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# THE ADAPTATION OF NAVAL ENLISTEES SCORING IN MENTAL GROUP IV ON THE ARMED FORCES QUALIFICATIONS TEST

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THE ADAPTATION OF NAVAL ENLISTEES SCORING IN MENTAL GROUP IV  
ON THE ARMED FORCES QUALIFICATION TEST

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## Introduction

In August of 1966, the Secretary of Defense, in a speech delivered to the Veterans of Foreign Wars in New York City, announced plans for the induction and enlistment of a large number of young men who fail to meet minimum mental and physical standards for entrance into the military services. According to the Secretary of Defense, the military establishment would accept 40,000 "substandard" applicants between 1 October 1966 and 30 June 1967, and another 100,000 during fiscal year 1968. The bulk of these - about 85 per cent - are to be the mentally substandard, while the remainder are those who fall below acceptable standards physically.

Each of the four military services has been directed to accept a proportion of its enlisted personnel from the marginal manpower pool. The Navy, for example, has been required to take fifteen per cent of its enlisted personnel allotment, or about 16,000 men during the next year, from applicants who are mentally below standard. This represents a marked increase in the percentage of enlistees to be accepted from this group. During the year prior to October 1966, it was necessary for the Navy to enlist only three per cent of its average monthly input from applicants who were mentally marginal.

The Armed Forces Qualification Test, in conjunction with special aptitude tests for some low-scoring individuals, is used for determining whether or not an applicant meets acceptable mental standards for induction or enlistment. It is a 100-item test covering the four subject areas of vocabulary, arithmetic, spatial relationships, and mechanics. The test measures the ability of applicants to profit from military training. Test scores are reported as percentiles, and these, in turn, are used to define mental levels or mental categories. Category IV personnel, which are those having percentile scores from ten to thirty, inclusive, constitute the mentally marginal group which the military services have been directed to accept in increased numbers.

Previous studies (Department of the Army, 1965; Flyer, 1960; Helme and Anderson, 1964; Klieger, Dubuisson, and deJung, 1961; and Plag, 1967) have indicated that AFQT scores are related to some criteria of military performance and adjustment. As a result of the increase in the number of mental group IV personnel to be enlisted during the next year, it has been anticipated that the military adaptations of new enlistees will be inferior to those who entered the service in the past. Yet few empirical data have been gathered which specify the magnitude or type of adjustment and performance decrements which mentally marginal enlistees might evidence.

It is the purpose of this report to present findings from a study designed to evaluate differences in the adaptations of "average" and mentally marginal sailors throughout their first service enlistments - a period of approximately four years for most subjects. In addition, the individual and composite validities of a number of pre-enlistment characteristics for predicting the overall naval effectiveness of Category IV applicants have been studied. It was the goal of this phase of the investigation to construct tables which could be used by recruiting officers for ascertaining the chances for effective service performance among mentally marginal applicants who possess specific pre-enlistment characteristics.

## Procedure

In 1960, the Navy Medical Neuropsychiatric Research Unit launched an extensive psychiatric selection study of 11,000 male Navy enlisted personnel who entered service at the two Naval Training Centers at Great Lakes and San Diego. During the subsequent five years, voluminous performance and adjustment data were collected for these sailors. A sizeable proportion of the enlistees who comprised the samples used in that study obtained scores in mental group IV on the AFQT, and it is the data for these subjects which were analyzed in the present investigation.

In order to compare the performances and adjustments of mentally marginal and mentally average enlistees, all subjects with AFQT percentile scores of 30 and below, and a random sample of those with scores of exactly 50, were selected to represent the two groups. Because the number of Category IV sailors who comprised the 11,000 man sample was sizeable, it was possible to further categorize these enlistees into three mentally marginal sub-groups, based upon their obtained AFQT scores. In other words, four groups of subjects were used in the data analyses - a control group with AFQT scores of exactly 50, and three experimental groups having scores of 29 to 30, 26 to 28, and 25 and below.

It is unfortunate that the AFQT scores of the experimental subjects used in this investigation were clustered at the high end of the mental group IV category. The fact that they were, places some limitations upon the applicability of the results to new mentally marginal enlistees who will be entering the services in the future and who will have AFQT scores spread throughout the entire Category IV range. Nevertheless, the findings of this investigation are suggestive, even for applicants scoring in the lower range of Category IV.

During the first enlistments of the sample subjects, performance and adjustment data were collected at three intervals. The first was during recruit training where weekly test grades, records of disciplinary action, the number of subjects requiring recycling, and attrition data were obtained. The second interval occurred at the end of the first two years of service. At that time, criterion data, in the form of semi-annual marks, disciplinary action, pay grade, attrition, and adjustment ratings by division officers were collected. Finally, at the end of four years, or at the completion of the first enlistment, measures of attrition, number of days spent on the sick list, commanding officer recommendations for re-enlistment, and number of subjects who re-enlisted were obtained. Appropriate statistical tests were used for computing the significance of differences between the various performance and adjustment measures for the four subject groups.

For the purpose of isolating a set of pre-enlistment variables which would have validity for predicting service adaptation, background characteristics of the Category IV subjects were tabulated from responses given to items of a screening questionnaire administered to all sailors immediately upon their arrival at the training stations. The predictors studied numbered thirty and included such variables as age at enlistment, years of formal education completed, marital status, reason for enlistment, sports participation, number of siblings, religion, race, etc.

The criterion used for validating the predictor data was a dichotomous variable termed "naval effectiveness." Effective sailors were defined as those who completed their tours of service and were recommended for re-enlistment by their commanding officers. Subjects whose performances and adjustments were unsatisfactory, such that they required early separation from the Navy, and those who were not recommended for re-enlistment, were classified as non-effective sailors. A small group of subjects, who were discharged because of physical disability or who died while on active duty, were classified as neither effective nor non-effective and were eliminated from the experimental sample.

For purposes of the statistical analysis in this phase of the study, Category IV enlistees were divided equally into validation and cross-validation groups. For the validation sample, the data were first analyzed by tabulating the number of effective and the number of non-effective sailors comprising each segment of each of the thirty predictor variables. By so doing, those background characteristics having little or no relation to the criterion were immediately identified and excluded from subsequent statistical analyses. Also, this procedure provided a convenient means for ascertaining whether the predictor-criterion relationships deviated markedly from linearity. For those variables which were found to be significantly curvilinear, appropriate correction weights were assigned to the variable categories in order that Pearson product-moment correlations could be utilized as true measures of the predictor-criterion relationships. Two-way interactions were studied for all pairs of predictors but none of the interaction terms was found to be uniquely related to the criterion.

Finally, a linear multiple regression analysis was employed in order to establish the predictive validity of the combined set of independent variables. In the analysis sample, regression weights were obtained for a number of different predictor combinations. For each regression equation so derived, predicted scores were computed for each of the subjects in the cross-validation sample and these were in turn correlated with the effectiveness criterion. The equation yielding the highest cross-validity for the fewest number of variables was used in the construction of an actuarial table showing the probability of naval effectiveness.

### Results

The number of subjects comprising the average group was 500, while 571, 347 and 342 subjects were contained in the Category IV sub-groups, as shown at the beginning of Table 1. On the subsequent lines of Table 1 are shown the performance and adjustment scores for the subjects in each of the four groups. For example, a chi-square with a subscript of one-two signifies a test of the significance of the difference between groups one and two, while a subscript one-four designates a comparison of scores between groups one and four.

As pointed out previously, it was hypothesized that performance and adjustment scores would be lower for groups possessing lower AFQT scores. In other words, tests of the significance of differences between the four groups are directional or one-tailed tests of significance in which a chi-square value of 2.7 and a critical ratio of 1.6 are each associated with a probability of .05.

Table 1

## Performance and Adjustment Scores for Four AFQT Groups of Naval Enlistees

| Measure  | Average<br>Group I | Mental Group IV |         |         | Significance<br>of Difference <sup>a, b</sup>                                    |
|--|--------------------|-----------------|---------|---------|--|
|  |                    | Group 2         | Group 3 | Group 4 |  |
| 1. AFQT Percentile Score   | 50                 | 29-30           | 26-28   | 25 Less |  |
| 2. Number of Sample Subjects   | 500                | 571             | 347     | 342     |  |
| 3. Recruit Training Criteria   |                    |                 |         |         |  |
| a. Percentage of Subjects<br>Completing Training who<br>Required Recycling be-<br>cause of Performance<br>Deficiencies | 11.27              | 19.07           | 19.02   | 27.27   | $\chi^2_{12}=11.9$ ; $\chi^2_{13}=9.4$<br>$\chi^2_{14}=34.2$ ; $\chi^2_{34}=6.5$ |
| b. Average Weekly Test Grade<br>(Range is 0.0 to 4.0)  | 3.00               | 2.80            | 2.74    | 2.68    | $t_{12}=9.8$ ; $t_{13}=11.8$<br>$t_{14}=14.2$ ; $t_{34}=2.4$<br>$t_{23}=2.8$     |
| c. Percentage of Subjects<br>Requiring Disciplinary<br>Action at or beyond<br>Regimental Level                         | 4.80               | 5.08            | 6.17    | 6.21    | $\chi^2_{14}=0.8$  |
| d. Chargeable <sup>c</sup> Attrition<br>Percentage   | 3.00               | 5.78            | 5.76    | 10.53   | $\chi^2_{12}=4.8$ ; $\chi^2_{13}=4.0$<br>$\chi^2_{14}=20.3$ ; $\chi^2_{34}=5.2$  |
| e. Non-Chargeable <sup>d</sup> Attrition<br>Percentage   | 1.20               | 0.70            | 0.29    | 0.58    |  |
| f. Total Percentage<br>Discharged  | 4.20               | 6.48            | 6.05    | 11.11   | $\chi^2_{12}=2.7$ ; $\chi^2_{13}=1.5$<br>$\chi^2_{14}=14.8$ ; $\chi^2_{34}=5.6$  |
| 4. Two-Year Criteria   |                    |                 |         |         |  |
| a. Mean Semi-Annual Mark<br>(Range 0.0 to 4.0)   | 3.312              | 3.261           | 3.272   | 3.266   | $t_{12}=2.5$ ; $t_{13}=1.7$<br>$t_{14}=1.9$                                      |
| b. Disciplinary Action   |                    |                 |         |         |  |
| (1) % No Discipline<br>Action  | 61.40              | 61.73           | 61.01   | 57.66   | $\chi^2_{12}=2.0$ ; $df=3$ ; N.S.  |
| (2) % Minor Discipline<br>Problem  | 5.70               | 7.93            | 5.42    | 6.85    | $\chi^2_{13}=0.2$ ; $df=3$ ; N.S.  |
| (3) % Captain's Mast   | 20.98              | 20.48           | 20.58   | 25.00   | $\chi^2_{14}=2.0$ ; $df=3$ ; N.S.  |
| (4) % Court-Martial  | 11.92              | 10.36           | 12.99   | 10.49   |  |
| c. Pay Grade   | 3.051              | 2.871           | 2.811   | 2.711   | $t_{12}=4.1$ ; $t_{13}=4.5$<br>$t_{14}=6.9$ ; $t_{34}=2.4$                       |
| d. Mean Division Officer<br>Rating of Adjustment<br>(14 Items - score range<br>1 to 4)                                 | 2.925              | 2.804           | 2.791   | 2.729   | $t_{12}=3.3$ ; $t_{13}=3.2$<br>$t_{14}=4.5$ ; $t_{34}=1.3$                       |

Table 1 (Continued)

| Measure  | Average<br>Group 1 | Group 2 | Mental Group IV<br>Group 3 | Group 4 | Significance<br>of Difference <sup>a, b</sup>                                   |
|--|--------------------|---------|----------------------------|---------|---|
| 4. Two-Year Criteria (Con't)   |                    |         |                            |         |   |
| e. Chargeable Attrition Percentage within 2 years after Recruit Training (% of Recruit Training Graduates)     | 8.35               | 9.74    | 10.43                      | 11.84   | $\chi^2_{12}=0.6$ ; $\chi^2_{13}=1.0$<br>$\chi^2_{14}=2.6$ ; $\chi^2_{34}=0.3$  |
| f. Non-Chargeable Attrition Percentage Within 2 Years after Recruit Training (% of Recruit Training Graduates) | 0.84               | 1.12    | 2.15                       | 2.30    |   |
| g. Total Percentage Discharged within 2 Years After Recruit Training (% of Recruit Training Graduates)         | 9.19               | 10.86   | 12.58                      | 14.14   | $\chi^2_{12}=0.8$ ; $\chi^2_{13}=2.4$<br>$\chi^2_{14}=4.6$ ; $\chi^2_{23}=0.6$  |
| 5. Four-Year Criteria  |                    |         |                            |         |   |
| a. Chargeable Attrition Percentage During Second 2-Year Period (% of 2-year Survivors)                         | 7.36               | 9.24    | 9.12                       | 11.11   | $\chi^2_{12}=1.1$ ; $\chi^2_{13}=0.7$<br>$\chi^2_{14}=2.9$ ; $\chi^2_{34}=0.6$  |
| b. Non-Chargeable Attrition Percentage During Second 2-Year Period (% of 2-Year Survivors)                     | 2.30               | 1.89    | 1.05                       | 0.77    |   |
| c. Total Percentage Discharged During Second 2-Year Period (% of 2-Year Survivors)                             | 9.66               | 11.13   | 10.17                      | 11.88   | $\chi^2_{12}=0.5$ ; $\chi^2_{13}=0.1$<br>$\chi^2_{14}=0.8$                      |
| 6. By End of Enlistment (4 Years for Most Subjects)  |                    |         |                            |         |   |
| a. Percentage of Subjects with One or More Admissions to Sick List for Psychiatric Illness                     | 6.80               | 6.30    | 7.20                       | 8.19    | $\chi^2_{13}=0.0$ ; $\chi^2_{14}=0.6$   |
| b. Percentage of Subjects with One or More Admissions to Sick List for Physical Illness                        | 51.88              | 53.39   | 53.48                      | 50.00   | $\chi^2_{12}=0.3$ ; $\chi^2_{13}=0.3$   |
| c. Percentage of Subjects with One or More Admissions to Sick List for Venereal Disease                        | 8.19               | 10.91   | 10.87                      | 14.65   | $\chi^2_{12}=2.2$ ; $\chi^2_{13}=1.8$<br>$\chi^2_{14}=8.6$ ; $\chi^2_{34}=2.1$  |
| d. Total Chargeable Attrition - Percentage of Total N  | 17.40              | 22.59   | 23.05                      | 29.53   | $\chi^2_{12}=4.4$ ; $\chi^2_{13}=4.2$<br>$\chi^2_{14}=17.2$ ; $\chi^2_{34}=3.8$ |
| e. Total Non-Chargeable Attrition - Percentage of Total N  | 4.00               | 3.33    | 3.17                       | 3.22    |   |

Table 1 (Continued)

| Measure  | Average | Mental Group IV |         |         | Significance<br>of Difference <sup>a, b</sup>                             |
|--|---------|-----------------|---------|---------|---|
|  | Group 1 | Group 2         | Group 3 | Group 4 |   |
| 6. By End of Enlistment (4 years<br>for Most Subjects) (Cont.)   |         |                 |         |         |   |
| f. Total Discharged -<br>Percentage of Total N   | 21.40   | 25.92           | 26.22   | 32.75   | $\chi^2_{12}=3.0; \chi^2_{13}=2.7$<br>$\chi^2_{14}=13.5; \chi^2_{34}=3.5$ |
| g. Percentage of Effective<br>Sailors - Those who com-<br>pleted Tour and were<br>Recommended for Reenlist-<br>ment (% of Total N minus<br>Non-Chargeable Attrition) | 75.00   | 68.66           | 68.75   | 57.70   | $\chi^2_{12}=5.1; \chi^2_{13}=3.9$<br>$\chi^2_{14}=26.9; \chi^2_{34}=8.7$ |
| h. Percentage Reenlisted or<br>Extended of those Eligible  | 24.72   | 21.90           | 27.27   | 25.13   | $\chi^2_{13}=0.5; \chi^2_{23}=2.3$  |

<sup>a</sup>

Unless otherwise specified, one degree of freedom is associated with all chi-square tests. For a one-tailed test of significance, a chi-square value of 2.7 is significant at the 5 per cent level of confidence and a value of 5.4 is associated with a probability of .01.

<sup>b</sup>

For samples the size of those used in this investigation, and for a one-tailed test of significance, a critical ratio of 1.6 is significant at the 5 per cent level of confidence and a value of 2.3 is associated with a probability of .01.

<sup>c</sup>

Chargeable Attrition - e.g.: Unfitness, Unsuitability, Misconduct, etc.

<sup>d</sup>

Non-Chargeable Attrition - e.g.: Physical Disability, Hardship, etc.

In general, the results of the analyses contained in Table 1 suggest that when compared with average sailors, enlistees in mental group IV obtain lower criterion scores on those performance measures in which cognitive abilities presumably play an essential role. For example, in recruit training, measures such as weekly test grades and the percentage of subjects who require recycling because of performance deficiencies both reflect a significant relation to AFQT scores; and in the fleet, at the end of two years, advancement in grade and division officer ratings show a similar significant relation.

On the other hand, with the exception of a higher rate of venereal disease among Category IV personnel, there appears to be no significant relation between AFQT score and the evidence of physical or psychiatric illness. Nor do disciplinary rates appear to vary with AFQT score. From an economics standpoint, these findings are important because hospitalizations and the convening of court-martial boards are generally regarded as two of the highest costs in the management of military personnel.

It is also of interest to note, as shown at the end of Table 1, that, contrary to expectations, there is no significant difference between average and mental group IV sailors with respect to rates of reenlistment - a ratio of subjects reenlisting to those eligible for reenlistment. On the other hand, if reenlistment rates are computed on the basis of the total number of cases entering the Navy in each group, rather than on the basis of those eligible to reenlist, the differences favor the average sailor.

Probably the most important finding of this phase of the study is that reported in Table 1 on line 6 g - the percentage of effective sailors in each of the four AFQT groups. While 75 per cent of average sailors are effective, mental group IV enlistees have an effectiveness rate which varies from 69 to 58 per cent - differences which are sizeable and, of course, statistically significant. As these figures indicate, many Category IV sailors do render effective military performances, but as their numbers increase among future enlistees, appreciable decrements in effectiveness can be anticipated.

In the second phase of this study, individual and composite validities of pre-enlistment characteristics of Category IV sailors for predicting four-year military effectiveness were ascertained. Table 2 contains the product-moment correlations of 18 of the 30 predictors having the highest validities. The multiple regression equation which yielded the highest criterion-correlation in the cross-validation sample was one containing the four variables of years

Table 2

Product-Moment Correlations of Predictors and Criterion<sup>a,b</sup>

| Variable                         | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16  | 17  |
|----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|
| 0. Criterion                     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |
| 1. Age                           | 144  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |
| 2. Act.Duty Obl.                 | 149  | 961  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |
| 3. Birthplace                    | 132  | 093  | 109  |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |
| 4. Recruit.Area                  | 113  | 020  | 006  | 494  |      |      |      |      |      |      |      |      |      |      |      |      |     |     |
| 5. Education                     | 241  | 344  | 301  | 022  | 015  |      |      |      |      |      |      |      |      |      |      |      |     |     |
| 6. Schl.Grds.Fld.                | -139 | -092 | -077 | 033  | 084  | -344 |      |      |      |      |      |      |      |      |      |      |     |     |
| 7. Age left Schl.                | 198  | 566  | 558  | 066  | 009  | 518  | -121 |      |      |      |      |      |      |      |      |      |     |     |
| 8. Schl.Expuls.                  | -139 | -160 | -150 | -057 | 011  | -159 | 126  | -159 |      |      |      |      |      |      |      |      |     |     |
| 9. Broken Homes                  | 124  | 022  | 034  | 031  | 075  | 044  | -031 | 022  | -058 |      |      |      |      |      |      |      |     |     |
| 10. Dating Freq.                 | 081  | -068 | -075 | 019  | 043  | 002  | 034  | 029  | 044  | 132  |      |      |      |      |      |      |     |     |
| 11. Hobbies                      | 181  | 196  | 167  | 019  | 034  | 185  | -080 | 170  | -044 | 003  | -097 |      |      |      |      |      |     |     |
| 12. Club Officer                 | 093  | 093  | 104  | 033  | 043  | 229  | -100 | 131  | -042 | 052  | -079 | 120  |      |      |      |      |     |     |
| 13. Arrests                      | -093 | -017 | -012 | 026  | 022  | -071 | 057  | -029 | 150  | -001 | 021  | -035 | -077 |      |      |      |     |     |
| 14. Reform Schl.                 | -103 | -038 | -032 | -058 | -056 | -045 | 079  | -049 | 031  | -066 | -049 | -082 | -008 | 152  |      |      |     |     |
| 15. Prior Serv.Rej.              | -101 | 075  | 060  | -036 | 002  | 010  | -035 | 075  | -048 | 027  | 059  | -072 | -064 | -014 | 016  |      |     |     |
| 16. AFQT                         | 072  | 043  | 031  | 041  | -012 | -022 | -030 | -007 | -049 | -059 | -004 | -042 | 045  | 035  | 030  | -131 |     |     |
| 17. Desired Serv.                | 094  | -033 | -047 | 066  | 007  | -030 | 073  | 015  | -021 | -028 | -051 | 064  | 021  | 045  | 048  | -205 | 083 |     |
| 18. Reason for<br>Serv.Rejection | 091  | -098 | -082 | 032  | 000  | -016 | 068  | -049 | -019 | -006 | -063 | 081  | 014  | 020  | -020 | -681 | 103 | 243 |

<sup>a</sup>Decimal points have been omitted from the correlations.

<sup>b</sup>For samples of the size used in this study, a correlation of approximately .09 is significantly different from zero at the five per cent level of confidence, while an r equal to .12 is significant at the .01 probability level.

of schooling completed, number of school expulsions, AFQT score, and number of arrests.

The cross-validity of this predictor composite was .309.

From a practical standpoint, the correlations of the individual predictors with the effectiveness criterion, as well as the multiple correlation, are admittedly low. As a result, predicted effectiveness scores are subject to considerable error. On the other hand, the relationships are statistically significant and do permit estimates of naval effectiveness which are considerably better than chance.

Table 3 shows the odds for naval effectiveness for each category of the four predictors comprising the regression equation. As an example, enlistee applicants who have not gone beyond

Table 3

Probability of Naval Effectiveness for Mental Group IV (AFQT)

Enlistees as a Function of Four Applicant Characteristics

| (A)                       | (B)                   | (C)               | (D)                   | (E)                |
|---------------------------|-----------------------|-------------------|-----------------------|--------------------|
| <u>Years of Schooling</u> | <u>No. of Expuls.</u> | <u>AFQT Score</u> | <u>No. of Arrests</u> | <u>Probability</u> |
| 8 or less                 | One <sup>+</sup>      | 24 <sup>-</sup>   | Two <sup>+</sup>      | 188                |
| 8 or less                 | One <sup>+</sup>      | 24 <sup>-</sup>   | 0 or 1                | 345                |
| 8 or less                 | One <sup>+</sup>      | 25-30             | Two <sup>+</sup>      | 267                |
| 8 or less                 | One <sup>+</sup>      | 25-30             | 0 or 1                | 425                |
| 8 or less                 | None                  | 24 <sup>-</sup>   | Two <sup>+</sup>      | 284                |
| 8 or less                 | None                  | 24 <sup>-</sup>   | 0 or 1                | 441                |
| 8 or less                 | None                  | 25-30             | Two <sup>+</sup>      | 363                |
| 8 or less                 | None                  | 25-30             | 0 or 1                | 521                |
| 9-11                      | One <sup>+</sup>      | 24 <sup>-</sup>   | Two <sup>+</sup>      | 356                |
| 9-11                      | One <sup>+</sup>      | 24 <sup>-</sup>   | 0 or 1                | 514                |
| 9-11                      | One <sup>+</sup>      | 25-30             | Two <sup>+</sup>      | 436                |
| 9-11                      | One <sup>+</sup>      | 25-30             | 0 or 1                | 594                |
| 9-11                      | None                  | 24 <sup>-</sup>   | Two <sup>+</sup>      | 452                |
| 9-11                      | None                  | 24 <sup>-</sup>   | 0 or 1                | 610                |
| 9-11                      | None                  | 25-30             | Two <sup>+</sup>      | 532                |
| 9-11                      | None                  | 25-30             | 0 or 1                | 690                |
| 12 <sup>+</sup>           | One <sup>+</sup>      | 24 <sup>-</sup>   | Two <sup>+</sup>      | 525                |
| 12 <sup>+</sup>           | One <sup>+</sup>      | 24 <sup>-</sup>   | 0 or 1                | 683                |
| 12 <sup>+</sup>           | One <sup>+</sup>      | 25-30             | Two <sup>+</sup>      | 605                |
| 12 <sup>+</sup>           | One <sup>+</sup>      | 25-30             | 0 or 1                | 762                |
| 12 <sup>+</sup>           | None                  | 24 <sup>-</sup>   | Two <sup>+</sup>      | 621                |
| 12 <sup>+</sup>           | None                  | 24 <sup>-</sup>   | 0 or 1                | 779                |
| 12 <sup>+</sup>           | None                  | 25-30             | Two <sup>+</sup>      | 701                |
| 12 <sup>+</sup>           | None                  | 25-30             | 0 or 1                | 859                |

A. Years of schooling completed.

B. Includes suspensions from school

C. Percentile score.

D. For reasons other than traffic violations.

E. Chances in 1000 of rendering effective service. Effective sailors are those who completed their first enlistment and were recommended for reenlistment by their commanding officers.

the eighth grade in school, who have been expelled on one or more occasions, who have AFQT percentile scores of 24 or lower, and who have been arrested on two or more occasions have only 188 chances out of 1000 of becoming effective sailors.

Table 3 is intended merely as a guide for the use of recruiting officers. Predicted effectiveness scores can certainly not be interpreted as guarantees of naval success or failure. In the sample of enlistees used in this study, some pre-selection obviously occurred at Navy Recruiting Offices. Had it not, it is probable that some of the variables, such as an arrest history and AFQT scores would have been more highly predictive.

#### Conclusions and Discussion

The major findings of this study are the following:

1. As many as 65% of the Category IV enlistees used in this study were found to be effective enlistees. However, their performances were less satisfactory than those of average sailors, particularly on criterion measures in which cognitive abilities presumably were most important.
2. Contrary to generally held beliefs, Category IV sailors were found to have no higher rates of court-martial action nor higher rates of physical and psychiatric illness than average sailors.
3. Four characteristics of new Category IV enlistees were found to be uniquely related to four-year effectiveness. These are: (a) years of schooling completed, (b) number of expulsions and suspensions from school, (c) AFQT score itself, and (d) number of arrests. The cross-validity of this predictor composite was found to be .309.
4. A probability table showing the odds for effectiveness for enlistee applicants was derived on the basis of different combinations of the four significant predictors. These data could be utilized by the Navy for selecting for enlistment those Category IV applicants who would have the highest chances of becoming effective sailors. For example, a Category IV applicant having an AFQT score in the 25 to 30 range who is a high school graduate with no arrest history and no expulsions or suspensions from school (probability of effectiveness = .859) is to be preferred over a Category IV applicant who possesses similar characteristics, but who has completed only 8 years of schooling (probability of effectiveness = .521)

To date, the Navy Medical Neuropsychiatric Research Unit has concentrated its research efforts with Category IV personnel in the area of evaluation and prediction of performance and adjustment. It is considered doubtful that further selection research of the type outlined in this report would result in the identification of behavioral characteristics which would markedly increase the accuracy of predictions of service effectiveness. On the other hand, research studies which are directed toward an evaluation of the validity of recruit training practices and procedures for facilitating military adaptation among personnel are considered to be of value. For example, some recruits, because of adjustmental problems, fail to meet recruit training standards for graduation without requiring special training and indoctrination. Are some retraining procedures superior to others in terms of changing fleet effectiveness rates?

Environmental factors which especially affect attitude change and alter motivation for achievement need to be identified and manipulated experimentally. Such studies could conceivably result in the derivation of training practices which would facilitate the achievement and performance of marginal personnel.

#### Summary

In summary, this report has presented findings from a study designed to evaluate differences in the adaptations of "average" and mentally marginal sailors during four years of military service. Sailors with AFQT scores of 50 are significantly superior to Category IV enlistees on military performance measures in which cognitive abilities play an essential role. While mental group IV sailors have appreciably lower rates of overall naval effectiveness, they do not differ significantly from average enlistees with respect to disciplinary and illness rates.

Four pre-enlistment characteristics were found to be valid for predicting four-year naval effectiveness among Category IV personnel. These four variables were years of schooling completed, number of school expulsions, AFQT score, and number of arrests. An actuarial table, showing the probability of naval effectiveness as a function of different combinations of these four predictors, was constructed as a guide for the use of recruiting officers in making decisions concerning the enlistment of mentally marginal applicants.

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