMY JOB PROVIDES WHAT YOU WANT FROM A JOB
 - 004 CHANCE TO RECEIVE COMMUNITY RECOGNITION FOR YOUR WORK
 - 005 CHALLENGE PROVIDED BY YOUR WORK
 - 006 OPPORTUNITY TO DO WHAT YOU ARE AUTHORIZED TO DO AT WORK
 - 007 EXTENT TO WHICH YOU ARE "ACCEPTED" BY YOUR CO-WORKERS
 - 008 AMOUNT OF TIME YOU SPEND WAITING FOR NEEDED TOOLS OR EQUIPMENT
 - 009 FAIRNESS WITH WHICH DISCIPLINARY ACTION IS TAKEN IN YOUR UNIT
 - 010 MORAL SUPPORT YOU RECEIVE FROM YOUR CO-WORKERS
 - 011 CHANCE TO BE RESPONSIBLE FOR YOUR OWN WORK
 - 012 MONEY YOU SAVE BY HAVING COMMISSARY PRIVILEGES
 - 013 SERVICEMAN'S GROUP LIFE INSURANCE (SGLI) PROGRAM
 - 014 AVAILABILITY OF ON-POST TRANSPORTATION
 - 015 HOW OFTEN YOUR WORK CHANGES BECAUSE OF NEW PROCEDURES
 - 016 OPPORTUNITY TO SEE THE RESULTS OF YOUR WORK
 - 017 FEELINGS YOU GET FROM WEARING THE ARMY UNIFORM
 - 018 AMOUNT OF DMOS-RELATED WORK YOU HAVE TO DO
 - 019 AMOUNT OF SELF RESPECT YOU GET FROM PERFORMING YOUR DUTIES
 - 020 SERVING YOUR COUNTRY THROUGH ARMY SERVICE
 - 021 CHANCE TO WORK WITH OTHERS AS PART OF A TEAM

Figure 2-2. Job Satisfaction Sample Questions

a. **Assumptions.** The assumptions for this impact area are:

- (1) Females may be used as light lifters and males as heavy lifters.
- (2) Although job satisfaction is dependent upon command organizational climate, that climate is similar in all units.
- (3) Job satisfaction is directly related to the ability to perform all MOS tasks.

b. **Data Required.** Job satisfaction data, separated by unit type (TOE and TDA), MACOM or geographic area compared by gender using the Comprehensive Occupational Data Analysis Program (CODAP) will be used. Selected MOS and all MOS clustered by weight category will be required.

c. **Use of Results.** If MEPSCAT is a valid predictor of success, one would expect that there would be a high percentage of positive responses on both the general job satisfaction questions and feelings of having sufficient physical capabilities questions, or a high percentage of negative responses on both. The usefulness of this information could be questioned. If soldiers are not satisfied with their jobs (for whatever reason), but their performance is as good as those who are satisfied, their attrition rate is no higher, and their reenlistment rate is not significantly less, then the collection and analysis of this data would seem to be for general interest only, not for use in any policy determination.

2-9. **HARASSMENT.** Because of the time required to create, administer and analyze a new questionnaire, harassment can only be considered as a portion of the long-term study effort. Harassment is briefly mentioned in the Retention portion of SSC-NCR's Army Occupational Survey Program (see Figure 2-3, item 057). Additional questions pertaining to types of harassment encountered that are not specifically related to retention will permit an analysis of its relationship to physical capabilities. In order to apply to all MOS, responses to the harassment questions will be clustered according to the weight requirements.

a. **Assumptions.** The assumptions for this impact area are:

- (1) Females may be used as light lifters and males as heavy lifters.
- (2) Responses to harassment questions are not biased by the implied decision on retention.

b. **Data Required.** Responses to new items on physical strength in a section on harassment that is separate from retention should be added to the occupational surveys. Enough soldiers should be surveyed to provide adequate samples of both genders when the data are separated by unit type, MACOM, and geographic area. If new items are the same for all MOS, then they may be clustered into the five weight categories to provide adequate samples.

RETENTION

- If you definitely plan to separate or retire, answer items 056-084.
- If you definitely plan to reenlist, answer items 085-106 beginning on page 53.
- If you have no definite separation, retirement or reenlistment plans, SKIP to Section VI on page 54.

SEPARATION/RETIREMENT REASONS

- Read items 056-084 and rate them in terms of IMPORTANCE to your decision to DEFINITELY SEPARATE or RETIRE using the following scale:
 1. Not important
 2. Of little importance
 3. Somewhat important
 4. Moderately important
 5. Quite important
 6. Very important
 7. Extremely important
- Record your answers beginning with item 056 on page 19 of the Answer Booklet.

056	COMMISSARY PRIVILEGES
057	AMOUNT OF HARASSMENT IN THE ARMY
058	DENTAL CARE PROVIDED "YOUR DEPENDENTS" BY THE ARMY
059	DENTAL CARE PROVIDED "YOU" BY THE ARMY
060	TO USE GI BILL EDUCATIONAL BENEFITS
061	TO USE POST-VIETNAM VETERAN'S EDUCATIONAL ASSISTANCE PROGRAM
062	MEDICAL CARE PROVIDED "YOUR DEPENDENTS" BY THE ARMY
063	MEDICAL CARE PROVIDED "YOU" BY THE ARMY
064	YOUR LIVING CONDITIONS (HOUSING/BARRACKS)
065	FREQUENT OVERSEAS OR ISOLATED ASSIGNMENTS
066	POOR MORALE IN YOUR UNIT
067	PLACED ON OVERSEAS LEVY (OVERSEAS ORDERS)
068	PEOPLE FOR WHOM YOU WORK
069	FREQUENCY OF FAMILY SEPARATIONS DUE TO YOUR ARMY ASSIGNMENTS
070	PEOPLE WITH WHOM YOU MUST ASSOCIATE
071	ATTITUDE OF YOUR WIFE/HUSBAND TOWARD YOUR REENLISTING
072	YOUR CHANCES FOR PROMOTION
073	AMOUNT OF "BUSY WORK" YOU MUST DO

Figure 2-3. Retention Sample Questions

c. **Use of Results.** If limited physical capabilities are a major factor in harassment, then mandatory use of MEPSCAT should lessen this problem.

2-10. REENLISTMENT. Since the test was instituted in January 1984 and the minimum enlistment period is two years, reenlistment has been identified as a long-term analysis effort. Reenlistment data for the period January 1986 through March 1989 will be required. When soldiers reenlist in a different MOS, original MEPSCAT scores will be used to determine if the individual met the requirements for both the enlistment and reenlistment MOS. Questions that will influence reenlistment in another MOS are: does the old MOS have a bonus; does the new MOS have a bonus; was the old MOS balanced or over strength; and was reenlistment into a new MOS mandatory? If large enough sample sizes can be found after discarding data for soldiers who changed to a MOS that has an enlistment bonus and after discarding data for soldiers who were required to reenlist in a different MOS because of imbalances in the old MOS, the physical strength of those who reenlist will be compared with those who do not reenlist. It will probably be necessary to cluster the data by weight categories for the analysis. In addition to actual reenlistments, some insight could be gained by adding questions pertaining to physical strength in the Retention section of SSC-NCR's Army occupational surveys. The responses could be used as an indicator of whether physical strength is an important factor in deciding to reenlist for the same or a new MOS.

a. **Assumptions**

- (1) All individuals have the opportunity to reenlist.
- (2) Unless precluded by DA policy, personnel can reenlist for any MOS.
- (3) Records of bonus programs, mandatory requirements to change MOS at reenlistment, etc., can be furnished.

b. **Data Required.** The data required are social security number, enlistment MOS, reenlistment MOS, and answers to the questions: was the enlistment MOS balanced or over strength, was reenlistment to a new MOS mandatory, does either or both of the MOS have a bonus (and the amount of bonus the individual received)? Data will be from a combination of the Enlisted Master File (EMF), REQUEST, ACT and ODCSPER.

c. **Use of Results.** One would expect that a majority of personnel would reenlist for their current MOS. If not, factors such as reenlistment bonuses and over strength MOS may be more significant influences on the reenlistment process than is physical strength.

CHAPTER 3

RESULTS

3-1. INTRODUCTION. This chapter describes the results of the analyses of the available MEPSCAT data. Data were available for the areas of enlistment and MOS selection, performance in training, MOS migration during training, and utilization (determination of mal- and underutilization is a policy decision). In addition, some data that had been collected by SSC-NCR, Occupational Survey Branch, on harassment and job satisfaction are presented.

3-2. AVAILABLE DATA. For these analyses, data were furnished by SSC-NCR, ODCSPER, and MILPERCEN.

a. Recruit Data. The records of all soldiers who were entered into the Recruit Quota System (REQUEST) between January 1984 and March 1985 were extracted for this analysis. These records were subdivided into separate files for each entry level MOS and into an extra set of five files, one for each MEPSCAT weight category. Since many of the recruits did not take the MEPSCAT, all records with no weight recorded were dropped from the analysis.

b. Training Data. The records of all soldiers who entered initial training during the same period of January 1984 through March 1985 were furnished from the Automated Control of Trainee (ACT). In order to attach the MEPSCAT score to the training data, records from both REQUEST and ACT were matched on social security number. Since soldiers may have selected their MOS several months prior to entering training, the trainees in the ACT file did not always have REQUEST records, and vice versa. A summary of the records from both systems and the results of the matching process is in Table 3-1. A listing of number of matched records with discharge data that were available for analysis by MOS is shown in Appendix F, Tables F-1 through F-10.

Table 3-1. Recruit and Training Data

Data source	Number of records	Number of females	Number of males
REQUEST	109,473	12,417	97,056
REQUEST with valid MEPSCAT	84,207	10,347	73,860
Matched REQUEST and ACT	60,965	8,331	52,634

c. **Utilization Data.** For MOS surveyed within the past 2 years which had a large enough sample of returns from women, SSC-NCR furnished printed reports showing tasks performed by all soldiers and percent of time spent, tasks performed more often by each gender and the percentages for each, samples of the questionnaire booklets, and other examples of CODAP reports available. The study team selected one MOS from each weight category for use as examples in this report. No data were available for any MOS in the heavy category. MOS for which data were examined were:

- (1) **Light.** MOS 75E, Personnel Actions Specialist.
- (2) **Medium.** MOS 96B, Intelligence Analyst.
- (3) **Moderately Heavy.** MOS 95B, Military Police.
- (4) **Very Heavy.** 76Y, Unit Supply Specialist.

3-3. ENLISTMENT AND MOS SELECTION. All records from the REQUEST data file which had a valid MEPSCAT score were used for this analysis.

a. **Actual MEPSCAT Distribution.** Table 3-2 displays the distribution of MEPSCAT scores for males in each weight category from the REQUEST data. Table 3-3 displays the REQUEST data distribution of MEPSCAT scores for females. As in the data received, weights less than 40 pounds are clustered and shown as <40, and weights greater than 90 pounds are clustered and shown as >90. Figure 3-1 portrays the total, final matched sample by weight lifted and gender. The graphical representations of the distributions in the matched data set of REQUEST and ACT files, by MEPSCAT category, are in Appendix F, Figures F-1 through F-5. Figure 3-1 shows that the majority of males lifted at least as much as the largest weight measured in this data; previous research has shown that the lift capacities of both genders is a normal distribution with the male capacity (mean around 135 pounds) being much greater than that of the females. Table 3-4 shows the male and female recruits grouped by qualified and not qualified for the weight required for the frequent lifts. Note that the male sample size of not qualified in every weight category is very small, zero in most cases. The amount required for frequent lift was discarded for use as a possible predictor of success in the Army. Table 3-5 is similar to the previous table, with the exception that the pounds required is now the number required for an occasional lift. Since the required lift is given as a range, the weight used as the criteria for this analysis was the maximum. For example, 80 pounds was used as the criteria for qualified for the moderately heavy category on the occasional lift. As can be seen from these data, the two lightest categories for males, and the light category for females, cannot be analyzed. In the rest of the data analysis, these categories will not be discussed.

Table 3-2. REQUEST Distribution by MEPSCAT Category (male)

Category	<40	40	50	60	70	80	90	>90	Total
Light	0	0	0	6	32	31	76	1,045	1,190
Medium	0	0	1	2	35	48	76	1,149	1,311
Moderately heavy	0	11	13	33	198	356	717	11,169	12,497
Heavy	0	2	1	5	27	227	444	6,384	7,090
Very heavy	2	9	19	46	299	1,653	3,277	46,467	51,772
Totals	2	22	34	92	591	2,315	4,590	66,214	73,860

Table 3-3. REQUEST Distribution by MEPSCAT Category (female)

Category	<40	40	50	60	70	80	90	>90	Total
Light	15	125	323	570	413	139	43	42	1,670
Medium	20	120	343	560	428	117	39	31	1,658
Moderately heavy	34	245	655	1,215	966	400	124	120	3,759
Heavy	20	40	170	243	204	125	51	56	909
Very heavy	39	118	432	628	520	364	118	132	2,351
Totals	128	648	1,923	3,216	2,531	1,145	375	381	10,347

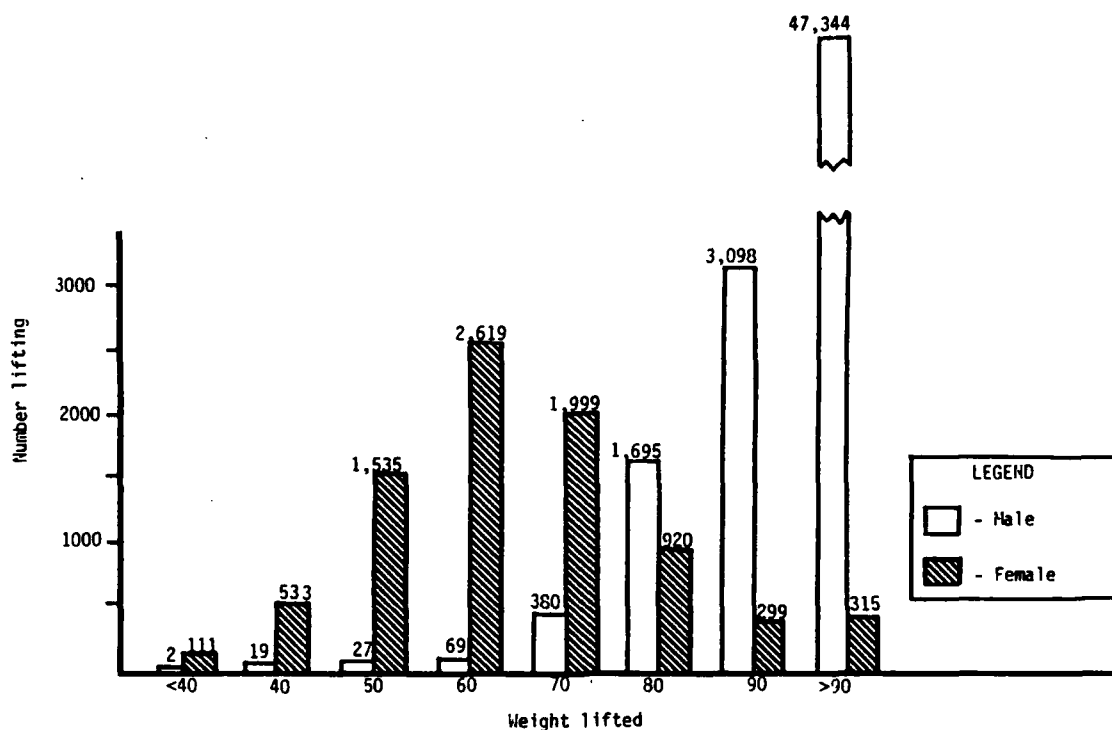


Figure 3-1. Distribution of Matched REQUEST and ACT Data

Table 3-4. Accession Qualifications Using Frequent Lift

Category	Pounds required	Qualified		Not qualified		Total
		Male	Female	Male	Female	
Light	10	1,190	1,670	0	0	2,860
Medium	25	1,311	1,658	0	0	2,969
Moderately heavy	40	12,497	3,725	0	34	16,256
Heavy	50	7,088	849	2	60	7,999
Very heavy	>50	51,742	1,762	30	589	54,123
Totals		73,828	9,664	32	683	84,207

Table 3-5. Accession Qualifications Using Occasional Lift

Category	Pounds required	Qualified ^a		Not qualified		Total
		Male	Female	Male	Female	
Light	20	1,190	1,670	0	0	2,860
Medium	50	1,311	1,518	0	140	2,969
Moderately heavy	80	12,242	644	255	3,115	16,256
Heavy	100	6,384	56	706	853	7,999
Very heavy	>100	46,467	132	5,305	2,219	54,123
Totals		67,594	4,020	6,266	6,327	84,207

^aSince all lifts of 100 pounds and greater were grouped in the data provided, all personnel in that group were counted as qualified in the very heavy category.

b. Redistribution. The first step in the redistribution was to total, by category, all the requirements in MOS that are closed to females because of probability of combat. Redistribution started with the most stringent qualifications, the very heavy category, and continued down to the light category. Closed MOS in each category were filled with qualified males first, and then the remainder of the category was filled with qualified males and females. When there were no more qualified recruits, the shortfall was identified, and redistribution moved to the next category.

(1) **Redistribution Using Occasional Lift Criteria.** Table 3-6 displays the results using the stated requirements. Figures 3-2 and 3-3 show before and after the redistribution in graphical form. According to this redistribution, there would be very few females in either of the heavy or very heavy categories, and the light category would be less than 1 percent males. The major problem is that there is a shortfall of 3,358 soldiers. Although the shortfall is only 4 percent of the total recruit population, it is the equivalent of 33 percent of the female recruits. Since the shortfall falls in the moderately heavy category due to the inability of the majority of females to lift 80 pounds, it is expected that most of the shortfall would be from the female population.

(2) **Redistribution Using Modified Occasional Lift Criteria.** Since previous research has shown that females gain an average of 13 percent in their lifting ability during training, the recruits were again redistributed, assuming that the criteria for the moderately heavy category was only 70 pounds. The shortfall again fell in the moderately heavy category, but the size of the shortfall was only 258 soldiers, probably females.

Table 3-6. Redistribution Using Occasional Lift

MEPSCAT category	Male			Female		Total N
	Closed MOS N	Other MOS N	Percent	N	Percent	
Light	0	24	.8	2,836	99.2	2,860
Medium	0	717	24.1	2,252	75.9	2,969
Moderately heavy ^a	35	11,343	88.2	1,520	11.8	12,898
Heavy	221	7,588	97.6	190	2.4	7,999
Very heavy	30,988	22,944	99.6	191	.4	54,123
Totals	31,244	42,616	91.4	6,989	8.6	80,849

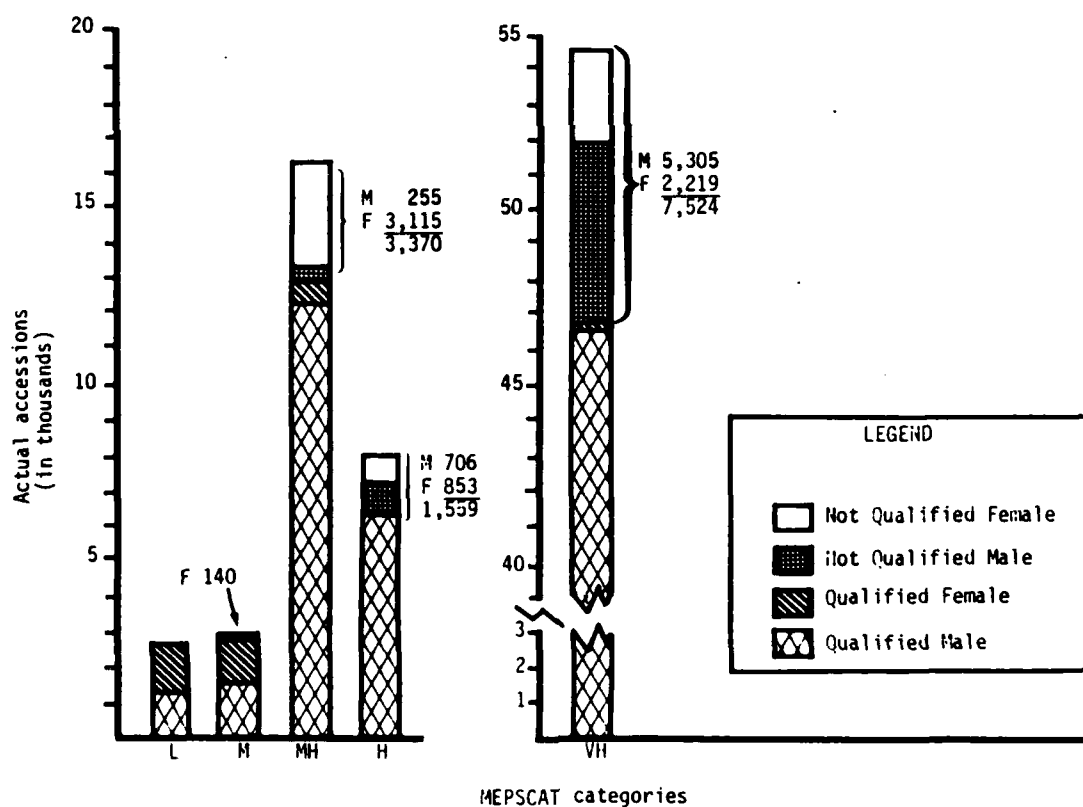
^aShortfall = 3,358

Figure 3-2. Actual Distribution by Category

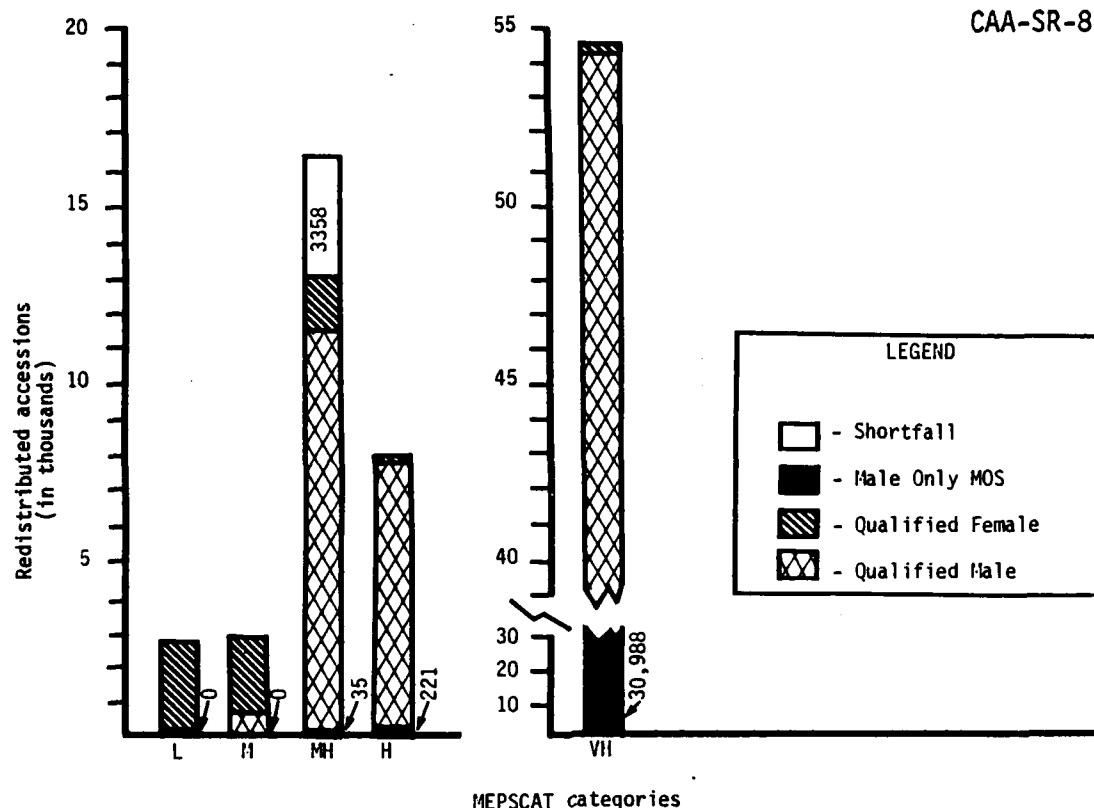


Figure 3-3. Redistribution by Category

(3) **Additional Expected Shortfalls.** There are many positions in the medium and light categories which are closed to females through combat probability coding. Although that number was not part of this analysis, it is expected that a much larger percentage of the medium and light categories would have to be male to assure that enough males were in the population to fill the combat probable positions. Each of these additional males would have been from one of the heavier categories, leaving an additional shortfall in the female population. Furthermore, it must be assumed that some unknown percentage of these recruits, both male and female, would have been lost to the Army if they had been forced into a different MOS. Finally, it is possible that additional shortfalls would be identified when the physical strength criteria are combined with other established criteria, such as Armed Services Vocational Aptitude Battery (ASVAB) scores.

3-4. PERFORMANCE IN TRAINING. As specified in the evaluation plan, completion of training is a surrogate for training success. Training attrition analyses used the matched ACT and REQUEST data. Records in the ACT file indicated whether the person was discharged under the Trainee Discharge Program, Expeditious Discharge Program, or discharged under some other program. For the purpose of this analysis, all three discharge categories were treated as one category of discharged. Results of the Physical Strength Test (PST) were studied, but success on the PST is not required for training success.

a. Training Attrition--Qualified versus Unqualified by MEPSCAT Categories. In each MEPSCAT category, the proportion of attrition from the group who successfully lifted the required weight was compared with the proportion of attrition from the group who did not successfully lift the required weight. In the light category for both genders, the number of unsuccessful lifters was unknown (i.e., the smallest weight measured was larger than the required weight). There were no males who were unable to lift 50 pounds, the requirement for the medium category, who enlisted in MOS in the medium category. Therefore, the proportional analysis was not performed for the male light and medium categories nor for the female light category. The results of the one-sided proportion analyses for other categories are shown in Table 3-7. This statistical test is sensitive to sample size; as the sample size decreases, the difference between the proportions that is required for significance increases. The numbers in Table 3-8 represent the smallest difference in proportions that is significant for each gender in each weight category for the sample sizes in Table 3-7. The difference in proportions shown in Figure 3-7 is significant for all male categories with sufficient data. The female data, however, show that there was no difference between the proportions in the very heavy category and no significant difference in the heavy category. MEPSCAT is not a predictor of training success in the two sets of data for which it had been expected to be most useful. Although MEPSCAT is statistically significant for males, it may not be practical to consider use of MEPSCAT as a screening device. Although rejecting males who were unable to lift more than 100 pounds would have removed the loss of a few hundred from training, more than 3,000 would have been rejected that successfully completed their training.

Table 3-7. Proportion Analyses, MEPSCAT Categories

MEPSCAT category	Gender	Lifted			Did not lift			Total ^a
		Stay	Disc	Prop	Stay	Disc	Prop	
VH ^b	M	29,253	3,240	10.0	3,032	484	13.8	36,009
H ^b	M	4,634	542	10.5	530	80	13.1	5,786
MB ^b	M	7,935	789	9.0	157	35	18.2	8,916
VH	F	95	18	15.9	1,555	295	15.9	1,963
H	F	42	7	14.3	565	126	18.2	740
MB ^b	F	443	66	13.0	2,137	398	15.7	3,044
MB	F	1,058	189	15.2	92	26	22.0	1,365
Total		43,460	4,851	11.2	8,068	1,444	17.9	57,823

^aTotals in matched set of REQUEST and ACT data.

^bSignificant, $p = .05$.

Table 3-8. Smallest Significant Proportion Differences

Category	Male	Female
Light	Nca	NC
Medium	NC	6.20
Moderately heavy	4.39	2.79
Heavy	2.28	8.37
Very heavy	1.03	5.38

^aNC = sample size too small to compute.

b. Training Attrition--Subcategory Analyses of Qualified versus Unqualified. In addition to the analyses by the MEPSCAT category, separate analyses had been planned for each educational level by MEPSCAT category, for each mental category by MEPSCAT category, and for each MOS with at least 30 physically unqualified soldiers. All samples with fewer than 30 in both the qualified and unqualified groups were discarded for insufficient sample size. The remaining analyses are shown in Appendix F, Tables F-11 through F-13. An examination of these data shows that MEPSCAT can be used as a predictor in only a few of the subcategories, and that results for each MOS are the same as its MEPSCAT category results.

c. Training Attrition--Regression Analyses. Many of the subcategories for males could not be used because of the sparseness of light lifters. In order to have enough light lifters to compute the percentages for males, the male categories of 40 pounds and less than 40 pounds were aggregated. The percentage of attrition was used for the regression. The MEPSCAT category results are presented in Table 3-9. As before, the very heavy and heavy categories are not significant for women. However, the males do not show as significant in any category. The graphical representation of these results for the moderately heavy category in Figure 3-4 helps to understand this apparent contradiction with previous results. The dotted line fitted to the Xs is the female attrition expressed as a percentage for each MEPSCAT weight lifted. The solid line fitted to the circles is the male attrition percentage. The number of attritions in the 40 and less pound

group was zero; the number in the subsample was 11. All sample sizes for this analysis are shown in Table 3-10. This zero percentage is pulling the line down from the substantial slope it would otherwise have had. Since previous studies (e.g., Myers, et al., Validation of the Military Entrance Physical Strength Capacity Test, Technical Report 610, US Army Research Institute for the Behavioral and Social Sciences, January 1984) have shown the mean male lift to be around 135 pounds, with a standard deviation of about 22 pounds, these men would be more than four deviations from the mean. A case could be made for considering this point as an aberration in the data and discarding it as an outlier, especially since it influences the line to this extent. Tables for subcategory results may be found in Appendix F, Tables F-14 and F-15. All subcategory results are similar to the category results; no significant data were found for males in any category or for females in the heavy and very heavy categories. To obtain meaningful results in these analyses for males, it would be necessary to have both the sample size and the attrition for the full range of male capability. In other words, the MEPSCAT would have to measure lifting capability to about 250 pounds; data provided for this analysis grouped nearly all males into the group called "greater than 90 pounds."

Table 3-9. Regression Analysis - Gender Within MEPSCAT Category

MEPSCAT category	Gender	t value
MH	F	-2.65 ^a
MH	M	-.09
H	F	-1.92
H	M	-1.55
VH	F	-1.85
VH	M	.52
^a Significant, $p = .05$		

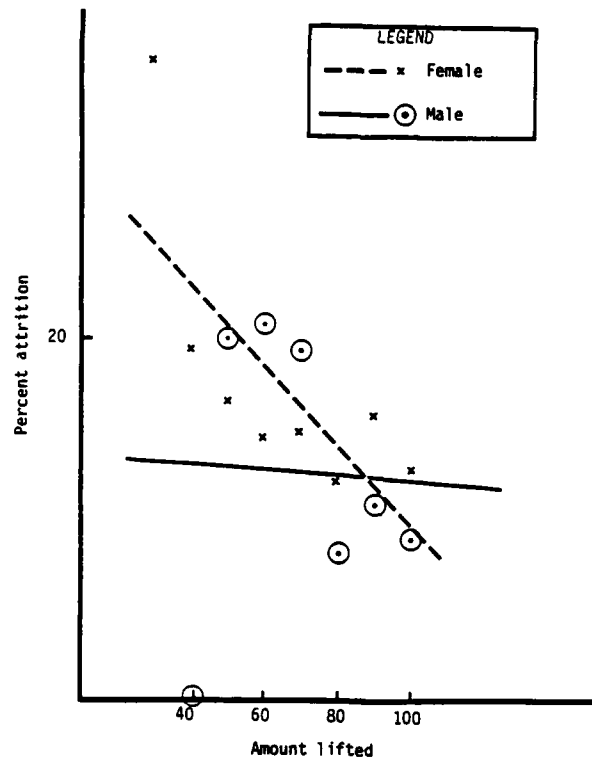


Figure 3-4. Regression Lines - Moderately Heavy Category

Table 3-10. Sample Sizes for Regression Analysis

	MEPSCAT category	Gender	<40	40	50	60	70	80	90	>90	Total
N	MH	F	31	210	530	989	775	315	101	93	3,044
Attrition N	MH	F	11	41	88	143	115	38	16	12	464
N	MH	M	0	11	10	25	146	261	476	7,987	8,916
Attrition N	MH	M	0	0	2	5	28	21	50	718	824
N	H	F	18	32	140	198	157	103	43	49	740
Attrition N	H	F	8	5	28	36	20	17	11	7	132
N	H	M	0	2	0	5	20	196	387	5,176	5,786
Attrition N	H	M	0	1	0	0	3	24	52	542	622
N	VH	F	35	100	360	525	414	316	100	113	1,963
Attrition N	VH	F	9	18	59	80	66	45	18	18	313
N	VH	M	2	6	16	31	163	1,178	2,120	32,493	36,009
Attrition N	VH	M	0	1	2	4	21	168	288	3,240	3,724

d. **Analysis of a Two-category System.** Since the MEPSCAT as actually implemented during 1984 used only two categories for counseling purposes, heavy (≥ 80 pounds) and light (< 80 pounds), rather than the five categories that had originally been planned, an additional analysis was performed which used 80 pounds as the cut point. For counseling purposes, soldiers who could lift 80 pounds or more were allowed to enlist in any MOS. If they could not lift that much, they were counseled on the strength requirements of the heavier MOS. The one-sided analyses were repeated on the categories with sufficient data. As on the previous analyses which used the actual weight requirements of the MOS, the two heaviest categories for females are not significant (see Table 3-11). More surprising is the result that males are not now significant in the heaviest two categories and the females are significant in only the medium category.

Table 3-11. Proportion Analyses with 80-Pound Criteria

MEPSCAT category	Gender	Lifted			Did not lift			Total
		Stay	Disc	Prop	Stay	Disc	Prop	
M	F	1,058	189	15.2	92	26	22.0 ^a	1,365
MH	M	7,935	789	9.0	157	35	18.2 ^a	8,916
MH	F	443	66	13.0	2,137	398	15.7	3,044
H	M	5,141	618	10.7	23	4	14.8	5,786
H	F	160	35	18.0	447	98	18.0	740
VH	M	32,095	3,696	10.3	190	28	12.5	36,009
VH	F	448	81	15.3	1,202	232	16.2	1,963

^aSignificant, $p = .05$.

e. **Physical Strength Test (PST).** The first requirement for the PST is that it must actually test the requirements of the job. Therefore, it would seem logical that a PST for a very heavy MOS should be a more physically demanding test than is required for any MOS in a lighter category. The study team observed both an individual PST for several MOS and a team PST. Figure 3-5 displays a description of two individual tests.

● PST 1 - BASED ON FREQUENT LIFT

- A. PERFORMED OUTSIDE
- B. LIFT BATTERY WEIGHING 51 POUNDS FROM GROUND TO DESIRED CARRYING HEIGHT
- C. CARRY BATTERY 10 FEET
- D. REPLACE BATTERY ON GROUND

● WEIGHT CLUSTER:
VERY HEAVY

● PST 2 - BASED ON OCCASIONAL LIFT

- A. PERFORMED IN REPAIR SHOP
- B. REMOVE TOOL CHEST FILLED WITH TOOLS (WEIGHT 73 POUNDS) FROM WORK TABLE TO DESIRED CARRYING HEIGHT
- C. CARRY TOOL CHEST 30 FEET
- D. REPLACE TOOL CHEST ON WORK TABLE

● WEIGHT CLUSTER:
MODERATELY HEAVY

Figure 3-5. Physical Strength Tests Observed

The task of carrying 51 pounds a distance of 10 feet would seem to be easier than the task of carrying 73 pounds a distance of 30 feet. However, the first task is for a very heavy MOS, while the second is for only a moderately heavy MOS. This highlighted the first difficulty in assessing whether a task fairly represented the job--no provision had been made for accounting for performance frequency. The very heavy task was based on the criteria of frequently lifting more than 50 pounds, while the other was based on the criteria of occasionally lifting 51-80 pounds. The study team then conducted an administrative comparison of all of the Physical Demands Analyses (PDA) and the matching PSTs. So many problems were found during this review that it was determined that the PST data collected thus far should not yet be used. If a standard algorithm can be developed which either allows direct comparison of a PDA and a PST or which allows rank ordering of the MOS and the PST, then any PST which passed the algorithm successfully could be used for data. Development of this type of algorithm is outside the scope of this study. The list of problems which precluded use of the PST data includes:

(1) Some PDAs documented team tasks; some of the matching PSTs were individual.

(2) There was no standard for distance a load was carried, yet stamina was clearly required for the distances required for some tests. Stamina did not seem to be needed for other tests.

(3) There was no standard for accounting for height a load was lifted or lowered.

(4) There was no standard for number of repetitions of a task based on frequency performed, nor was there a modifying factor to increase or decrease the weight to account for frequency.

3-5. MOS MIGRATION. To determine the impact of physical strength (or lack thereof) on MOS migration during training, the enlistment MOS was compared with the MOS actually awarded upon completion of training in the records of all trainees. The total number of migrations was very small compared to the number of trainees. Only .8 percent of the trainees changed MOS. Of those who did change, 16 percent changed to a heavier MOS; 71 percent changed to a MOS in the same weight category, and 13 percent changed to an MOS in a lighter category. Only .11 percent of the total number of trainees changed to a lighter MOS. These changes are summarized in Table 3-12. There were not enough trainees in the majority of the samples to perform any analysis of their lifting capabilities. Since the amount of migration during training is less than 1 percent, the impact of physical strength is negligible.

Table 3-12. MOS Migration During Training

MEPSCAT category	Stayed in same MOS		Changed to lighter MOS		Changed to MOS in same cluster		Changed to heavier MOS		Totals ^a
	N	Percent	N	Percent	N	Percent	N	Percent	
L	2,097	98.6	N/A	N/A	6	.28	33	1.55	2,136
M	2,331	98.8	15	.64	2	.08	12	.51	2,360
MH	11,652	97.7	15	.10	241	2.00	23	.19	11,931
H	6,484	99.8	4	.06	2	.03	10	.15	6,500
VH	37,392	99.6	33	.09	101	.27	N/A	N/A	37,526
Totals	59,956	99.2	67	.11	352	.58	78	.13	60,453

^aTotals are less than total sample because end of training MOS was missing.

3-6. UTILIZATION. Soldier Support Center-National Capital Region (SSC-NCR) provided questionnaire booklets and outputs for first-term soldiers from the Comprehensive Occupational Data Analysis Program (CODAP). Criteria used for selection of the MOS were that they had been surveyed within the past 2 years and that the responses included a large enough sample of first-term women for the CODAP analyses. For each MEPSCAT category the study team selected an MOS which had a large enough sample in our data base for separate analyses in other impact areas. No data was available from SSC-NCR for any MOS in the heavy category.

a. Percent Performing. Given a set of tasks that would be performed by soldiers in their MOS, all respondents were asked to check those tasks which they performed in their current job. Figure 3-6 displays the percent performing results for 76Y, Unit Supply Specialist (Very Heavy) from the CODAP program which clusters tasks by percent performing by gender. Data for other categories are in Appendix F, Figures F-6 through F-8. CODAP then prints tasks which are performed by one gender more than by the other by a specified amount (the difference amount for this table was 10 percent; one of the figures in Appendix F shows a 20 percent difference). There does seem to be a difference in tasks performed. The differences can be categorized into three general types of tasks: combat tasks such as "fire M60 machinegun"; tasks having to do with vehicle maintenance; and MOS tasks. In the MOS tasks, females seem to perform desk tasks more often, while males perform tasks that are probably heavier, e.g., in the 76Y MOS, stack or move supplies. The MOS proponents should determine whether these differences are a result of differing assignments. This same report broken out by unit type (TOE or TDA) and location or major command would help determine whether the genders perform the same jobs when they are assigned to the same unit.

b. Perceptions of Lifting Requirements. The 76Y respondents were also asked to rate how important it is to their current job to carry a 50-pound object at least 100 yards. These results are shown in Figure 3-7. Male respondents felt it was more important than did females, but a sizable percentage of both genders felt it was less than moderately important. The Military Police, MOS 95B (see Figure 3-8) were given the frequent and occasional lift demands of the five MEPSCAT categories and asked to choose the one that best represented their current job. Although this MOS is rated as moderately heavy, more than one half of the males and nearly 80 percent of the females rated their job as light or medium. Charts for the other MOS are in Appendix F, Figures F-9 and F-10.

DIFFERENCES SHOWN WHEN 10% OR MORE IN TERMS OF PERCENT OF MEMBERS PERFORMING

1ST MEN MEMBERS = 240 MOS 76Y FIRST-TERM MEN
 1ST WOM MEMBERS = 89 MOS 76Y FIRST-TERM WOM

		PERCENT MEMBERS PERFORMING---DIFFERENCE, 1ST MEN MINUS 1ST WOM.....		
		1ST WOM PERCENT MEMBERS PERFORMING.....		
		1ST MEN PERCENT MEMBERS PERFORMING.....		
D-TSK	TASK TITLE			
B 17	MOVE SUPPLY ITEMS WITH MATERIALS HANDLING EQUIPMENT (HMF)	49.58	25.70	24.58
D 11	STACK SUPPLY ITEMS FOR STORAGE	65.67	44.32	22.35
Q 13	FIRE M60 MACHINEGUN	35.67	14.77	21.89
B 16	MOVE SUPPLY ITEMS MANUALLY	77.50	55.68	21.92
Q 12	LOAD/REDUCE STOPPAGE/CLEAR M60 MACHINEGUN	35.00	14.77	20.23
P 6	INSPECT VEHICLE FOR SERVICEABILITY	41.67	21.59	20.08
P 17	CHANGE VEHICLE TIRES	37.93	11.36	19.47
P 8	PERFORM VEHICLE BEFORE/DURING/AFTER OPERATION CHECKS/ SERVICE	39.58	20.45	19.13
P 23	INSPECT/SERVICE VEHICLE SPECIAL TOOLS/EQUIPMENT	27.50	9.09	18.41
D 4	INSPECT SUPPLY TENTAGE FOR DAMAGE	45.42	27.27	18.14
P 4	DRIVE 2 1/2 TON SERIES CARGO TRUCK	28.33	10.23	18.11
D 6	FOLD/UNFOLD SUPPLY TENTAGE FOR/AFTER STORAGE	49.75	30.98	18.07
Q 10	LOAD/UNLOAD/CLEAR M203 GRENADE LAUNCHER	31.67	13.54	18.03
D 10	REPAIR SUPPLY TENTAGE	39.33	20.45	17.98
P 11	INSTALL VEHICLE TARPS/BOMS/CURTAINS	27.33	5.68	17.55
Q 5	ENGAGE HOSTILE AIRCRAFT WITH M16A1 RIFLE	25.25	9.09	17.16
Q 32	CLEAR FIELDS OF FIRE	27.42	3.41	17.11
Q 16	APPLY IMMEDIATE ACTION TO CORRECT MALFUNCTION ON M79A2 LAW	25.83	9.09	16.74
Q 10	REACT TO INDIRECT FIRE	25.42	9.09	16.33
D 9	CLEAN SUPPLY TENTAGE	44.58	28.41	16.17
P 7	RECORD/REPORT VEHICLE DISCREPANCIES TO DISPATCHER/ SUPERVISOR	39.75	22.73	16.02
P 18	PERFORM FIELD EXPEDIENT REPAIRS ON VEHICLE	27.00	4.55	15.45
P 21	PERFORM PREVENTIVE MAINTENANCE ON TRAILERS	27.33	7.95	15.38
P 20	CONNECT/DISCONNECT TRAILER TO/FROM VEHICLE	31.25	15.91	15.34
D 7	ERECT/SMIKE SUPPLY TENTAGE	41.25	26.14	15.11
Q 11	ENGAGE TARGETS WITH M203 GRENADE LAUNCHER/APPLY IMMEDIATE ACTION TO REDUCE STOPPAGE	24.17	9.09	15.08
Q 38	CONDUCT DAY/NIGHT SURVEILLANCE WITHOUT THE AID OF ELECTRONIC DEVICES	24.17	9.09	15.08
I 28	PERFORM ORGANIZATIONAL MAINTENANCE ON ARMORY WEAPONS	29.58	14.77	14.81
Q 28	MOVE UNDER DIRECT FIRE	24.00	10.23	14.77
Q 22	CONSTRUCT INDIVIDUAL FIGHTING POSITIONS	29.33	13.44	14.70
D 5	SET UP DUNNAGE	37.59	25.70	14.58
Q 6	PERFORM OPERATOR MAINTENANCE ON .45 CALIBER PISTOL	37.42	15.91	14.51
P 9	UPDATE VEHICLE/VEHICLE EQUIPMENT LOG BOOKS	25.83	11.36	14.47
Q 29	MOVE OVER/THROUGH OR AROUND OBSTACLES (EXCEPT MINETELDS)	24.59	10.23	14.36
Q 37	PRACTICE NOISE/LIGHT/LITTER DISCIPLINE	35.93	21.59	14.24
P 10	PREPARE VEHICLE FOR HOT/COLD WEATHER OPERATION	25.67	12.50	14.17
Q 17	PERFORM SAFETY CHECKS ON HAND GRENADES	27.91	6.82	14.22
P 16	SLAVE-START VEHICLE	17.08	3.41	13.67
A 2	DETERMINE UNIT'S FORCE/ACTIVITY DESIGNATOR (FAD) FOR REQUEST	44.75	35.23	11.52

Figure 3-6. 76Y, Unit Supply Specialist (VH) Tasks
 (page 1 of 2 pages)

DIFFERENCE BETWEEN 1ST MEN AND 1ST WOM

2	39	USE CHALLENGE AND PASSWORD	48.75	35.23	11.52
2	14	PREPARE M72A2 LAW FOR FIRING/RESTORE M72A2 LAW TO CARRYING CONFIGURATION	27.08	13.64	11.45
I	4	RECOMMEND CHANGES TO REMOVE ARMORY FIRE/SAFETY HAZARDS	21.25	7.95	13.30
2	79	REPLACE FILTERS IN M17 SERIES PROTECTIVE MASK	51.75	40.91	12.84
I	3	INSPECT ARMORY FOR FIRE/SAFETY HAZARDS	27.50	14.77	12.73
2	80	PUT ON/WEAR M17 SERIES PROTECTIVE MASK	60.42	47.73	12.69
0	44	ESTIMATE RANGE	21.67	9.39	12.58
0	14	CHECK SECURITY OF SUPPLY ITEMS IN STORAGE	61.75	49.46	12.39
I	33	PACK/CRATE ARMORY WEAPONS FOR MOVEMENT	12.17	6.92	12.35
0	18	ENGAGE (NEW) TARGETS WITH HAND GRENADES	21.25	9.39	12.16
2	19	INSTALL/FIRE/RECOVER M18A1 CLAYMORE MINE	21.25	9.09	12.16
2	15	ENGAGE TARGETS WITH M72A2 LAW	24.58	12.50	12.28
I	29	INSPECT ARMORY WEAPONS AFTER ORGANIZATIONAL MAINTENANCE	27.92	15.91	12.01
0	12	PLACE OLDER/DATED SUPPLY ITEMS FOR EARLY USAGE	41.75	31.32	11.93
P	19	ASSIST MECHANIC WITH VEHICLE ORGANIZATIONAL MAINTENANCE	31.25	19.32	11.93
2	78	MAINTAIN M17 SERIES PROTECTIVE MASK	58.73	46.59	11.74
0	68	RECOGNIZE/GIVE FIRST AID TO BLISTER AGENT CASUALTY	44.58	32.95	11.63
0	35	CAMOUFLAGE EQUIPMENT	47.92	36.36	11.55
P	22	PERFORM PREVENTIVE MAINTENANCE ON VEHICLE WINTERIZATION EQUIPMENT	17.08	5.68	11.40
0	4	CHECK UNIT OF ISSUE/AMOUNT OF ITEMS RECEIVED AGAINST RECEIPT DOCUMENTS (DD 1348-1)	61.25	50.00	11.25
2	77	REACT TO NUCLEAR HAZARDS	44.17	32.95	11.21
I	1	INSPECT ARMORY FOR PHYSICAL SECURITY	31.67	20.45	11.21
0	81	STORE M17 SERIES PROTECTIVE MASK WITH HOOD IN CARRIER	55.67	45.45	11.21
0	84	PUT ON/WEAR PROTECTIVE CLOTHING	67.00	49.96	11.14
0	13	CLEAN SUPPLY ITEMS IN STORAGE	52.92	42.05	10.87
0	66	GIVE FIRST AID FOR FROSTBITE	42.42	29.55	10.97
2	33	EMPLACE/RECOVER FIELD EXPEDIENT WARNING DEVICES	15.42	4.55	10.97
2	21	DESIGNATE FIGHTING POSITIONS FOR SQUAD MEMBERS (LESS CREW-SERVED WEAPONS)	19.75	7.95	10.90
2	7	ENGAGE TARGETS WITH .45 CALIBER PISTOL	17.50	6.42	10.98
I	45	ISSUE/RECEIVE ARMORY WEAPONS TO/FROM UNIT PERSONNEL	37.00	19.32	10.58
I	19	UNPACK NEW ARMORY WEAPONS	12.58	9.39	10.49
P	14	PREPARE VEHICLE FOR TOWING/TO BE TOWED	13.75	3.41	10.34
I	27	SCHEDULE ORGANIZATIONAL MAINTENANCE ON ARMORY WEAPONS	29.33	18.18	10.15
F	17	TURN-IN ABSENTEE'S ABANDONED PERSONAL PROPERTY THROUGH SUPPLY CHANNELS	34.75	26.14	10.11
C	22	PREPARE EQUIPMENT CONTROL RECORD FOR GAIN/LOSS/TRANSFER (DA 2407-9)	27.08	17.35	10.04
0	23	SUPERVISE/EVALUATE CONSTRUCTION OF FIGHTING POSITION	14.48	4.55	10.04

TASKS OMITTED WHERE THE ABSOLUTE DIFFERENCE IN PERCENT MEMBERS PERFORMING IS LESS THAN 10.00

M	11	TYPE OUTGOING CORRESPONDENCE/MESSAGES	12.50	23.46	-11.36
K	7	REVIEW UNIT SUPPLY PUBLICATION/CATALOG/BLANK FORM REQUIREMENTS	14.33	30.48	-12.35
A	8	CONSOLIDATE REQUESTS FOR BULK PROCUREMENT	47.08	54.55	-12.46

Figure 3-6. 76Y, Unit Supply Specialist (VH) Tasks
(page 2 of 2 pages)

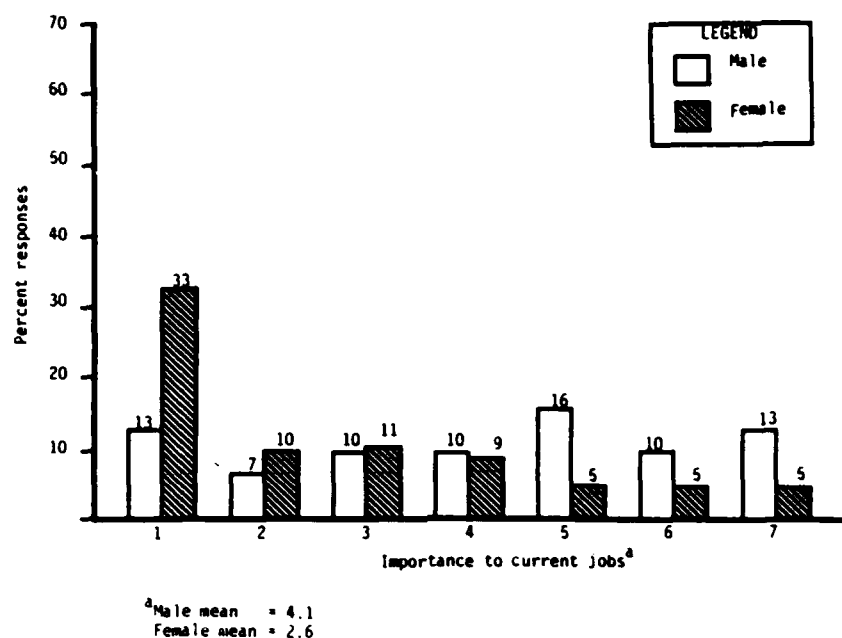


Figure 3-7. Lifting Perceptions, 76Y, Unit Supply Specialist (VH)

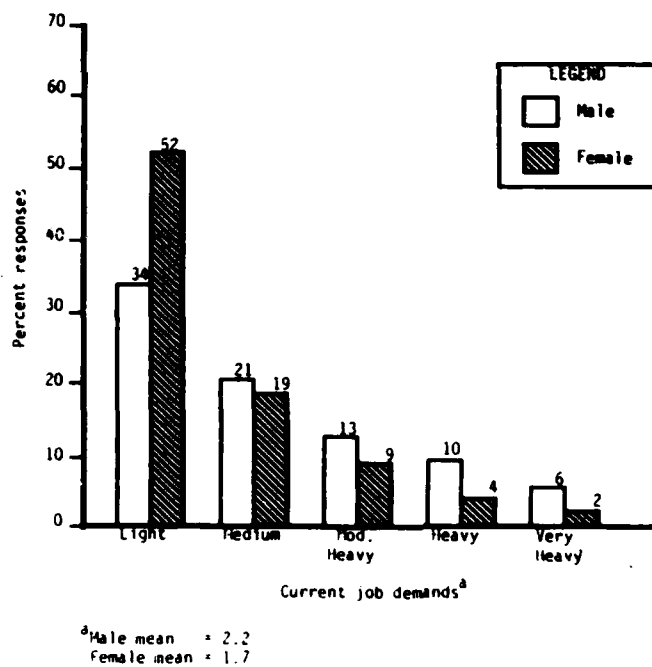


Figure 3-8. Lifting Perceptions, 95B, Military Police (MH)

3-7. OTHER ANALYSES. During the E-MEPSCAT Study, two types of analyses which had not been specified in the study directive were performed.

a. Job Satisfaction and Harassment. The first additional analysis was a brief evaluation of responses to questions about job satisfaction. Because both the study sponsor and CAA had been unaware that soldiers were questioned about job satisfaction as part of the occupational survey, the study directive had specified that job satisfaction would not be addressed. However, the job data provided by SSC-NCR also included responses to a list of questions concerning soldiers' satisfaction with the Army and with their job. A summary of soldiers' responses to the questions that were concerned with job satisfaction are presented in Table 3-13. The soldiers were asked to respond with an answer which could range from a value of one to represent extremely dissatisfied to a value of seven to represent extremely satisfied; a value of four meant neither dissatisfied nor satisfied. The mean values for both genders on most questions fall within a one point range of the midpoint. Although neither gender seems to be particularly dissatisfied with the Army, the female responses are slightly higher than those of the males. Since females are at least as challenged and interested in their work as males, and get at least as much self respect from their work, it would seem that they believe that they are performing their Army job adequately. Responses to another question that had been asked about harassment are presented in Table 3-14. Since this question was one of a series of questions on retention that would have been answered by only those first-term respondents who had definitely decided not to reenlist in the Army, these responses represent only a subset of the respondents to the job satisfaction questions. These responses are near the midpoint which means no effect, except for the 76Y females, a very heavy MOS. Although this may indicate physical strength problems, it cannot be assumed without other supporting data. Responses to some of the questions on satisfaction could cause one to question whether there could be a significant amount of harassment about physical weakness. For example, females are a minority in the heavier MOS (in 76Y, females represented 12.5 percent of the recruits), yet they are receiving moral support (the first item) from their co-workers to a greater extent than males. Minor changes to these attitude sections of the occupational surveys which specifically addressed physical strength issues might offer a great deal of additional information at relatively little cost.

Table 3-13. Mean Values - Job Satisfaction Responses^a
 (page 1 of 3 pages)

	76Y (VH)		95B (MH)		96B (M)		75E (L)	
	M	F	M	F	M	F	M	F
Moral support you receive from your coworkers	4.37	4.78	4.33	4.61	4.70	5.15	4.58	4.71
Number of hours you work per week for the Army	4.46	4.34	3.33	3.62	4.18	4.56	4.50	4.47
Attention Given to safety in your work environment	4.66	4.67	4.36	4.38	4.55	4.62	5.03	4.55
How well your Army job provides what you want from a job	3.97	4.23	3.30	3.41	3.28	3.53	3.48	3.78
Chance to receive community recognition for your work	3.21	3.36	3.08	3.23	3.03	3.09	3.06	3.38
Challenge provided by your work	4.19	4.22	3.69	3.76	3.61	3.76	4.00	4.01
Opportunity to do what you are authorized to do at work	4.32	4.55	3.50	3.70	3.48	3.77	4.43	4.59
Extent to which you are "accepted" by your co-workers	4.91	5.05	4.92	4.99	5.07	5.11	5.26	5.21
Amount of time you spend waiting for needed tools or equipment	3.87	3.84	2.93	3.31	3.20	3.43	3.35	3.64
Fairness with which disciplinary action is taken in your unit	3.73	3.81	3.25	3.59	3.65	3.64	3.74	3.81
Chance to be responsible for your own work	4.79	5.23	4.23	4.56	4.66	5.11	5.06	4.85
Money you save by having commissary privileges	4.57	4.56	3.87	4.05	4.16	4.80	4.66	4.73
Serviceman's group life insurance (SGLI) program	4.90	4.89	4.57	4.72	4.74	5.00	5.16	5.09
Availability of on-post transportation	3.76	3.72	3.53	3.49	3.26	3.62	3.41	3.67
How often your work changes because of new procedures	3.90	3.89	2.89	3.06	3.37	3.57	3.62	4.05
Opportunity to see the results of your work	4.63	4.59	3.67	3.82	4.15	4.52	4.56	4.71
Feelings you get from wearing the Army uniform	4.87	4.76	4.71	4.73	4.73	4.82	4.94	4.73
Amount of DMOS-related work you have to do	4.25	4.51	3.74	3.95	3.26	3.76	4.38	4.54

Table 3-13. Mean Values - Job Satisfaction Responses^a
 (page 2 of 3 pages)

	76Y (VN)		95B (MN)		96B (M)		75E (L)	
	M	F	M	F	M	F	M	F
Amount of self respect your get from performing your duties	4.80	5.06	4.52	4.57	4.20	4.80	4.73	4.86
Serving your country through Army Service	5.21	5.24	5.00	5.10	5.23	5.13	5.37	4.88
Chance to work with others as part of a team	4.70	4.99	4.74	4.69	4.58	5.11	4.62	4.86
Recognition your get from your unit for doing a good job	3.44	3.47	3.15	3.44	3.32	4.04	3.19	3.45
Technical "know how" of your supervisor	4.68	4.71	4.05	4.16	4.27	4.36	4.99	4.67
Promotion opportunity in the Army compared to those in similar civilian occupations	3.80	3.86	3.18	3.38	4.46	4.77	3.06	3.55
Level of interest in this job compared to others you have held	4.22	4.40	4.16	4.19	3.65	4.41	3.96	4.38
Interest you have in going to work each day	4.38	4.60	3.89	3.90	4.21	4.43	3.99	4.17
Amount of self-respect you get from being in the Army	4.72	4.86	4.61	4.72	3.88	3.93	4.87	4.88
Leave policy of your unit	4.46	4.59	3.92	4.33	4.42	4.52	4.53	4.70
Time pressures of your job	3.87	4.42	3.33	3.52	4.29	4.55	3.92	4.27
Economic security you have in the Army	4.54	4.65	4.21	4.60	3.64	4.05	4.49	4.53
Promptness with which malfunctioning equipment is fixed	3.74	3.61	2.63	2.78	4.38	4.35	3.19	3.52
Opportunity for promotions in your career management field	3.64	3.81	2.95	3.06	2.95	3.09	2.86	3.23
Freedom to decide what to wear after duty hours	5.71	5.44	5.24	5.39	4.24	4.88	5.64	5.77
Distance from your duty location to your home of record	3.74	3.81	3.18	3.15	5.49	5.61	3.42	3.42
Cost of living in the area to which you are assigned	3.94	3.77	3.69	3.73	3.36	3.30	3.99	3.92
Availability of on-post housing at your duty location	3.71	3.77	3.35	3.31	3.66	3.39	3.34	3.48

Table 3-13. Mean Values - Job Satisfaction Responses^a
 (page 3 of 3 pages)

	76Y (VH)		95B (NH)		96B (M)		75E (L)	
	M	F	M	F	M	F	M	F
Demand for your Army-obtained skills in the civilian job market	3.82	4.09	4.65	4.31	3.30	3.15	3.61	3.81
Money you save by having PX privileges	4.20	4.38	3.97	4.00	3.51	3.64	4.44	4.29
Military pay and allowances compared to what you would make as a civilian	3.95	4.04	3.37	3.56	4.04	4.49	3.53	3.67
Having coworkers of a difference race	5.00	5.13	4.60	4.92	3.46	3.93	5.13	5.18
"Spirit of teamwork" which exists between you and your coworkers	4.55	4.81	4.28	4.33	4.54	4.84	4.40	4.54
Working for supervisors of a different race	4.83	5.15	4.44	4.81	4.24	4.78	5.03	4.98
Moral support you receive from your supervisor	4.41	4.81	4.04	4.40	4.38	4.63	4.68	4.39
Working for supervisors of the same sex	4.65	4.73	4.48	4.48	4.42	5.02	4.73	4.47
Importance of your work to the Army	4.97	5.28	4.57	4.50	4.63	4.56	4.67	5.05
Opportunity to work with people who know their jobs	4.88	5.11	4.29	4.33	4.26	4.57	4.66	4.84
Extent to which your supervisor brings out the best in you	4.30	4.71	3.94	3.97	4.51	4.74	4.39	4.22
Extent to which your supervisor explains his/her supervisory actions	4.23	4.44	3.88	4.03	4.11	4.58	4.67	4.21
Army's haircut policy	3.68	3.97	3.59	4.11	4.20	4.82	3.51	4.29
How well Army life provides what you want in life	3.92	4.16	3.40	3.53	3.40	3.96	3.49	4.26
Chances of being injured on your job	4.35	4.34	3.89	3.97	3.36	3.58	5.32	4.86
Image of the Army in the civilian community	3.85	3.87	3.46	3.69	4.35	4.49	3.78	4.09
Way your job uses your abilities	4.11	4.53	3.52	3.56	3.28	3.81	3.77	4.26

^aSatisfaction rating scale
 1 = Extremely dissatisfied
 4 = Neither dissatisfied or satisfied
 7 = Extremely satisfied

Table 3-14. Harassment Related to Retention^a

Question: Rate in terms of importance to your decision to definitely separate

	Mean values							
	76Y (VH)		95B (MH)		96B (M)		75E (L)	
	M	F	M	F	M	F	M	F
Amount of harassment in the Army	4.7	5.6	4.5	4.7	4.8	4.4	4.5	4.7

^aImportance rating scale

1 - Not important

4 - Moderately important

7 - Extremely important

b. Weight-lifting Distributions Within Categories. MEPSCAT was not a predictor of training success for the two categories for which it had been most expected to be useful--females in the heavy and very heavy categories. Therefore, the study team attempted to replicate one of the findings of the WITAPRG. All females in the heavy and very heavy categories were grouped together. All females from the three lighter categories were then placed in a second group. The attrition from each group was compared with the other. No significant differences were found; WITAPRG had found the opposite. Differing distributions within the weight categories could have biased all results in this study. A distribution difference could have been a result of the program of counseling new recruits on the physical demands of the MOS which was instituted at the same time as the MEPSCAT. Therefore, the distributions of the weight-lifting capabilities for each category were compared with each other (see Appendix G for a description of the method used). The distributions of the female, heavy and very heavy categories were very similar to each other and both were skewed towards the heavy end. Figure 3-9 shows the total sample and the very heavy category. If recruits had not been counseled on weight-lifting requirements of the MOS, the expectation is that they would have been randomly distributed among the categories, and each category would have been similar to the overall sample. Only the moderately heavy (the middle) category was similar to the total sample. The light and medium categories were similar to each other, and, although both were skewed to the light end, the distribution of the medium category was actually lighter than that of the light category. Since the heaviest measure in these data was 40 pounds less than the average male capability and nearly all males were grouped in the heaviest MEPSCAT weight (>90), the male distributions could not be compared. Since there is no measure available of the physical capability distributions of females prior to the beginning of MEPSCAT and the

counseling program, these results cannot be used to state unequivocally that counseling is having the desired effect. It is possible that female recruits may self-select using a combination of motivation to succeed in nontraditional jobs and some prior knowledge of Army job requirements and personal capabilities. Nonetheless, there should be some explanation for our inability to replicate the WITAPRG results which showed a significantly higher amount of attrition from females in the heavier categories than from those in the lighter categories. The differences in distributions may well be that explanation.

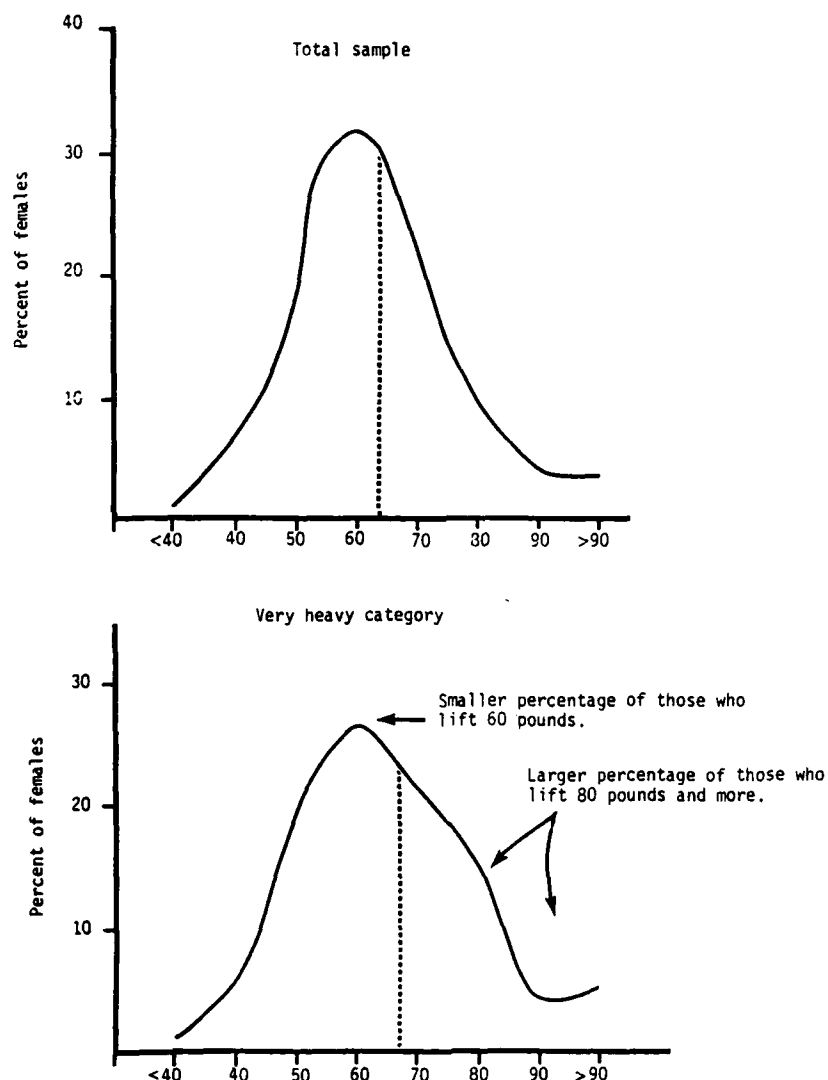


Figure 3-9. Distributions of Female, Total Sample, and of Female, Very Heavy Category

CHAPTER 4

REVIEW OF STRENGTH CAPACITY REQUIREMENTS OF OTHER SERVICES

4-1. INTRODUCTION. A literature survey was made to review research done by the military services concerning physical strength capacity requirements for occupational specialties. This chapter discusses the commonality of results and differences.

4-2. NAVY STRENGTH REQUIREMENTS. In May 1978, the Navy began a 3-year project to develop an occupational strength test battery to predict performance on job tasks requiring substantial muscular demands. However, the Navy has not used the results of the study to classify Navy job specialties and has not implemented a pre-enlistment strength test. The Navy's study effort is documented in the report, "Development of an Occupational Strength Test Battery (STB)," Navy Personnel Research and Development Center Technical Report 82-42, April 1982.

4-3. AIR FORCE STRENGTH REQUIREMENTS. The Air Force has implemented a mandatory program of physical strength testing called the X-Factor Program. A physical strength capacity test, X-Factor Test, is administered to all potential enlistees at the Military Entrance Processing Station (MEPS). The test is the amount of weight lifted on the incremental lift device (ILD). This test is one of the factors used to determine the Air Force specialty for which an individual is qualified. The Air Force X-Factor Program was implemented in 1981, after an extensive research effort which began in 1977. The study effort is documented in the report, "Weight Lift Capabilities of Air Force Basic Trainees," AFAMRL-TR-83-0001, May 1983. The Institute of Biotechnology, Texas Tech University, Lubbock, Texas, performed a 4-year study for the Air Force to determine and validate actual task performance requirements of Air Force specialty codes (AFSC). In this study, physically demanding tasks within AFSC were identified. Working supervisors were interviewed, and site visits were made to obtain actual measurements of work performed and task strength demands. Weight levels to be lifted to specified heights were determined in part by surveying job requirements, actual measurement of work performed by service members, and interviews and questionnaire surveys of supervisors and service members. All AFSC (350) were then classified into three weight categories--heavy (20 or 6 percent), moderate (87 or 25 percent), light (243 or 69 percent). These categories are based on the physical demands of jobs which are required for prolonged periods. To qualify for an AFSC within a specified category, an enlistee must lift the appropriate weight to the height on the ILD:

- **Light Duty:** 40 pounds to elbow height.
- **Moderate Duty:** 70 pounds to a height of 6 feet.
- **Heavy Duty:** 100 pounds to a height of 6 feet.

The Air Force has also made the weight lifting capacity of the individual a part of the physical profile serial PULHES which is called the X-Factor (PULHESX).

4-4. ARMY STRENGTH REQUIREMENTS. The Women in the Army Policy Review Group (WITAPRG), formed in May 1981, conducted a comprehensive analysis, in conjunction with enlisted career management field proponents, of the individual and organizational physical demands of the tasks implied or specified in each MOS. All MOS were then classified into physical demand categories based on the US Department of Labor standards with modifications to suit unique Army requirements. The categories into which all MOS fall are: light, medium, moderately heavy, heavy, and very heavy. The distribution of all MOS (351), based on the results of the WITAPRG, was as follows: light--42 (12 percent); medium--65 (18 percent); moderately heavy--64 (18 percent); heavy--48 (14 percent); very heavy--132 (38 percent). The MEPSCAT, developed and implemented to measure a soldier's physical capacity, uses the ILD at the MEPS as does the Air Force. The differences between the Army and Air Force physical demand categories are shown in Table 4-1. Since MEPSCAT is given only at initial entry, for this study only entry-level MOS (244) were used. The weight categories into which they fell were: light--23 (9 percent); medium--33 (14 percent); moderately heavy--57 (23 percent); heavy--32 (13 percent); very heavy--99 (41 percent).

Table 4-1. Physical Demand Categories

Category	Army			Air Force	
	Pounds lifted >20% of time	Pounds lifted ≤20% of time	Height	(lbs)	Height
Light	≤10	≤20	5 feet	40	Elbow
Medium	11-25	21-50	5 feet	NA	
Moderately heavy	26-40	51-80	5 feet	NA	
Moderate		NA		70	6 feet
Heavy	41-50	81-100	5 feet	100	6 feet
Very heavy	>50	>100	5 feet	NA	

4-5. COMPARISON OF RESULTS

a. **Comparison of Categories.** In order to better compare the physical demands standards of the Army and the Air Force, it may be more appropriate to look at them in terms of work performed. McNeese and Hoag (Engineering and Technical Handbook, Prentice-Hall, Inc., Englewood Cliffs, NJ, 1957) state that "Work (U) is defined as the product of a force and the displacement in the direction of the force, or the component of a force in the direction of the displacement multiplied by the linear displacement of the point of application of the force. $U = Fs$. Units: ft-lbs . . ." There are other stresses that interact when actually performing tasks that are not measured using simple foot-pounds. However, the foot-pounds approach provides a relative measure to illustrate the discrepancies between Army and Air Force physical demand classifications. Therefore, the work performed will be calculated as if the weight were lifted in a pure vertical motion. Table 4-2 reflects the standards in rank order of work performed. Using work performed, the Air Force standard of moderate essentially equates to the Army's moderately heavy and their heavy exceeds all the Army categories. Currently, prospective Army enlistees who lift 80 pounds can select any MOS without a waiver. Using work performed in Table 4-2 and the Army criteria of 80 pounds, all Air Force personnel who lift in the Air Force moderate category would qualify for all Army MOS.

Table 4-2. Physical Demand Categories/Work Performed

Army		Air Force	
Category	Work performed (foot-lbs)	Category	Work performed (foot-lbs)
Light	100	Light ^a	160
Medium	250		
Moderately heavy	400	Moderate	420
Heavy	500		
Very heavy ^b	550	Heavy	600

^aElbow height was considered 4 feet.

^bSince the ILD is in 10-pound increments, weight lifted was considered as 110 pounds.

b. Comparison of Specialties

(1) **Basis.** Of the MOS and AFSC which were specified as similar in the Department of Defense Occupational Conversion Manual (DOD 1312.1M), September 1984, 38 MOS were selected for comparison. As indicated in the DOD Manual, similar jobs may be grouped for administrative or analytical purposes. They do not necessarily represent equivalent or identical requirements because of differences in service missions, types of equipment used, and personnel utilization and career development policies. Based on the general DOD occupational groupings in DOD 1312.1M, the general duties and responsibilities for similar AFSC and MOS were reviewed using Air Force Regulation 39-1, Airman Classification, 31 October 1984, and Army Regulation 611-201, Enlisted Career Management Fields and Military Occupational Specialties, December 1984. Of the 38 MOS reviewed, 4 had no AFSC equivalent; 1 AFSC could be classified as similar; 22 AFSC appeared to be classified differently due to tactical mission differences; and only 10 appeared to be similar. Table 4-3 summarizes this comparison of Army MOS and their equivalent AFSC. Appendix H provides a summation of the results of the specialty comparisons performed during the E-MEPSCAT Study.

(2) **Comparison.** It would appear that job requirements reflect the major differences between Army and Air Force missions. The Army is tactically oriented and mobile; the Air Force operates in a relatively fixed environment. The Army has a wider range of tactical equipment, and because of its mobility requirements, must rely on manual labor in many tactical situations. The Air Force is static and more equipment oriented; it uses more mechanized equipment to handle its heavy weaponry payloads. In areas which seem to have similar missions in both services (e.g., legal, personnel, finance), the specialties seem to have similar physical demands. The classification methodology used by the Air Force and Army to categorize the physical requirements of their respective occupational specialties was approached somewhat differently. Task analyses within similar occupational specialties may have been evaluated differently as to the task's importance to job performance. Such differences could reflect the uniqueness of each service's mission and philosophy of organization.

(3) **Differences.** It is beyond the scope of this study to evaluate the specific causes for the differences in physical demands of occupational specialties grouped as similar by DOD. This would require on-site visits and physical observation of actual duties being performed to determine discriminators in implied and specified tasks of MOS/AFSC which are not readily discernible from their job descriptions.

Table 4-3. MOS and AFSC Comparison

Army category	Number of MOS	No Air Force equivalent	Similar	Differences due to mission	No apparent differences
Very heavy	13 ^a	4		8	
Heavy	3		1	2	
Moderately heavy	8			5	3
Medium	11			7	4
Light	2				3
Total	38	4	1	22	10

^aIncludes two Army supply MOS which have a common AFSC equivalent.

CHAPTER 5

FINDINGS AND COMMENTS

5-1. INTRODUCTION. The purpose of this chapter is to summarize study results, to address essential elements of analysis, and to comment on the use of the study results.

5-2. SUMMARY OF STUDY RESULTS

a. Data. A total of 60,965 records for enlisted personnel (8,331 females and 52,634 males) were analyzed. Separate MOS were clustered into their appropriate physical demands category--light, medium, moderately heavy, heavy, and very heavy--for this analysis. This clustering was necessary because many MOS did not have enough recruits, male or female, for statistical analyses. There were not enough male trainees who lifted light amounts to analyze the medium category. The smallest weight lifted was 40 pounds. Since the heaviest weight for the light category is 20 pounds, the MEPSCAT score can not be used to determine whether any recruit is unable to lift the 20-pound requirement. Analyses of the light category for either gender could not be performed.

b. Analyses. Results of this study do not support changing use of the MEPSCAT to a mandatory screening device for MOS selection. It is possible that results of this study were biased by the effects of using MEPSCAT as a counseling tool for MOS selection. If so, it appears that it has probably been successful in encouraging recruits to select those MOS for which they are physically qualified. Male soldiers are performing some MOS tasks that seem to require heavier lifting than those performed by the females. They are also performing tasks related to operating and maintaining vehicles more frequently than females. Some of the tasks that males perform more frequently seem to be combat tasks.

5-3. RESPONSES TO ESSENTIAL ELEMENTS OF ANALYSIS (EEA). The following EEA are from the study directive. The findings pertinent to each are summarized.

a. How would mandatory use of the MEPSCAT results for MOS selection affect the recruit rejection rate? The moderately heavy cluster would lose 26 percent of the present number of recruits, and 33 percent of the total group of female recruits would be rejected. The very heavy cluster would be no more than .4 percent female and the light cluster would be .8 percent male. Dropping the requirement for the moderately heavy category to 70 pounds lowers the number of rejections from 3,358 to 258. Using either of the redistribution schemes, an additional female would be rejected for every additional male accessed into light and medium clusters to fill combat positions.

b. How important a factor is physical strength in training base attrition? Physical strength is statistically significant for males in the

three categories for which sufficient data existed. These were the three heaviest clusters. It is not statistically significant for females in the heavy and very heavy categories. Based on these study results, MEPSCAT weight lifted does not predict female training attrition. Although MEPSCAT does predict a small percentage difference in male attrition, of the males who did not qualify on the MEPSCAT weight, several thousand do complete training for every few hundred who do not.

c. What is the relationship between passes and failures (60s/NO-60s) on the Physical Strength Test (PST) and: (1) The amount lifted on the MEPSCAT; (2) MOS migration? Until an algorithm is developed which provides quantitative comparison of MOS tasks and PST tasks, the PSTs are not meaningful and no comparisons can be made.

d. What is the impact of physical strength (or lack thereof) on MOS migration? There was no impact during training. In those instances of migration, only 13 percent changed to a lighter MOS. The total number of migrations was too small to perform further analysis.

e. How do different physical capabilities affect soldiers' duty performance within an MOS? Men perform more common soldier tasks than do women. Conversely, women perform more administrative tasks than men. Few men or women perceive their job as heavy as the physical demands analysis.

f. What significant differences in strength requirements exist among the military Services? Significant differences found were due to differences in mission.

5-4. COMMENTS

a. **Combat Versus Peacetime Tasks.** Results from this study can not be used to determine cut scores for use of MEPSCAT as a mandatory screening device. Further analyses of this type will not produce data that are more meaningful. The reason for this ambiguity is the contradiction caused by (1) determining the MOS strength requirements based on tasks that are expected to be performed in a wartime environment and (2) measuring soldiers' behaviors related to their job or training performance when that performance is in a peacetime environment. Data gathered on percent of soldiers performing and the percent of time they spend on tasks are used to determine which tasks will be taught in the training base. These data are gathered from soldiers who are told to respond in terms of their present duty position. When the respondents are performing these tasks during peacetime rather than during wartime, both the percent performing and percent time spent may identify tasks for training that are different from those that would have been identified during a war. If the wartime or combat tasks require lifting of heavier loads than those required during training, it would be much less likely that attrition related to physical strength would be found during peacetime. It is probable that this is the reason more significant results were not found. If further analyses of these types are to be attempted, then MOS proponents should change the strength requirements to match the peacetime jobs that are actually being performed. If the decision is that requirements must be based on the

is that requirements must be based on the combat tasks, then further analysis of areas such as soldiers' job performance, satisfaction, reenlistment rates, and MOS migration should not be attempted. Meaningful results can not be found unless the Army is engaged in an actual war or the soldiers studied are situated in a long-term simulated combat environment. If a simulation were used, it would necessarily involve a small percentage of the first-term soldiers who have taken the MEPSCAT. It will be very difficult to include a sample of soldiers who lifted light weights that is large enough to analyze and still have a representative sample of soldiers. In short, since the physical requirements for combat needs can not be statistically supported by data collected during peacetime operations, the dichotomy between measuring soldier performance in peacetime versus the need for assuring soldiers are capable of performing wartime jobs can not be resolved by these types of analyses.

b. Physical Strength Tests. Civilian research in materiel handling and injury prevention areas and research by military organizations such as ARI and the Aerospace Medical Research Laboratory show that dynamic strength tests are all highly correlated with each other and with the ability to perform physically demanding jobs. The PST seems to be an unnecessary addition to the training program. It is a difficult problem to create nearly 300 different PSTs which are valid tests of the soldiers' strength and ability to perform the MOS tasks. This problem would be greatly attenuated if the dynamic lift were used in place of the present PST. A more useful effort might be placed on the problem of assuring that the MOS requirements have been correctly computed. The method developed by the Air Force could be easily adapted for Army use. It accounts for frequency of performance and assures that a selection of the most difficult activities is used to compute the requirements. A short description of the Air Force method adapted for use by the Army is at Appendix I.

c. Job Performance. According to the task performance data provided by SSC, many male soldiers appear to be performing different tasks than are the female soldiers in the same MOS. Since the AOSP questionnaires specify that the respondents must answer in terms of their current assignment, the responses depend upon where their unit is located and what its mission is. Females may not be assigned proportionally to all types of units. Prior to additional study on reasons for differing tasks performed, it should be determined whether these differences are a result of assignment differences. If so, no further effort is required. If differences are found within the same type unit, ODCSPER is interested in determining whether they are due to differences in physical strength. However, data for this determination would be very difficult to both gather and analyze. Other reasons for the differences could range from soldiers' inability to perform certain jobs to supervisors' feelings of appropriateness of particular tasks for a specific gender.

d. MEPSCAT for Counseling. MEPSCAT is probably successful as a counseling tool. The use of 80 pounds for dividing MOSs into light and heavy groups seems to have aided in creating three groups of female recruits--those who

can lift light (much less than 80 pounds), medium (some less than 80 pounds), and heavy (more than 80 pounds) loads. In order to provide additional information to the recruits when the MEPSCAT is used only for counseling, the Army should consider giving them the actual weight requirements. With the present system, the recruit is unable to differentiate between very heavy and heavy MOSs.

e. Physically Unqualified Soldiers. Enlistees who select an MOS with lifting requirements beyond their tested capacity may succeed in training because they are highly motivated, because the MOS has not been categorized to match the tasks for which they are being trained, or because training does not require frequent performance of physically demanding tasks. They may succeed on the job for the same reasons. If so, it may not be possible to gather data which can be used to develop a score for screening recruits.

APPENDIX A
STUDY CONTRIBUTORS

1. STUDY TEAM

a. Study Director

Ms Sally J. Van Nostrand, Force Systems Directorate

b. Team Members

LTC Marcia E. Thompson
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Mr. Franklin E. Womack

2. PRODUCT REVIEW BOARD

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MAJ Tommy E. Shook
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SFC Linda Davis, Classification and Standards Branch, Accession
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Deputy Chief of Staff for Personnel, HQDA

Mr. Darrel Worstine, Chief, Survey Division, Military Occupational
Development Directorate, Soldier Support Center - National Capital
Region

Ms Susan Kerner-Hoeg, Survey Division, Military Occupational Develop-
ment Directorate, Soldier Support Center - National Capital Region

APPENDIX B
STUDY DIRECTIVE



REPLY TO
ATTENTION OF

DAPE-MPA-CS

12 JUN 1985

SUBJECT: Military Entrance Physical Strength Capacity Test
(MEPSCAT) Evaluation

Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, Maryland 20814-2797

1. Attached at Enclosure 1 is the study directive for evaluation of the Military Entrance Physical Strength Capacity Test (MEPSCAT).
2. For continuity purposes, request that CAA begin planning toward the necessary follow-on research to determine the impact MEPSCAT has on the longer term objectives (i.e., job satisfaction, reenlistment, etc.). I would appreciate receiving your thoughts on this matter.

Enclosure

A handwritten signature in dark ink, appearing to read "Robert M. Elton".

ROBERT M. ELTON
Lieutenant General, GS
Deputy Chief of Staff
for Personnel

CF: DAS, ATTN: DACS-DMO

STUDY DIRECTIVE

1. Purpose. This directive provides tasking for phase one of a study to develop a method for evaluating the impact of the Army MEPSCAT program. It will be accomplished by evaluating the relationship between physical strength and the physical demands of Army specialties.

2. Study Title. Evaluation of the Military Entrance Physical Strength Capacity Test (E-MEPSCAT).

3. Background. The Army MEPSCAT program was implemented in January 1984 as a voluntary screening tool to fill a void which existed in entrance requirements. MEPSCAT was designed to match prospective soldiers' strengths to the physical demands of the military occupational specialty (MOS) for which they are enlisting. The attrition rate for first term soldiers is of concern. The physical demands of a great number of Army jobs may be an important factor in this attrition, particularly when soldiers are not assigned to jobs which match their level of physical strength. Other areas of interest that may be affected by a mismatch between soldier strength and MOS requirements include:

- a. Enlistment.
- b. Performance in training.
- c. MOS migration.
- d. Malutilization or under-utilization.
- e. Reenlistment.
- f. Job satisfaction.

However, there has not been an empirical investigation of the actual effects of the program. The Army MEPSCAT results are used only for counseling soldiers on the strength requirements of various MOS and for recommending enlistment in MOS which fit the individual's demonstrated physical strength capacity. The Air Force currently uses the MEPSCAT as a mandatory screen for specialty placement.

4. Study Proponent. Office of the Deputy Chief of Staff for Personnel (ODCSPER).

5. Study Agency. US Army Concepts Analysis Agency (CAA).

ENCL 1

1

6. Terms of Reference.

a. Problem. There has not been an evaluation of the MEPSCAT program to determine the effects of matching an individual soldier's physical strength capacity to the demands of a specific MOS. It is necessary to determine:

- (1) Whether the MEPSCAT affects the enlistment process.
- (2) Whether physical strength is an important factor in:
 - (a) Performance in training.
 - (b) MOS migration.
 - (c) Malutilization or under-utilization.
 - (d) Attrition.
 - (e) Reenlistment.
- (f) Job satisfaction (to include harassment due to inability to perform the MOS tasks).

b. The results will aid in determining whether the MEPSCAT program should:

- (1) Continue to be administered as a counseling tool with voluntary MOS selection.
- (2) Be introduced as a mandatory screening device.
- (3) Be eliminated from enlistment testing.

c. Objectives.

(1) Investigate available data sources to determine whether appropriate and sufficient data for the evaluation have been or are being collected. A description of data sources selected will be provided to ODCSPER.

(2) Develop a quantitative evaluation procedure for measuring the effects of soldiers' physical strength. Areas in which a quantitative evaluation will be required include:

- (a) Enlistment,
- (b) Performance in training,
- (c) MOS migration,
- (d) Malutilization or under-utilization,

(e) Attrition,

(f) Reenlistment.

(3) Evaluate impact areas for which the data are available. Also, develop an initial predictive model of Army success (as defined by c(2) above) based on MEPSCAT scores by MOS cluster. Data used for this evaluation will be provided to ODCSPER for use in the longitudinal data collection and analysis.

(4) Compare proposed Army physical strength capacity standards with other services' physical strength capacity standards. Make this comparison to determine whether there are differences between services within the same occupational specialty or career management field.

(5) Assist ODCSPER in developing plans for a data collection plan for those impact areas in which appropriate or sufficient data are not presently collected.

d. Scope.

(1) Although analyses for individual MOS are desired, this study will cluster MOS into the five MEPSCAT categories (Enclosure 1 to Enclosure 1) if necessary to obtain sufficient data.

(2) Analysis will be by amount lifted on MEPSCAT device and gender.

(3) This study will consider enlisted personnel only.

(4) This study will evaluate only those impact areas and only those MOS for which the data is now collected and available. (See para c(2) above.)

(5) This study will not address impact on job satisfaction or harassment.

(6) Complete verification that the physical strength test (PST) is both valid and reliable is not a part of this study.

e. Time frame. Data analysis will cover the period 1 January 1984 to 31 March 1985.

f. Assumptions.

(1) The five MOS clusters of light, medium, moderately heavy, heavy and very heavy are appropriate clusters for this study.

(2) The MOS have been clustered correctly.

(3) The MEPSCAT was administered to all recruits under the same conditions.

g. Essential Elements of Analysis.

(1) How would use of the MEPSCAT results for mandatory MOS selection affect the recruit rejection rates?

(2) How important a factor is physical strength in training base attrition?

(3) What is the relationship between the passes and failures (GOs/NOGOs) on the Physical Strength Test and:

(a) The amount lifted on the MEPSCAT?

(b) MOS migration?

(4) What is the impact of physical strength (or lack thereof) on MOS migration?

(5) What significant differences in the strength requirements of similar specialties now exist among the military services.

h. Environmental and Threat Guidance.

(1) There are no threat aspects to this study.

(2) No environmental consequences are envisioned. However, the study agency is required to surface and address any environmental considerations that develop in the course of the study effort.

i. Benefits. When the evaluation is completed the Army will be able to determine:

(1) Whether specific weights should be established as cut-off scores for the incremental lift device.

(2) Whether matching soldiers to Army jobs for which they meet the physical strength criteria should be implemented as a mandatory program, remain as it now is, or be eliminated.

7. Responsibilities.

a. ODCSPER will:

(1) Provide a study coordinator to support the study--LTC R. Sparacino, DAPE-MPA-CS, telephone 695-0810.

(2) Provide points of contact in other organizations, as needed.

(3) Provide liaison and written request to appropriate agency, as necessary, to ensure data is furnished to CAA in a timely manner.

(4) Prepare an evaluation of study results in accordance with AR 5-5 and submit the evaluation update on DD Form 1498.

b. CAA will:

(1) Designate a study director and establish a study team.

(2) Provide ADP support for the analysis performed in this study.

(3) Provide study results to the study proponent and the Defense Technical Information Center (DTIC).

(4) Provide written requests for data to ODCSPER for data as required.

c. Military Personnel Center will:

(1) Provide extracts from the REQUEST data base, as needed, within two weeks of request.

(2) Provide extracts from the Enlisted Master File (EMF), as needed, within two weeks of request.

(3) Provide extracts from other MILPERCEN data bases if needed, within two weeks of request.

(4) Provide ADP support for the preparation of data extracts provided to CAA by MILPERCEN.

d. Recruiting Command will: Provide Army recruiting data as needed within two weeks of request.

e. Training and Doctrine Command will:

(1) Provide results of the Physical Strength Test by social security account number within two weeks of request, if results are on a fully automated system or within 30 days if not automated.

(2) Provide any ADP resources required to reformat data for CAA.

f. Health Services Command will:

(1) Provide results of the Physical Strength Test by social security account number within two weeks of request.

(2) Provide ADP support for the preparation of data extracts provided to CAA by HSC.

(3) Provide any ADP resources required to reformat data for CAA.

g. Surgeon General will provide technical advice and expertise on physiological analysis as requested by CAA.

h. Army Research Institute will provide technical advisory service in developing the PST verification Procedure.

8. References.

a. Department of the Army Regulation 5-5, The Army Study Program.

b. Departments of the Defense Manual 1312.1M, DOD Occupation Conversion Manual.

c. Message dated 201035Z June 84, DAPE-MPA-CS, subject: Military Entrance Physical Strength Capacity Test (MEPSCAT) results.

d. Department of the Army Regulation 611-201, Enlisted Career Management Fields and Military Occupational Specialties, 10 June 1984.

e. Department of the Air Force Regulation 39-1 with 6 changes, Airman Classification, dated 1 January 1982.

f. Department of the Air Force Regulation 160-43, Medical Examination and Medical Standards, 10 November 1983.

9. Literature Search.

a. "Women in the Army Policy Review," Office of the Deputy Chief of Staff for Personnel, 12 November 1982.

b. "Validation of the Military Entrance Physical Strength Capacity Test," US Army Research Institute for the Behavioral and Social Sciences, January 1984.

c. "Analysis of Attrition, Retention, and Criterion Task Performance of Recruits During Training," US Army Research Institute of Environmental Medicine, February 1982.

d. "Physical Fitness Requirements for Sustained Combat Operations of the Light Infantry," US Army War College Army Physical Fitness Research Institute, 10 September 1984.

10. Administration.

a. Funding for TDY, per diem and overtime will be provided by respective organizations.

b. Clerical support will be provided by respective organizations.

c. Computer support will be supported by respective organizations.

d. Milestones.

(1) Study Plan Briefing to SAG 28 February 1985

(2) All data required for D Day
evaluation in this study
is provided to CAA

(3) IPR D + 60 Days

(4) IPR D + 150 Days

(5) Accept draft final report D + 180 Days

e. This draft directive has been coordinated with CAA in accordance with AR 10-38.

PHYSICAL DEMANDS CATEGORIES

<u>LIGHT</u>	<u>MEDIUM</u>	<u>MODERATELY HEAVY</u>	<u>VERY HEAVY</u>
Lift on an occasional basis a maximum of 20 lbs with frequent or constant lifting of 10 lbs.	Lift on an occasional basis a maximum of 50 lbs with frequent or constant lifting of 25 lbs.	Lift on an occasional basis a maximum of 80 lbs with frequent or constant lifting of 40 lbs.	Lift on an occasional basis over 100 lbs with frequent or constant lifting in excess of 50 lbs.

OCCASIONAL = LESS THAN 20% OF THE TIME

FREQUENT = GREATER THAN 20% BUT LESS THAN 80% OF THE TIME

CONSTANT = GREATER THAN 80% OF THE TIME

NOTE: Frequency and weight must be considered. For example, a weight of 50 lbs lifted occasionally equals a category of MEDIUM; however, a weight of 50 lbs lifted frequently equals a category of HEAVY.

Encl 1 to encl 1

APPENDIX C
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Myers, David C., Gebhardt, Deborah L., Crump, Carolyn E., and Fleishman, Edwin A., Validation of the Military Entrance Physical Strength Capacity Test, Technical Report 610, US Army Research Institute for the Behavioral and Social Sciences, January 1984

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Army Occupational Survey Program Questionnaire, MOS 96B Intelligence Analyst, Form A, Relative Time Spent, Survey VIII, August 1984, US Army Soldier Support Center-National Capital Region, Alexandria, VA

Innovative Test of Physical Fitness Requirements for Sustained Combat Operations of the Light Infantry, Report Number TRADOC TRMS 3-000-395, US Army War College Army Physical Fitness Research Institute, 10 September 1984

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McDaniel, J. W., Skandis, R. J., and Madole, S. W., Weight Lift Capabilities of Air Force Basic Trainees, AFAMRL-TR-83-0001, Wright-Patterson Air Force Base, OH; Air Force Aerospace Medical Research Laboratory, May 1983

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Development of an Occupational Strength Test Battery (STB) NPRDC TR82-42, April 1982

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Ayoub, M. M.; Denardo, J. D.; Smith, J. L.; Bethea, N. J.; Lambert, B. K.; Alley, L. R.; Duran, B. S.: Establishing Physical Criteria for Assigning Personnel to Air Force Jobs, Institute for Ergonomics Research, Texas Tech University, Lubbock, Texas, September 1982

Ayoub, M. M.; Selan, Joseph L.; and Liles, Donald H.: An Ergonomics Approach for the Design of Manual Materials - Handling Tasks, Human Factors 25(5):507-515, 1983

Hollander, Myles and Wolfe, Douglas: Nonparametric Statistical Methods, Chapter 6 - Kruskal-Wallis Test, John Wiley and Sons, Inc., New York, NY 1973

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Liles, D. H.; Mahajan, P.; Ayoub, M. M.: An Evaluation of Two Methods for the Injury Risk Assessment of Lifting Jobs, Proceedings of Human Factors Society 27th Annual Meeting, 1983

McNeese, Donald C. and Hoag, Albert L.: Engineering and Technical Handbook, Prentice-Hall, Inc., Englewood Cliffs, NJ, 1957

APPENDIX D

LONGITUDINAL DATA COLLECTION PLAN

D-1. PURPOSE. The purpose of this plan is to identify the data sources and data collection requirements for a long-term evaluation of MEPSCAT.

D-2. SCOPE. The areas of attrition during the first term, MOS migration, utilization, harassment, job satisfaction, and reenlistment are included. Training attrition, further analysis of the results of the Physical Strength Test (PST) given during training and MOS migration during training are not included. Training attrition and MOS migration were analyzed during the first CAA E-MEPSCAT study. No differences in results would be expected unless the training program is changed. The amount of MOS migration during training is insignificant. PST results cannot be used until they have been restructured using standardized algorithms.

D-3. TIMEFRAME. Data should be collected until all soldiers who took the MEPSCAT between the dates of 1 January 1984 and 31 March 1985 have passed the first reenlistment point. This date would be some time after 1 April 1989, during calendar year 1989.

D-4. ATTRITION DURING THE FIRST TERM

a. Data Required. For each soldier who fails to complete the first-term enlistment, the following data are required:

- (1) Social security number.
- (2) Type of discharge with code to indicate whether physical capabilities were or were not a factor for discharge.
- (3) Other reasons (i.e., desertion, death, etc.) for those who did not complete the first term but were not discharged.

b. Source. Data can be obtained from the Enlisted Master File maintained by the US Army Military Personnel Center (MILPERCEN).

D-5. MOS MIGRATION

a. Data Required. Data will be required only for those personnel who were reclassified for some reason other than Career Management Field realignment or MOS being eliminated. The following data are required for each individual:

- (1) Social security number.
- (2) Enlistment MOS.
- (3) MOS to which reclassified.

- (4) Reason for reclassification.
- (5) Was reclassification voluntary or involuntary.

b. **Source.** Data are available from the Enlisted Master File maintained by MILPERCEN.

D-6. UTILIZATION, HARASSMENT AND JOB SATISFACTION.

a. **Data Required.** Since the source of data for all these areas is occupational surveys administered by SCC-NCR, these areas have been considered together. Soldier Support Center will need to oversample females and include additional questions pertaining to physical strength in all future occupational surveys. Data should be provided by type of unit (TDA or TOE) and major command or locations. The following data are required for each MOS:

- (1) MOS Survey Booklet.
- (2) Common soldier tasks from Relative Time Spent Section.
- (3) MOS specific tasks from Relative Time Spent Section.
- (4) Job satisfaction/retention responses.
- (5) Physical requirements responses.

b. **Source.** Data can be obtained from automated data from occupational surveys collected by SSC-NCR.

D-7. REENLISTMENT

a. Data Required

- (1) The following data are required for all soldiers who reenlist:
 - Social security number.
 - Enlistment MOS.
 - Reenlistment MOS.
 - Does enlistment MOS offer a bonus and how much?
 - Does reenlistment MOS offer a bonus and how much?
 - Was change in MOS mandatory?
 - Term of reenlistment?

(2) The first two items, social security number and enlistment MOS, will be needed for each individual who does not reenlist.

b. **Source.** Information pertaining to bonus can be obtained from ODCSPER and the remaining data from the Enlisted Master File maintained by MILPERCEN.

APPENDIX E

ONE-SIDED TEST OF HYPOTHESIS

E-1. INTRODUCTION. This appendix describes the one-sided test of hypotheses for evaluating training attrition. An arc-sin transform has been used on the proportions.

E-2. HYPOTHESES**a. The Null Hypothesis, H_0**

H_0 = The proportion of attrition for successful lifters exceeds the proportion of attrition for unsuccessful lifters.

b. The Alternate Hypothesis, H_a

H_a = The attrition rate of successful lifters is less than or equal to the attrition rate for unsuccessful lifters.

c. Hypotheses, Short Form

$$H_0 : P_1 > P_2$$

$$H_1 : P_1 \leq P_2$$

E-3. Definitions

a. P_1 = Proportion of attrition from successful lifters

b. P_2 = Proportion of attrition from unsuccessful lifters

c. n_1 = Number in sample of successful lifters

d. n_2 = Number in sample of unsuccessful lifters

e. α = Probability of rejecting the null hypothesis when in fact it is true. For this test, $\alpha = .05$.

f. β = Probability of failing to reject the null hypothesis when in fact it is false. $\beta = .05$.

g. Z = The test statistic:

$$Z = \left[2\sin^{-1}\sqrt{P_1} - 2\sin^{-1}\sqrt{P_2} \right] / \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

h. C = Critical value of the test statistic Z . For this test, $C = -1.645$.

E-4. STATISTICAL TESTS

- a. When $Z < C$, reject H_0 .
- b. When $Z \geq C$, can not reject H_0 .

APPENDIX F**ADDITIONAL ANALYSIS RESULTS DATA**

The purpose of this appendix is to present tables and figures which represent additional data for the results chapter. The tables and figures are presented in the same order as their companion tables, figures, and references in Chapter 3.

a. **MOS Data.** The first set of Tables, F-1 through F-10, contain a listing of all the MOS for which trainee discharge data were available during the evaluation of MEPSCAT. The MOS are listed by MEPSCAT category. Each MOS has a listing for males and females, the numbers who lifted each weight during testing, and whether they stayed in the service (indicated by Stay) or were discharged during training (indicated by Disc). These tables are referred to in Chapter 3, paragraph 3-2b, Available Data.

Table F-1. Male Trainees in Light Category by MOS and Weight Lifted

MOS	Weight lifted														Total		
	<40		40		50		60		70		80		90			> 90	
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc		Stay	Disc
02B									2		2					19	23
02H																1	1
02K																1	3
16H									2		3			1		42	51
51G			1								1					7	10
71D			1						2					3		43	58
71N									2	1	1			3		19	27
71Q																16	21
71R																9	11
72G									2	1	2					82	104
73C									2					1		23	28
73D									1					1		22	28
74F																41	54
75B										1	1			4		173	254
75C			2		1				3	2	5			9		26	35
75D					1						1			2		55	71
75E									1		1			4		39	50
75F										1				3		2	4
81B														2		14	14
81C														1		6	7
91U									1							1	2
91Y																6	6
96C														6		48	57
Total			4		2		18	6	18	5	48	9	695	114		919	

Table F-2. Female Trainees in Light Category by MOS and Weight Lifted

MOS	Weight lifted														Total		
	<40		40		50		60		70		80		90			>90	
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc		Stay	Disc
02B									2								2
02H									2								2
02K																1	1
16H									8							1	1
51G									2								
71D									13							2	2
71N	1		3		7	3	14		7							1	
71Q	1		2		13	3	22		10							2	2
71R			2		6	2	10		10							1	1
71R							1										
72G	1		12		19	4	54		12							3	3
73C	1		4		9	2	17		3							1	1
73D			1		3	1	6		3							1	1
74F			3		2		1		4							2	2
75B			22		40	20	87		20							7	4
75C		1	6		17		26		6							1	1
75D			6		22	2	50		4							3	3
75E	2	1	6		19	2	18		4							1	1
75F			4		3		6		6							2	2
75F	1				1		3		3							4	4
81B					1		4		1								
81C			2		1		4		1							3	7
91U							3		3							2	2
91V			3		7	1	3		1							1	1
96C	1		2		18	4	24		6							4	4
Total	8	2	73	17	192	44	347	70	261	45	83	15	25	31	4	4	1,219

Table F-3. Male Trainees in Medium Category by MOS and Weight Lifted

MOS	Weight lifted																Total	
	<40		40		50		60		70		80		90		>90			
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc		
02C															2		1	3
02D												1			1		1	3
02E												1			2		4	8
02G																	1	1
02J												1			1		4	6
02L															2		7	9
02M																	1	1
02N																	1	1
02T																	4	4
15J							3	1			6				4		52	3
26V											2				2		67	69
31N														1			4	74
32D						1					1						64	2
33Q							2							1			18	8
33R							1								1		3	1
33T																	3	3
35C						1											12	2
35M																	3	15
41B																	3	4
42E																	4	5
71G																	3	3
71I																	4	4
71M							1		2		1				3	1	36	5
71P							7				11				21	2	270	18
81E							3				4				3		76	4
81Q							1										8	4
84F																	4	4
91D																	5	6
91S																	6	7
92D							2				1				2		46	2
968																	14	3
96D						1					5				3		12	1
97B							1										62	3
Total							1	1	1	24	3	35	2	53	5	813	66	1,004

Table F-4. Female Trainees in Medium Category by MOS and Weight Lifted

MOS	Weight Lifted																Total
	<40		40		50		60		70		80		90		>90		
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	
02G					1												1
02J					1												1
02L					1		1					1					4
02M								1									1
26V			2		4		3	10	4	11	2	1			1		38
31N	1		4		5		3	8	3	11	1						39
32D	2		4		4		4	10	3	17	1	2	1		1	1	50
33Q										3	1						4
33T															1		1
35C							1										1
35M			1		3			1	1	1		1					9
41B												1					2
42E					1			1	1	2	1						6
71G					5		3		5		2				1		18
71L	9	2	39	12	139	22	262	45	154	27	50		8	15	2	12	799
71M	1		12	3	18	4	39	7	29	6	5		1	1	2		128
71P			5		9	2	14	1	7	1	2				1	1	43
81E	1		2		4	1	8		1	1							18
81Q						1	3		1		1				1		7
84F					2		5		2		2						11
91D			1	1	7	1	8	4	7	3	1			1	1		35
91S	1				9	1	11	2	15	3	1	1	1	2			46
92D								1	1		1						3
96B			6	4	9		15	4	20	1	4		3				66
96D			1	1	2		13	1	10	1	1		2		1	1	33
97B					1												1
Total	15	2	77	24	225	44	412	78	298	49	76	12	26	2	21	4	1,365

Table F-5. Male Trainees in Moderately Heavy Category by MOS and Weight Lifted
(page 1 of 2 pages)

MOS	Weight Lifted														Total		
	<40		40		50		60		70		80		90			>90	
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc		Stay	Disc
02F									1			1			1	8	10
02S												1				7	9
03C												1			1	29	34
05D							1								2	19	26
05H									1						7	132	150
13C			1				1		1		2	1			5	39	55
13F			3		1		5	1	3		26	4			34	676	847
13M							1		27	2	5				10	203	249
15E			1				1		12	2	8	1			9	165	207
17K									6	1					2	22	33
24J									4		1					4	4
24L																6	6
25L																2	2
26C																9	16
26T							1									3	3
26Y																70	76
31C									5		2				3	337	416
31E								1	5		2				4	76	98
31K			1						2	3	46	5			91	1,197	1,527
31S											3				6	32	43
32F					1				1						2	27	30
32G									2		1				1	17	21
35E													1		1	16	20
35G																5	5
35H																16	23
35R																4	4
36L									1		1				1	47	55
36M							2		5	3	5	1			12	129	169
41E																1	1
42D																6	8

Table F-5. Male Trainees in Moderately Heavy Category by MOS and Weight Lifted
(page 2 of 2 pages)

MOS	Weight lifted																Total
	<40		40		50		60		70		80		90		> 90		
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	
52C							2	1	7	4	7		6	2	126	13	168
68B															27	2	29
68H											1		2		18	3	24
74D									1						11	1	13
82B													1		7		8
82D											1				7		8
83E															3		3
91A	1				5		1	1	20	6	47	1	78	11	977	120	1,268
91B											1				9		10
91C															2		2
91E													1		9	1	11
91F											1		4		7		12
91G													1		13	3	17
91H															1		1
91J															1		1
91N															5	1	6
91P										1			1		11		13
91Q					1				1		1			2	40	6	51
91T									1				1		19	2	23
92B							1				3	1	2		43	2	52
93F							1								6		7
94F																	
95B	4						2	1	11	1	58	3	87	5	2,253	164	2,589
95C											1	1	5		53	2	62
98C									1		2		3	2	62	4	74
98G							1		3	1	4	3	17	4	226	16	275
98J															11		11
Total	11				8	2	20	5	118	28	240	21	426	50	7,269	718	8,916

Table F-6. Female Trainees in Moderately Heavy Category by MOS and Weight Lifted
(page 1 of 2 pages)

MOS	Weight lifted																Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	<40		40		50		60		70		80		90		>90																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Table F-6. Female Trainees in Moderately Heavy Category by MOS and Weight Lifted
(page 2 of 2 pages)

MOS	Weight Lifted														Total		
	<40		40		50		60		70		80		90			>90	
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc		Stay	Disc
52C			2		7	2	15	2	18	5	3			1		55	
688			1				1	1	3	1	3				1	12	
68H					1	2	2		5	2		1				14	
740			1			1	4	1	5	1						18	
820			2		1		3		2	1				1		10	
83E					4		2		1							7	
91A	5	4	55	10	127	26	222	33	129	18	57	11	18	1	20	4	740
91B	1	1	20	3	40	3	98	10	68	6	31	1	9		8	2	301
91C					4	1	7		2		5				2		21
91E	1	1	3	1	4	3	11		4	2					1		31
91F				1	1	1	6	1	7	1	3				1		22
91G			1	3	3	3	7		12	1	3	1			1		34
91H					2		3		1								6
91J							1	1									2
91L					1				3		1				1		1
91M					2		1		2								8
91P	1				1	1	1	1	3								7
91Q			2		7	1	6	3	3	2	5	1	2		1		33
91T			3	1	8		19	3	6				1		3		44
928	1		7		18	2	25	3	20	4	5	1	1	1	1		88
93F			1	1	2		2	2	3			1					12
94F			1		11		20	3	7	5	2	3	3		1		57
958	6	2	24	11	82	17	179	47	198	30	107	12	29	7	24	4	779
95C					2	1	5		4		1		1				14
98C			7	1	11	1	16	5	8	3	9	1	1		2		65
98G	3	1	3	1	11	5	22		26	1	5	1	3		4		86
98J			1	2	7		5	1	8	1	1				2		28
Total	20	11	169	41	442	88	846	143	660	115	277	38	85	16	81	12	3,044

Table F-7. Male Trainees in Heavy Category by MOS and Weight Lifted

MOS	Weight lifted															Total				
	<40		40		50		60		70		80		90		> 90					
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay		Disc			
16J													1					20	3	24
17C																		36	7	56
17M										1								4	1	6
21L																		13		13
24C																		22	2	25
24N																		24	2	27
26D																		29	5	37
27B																		22	1	24
31J																		162	21	206
31T																		12	2	16
32H																		22	2	26
35K																		29	1	34
35L																		12	2	14
36C																		354	48	447
44B																		141	15	175
44E																		63	4	71
51K																		43	4	52
57E																		40	4	50
61C																		20	7	32
64C																		2,161	249	2,671
67G																		20	2	23
67H																		25	5	31
67Y																		76	11	91
72E																		317	41	406
76C																		668	71	853
76P																		183	20	228
83F																		15	3	20
84B																		2		6
84C																		3		1
91R																		50	6	68
93H																		23		25
93J																		25	3	28
Total	1	1					5		17	3	172	24	335	52	4,634	542		5,786		

Table F-8. Female Trainees in Heavy Category by MOS and Weight Lifted

MOS	Weight Lifted																Total
	<40		40		50		60		70		80		90		>90		
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	
21L							1									1	1
24C							2		1				2		1		1
26D							1								2		8
27B								2									5
31J	1	1			1	1			1								9
31T																	1
32H					2		1	1									6
35K					1				1						1		4
35L					1		3				1						10
36C	2	1	5	2	24	4	29	5	19	3	18	5	4	1	6	1	2
44B		1				2	1		3		1						130
44E					1		1				1				1		10
57E			1		3		4	1	3				1				4
61C											1						14
64C	4	4	13	2	48	12	80	20	73	11	36	5	14	8	17	2	349
67G					1		1				1						2
72E			1	1	10	3	21	2	21	5	10	1	3	1	4		4
76C	1		1		4	1	1		4		1		1				83
76P	1		3		10	1	6	3	2		4	1	1		5	1	15
83F	1		1			1	1	1	3								38
84B					1												8
91R			1		5	1	5		2		2		3		2	1	1
93H							3	1	3								22
93J							1				4	1					9
Total	10	8	27	5	112	28	162	36	137	20	86	17	32	11	42	7	740

Table F-9. Male Trainees in Very Heavy Category by MOS and Weight Lifted
(page 1 of 3 pages)

MOS	Weight lifted														Total			
	<40		40		50		60		70		80		90			>90		
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc		Stay	Disc	
05G			3				6					3	34	406	54	12	2	17
11X					2				35	4	201	66	9	100	12	7,410	880	9,035
128					1				8	1	10	2	21	5	1,722	157	2,076	
12C									1			2			289	31	359	
12E												2			33	6	41	
12F												6	1	16	3	216	32	274
13B					1	1	6	1	8	2	87	8	176	16	2,211	195	2,712	
13E											4		10	2	163	12	191	
13R													1		84	7	92	
150												6		24	2	225	34	292
16P			1		1		1		3		16		1	35	5	561	34	659
16R	1						1		7	1	7	2	20	1	252	26	317	
16S									2		16		28	6	453	45	550	
17B											2		1	1	19	3	26	
19D					1				6		33	7	67	18	899	152	1,183	
21G											2		1		33	1	37	
24E											1			2	12	13	13	
24G											1			1	44	5	52	
24H														1	13	1	15	
24K							1							2	16	19	19	
24M									1					3	26	3	35	
24T										1				6	58	4	69	
24U														1	14	1	17	
24W														1	5	1	6	
268														3	6	1	10	
26E														1		1	8	
26F														1			5	
26H																8	1	10
26L																64	3	77
26Q									2					3	151	16	189	
27E														10	155	12	185	
27F														12	13	1	16	
27G														2	1	1	2	

Table F-9. Male Trainees in Very Heavy Category by MOS and Weight Lifted
(page 2 of 3 pages)

MOS	Weight Lifted														Total		
	<40		40		50		60		70		80		90			>90	
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc		Stay	Disc
27I									1							1	1
27M																22	1
27N																7	
31M									3	22	5					676	96
31V					1				2	21	3					570	43
34L																26	
34Y										2						1	1
41C																12	2
43E									1	11	3					19	2
43M																232	47
45B										3						23	6
45D										5						34	4
45E																45	4
45G										2	1					30	1
45K										1						21	4
45L									1	5						154	14
45M									1	2						77	14
45T																96	27
46N									1							41	10
51B																17	2
51C										4	1					118	14
51M																25	2
51N																10	1
51R									1	7	2					69	18
52D										1	1					46	7
52F					1				3	1	4					998	87
52G																46	4
55B									1	1	8					12	3
55G											3					282	16
57F											1					36	3
57H									1	6	2					20	2
61B										3	4					148	18
62B									2	13	4					52	7
																390	35
																	465

Table F-9. Male Trainees in Very Heavy Category by MOS and Weight Lifted
(page 3 of 3 pages)

MOS	Weight Lifted																Total
	<40		40		50		60		70		80		90		> 90		
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	
62E									1		12	2	12	2	188	15	232
62F											4		3	1	75	13	96
62G											2			1	25	2	30
62H													2		28	3	33
62J											4		7		153	10	174
63B					2		3	1	5	2	58	12	81	24	1,731	197	2,116
63D	1				1		1		1		10	2	8	1	241	27	292
63E											3		5		103	9	121
63G											3	1	2		104	5	115
63H					1				2		22	1	24		416	27	493
63J									1		6		9	1	96	7	120
63N			1								16		15	4	376	48	460
63S					1						10	3	19	2	398	42	473
63T											5	1	10	2	215	25	258
63W							1		3		20		29	6	516	42	617
63Y											3	1	12		163	18	197
67N									1		9	1	15		255	18	299
67T									2		2		10	1	129	13	157
67U									1		2	1	13	2	165	15	199
67V											3	1	9		93	11	117
68D									2		3		4		54	5	68
68F											1		4		58	3	66
68G											3	1	4		107	9	124
68M							1						5	1	46	6	60
76J											3		6		45	9	63
76V										5	17	2	36	6	463	38	568
76W							3		4		37	8	45	9	684	91	882
76X				1							4	3	8		86	5	106
76Y							1		5	2	25	2	56	13	846	100	1,050
82C									2		10	2	14	6	262	26	322
92C													1		11	12	12
94B					1		3		15	4	80	23	118	28	1,586	239	2,097
96H															2	2	4
Total	2		5	1	14	2	27	4	142	21	1,010	168	1,832	288	29,253	3,240	36,009

Table F-10. Female Trainees in Very Heavy Category by MOS and Weight Lifted
(page 1 of 2 pages)

MOS	Weight lifted														Total		
	<40		40		50		60		70		80		90			> 90	
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc		Stay	Disc
05G	1	1															33
15D																	4
21G																	6
24G																	1
24K																	5
24T	1				2		5		2			1		2	1		11
26B			1														1
26H																	2
26L	1								1		1				1		2
26Q					4		6		5		1						3
27E	1		1	1	6		3		3		2		1	3	1	1	21
27F									1		1			2			17
27G									1		1						4
27M						1											4
31M	1	5	8		28	6	24	4	26	5	28	5	7	12	5		164
31V			1		7		7	1	11		5	1		2			35
41C			2				2				2	1		1			8
43E	1		2	1	11	4	15	5	12	4	4	4	4	1	1		69
43M			3		2		2		3	1							11
45B							2										2
45G																	1
45K	1		1		1			1	1		1	1	1				13
45L									1				1				2
46N											1						1
51C											1						1
51M											1						1
51N			2		3	1	5	3	3		1				1		20
52D			5		7	5	12	2	14		14	2	6	7			74
52F							1		1								2
55B					3		4		1		3		2	1			16

Table F-10. Female Trainees in Very Heavy Category by MOS and Weight Lifted
(page 2 of 2 pages)

MOS	Weight Lifted																Total
	<40		40		50		60		70		80		90		> 90		
	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	Stay	Disc	
55G																	7
57F																	3
57H																	34
61B			2														19
62B	1																40
62E																	1
62F																	1
62J																	13
63B	3	1	7	2	23	4	37	9	21	5	18	6	10	5	7	5	163
63G																	5
63H	1																22
63J		1	1	1	1	1	8	1	9	1	6		1	1	1		32
63S							2										6
63W			1		10	1	16	2	12	4	6	2	3	3	5	1	63
63Y																	2
67N									2		2				1		5
67T																1	1
67U														1			1
67V																	1
68F					1				1	1	1						5
68G					1				2								5
68M						1				1							5
76J																	5
76V			2														194
76W	1		7	4	40	6	49	6	35	4	23	1	8	1	9		90
76X	1		9	9	21	1	28	1	14	2	8	2	1	1			34
76Y	1		3	1	5	1	10	1	7		1		1	1			150
92C	3		5	1	18	2	39	6	31	3	26	2	5		9		2
94B																	512
96H	7	1	19	3	90	17	123	25	86	26	65	9	12	4	25		3
							1						2				
Total	26	9	82	18	301	59	445	80	348	66	271	45	82	18	95	18	1,963

b. **Distributions by Category.** Figures F-1 through F-5 are bar graphs representing the distribution of trainees (from matched ACT and REQUEST data) by gender and amount lifted for each category, light through very heavy. The overall distribution is shown in Chapter 3, paragraph 3-3a, Actual MEPSCAT Distribution.

c. **One-sided Subcategory Analysis.** Tables F-11 through F-13 present the results of the one-sided subcategory analyses discussed in Chapter 3, paragraph 3-4b, Training Attrition - Subcategory Analyses. The total number of soldiers within each MEPSCAT weight category is less than the total number of soldiers for the category shown in Table 3-7. Most of the differences are caused by missing education level codes or missing scores for the Armed Forces Qualification Test (AFQT) which is used to determine the mental category. The other reason is that the subcategory of soldiers with advanced degrees was deleted from Table F-11 because all sample sizes were too small to compute proportion differences.

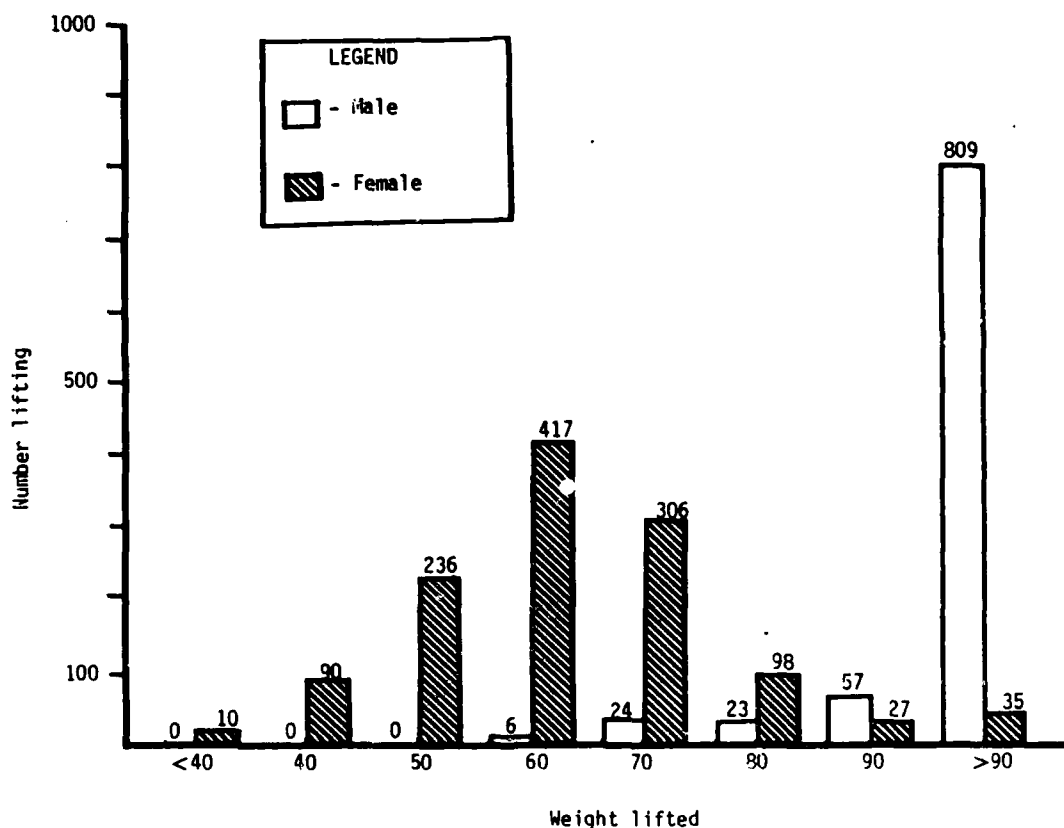


Figure F-1. Trainee Distribution of Light Category

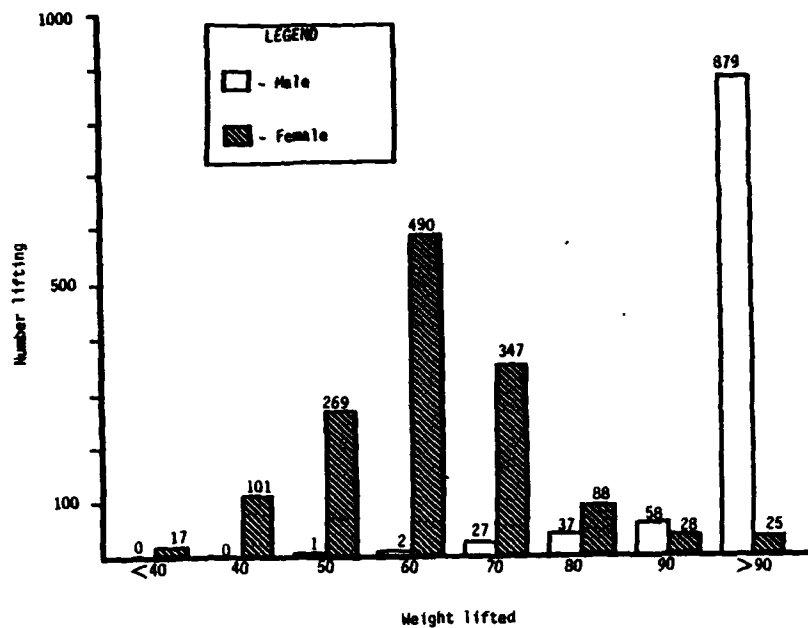


Figure F-2. Trainee Distribution of Medium Category

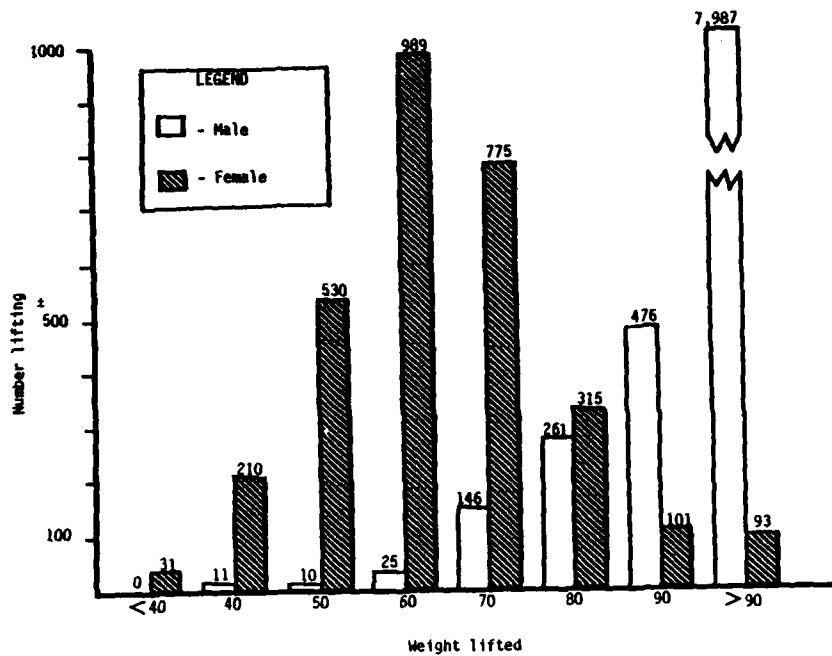


Figure F-3. Trainee Distribution of Moderately Heavy Category

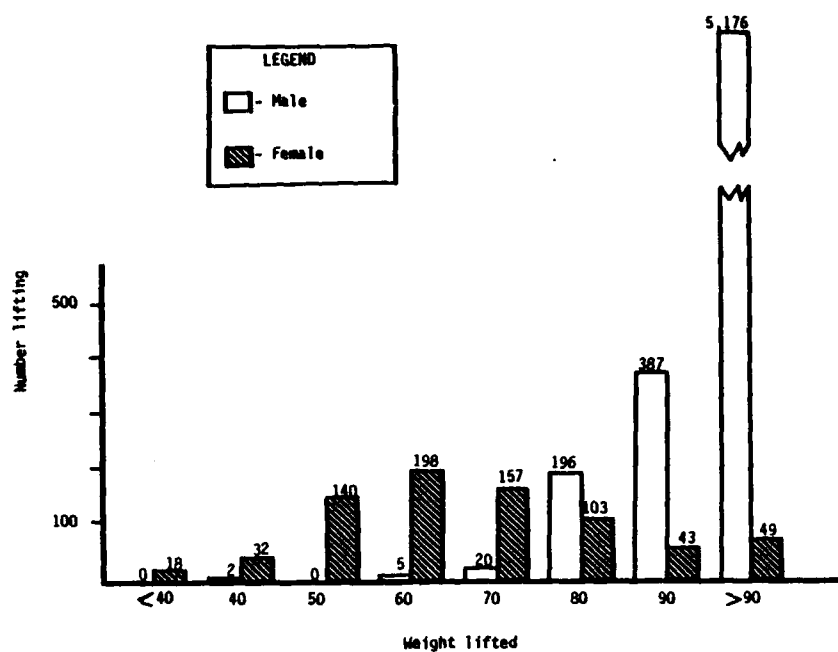


Figure F-4. Trainee Distribution of Heavy Category

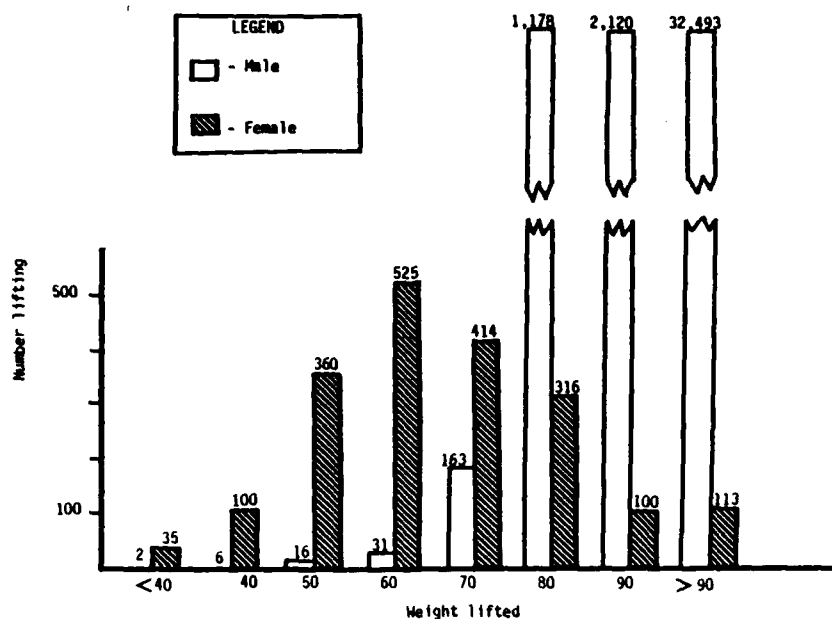


Figure F-5. Trainee Distribution of Very Heavy Category

Table F-11. Proportion Analysis - Education Level by Gender and MEPSCAT Category

MEPSCAT category	Gender	Educ level ^a	Lifted			Did not lift		
			Stay	Disc	Prop	Stay	Disc	Prop
MH	M	NHS	620	125	16.8	28	9	24.3
MH	M	HSC	601	109	NC ^a	11	2	NC
MH ^b	M	HSG	6,371	530	7.7	113	24	17.5
H	M	NHS	362	86	19.2	44	8	15.4
H	M	HSC	445	95	17.6	68	15	18.1
H ^b	M	HSG	3,766	357	8.7	418	57	12.0
H	M	Col	114	8	NC	12	2	NC
VH ^b	M	NHS	2,650	532	16.7	360	97	21.2
VH	M	HSC	2,647	503	16.0	272	63	18.8
VH ^b	M	HSG	23,323	2,164	8.5	2,338	318	12.0
VH	M	Col	623	40	6.0	61	6	9.0
M	F	HSC	8	5	NC	0	2	NC
M	F	HSG	986	178	15.3	90	22	19.6
M	F	Col	64	5	NC	2	2	NC
MH	F	HSC	4	2	NC	41	11	NC
MH	F	HSG	405	60	12.9	1,940	357	15.5
MH	F	Col	33	4	10.8	150	26	14.8
H	F	HSC	1	0	NC	6	4	NC
H	F	HSG	41	5	10.9	522	122	18.9
H	F	Col	2	0	NC	24	0	NC
VH	F	HSC	1	1	NC	38	7	NC
VH	F	HSG	89	17	16.0	1,460	281	16.1
VH	F	Col	5	0	NC	57	6	NC

^aCode: NHS = Non-high school graduate

HSC = High school certificate

HSG = High school graduate

Col = College

NC = Not computed, sample size too small

^bSignificant, $p = .05$.

Table F-12. Proportion Analysis - Mental Category by Gender and MEPSCAT Category

MEPSCAT category	Gender	Ment cat	Lifted			Did not lift		
			Stay	Disc	Prop	Stay	Disc	Prop
MH	M	I	408	5	NC	6	0	NC
MHa	M	II	3,224	288	8.2	70	12	14.6
MHa	M	IIIA	2,065	234	10.2	39	12	23.5
MH	M	IIIB	1,815	184	9.2	35	7	16.7
MH	M	IV	322	37	10.3	4	4	NC
H	M	I	97	5	NC ^b	15	0	NC
H	M	II	1,163	133	10.3	115	17	12.9
H	M	IIIA	1,084	141	11.5	120	19	13.7
H	M	IIIB	1,293	149	10.3	162	27	14.3
H	M	IV	786	86	9.9	94	15	13.8
VH	M	I	693	50	6.7	50	3	5.7
VHa	M	II	8,170	842	9.3	815	120	12.8
VHa	M	IIIA	7,213	947	11.6	662	140	17.5
VHa	M	IIIB	8,034	863	9.7	895	131	12.8
VHa	M	IV	4,103	405	9.0	388	72	15.6
M	F	I	19	4	NC	0	1	NC
M	F	II	297	54	15.4	27	7	20.6
M	F	IIIA	304	55	15.3	27	9	25.0
M	F	IIIB	438	64	12.7	38	9	19.1
MH	F	I	24	2	7.7	86	13	13.1
MH	F	II	235	33	12.3	1,021	185	15.3
MH	F	IIIA	125	19	13.2	678	128	15.9
MH	F	IIIB	59	12	16.9	352	72	17.0
H	F	I	0	0	NC	9	0	NC
H	F	II	10	3	23.1	102	28	21.5
H	F	IIIA	15	2	11.8	160	27	14.4
H	F	IIIB	17	2	10.5	294	71	19.4
VH	F	I	2	1	NC	15	3	NC
VH	F	II	31	4	11.4	275	58	17.4
VH	F	IIIA	28	8	22.2	389	80	17.1
VH	F	IIIB	34	5	12.8	876	154	14.9

^aSignificant, $p = .05$.^bNC = Not computed, sample size too small.

Table F-13. Proportion Analysis - MOS by Gender and MEPSCAT Category

MOS	Gender	MEPSCAT category	Lifted			Did not lift		
			Stay	Disc	Prop	Stay	Disc	Prop
31K	M	MH	1,334	188	NC ^b	2	3	NC
31K	F	MH	13	2	NC	48	7	NC
91A	M	MH	1,098	132	10.7	27	7	20.6
91A	F	MH	95	16	14.4	537	91	14.5
95B	M	MH	2,398	172	NC ^b	17	2	NC
95B ^a	F	MH	160	23	12.6	489	107	18.0
36C	M	H	354	48	11.9	38	7	15.6
36C	F	H	6	2	NC	99	21	NC
64C	M	H	2,160	249	10.3	230	31	11.9
64C	F	H	17	62	78.5	268	2	.74
72E	M	H	317	41	11.5	43	5	10.4
72E	F	H	4	0	NC	66	13	NC
11X	M	VH	7,410	880	10.6	653	92	12.3
12B	M	VH	1,674	153	8.4	168	22	11.6
12C	M	VH	289	31	9.7	32	7	17.9
13B	M	VH	2,211	195	8.1	278	28	9.1
15D	M	VH	225	34	13.1	31	2	6.1
16P	M	VH	561	34	5.7	58	6	9.4
16R	M	VH	252	26	9.3	35	4	10.3
16S	M	VH	453	45	9.0	46	6	11.5
19D	M	VH	899	152	14.5	107	25	18.9
26Q	M	VH	151	16	NC	19	3	NC
27E	M	VH	155	12	NC	16	2	NC
31V ^a	M	VH	570	43	7.0	52	9	14.7
63B ^a	M	VH	1,731	197	10.2	149	39	20.7
63B	F	VH	7	5	NC	119	32	NC
94B ^a	M	VH	1,586	239	13.1	217	55	20.2
94B	F	VH	25	0	NC	402	85	NC

^aSignificant, $p = .05$.^bNC = Not computed, sample size too small.

d. **Regression Analysis.** The results of the regression analyses for education levels and mental categories are given in Tables F-14 and F-15 and are discussed in Chapter 3, paragraph 3-4c, Training Attrition - Regression Analysis.

Table F-14. Regression Analysis - Education Level by Gender and MEPSCAT Category

MEPSCAT category	Gender	Education level	t Value
VH	M	HSC	-2.34
VH	M	HSG	-2.25
VH	F	HSG	-1.77
H	M	HSG	-1.67
H	F	HSG	-1.46
MH	M	HSG	- .38
MH	F	HSG	-2.94 ^a
L	F	HSG	-2.97 ^a

^aSignificant, $p = .05$.

Table F-15. Regression Analysis - Mental Category by Gender and MEPSCAT Category

MEPSCAT category	Gender	Mental category	t Value
H	F	II	- .59
H	F	IIIA	-1.24
H	F	IIIB	-2.32
MH	M	II	.28
MH	M	IIIB	- .43
MH	F	I	-1.24
MH	F	II	-3.70 ^a
MH	F	IIIA	-1.67
MH	F	IIIB	-3.57 ^a

^aSignificant, $p = .05$.

e. **Percent Performing.** As discussed in Chapter 3, paragraph 3-6a, Percent Performing, the percent males, the percent females, and the difference in percentages are displayed for those tasks that are performed substantially more frequently by one gender than the other. Figures F-6 through F-8 each display the tasks for one MOS.

f. **Perceptions of Lift.** Figures F-9 and F-10 display additional perceptions of lifting requirements that are discussed in Chapter 3, paragraph 3-6a, Percent Performing.

PERCENT MEMBERS PERFORMING---DIFFERENCE, 1STMEN MINUS 1STWOM.....			
1STWOM PERCENT MEMBERS PERFORMING.....			
1STHEN PERCENT MEMBERS PERFORMING.....			
TASK TITLE			
ENGAGE TARGETS WITH CALIBER .45 PISTOL	73.36	18.03	55.33
QUALIFY/FAMILIARIZE WITH CALIBER .45 PISTOL	74.70	19.67	55.03
PERFORM OPERATOR MAINTENANCE ON CALIBER .45 PISTOL	74.30	20.77	53.53
LOAD, REDUCE STOPPAGE, CLEAR CALIBER .45 PISTOL	71.98	18.03	53.95
PARTICIPATE IN CALIBER .45 PISTOL DRILL	45.25	14.21	31.04
CONNECT/DISCONNECT TRAILER TO/FROM VEHICLE	51.94	28.96	22.98
PERFORM PREVENTIVE MAINTENANCE ON TRAILERS	47.26	25.14	22.12
SLAVE START VEHICLE	41.90	21.31	20.59
OPERATE VEHICLE UNDER BLACKOUT CONDITIONS	551-721-1319	51.14	30.60
OPERATE VEHICLE IN SAND	551-721-1309	53.68	33.88
OPERATE DISMOUNT POINT	191-376-4108	42.30	22.95
CHECK AND SERVICE VEHICLE SPECIAL TOOLS AND EQUIPMENT		42.84	23.50
CAMOUFLAGE/CONCEAL UNIT EQUIPMENT		40.43	21.86
OPERATE VEHICLE OFF ROAD	551-521-1311	63.86	45.36
OPERATE VEHICLE IN MOTOR MARCH/CONVOY	551-721-1312	52.74	34.43
CAMOUFLAGE/CONCEAL SELF AND INDIVIDUAL EQUIPMENT		44.44	26.23
SPOT PAINT VEHICLE/TRAILER		49.13	31.15
CHANGE VEHICLE TIRES		54.40	36.61
CAMOUFLAGE/CONCEAL DEFENSE POSITIONS		42.97	25.14
CONDUCT CALIBER .45 PISTOL DRILL		29.18	11.48
REACT TO FLARES 071-326-0511		35.07	17.49
LOAD/UNLOAD/CLEAR M203 GRENADE LAUNCHER		35.34	18.03
TOW ANOTHER VEHICLE WITH OWN VEHICLE		25.97	8.74
OPERATE CCP	191-376-4105	41.50	24.59
OPERATE VEHICLE IN SNOW/ICE	551-721-1309	55.59	39.34
INSTALL VEHICLE TARPS, BOMS AND CURTAINS		39.76	24.04
PERFORM FIELD EXPEDIENT REPAIRS ON VEHICLE		30.55	22.95
CLEAR FIELD OF FIRE		20.85	13.11
ASSIST MECHANIC IN VEHICLE ORGANIZATIONAL MAINTENANCE		42.84	27.32
PERFORM ESCORT/SECURITY DUTY FOR CONVOYS		38.42	22.95
CONSTRUCT INDIVIDUAL FIGHTING POSITIONS		37.48	22.40
CONTROL TRAFFIC AT DEFILE	191-376-4109	31.59	16.94
PREPARE VEHICLE FOR TOWING/TO BE TOWED		26.37	12.02
APPLY IMMEDIATE ACTION TO REDUCE STOPPAGE ON M203 GRENADE LAUNCHER		31.19	16.94
ENGAGE ENEMY ARMOR WEAK POINTS	071-331-0805	23.43	9.29
ENFORCE NOISE, LIGHT AND LITTER DISCIPLINE		33.07	19.13
ENGAGE TARGETS WITH M72A2 LAW		40.70	26.78
ENGAGE TARGETS WITH M203 GRENADE LAUNCHER		31.86	18.03
ENGAGE TARGETS WITH HAND GRENADES		36.91	22.40
PERFORM PM CAMP PATROL		29.32	15.85

Figure F-6. 95B, Military Police (MH) Tasks
(page 1 of 3 pages)

PROVIDE/SUPERVISE SECURITY FOR DIVISION HEADQUARTERS ELEMENTS/TOC	191-379-4411	24.10	10.93	13.17
NAVIGATE WHILE MOUNTED	071-317-1030	44.31	31.15	13.18
REACT TO HOSTILE FIRE DURING CONVOY MOVEMENT	191-376-4111	37.62	24.59	13.03
PARTICIPATE IN SEARCH/DESTROY MISSION		23.29	10.38	12.91
PLACE INTO OPERATION AM/PVS-4 GOGGLES	071-315-0003	23.03	10.93	12.90
DETERMINE DISTANCE WHILE MOVING BETWEEN TWO POINTS ON GROUND	371-329-1007	44.44	31.69	12.75
APPLY IMMEDIATE ACTION TO CORRECT M72A2 MALFUNCTIONS		43.11	30.80	12.50
IDENTIFY PERSONNEL USING CHALLENGE AND PASSWORD		33.20	20.77	12.43
OPERATE RIOT CONTROL AGENT DISPENSER	191-376-4119	23.03	10.93	12.10
ESCORT ENEMY PRISONERS OF WAR/CIVILIAN INTERNEES (EPW/CI) TO REAR AREAS	191-376-4102	32.26	20.22	12.04
ZERO M203 GRENADE LAUNCHER	371-311-2103	26.77	14.75	12.02
LOCATE TARGET BY SHIFT FROM KNOWN POINT		22.89	10.93	11.96
PERFORM SAFETY CHECKS ON HAND GRENADES		31.00	19.13	11.93
PREPARE VEHICLE FOR WINCH OPERATIONS		19.54	7.65	11.89
POST VEHICLE TRIP TICKETS BEFORE/DURING/AFTER OPERATION		40.29	28.42	11.80
INSTALL FIELD TELEPHONE	113-600-1015	34.27	22.40	11.87
EMPLACE/RECOVER EARLY WARNING DEVICES	371-331-0810	22.22	10.38	11.84
DRIVE VEHICLE WITH MANUAL TRANSMISSION	351-721-1307	64.68	53.01	11.65
CALL FOR/ADJUST INDIRECT FIRE	061-283-6003	24.10	12.57	11.53
USE VISUAL SIGNALS TO CONTROL MOVEMENT (MOUNTED)	371-326-0601	27.31	15.05	11.46
PERFORM OPERATOR MAINTENANCE ON M203 GRENADE LAUNCHER	371-311-2101	30.39	19.13	11.26
CONDUCT HASTY ROUTE RECONNAISSANCE	191-376-4104	37.48	26.23	11.25
ESTABLISH/SUPERVISE ROADBLOCKS/CHECKPOINTS	191-377-4203	19.95	8.74	11.20
MOUNT/DISMOUNT AM/PVS-4 ON M16A1 RIFLE	071-315-2306	26.37	15.30	11.07
REACT TO SNIPER FIRE	191-376-4120	37.75	26.70	10.98
CONDUCT WINCH OPERATIONS WITH OWN VEHICLE		10.07	7.10	10.97
PARTICIPATE IN AREA RECONNAISSANCE	071-326-5000	26.24	15.30	10.94
USE VISUAL SIGNALS TO CONTROL MOVEMENT (DISMOUNTED)	071-326-0600	28.38	17.49	10.89
CONSTRUCT FIGHTING POSITION FOR CREW SERVED WEAPON	071-317-3307	25.57	14.75	10.81
PREPARE MOTOR VEHICLE UTILIZATION RECORD (DD FORM 1970)	551-721-1301	39.76	28.96	10.80
LOCATE TARGET BY GRID COORDINATES	061-283-6001	28.25	17.49	10.76
PLAN DEFILE HOLDING AREAS	191-379-4403	21.69	10.93	10.76
ESTABLISH/SUPERVISE DISMOUNT POINT	191-377-4201	22.76	12.02	10.74
SEARCH AND CLEAR BUILDINGS IN URBAN TERRAIN	071-326-9542	25.97	15.30	10.67
	071-326-0556			
ESCORT/GUARD MONEY CARRIERS		73.49	62.84	10.65
PERFORM PREVENTIVE MAINTENANCE ON VEHICULAR WINTERIZATION EQUIPMENT		27.04	16.39	10.65
ESTABLISH/SUPERVISE DEFILE	191-377-4204	10.74	8.20	10.54
PARK VEHICLE PARALLEL	551-721-1300	62.38	51.91	10.47
PREPARE ACCIDENT-IDENTIFICATION CARD (DD FORM 510)		23.03	12.57	10.46

Figure F-6. 95B, Military Police (MH) Tasks
(page 2 of 3 pages)

PREPARE M72A2 LAW FOR FIRING		45.92	35.52	10.40
PLAN ESTABLISHMENT OF CIRCULATION CONTROL POINT (CCP)		22.36	12.02	10.33
ORIENT MAP USING COMPASS	91-379-4409	50.20	39.89	10.31
PROCESS EPW/CI AT PW CAMP	71-329-1011	25.03	14.75	10.28
LEAD TACTICAL PATROL	91-376-4103	16.73	6.56	10.18
INSTALL/REMOVE RC-292 ANTENNA	13-596-1010	30.39	20.22	10.17
IDENTIFY OPFOR VEHICLES		24.36	14.21	10.16
PROCESS EPW/CI AT BRIGADE COLLECTING POINT	91-376-4101	21.02	10.93	10.09
DESTROY MINES IN PLACE		21.55	11.48	10.08
SELECT/UTILIZE APPROPRIATE SMALL ARMS TECHNIQUES AGAINST ENEMY AIRCRAFT		17.67	7.65	10.02
PERFORM OPERATOR MAINTENANCE ON RC-292 ANTENNA	13-596-3009	25.30	15.30	10.00

TASKS OMITTED WHERE THE ABSOLUTE DIFFERENCE IN
PERCENT MEMBERS PERFORMING IS LESS THAN 10.00

PROVIDE CHAIN OF CUSTODY FOR EVIDENCE (DA FORM 4137)		17.00	27.87	-10.86
INTERVIEW WITNESSES AND VICTIMS 191-376-5126		17.00	27.32	-10.32
PROCESS JUVENILE OFFENDERS		39.36	49.73	-10.37
PREPARE MILITARY POLICE REPORTS (DA FORM 3975)		34.94	45.36	-10.42
DISPATCH MILITARY POLICE PATROLS AND GUARDS		13.79	24.59	-10.80
PREPARE RIGHTS WARNING CERTIFICATE (DA FORM 38(1))		20.92	39.89	-10.98
PREPARE PRISONER RELEASE FORM		14.59	25.68	-11.09
PREPARE MILITARY POLICE PROPERTY RECEIPT (DA FORM 4137)		22.76	33.88	-11.12
MAINTAIN/FILE MILITARY POLICE DESK BLOTTER		7.90	19.13	-11.23
REVIEW MILITARY POLICE DESK BLOTTER	191-377-5204	0.64	21.31	-11.67
PREPARE SWORN STATEMENT (DA FORM 2023)		35.74	48.09	-12.34
DETERMINE DISPOSITION OF COMPLAINTS		12.72	25.14	-12.42
PREPARE MILITARY POLICE DESK BLOTTER (DA FORM 3997)	191-377-5205	9.24	21.06	-12.62
REVIEW MP REPORTS/FORMS FOR ACCURACY AND COMPLETENESS	191-377-5204	11.70	24.59	-12.81
CONDUCT PRELIMINARY INVESTIGATIONS		17.14	30.60	-13.47
QUESTION OFFENDERS/COMPLAINANTS/WITNESSES		23.43	37.79	-14.28
PREPARE/ASSEMBLE CASE REPORTS		14.32	28.96	-14.64
RECEIVE/RECORD COMPLAINTS		19.54	34.43	-14.88
PROCESS MILITARY POLICE REPORTS/RECORDS/FORMS		10.17	25.68	-15.51
ENGAGE TARGETS WITH CALIBER .38 PISTOL		10.34	74.32	-55.98
LOAD, REDUCE STOPPAGE, CLEAR CALIBER .38 PISTOL		10.07	74.32	-56.24
PERFORM OPERATOR MAINTENANCE ON CALIBER .38 PISTOL		10.74	75.41	-56.67
QUALIFY/FAMILIARIZE WITH CALIBER .38 PISTOL		10.07	77.05	-56.98

Figure F-6. 95B, Military Police (MH) Tasks
(page 3 of 3 pages)

PERCENT MEMBERS PERFORMING---DIFFERENCE, 1STMEN MINUS 1STWOM.....			
1STWOM PERCENT MEMBERS PERFORMING.....			.
1STMEN PERCENT MEMBERS PERFORMING.....		.	.
TASK TITLE	.	.	.
INSPECT VEHICLE FOR SERVICEABILITY	65.98	41.67	24.31
ASSIST MECHANIC IN VEHICLE ORGANIZATIONAL MAINTENANCE	44.85	20.83	24.01
DEVELOP ENEMY FORCES COMPOSITION	41.24	18.75	22.49
TRANSMIT MESSAGES ON TACTICAL FM RADIOS	61.86	39.58	22.27
SLAVE-START VEHICLE	32.47	10.42	22.06
DEVELOP ENEMY FORCES DISPOSITION	40.72	18.75	21.97
PREPARE TACTICAL FM RADIOS FOR OPERATION	46.91	25.00	21.91
RECEIVE MESSAGES ON TACTICAL FM RADIOS	61.34	39.58	21.76

TASKS OMITTED WHERE THE ABSOLUTE DIFFERENCE IN PERCENT MEMBERS PERFORMING IS LESS THAN 20.00			

FINGERPRINT PERSONNEL	19.59	37.50	-17.91

Figure F-7. 968, Intelligence Analyst (M) Tasks

PERCENT MEMBERS PERFORMING--DIFFERENCE, 1STMEN MINUS 1STWOM.....			
1STWOM PERCENT MEMBERS PERFORMING.....			
1STMEN PERCENT MEMBERS PERFORMING.....			
TASK TITLE			
PREPARE M72A2 LAW FOR FIRING/RESTORE M72A2 LAW TO CARRYING CONFIGURATION	40.45	19.48	20.97
INSTALL/FIRE/RECOVER M19A1 CLAYMORE MINES	59.33	20.78	18.55
BATTLELIGHT ZERO M16A1 RIFLE	67.42	50.65	16.77
ENGAGE TARGETS WITH M72A2 LAW	25.84	9.09	16.75
APPLY IMMEDIATE ACTION TO CORRECT MALFUNCTION ON M72A2 LAW	29.21	12.99	16.23
MEASURE DISTANCE ON MAPS	39.33	23.38	15.95
ENGAGE TARGETS WITH M16A1 RIFLE	66.29	50.65	15.64
FIRE M60 MACHINEGUN	23.60	9.09	14.50
USE MAP-TERRAIN ASSOCIATION TO ORIENT MAPS	26.97	12.99	13.98
DECONTAMINATE YOUR SKIN/INDIVIDUAL CLOTHING/EQUIPMENT	50.56	37.66	12.90
LOAD/REDUCE STOPPAGE/CLEAR M60 MACHINEGUN	20.22	7.79	12.43
USE CUSTOMS/LAWS OF WAR TO PREVENT/REPORT CRIMINAL ACTS	22.47	10.39	12.08
PUT AUTOMATIC CHEMICAL AGENT ALARM SYSTEM INTO OPERATION	16.85	5.19	11.66
USE COMPASS TO ORIENT MAPS	26.97	15.58	11.38
ANALYZE TERRAIN USING FIVE MILITARY ASPECTS OF TERRAIN	43.82	32.47	11.35
PERFORM CASUALTY RELATED REPORTING/ACTIONS FOR OTHER DOD SERVICES	20.22	9.09	11.13
USE TERRAIN ASSOCIATION TO DETERMINE LOCATION ON GROUND	20.22	9.09	11.13
USE CUSTOMS/LAWS OF WAR TO BEHAVE TOWARD CAPTIVES/DETAINEES/CIVILIANS	21.35	10.39	10.96
REVIEW SIDPERS PERSONNEL CHANGE REPORTS (DA FORMS 3728/3732/3813)	30.34	19.48	10.86
121-031-3524			
SPLINT SUSPECTED BROKEN ARM/LEG	67.19	36.36	10.83
ENGAGE TARGETS WITH M203 GRENADE LAUNCHER/APPLY IMMEDIATE ACTION TO REDUCE STOPPAGE	14.61	3.90	10.71
SHUT DOWN AUTOMATIC CHEMICAL AGENT ALARM SYSTEM	15.73	5.19	10.54
POST REGULATIONS/DIRECTIVES	25.84	13.58	10.26
121-004-1515			

TASKS OMITTED WHERE THE ABSOLUTE DIFFERENCE IN PERCENT MEMBERS PERFORMING IS LESS THAN 10.00			

PREPARE/MAINTAIN LISTS OF SELECTED FILE NUMBERS	19.10	32.47	-13.37
121-004-1227			

Figure F-8. 75E, Personnel Actions Specialist (L) Tasks

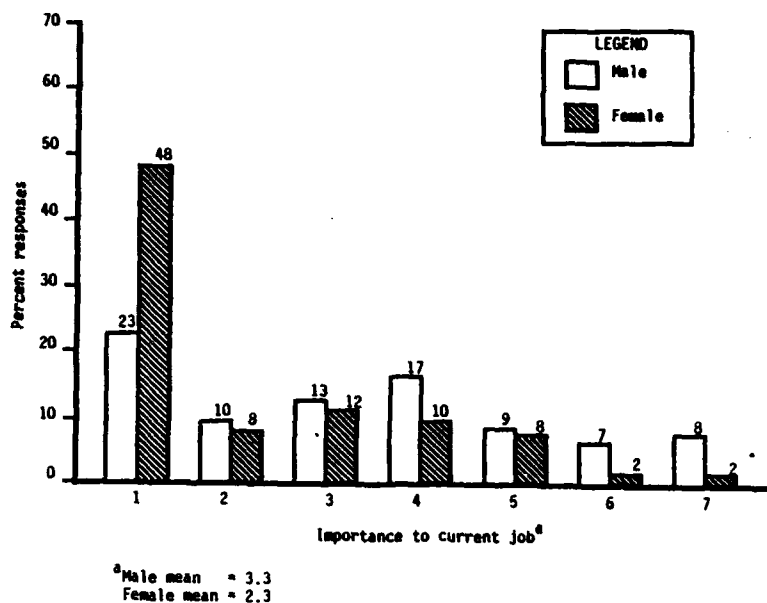


Figure F-9. Lifting Perception, 968, Intelligence Analyst (M)

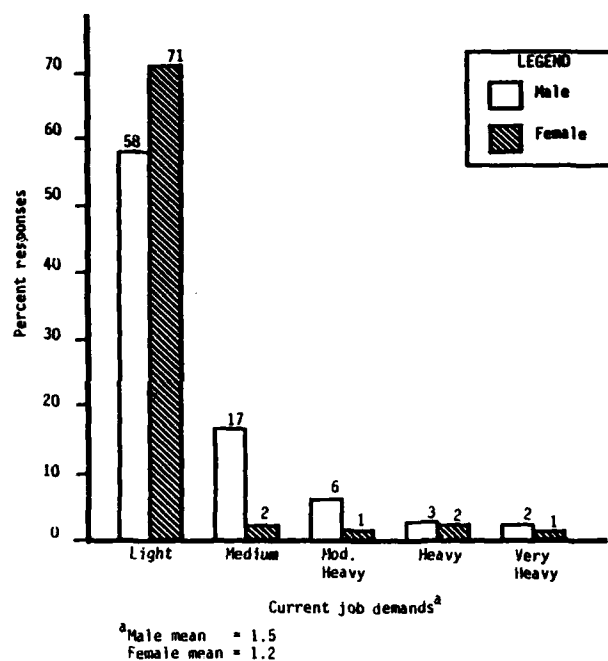


Figure F-10. Lifting Perceptions, 75E, Personnel Actions Specialist (L)

APPENDIX G

COMPARISON OF DISTRIBUTIONS BY GENDER AND CATEGORY

This appendix describes the method used for the comparison, by category, of the distributions of amount lifted on the MEPSCAT. Results are provided for the females. Since the majority of the male distribution lies above the maximum amount tested, the data were not suitable for an analysis of this type.

a. **Distribution.** Assume weight lifted by an individual enlisting in a particular MEPSCAT category can be modeled as follows:

$$X_{ij} = \mu + T_j + \epsilon_{ij}$$

where X_{ij} = weight lifted by i th enlistee who selects an MOS from the j th weight category.

- $j = 1$, light MEPSCAT category
- $j = 2$, medium MEPSCAT category
- $j = 3$, moderately heavy MEPSCAT category
- $j = 4$, heavy MEPSCAT category
- $j = 5$, very heavy MEPSCAT category

μ = overall mean effect

T_j = weight lifting effect of being in the j th category

ϵ_{ij} = deviation of weight lifted by i th individual from expected value given for j th category by model

$$H_0 : T_1 = T_2 = T_3 = T_4 = T_5$$

$$H_a : T_j\text{'s are not all equal}$$

- Method:
- (1) Rank all observations jointly.
 - (2) Compute average rank for each weight category.
 - (3) Compute H' statistic which is approximately χ^2 distributed with 4 df.

Results:	Cluster	Average rank (N=10347)	n_j
(Female)	Light	4872.7149	1,670
	Medium	4755.9909	1,658
	Mod heavy	5175.4163	3,759
	Heavy	5522.2139	909
	Very heavy	5537.7277	2,351

$$H' = 10153.936 > \chi^2_{\alpha = .05, df = 4} = 9.49$$

∴ reject H_0

b. **Distribution-free Multiple Comparisons Based on K-W Rank Sums.**
Calculate the 10 absolute differences $|R_k - R_l|$, where R_k and R_l are the average ranks and $k < l$ as in Table G-1.

Table G-1. Absolute Difference Calculations

Weight category difference (female)	Value absolute difference	Critical constant
Light-medium	116.7240*	290.99951
Medium-moderately heavy	419.4254.	247.45834
Moderately heavy-heavy	346.7976.	310.24044
Heavy-very heavy	15.5138*	327.83223
Light-moderately heavy	302.7014.	246.84061
Medium-heavy	766.2230.	346.40953
Moderately heavy-very heavy	362.3114.	220.70350
Light-heavy	649.4990.	345.96852
Medium-very heavy	781.7368.	269.18481
Light-very heavy	665.0128.	268.61706

(. means $T_k \neq T_l$, * means cannot reject $T_k = T_l$)

Decide $T_k \neq T_l$ if $|R_k - R_l| \geq \text{critical constant}$

$$\text{critical constant} = Z(.05/(5)(4)) \left[\frac{N(N+1)}{12} \right]^{\frac{1}{2}} \left(\frac{1}{n_k} + \frac{1}{n_l} \right)$$

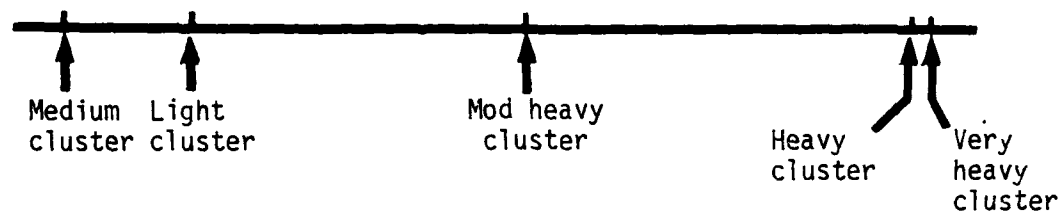


Figure G-1. Pictorial Representation of Differences

When H_0 is true, all 10 inequalities $|R_k - R_l| < Z(.0025) \left[\frac{N(N+1)}{12} \right]^{1/2} \left(\frac{1}{n_k} + \frac{1}{n_l} \right)$ hold simultaneously with probability 0.95.

APPENDIX H

ARMY AND AIR FORCE SPECIALTY COMPARISON

H-1. INTRODUCTION. This appendix provides, in Table H-1, a comparison of tasks and duties for selected Army and Air Force occupational specialties. This comparison was based on classification information provided in Army Regulation (AR) 611-201 and Air Force Regulation (AFR) 39-1. These regulations contain the job descriptions of each occupational specialty for the Army and Air Force, respectively, and specify the physical demands of each specialty.

H-2. PURPOSE. The purpose of this review was to determine if the duties of similar specialties could explain differences in physical demand requirements.

Table H-1. Specialty Comparison
(page 1 of 4 pages)

MOS/ AFSC	Title	Army	Air Force	Comments
31M10	Multichannel commo equipment operator	Very heavy	No equivalent	
36H10 63211	Dial/manual control office repairer Telephone control office switch equipment specialist	Very heavy	Light	Army requires installation of the mainframe. Air Force works on an already installed mainframe.
52010 542X2	Power generator equip repairer Electrical power prod specialist	Very heavy	Moderate	Army uses smaller generators (1.5K-3.5K) and must move them. Air Force power plants are normally very large and transported on semi-trailers.
55810 46110	Ammunition specialist Munitions systems specialist	Very heavy	Light	Army manually handles small munitions. Air Force is completely mechanized due to very large size of munitions.
57H10 60511	Cargo specialist Air cargo specialist	Very heavy	Light	Army specialists are used in a shipping terminal and directly handle materials coming in or going out. Air Force specialists primarily inspect pallets palletized by others and transport pallets on special vehicles to load on aircraft.
62810 47210	Construction equip repairer Base vehicle equip mechanic	Very heavy	Light	Army personnel repair all components of heavy construction equipment. Air Force personnel appear to be only responsible for replacing electrical components and tune-ups.
63H10	Track vehicle repairer	Very heavy	No equivalent	
63H10 47211	Wheel vehicle repairer Special vehicle mechanic	Very heavy	Light	Army personnel have tactical mission to fix forward if possible. This may require devising expedient lifting devices. Air Force personnel are essentially operating in a static environment with necessary repair equipment available.

Table H-1. Specialty Comparison
(page 2 of 4 pages)

MOS/ AFSC	Title	Army	Air Force	Comments
76J10 645X0	Medical supply specialist Inventory management specialist	Very heavy	Light	Army personnel appear to be more involved in manual handling tasks. Air Force appears mainly concerned with administrative processing functions.
76V10 76X10 64510	Material storage & handling specialist Subsistence supply specialist Inventory management specialist	Very heavy Very heavy	Light	Army personnel break down and palletize or stack items by unit. Most likely will be a manual process in a tactical situation. Air Force duties are largely administrative in nature.
36C10 36110	Wire system installer/operator Cable & antenna systems installation & maintenance	Heavy	Heavy	Duties and responsibilities appear to be similar.
57E10	Laundry & bath specialist	Heavy	No equivalent	
64C10 60310	Motor transport operator Veh operator/dispatcher	Heavy	Light	Army operator performs maintenance and assists mechanic in making repairs. Air Force operator relies largely on maintenance personnel to repair malfunctions.
76C10 64510	Equipment records & parts specialist Inventory management spec	Heavy	Light	Army requires individual to actually handle repair parts, e.g., receive, store, and issue. Air Force personnel perform inventory control, property accountability, and other administrative supply support functions.
91R10 908X0	Veterinary food inspection spec Environmental medicine spec	Heavy	Light	The 91R has a tactical mission (packs, unpacks, loads, and unloads equipment and assists in setting up unit equipment and shelters) whereas the Air Force does not.
05H10	Electronic warfare/signal intelligence	Moderately heavy	No equivalent	Duties and responsibilities appear to be similar.
24L10 316X1	Improved HAWK launcher/mech systems repairer Missile systems maintenance spec	Moderately heavy	Moderate	
31E10 304X6	Field radio repairer Ground radio commo spec	Moderately heavy	Light	This MOS is not open to women in the Air Force (as of Sep 84). Duties between Army and Air Force are similar. Discriminate factors were not discernible from MOS/AFSC job descriptions. Difference may be attributable to weights of various radios used by both services.

Table H-1. Specialty Comparison
(page 3 of 4 pages)

MOS/ AFSC	Title	Army	Air Force	Comments
52C10 542X2	Utilities equipment repairer Electrical power production specialist	Moderately heavy	Moderate	Duties and responsibilities appear to be similar.
91A10 902X0	Medical specialist Medical service spec	Moderately heavy	Light	Army requires packing, loading, unloading equipment, and assisting in setting up unit equipment and shelters in a tactical environment. Air Force has no similar requirements because it operates from a fixed location.
91Q10 91510	Pharmacy specialist Pharmacy specialist	Moderately heavy	Light	Army requires packing, loading, unloading equipment, and assisting in setting up unit equipment and shelters. Air Force appears to have no similar requirements.
92B10 924X0	Medical laboratory specialist Medical laboratory specialist	Moderately heavy	Light	Army requires packing, loading, unloading equipment, and assisting in setting up unit equipment and shelters. Air Force appears to have no similar requirements.
94F10 62210	Hospital food service specialist Food service specialist	Moderately heavy	Light	Discriminate factors not discernible from MOS/AFSC job descriptions from the literature search.
95B10 811X2	Military police Law enforcement specialist	Moderately heavy	Moderate	Duties and responsibilities appear to be similar.
05K10 20710	EW/SIGINT non-morse interceptor Printer systems operator	Moderately heavy	Light	Army requires individual to erect selected antennas whereas Air Force personnel with this AFSC only select the type of antenna to be used.
26V10 30410	Strategic microwave systems repairer Wide band commo equip specialist	Medium	Light	No major differences were discernible from the literature review.
32010 30710	Station technical controller Telecommunications systems control specialist	Medium	Light	No major differences were discernible from the literature review.
71M10 70110	Chapel activities specialist Chapel management specialist	Medium	Light	Army chaplain's assistant is required to set up facilities in a field environment. Air Force is not due to use of static facilities. Otherwise duties are similar.

Table H-1. Specialty Comparison
(page 4 of 4 pages)

MOS/ AFSC	Title	Army	Air Force	Comments
91010 90212	Operating room specialist Surgical service specialist	Medium	Light	Army personnel are required to set up field equipment and shelters. Air Force personnel are not.
96810 20110	Intelligence analyst Intelligence operations specialist	Medium	Light	No major differences discernible.
71010 70510	Legal clerk Legal services specialist	Light	Light	No major differences were discernible from the literature review.
75C10 73311	Personnel management specialist Manpower management technician	Light	Light	Similar tasks.
75010 73210	Personnel records specialist Personnel specialist	Light	Light	Army requirements in a field environment may require more physically demanding tasks.
75E10 73211	Personnel actions specialist Personal affairs specialist	Light	Light	Army requirements in a field environment may require more physically demanding tasks.
72610 29110	Auto data telecom center operator Telecommunications operations specialist	Light	Light	Duties and responsibilities appear to be equivalent.
73C10 67212	Finance clerk Financial services specialist	Light	Light	Duties and responsibilities appear to be equivalent.
96C10 20310	Interrogator Linguist/interrogator technician	Light	Light	Duties and responsibilities appear to be equivalent.

APPENDIX I

PROPOSED METHOD FOR PHYSICAL DEMANDS ANALYSIS

I-1. INTRODUCTION. The purpose of this appendix is to describe a proposed method of analyzing the physical demands of an MOS. It is based entirely on the work performed by the Institute for Ergonomics Research, Texas Tech University (Ayoub, M. M.; Denardo, J. D.; Smith, J. L.; Bethea, N. J.; Lambert, B. K.; Alley, L. R.; Duran, B. S., Establishing Physical Criteria for Assigning Personnel to Air Force Jobs, Institute for Ergonomics Research, September 1982) under contract to the Air Force Office of Scientific Research with technical monitorship from the Aerospace Medical Research Laboratory. The study team expresses appreciation to the Air Force for the use of their research. Since modifications were made by the study team, the modification of the Air Force formulas should not be construed as the result of Air Force research.

I-2. ASSUMPTIONS

- a. If a soldier possesses the physical capacities demanded by the MOS, then the soldier is capable of performing the MOS tasks.
- b. There is a direct correlation between the soldier's physical capacities and the soldier's ability to perform the MOS tasks.
- c. The physical demands of the MOS and the individual's physical capacities remain relatively constant.
- d. In order to accurately determine the physical demands of an MOS, it is necessary to consider more than the one, most physically demanding task.

I-3. QUANTIFY PHYSICAL DEMANDS. To use the Air Force method, it will be necessary to determine the 25 most physically demanding activities within an MOS. If a later data analysis of soldiers' success on the job, reenlistment rates, etc. is to be attempted, these activities will have to be selected from the tasks that are normally performed by the soldiers; i.e., from among the peacetime tasks. If the tasks used for determining the physical demands are wartime tasks, which are performed infrequently in peacetime, then a concrete data analysis of soldiers' success cannot be performed except on very small samples using data gathered by observation during field exercises.

a. Determine Peacetime Physical Demands

- (1) Use AOSP occupational surveys (Air Force used E6 and above).
 - (a) Ask for rating of physical demand for task performed (as is now done with percent time spent).
 - (b) Ask for frequency in terms of daily, weekly, monthly, quarterly, semiannually, annually.

(2) Have proponents analyze the 25 most demanding tasks (ignoring, for now, frequency) in terms of number of pounds lifted or lowered, pushed or pulled, carried, or held and positioned using categories created by the Air Force. There may be many activities for each task; see Annex 1 to this appendix for the relationship of activity to task.

(3) Use the following computation and conversion formulas:

(a) Compute physical (P) equivalents for each activity in the 25 most demanding tasks using formulas given in Table I-1.

Table I-1. Formulas for Computing Physical (P) Equivalencies

Formula	Variable definition
$P = -53.8355 + 18.0828\sqrt{L2}$	P = Pounds for 6-foot lift L2 = Lift/lower tool box to/from work-bench level from/to floor (1 hand)
$P = -31.6481 + 12.0823\sqrt{L6}$	L6 = Lift/lower regular box to/from knuckle level from/to floor
$P = -17.2840 + 11.5058\sqrt{L7}$	L7 = Lift/lower regular box to/from workbench level from/to floor
$P = -56.9299 + 19.8865\sqrt{L8}$	L8 = Lift/lower regular box to/from shoulder height from/to floor
$P = -31.2656 + 18.9131\sqrt{L9}$	L9 = Lift/lower regular box floor to/from 6 feet to/from reach level
$P = -50.6618 + 15.9915\sqrt{C2}$	C2 = 1-hand tool box carry
$P = -27.9953 + 13.3748\sqrt{C3}$	C3 = 2-hand side carry
$P = -20.1369 + 11.9497\sqrt{C4}$	C4 = 2-hand front carry
$P = -55.2871 + 16.4156\sqrt{H3}$	H3 = Hold in position, shoulder level
$P = -55.6685 + 16.9386\sqrt{H4}$	H4 = Hold in position, reach level
$P = -9.396 + 0.404P1 + 0.531WT$	P1 = Low level push WT = Body weight
$P = -9.330 + 0.606P2 + 0.374WT$	P2 = Low level pull
$P = -14.205 + 0.607P3 + 0.551WT$	P3 = Upper level push

(b) Convert to 5-foot incremental lift by converting to foot-pounds for 6 feet and back to pounds for 5 feet:

$$P = (P \cdot 6) / 5$$

(4) Select the 25 most demanding activities, but if one activity is repeated within the same task, do not use it but once. It may be used as many times as the number of tasks in which it appears.

(5) Assign three weights to each activity.

(a) **Weight 1 (W_1)**. Percent performing based on percent performing the task in which the activity appears which is obtained from SSC-NCR:

$$W_1 = \text{Percent performing} / 100$$

(b) **Weight 2 (W_2)**. Performance frequency using the formula that daily has a weight of 365/365 or one (1.0000) and annually has a weight of 1/365 or 0.0027:

$$W_2 = \text{frequency} / 365$$

(c) **Weight 3 (W_3)**. Criticality of task performance using either criticality directly or training emphasis, depending upon which is available from SSC-NCR. (See Ayoub, et al., 1982, page 135, for complete description of use of training emphasis.)

(6) Compute activity weight (W_i):

$$W_i = (W_1 + W_2 + W_3) / 3$$

(7) Determine the demand score using the activity weight for each P activity:

$$\text{Demand} = \frac{\sum_{i=1}^n P_i(W_i)}{\sum_{i=1}^n W_i}$$

where n = number of activities (25).

(8) Round down to the nearest 10-pound increment.

b. Determine the Wartime Physical Demand

(1) Determining the wartime demands is similar to the peacetime analysis, but the first analysis task must be replaced with the following two tasks:

(a) Using AOSP occupational surveys, subject matter experts (SME) must determine the most physically demanding tasks that will be performed in wartime.

(b) Then, using these same surveys, SMEs must estimate the frequency with which the tasks will be performed (not occasionally or frequently, but daily, weekly, etc.).

(2) Then, steps three through nine will be as described in paragraphs I-3a(2) through I-3a(8), above.

ANNEX 1 TO APPENDIX I

RELATIONSHIPS OF TASKS, SUBTASKS, ELEMENTS, AND ACTIVITIES

In the example (Ayoub, et al., 1982), a task was to "maintain vegetated areas." Subtasks included obtaining a job order, obtaining a vehicle, removing a lawn mower from storage, obtaining gas, checking oil and gas, pushing the mower to vehicle, placing the mower in a vehicle, securing the mower, obtaining personal protective equipment, and mowing the vegetation. The subtask of "placing the mower in a vehicle" included a variety of activities such as stooping, grasping, lifting, carrying while performing the elements of lifting the mower, raising it to the height of the truck bed, positioning the mower, etc. Figure I-1-1 presents the organizational structure of an MOS.

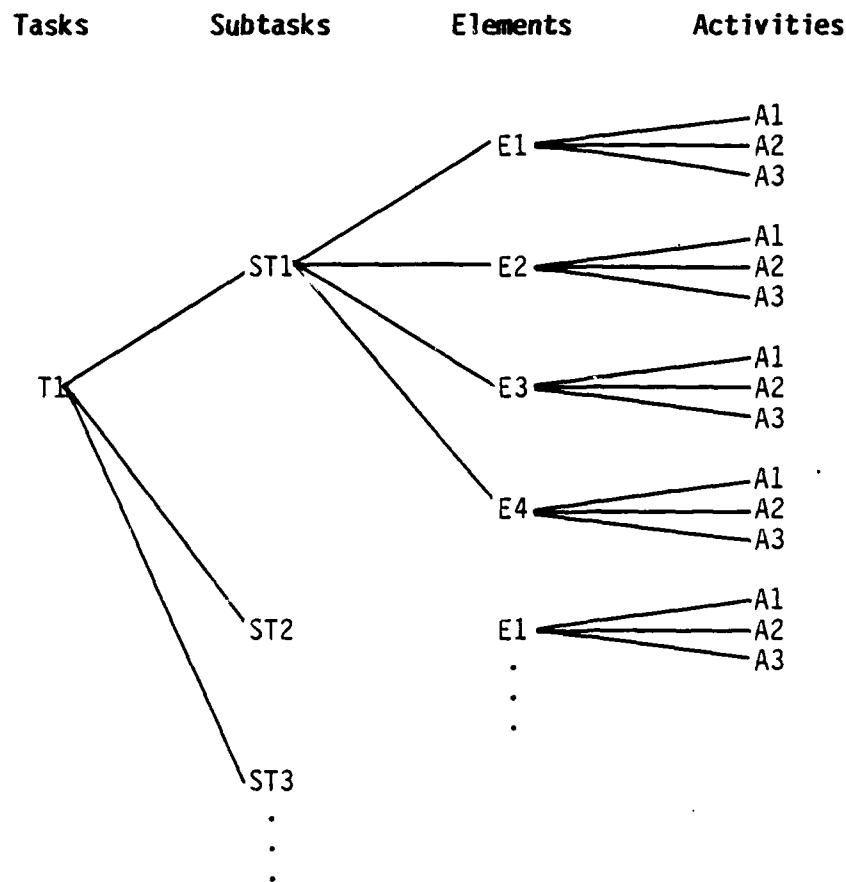


Figure I-1-1. Organizational Structure of an MOS

APPENDIX J
SPONSOR'S COMMENTS



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
WASHINGTON, DC 20310-0300

13 FEB 1986

DAPE-MPA-CS

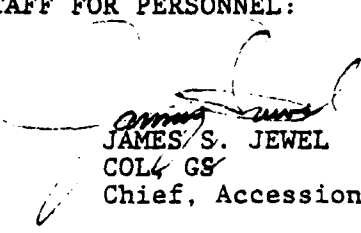
SUBJECT: Evaluation of the Military Entrance Physical Strength
Capacity Test

Director
U.S. Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, MD 20814-2797

1. Attached is the study critique sheet pertaining to the Concepts Analysis Agency (CAA) draft Evaluation of the Military Entrance Physical Strength Capacity Test (E-MEPSCAT). The opportunity to provide these comments is greatly appreciated.
2. We would particularly like to commend CAA for their cooperation and enthusiasm demonstrated during the conduct of their evaluation.

FOR THE DEPUTY CHIEF OF STAFF FOR PERSONNEL:

Encl


JAMES S. JEWEL
COL & GS
Chief, Accession Division

CAA-SR-85-23

(NOT USED)

STUDY CRITIQUE

1. Were there any editorial comments? No
2. Was the work accomplished in a timely manner? Yes
The cooperation and enthusiasm demonstrated by CAA was superb.
3. Does the work report address adequately the issues planned for the analysis? Yes
4. Were appropriate analysis techniques used? Yes
5. Are the findings fully supported by good analysis based on sound assumptions? No If not, please explain.
 - a. Base population in the proportional analysis used Jan 84 and Mar 85 cases for which no MEPSCAT data were available. This resulted in unnecessarily small cell sizes and failed to consider the possibility that cases for which no MEPSCAT data were available were in some way influenced by the MEPSCAT implementing procedures in effect in the MEPS during this period. Utilization of data for a period prior to MEPSCAT implementation as a base population would have yielded larger cell sizes free from MEPSCAT influence.
 - b. Substantial increases in the number of available light category job opportunities for females were introduced during the evaluated period. These changes influenced both the distribution of female applicants and subsequent attrition patterns due to increased job satisfaction. These factors were not considered in the analysis.
 - c. Although specific attrition cause was known (i.e., physical, apathy, academic failure, etc), only aggregate attrition was evaluated.
 - d. Concur with the evaluation of the Physical Strength Test conducted in the training base. Without rigid standardization of the PST and the timing within the training cycle at which tests are conducted, conclusive evaluation of the MEPSCAT program is not possible.
6. Does the report contain the preferred level of detail of the analysis? Yes

STUDY CRITIQUE (continued)

7. Is the written material fully satisfactory in terms of clarity of presentation, completeness, and style? Yes

8. Are all figures and tables clear and helpful to the reader? Yes

9. Does the report satisfy fully the expectations that were present when the work was directed? No If not, please explain how not.

a. First term attrition, reenlistment, utilization, migration and sexual harrassment as influenced by MEPSCAT were not evaluated because the MEPSCAT program has not been in effect long enough. Further, comparative data between the original strength test administered in the MEPS and the MOS related strength test administered during AIT/OSUT were not available. This was due, in part, to inconsistant physical demands analysis when compared to the MOS physical strength test during training.

b. The aspects highlighted in #5 above requires further analysis.

c. It is apparent that a second phase of MEPSCAT evaluation is required to both allow this program to "mature" long enough to gather qualitative data needed and to resolve the issues highlighted in #5 above.

10. Will the findings in this report be helpful to the organization which directed that the work be done? Yes If so, please indicate how, and if not, please explain why not.

The findings of this report are significant and will be used by the Army. Specifically:

a. TRADOC and Academy of Health Sciences can use this report to review and evaluate their responsibility with the MEPSCAT program.

b. HQDA will use this report to develop phase 2 of the MEPSCAT evaluation.

11. Judged overall, how do you rate the study? (circle one)

Poor Fair Average Good Excellent

APPENDIX K
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CAA-SR-85-23

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GLOSSARY

1. ABBREVIATIONS, ACRONYMS, AND SHORT TERMS

AFR	Air Force Regulation
AFSC	Air Force Specialty Code
AOSP	Army Occupational Survey Program
AR	Army Regulation
ARI	Army Research Institute for the Behavioral and Social Sciences
ASVAB	Armed Services Vocational Aptitude Battery
CAA	US Army Concepts Analysis Agency, an operating agency of the Department of the Army Staff under control of the Director of the Army Staff where short-range studies are conducted for the Army Staff.
CODAP	Comprehensive Occupational Data Analysis Program
commo	communications
DA	Department of the Army
DCSPER	Deputy Chief of Staff for Personnel
disc	discharge
DMOS	duty military occupational specialty
DMPM	Director of Military Personnel Management, ODCSPER
DOD	Department of Defense
educ	education
EEA	essential element(s) of analysis
E-MEPSCAT	Evaluation of the Military Entrance Physical Strength Capacity Test
HQDA	Headquarters, Department of the Army
ILD	incremental lift device

CAA-SR-85-23

MACOM	major Army command
ment	mental
MEPS	Military Entrance Processing Station
MEPSCAT	Military Entrance Physical Strength Capacity Test
MILPERCEN	US Army Military Personnel Center
MOS	military occupational specialty(ies)
N	number of soldiers in the sample
ODCSPER	Office of the Deputy Chief of Staff for Personnel
PDA	physical demands analysis(ses)
PDC	physical demands category
prop	proportion
PST	Physical Strength Test
PX	post exchange
SGLI	serviceman's group life insurance
SME	subject matter expert(s)
SSAN	Social Security Administration Number
SSC-NCR	Soldier Support Center-National Capital Region
TDA	table(s) of distribution and allowances
TOE	table(s) of organization and equipment
WITA	Women in the Army
WITAPRG	Women in the Army Policy Review Group

2. AUTOMATED DATA BASES

ACT	Automated Control of Trainees System
EMF	Enlisted Master File
REQUEST	Recruit Quota System

3. DEFINITIONS

Weight category	The classification system by which MOS are classified according to their major physical strength demands. There are five categories: light, medium, moderately heavy, heavy, very heavy.
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EVALUATION OF THE MILITARY ENTRANCE
PHYSICAL STRENGTH CAPACITY TEST
(E-MEPSCAT)

STUDY
SUMMARY
CAA-SR-85-23

THE REASON FOR PERFORMING THE STUDY was to evaluate the effectiveness of the Army's Military Entrance Physical Strength Capacity Test (MEPSCAT).

THE PRINCIPAL FINDINGS of this study are:

- (1) If MEPSCAT had been a mandatory selection requirement during 1984, the Army would have created a substantial shortfall in the moderately heavy category (required lift is 80 pounds) by rejecting 32 percent of the female accessions.
- (2) MEPSCAT did not predict female training completion in the heavy and very heavy categories (required lift 100 pounds and >100 pounds respectively). The male training attrition rate was significantly higher in the group that was unable to lift the required amount for all categories with sufficient data.
- (3) Based on the number of discharges found, there will never be enough data to analyze the medium and light categories (required lift is 50 pounds and 20 pounds respectively) for men.
- (4) The Physical Strength Test (PST), administered at the end of training, cannot be related to MEPSCAT weights lifted.
- (5) MOS migration during training is not related to physical strength.
- (6) Based on results of this study, a predictive model for determining cutoff scores for MOS selection can not be developed.
- (7) Differences in strength requirements between Army and Air Force are related to mission differences. Other services did not have data to analyze.

THE MAIN ASSUMPTIONS upon which this study was based are:

- (1) MOS have been clustered into the proper weight categories.
- (2) Results for an MOS with insufficient data would be the same as the category results.
- (3) The MEPSCAT was administered to all recruits under the same conditions.
- (4) Physical strength has an effect on all aspects of a soldier's duty environment.

THE PRINCIPAL LIMITATION of the study is that MEPSCAT has only been in effect on for a little over a year; therefore, data for all areas of interest for all MOS were not available.

BACKGROUND. The Army MEPSCAT program was implemented in January 1984 as a voluntary screening tool. Its purpose is to match prospective soldiers' strength capabilities to the physical demands of the MOS for which they are contracting. This study evaluated the effectiveness of the program during its first year of implementation. The sponsor will use results of the study to determine whether the program: (1) should continue as is; (2) should be changed to a mandatory selection requirement; or (3) should be eliminated from the enlistment qualification process.

THE SCOPE OF THE STUDY focused on analyzing amounts lifted on the MEPSCAT by gender and it considered enlisted personnel only. The study evaluated only those impact areas and MOS for which data had been collected and which were available to the study effort. Since data for individual MOS were limited, the study primarily focused on the five physical demand categories into which all MOS are classified. These classifications are light, medium, moderately heavy, heavy, and very heavy.

THE STUDY OBJECTIVES were to:

- (1) Develop quantitative evaluation procedures to measure effects of physical strength.
- (2) If it is not now available, determine the types of data to be collected to ascertain success of the program.
- (3) Develop a longitudinal data collection plan to support future evaluation.
- (4) Develop an initial predictive model of success, by MOS weight category, based on weight lifted on the MEPSCAT.
- (5) Determine how Army physical strength requirements compare to those of other services.

THE BASIC APPROACH was to determine what data were available and usable. Where appropriate information existed, a statistical analysis was performed. A statistical analysis was applied to the training attrition data. Other impact areas, such as MOS migration, enlistment, follow-on physical strength testing, and utilization, required an enumerative analysis. To compare Army physical standards with those of other Services, a review of appropriate regulations and other publications was made.

THE STUDY SPONSOR was the Deputy Chief of Staff for Personnel, who established the objectives and monitored study activities.

THE STUDY EFFORT was directed by Ms Sally J. Van Nostrand, Force Systems Directorate.

COMMENTS AND QUESTIONS may be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-FS, 8120 Woodmont Avenue, Bethesda, Maryland 20814-2797.

	EVALUATION OF THE MILITARY ENTRANCE PHYSICAL STRENGTH CAPACITY TEST (E-MEPSCAT)	STUDY SUMMARY CAA-SR-85-23
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- (1) If MEPSCAT had been a mandatory selection requirement during 1984, the Army would have created a substantial shortfall in the moderately heavy category (required lift is 80 pounds) by rejecting 32 percent of the female accessions.
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BACKGROUND. The Army MEPSCAT program was implemented in January 1984 as a voluntary screening tool. Its purpose is to match prospective soldiers' strength capabilities to the physical demands of the MOS for which they are contracting. This study evaluated the effectiveness of the program during its first year of implementation. The sponsor will use results of the study to determine whether the program: (1) should continue as is; (2) should be changed to a mandatory selection requirement; or (3) should be eliminated from the enlistment qualification process.

THE SCOPE OF THE STUDY focused on analyzing amounts lifted on the MEPSCAT by gender and it considered enlisted personnel only. The study evaluated only those impact areas and MOS for which data had been collected and which were available to the study effort. Since data for individual MOS were limited, the study primarily focused on the five physical demand categories into which all MOS are classified. These classifications are light, medium, moderately heavy, heavy, and very heavy.

THE STUDY OBJECTIVES were to:

- (1) Develop quantitative evaluation procedures to measure effects of physical strength.
- (2) If it is not now available, determine the types of data to be collected to ascertain success of the program.
- (3) Develop a longitudinal data collection plan to support future evaluation.
- (4) Develop an initial predictive model of success, by MOS weight category, based on weight lifted on the MEPSCAT.
- (5) Determine how Army physical strength requirements compare to those of other services.

THE BASIC APPROACH was to determine what data were available and usable. Where appropriate information existed, a statistical analysis was performed. A statistical analysis was applied to the training attrition data. Other impact areas, such as MOS migration, enlistment, follow-on physical strength testing, and utilization, required an enumerative analysis. To compare Army physical standards with those of other Services, a review of appropriate regulations and other publications was made.

THE STUDY SPONSOR was the Deputy Chief of Staff for Personnel, who established the objectives and monitored study activities.

THE STUDY EFFORT was directed by Ms Sally J. Van Nostrand, Force Systems Directorate.

COMMENTS AND QUESTIONS may be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-FS, 8120 Woodmont Avenue, Bethesda, Maryland 20814-2797.

	EVALUATION OF THE MILITARY ENTRANCE PHYSICAL STRENGTH CAPACITY TEST (E-MEPSCAT)	STUDY SUMMARY CAA-SR-85-23
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THE REASON FOR PERFORMING THE STUDY was to evaluate the effectiveness of the Army's Military Entrance Physical Strength Capacity Test (MEPSCAT).

THE PRINCIPAL FINDINGS of this study are:

- (1) If MEPSCAT had been a mandatory selection requirement during 1984, the Army would have created a substantial shortfall in the moderately heavy category (required lift is 80 pounds) by rejecting 32 percent of the female accessions.
- (2) MEPSCAT did not predict female training completion in the heavy and very heavy categories (required lift 100 pounds and >100 pounds respectively). The male training attrition rate was significantly higher in the group that was unable to lift the required amount for all categories with sufficient data.
- (3) Based on the number of discharges found, there will never be enough data to analyze the medium and light categories (required lift is 50 pounds and 20 pounds respectively) for men.
- (4) The Physical Strength Test (PST), administered at the end of training, cannot be related to MEPSCAT weights lifted.
- (5) MOS migration during training is not related to physical strength.
- (6) Based on results of this study, a predictive model for determining cutoff scores for MOS selection can not be developed.
- (7) Differences in strength requirements between Army and Air Force are related to mission differences. Other services did not have data to analyze.

THE MAIN ASSUMPTIONS upon which this study was based are:

- (1) MOS have been clustered into the proper weight categories.
- (2) Results for an MOS with insufficient data would be the same as the category results.
- (3) The MEPSCAT was administered to all recruits under the same conditions.
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THE SCOPE OF THE STUDY focused on analyzing amounts lifted on the MEPSCAT by gender and it considered enlisted personnel only. The study evaluated only those impact areas and MOS for which data had been collected and which were available to the study effort. Since data for individual MOS were limited, the study primarily focused on the five physical demand categories into which all MOS are classified. These classifications are light, medium, moderately heavy, heavy, and very heavy.

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EVALUATION OF THE MILITARY ENTRANCE
PHYSICAL STRENGTH CAPACITY TEST
(E-MEPSCAT)

STUDY
SUMMARY
CAA-SR-85-23

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THE MAIN ASSUMPTIONS upon which this study was based are:

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