# PREDICTORS RELATED TO PREMATURE ATTRITION OF NAVY RECRUITS

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# PREDICTORS RELATED TO PREMATURE ATTRITION OF NAVY RECRUITS

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The problem of turnover has become one of major importance to both industry
and the military. The costs of even a small turnover are great in terms of
money, personnel utilization, training, and time. The frustration experienced by
those who leave an organization, as well as that felt by those who failed in
their performance of selecting and training these individuals, results in a huge
waste of human energy. The reduction in turnover would improve any organization's
program of human utilization and also its financial position (Lawler, 1970).
Because of the high costs accrued from attrition, a study of the relationships of
turnover with other variables could prove to be beneficial and profitable.

The initial step in the study of turnover is to determine which character-
istics differentiate between those who leave an organization and those who stay
within an organization. Within the military the knowledge of the distinctive
characteristics of those who either remain within the organization or leave it
would be helpful in the subsequent selection of men to be enlisted into the all-
volunteer force.

During the last decade Plag and his associates (1966, 1967) have studied the
relationships of naval enlistee characteristics and the subsequent performance of
those men during their first tours of duty. Predictors of success or failure in
completing a term of enlistment have been examined and from these research efforts
odds for effectiveness have evolved. Briefly stated, a man's odds for effective-
ness are mathematically determined by using combinations of four variables: number
of arrests, number of suspensions and expulsions from school, years of education
completed, and score on the Armed Forces Qualification Test. These odds for
effectiveness have been compiled into actuarial tables which provide the recruiter

with a means to either select or reject an applicant on the basis of his chances for effective completion of his first naval tour of duty. Even though the technique of recruit selection based upon these tables has been implemented, the addition of other variables or characteristics which distinguish the effective from the non-effective man could also be used to lower the present rate of attrition.

A measure which is currently being evaluated and from preliminary findings if appears to have value in predicting success or failure in naval recruit training is the Recruit Temperament Survey (RTS). This inventory was designed by Waite and Barnes (1968) for psychiatric screening purposes and has been administered to recruits at the Naval Training Centers in Great Lakes and San Diego. Although the authors of the RTS have reported that high total RTS scores were related to premature attrition, the utility of this questionnaire as a prediction or selection device has not been fully explored nor implemented.

The purpose of this study, therefore, is to compare the characteristics and RTS responses of those men who were discharged due to psychiatric reasons from the Recruit Training Center, San Diego with a sample of recruits who were not discharged during initial training. The final step in this study would then be to compute effectiveness predictions using the variables.

## Method

### Subjects

The sample consisted of 1643 recruits who were discharged from the Navy during 1972 and a selected control group of 1625 recruits who were not discharged during this time period. Recruits in the control group were chosen from the same companies as recruits in the experimental group. In addition, recruits in these two groups were matched, as accurately as possible, on scores for the Armed Forces Qualification Test.

The number of recruits who entered recruit training in San Diego during 1972 was 43,031; the 1643 recruits discharged for unsuitability due to psychiatric reasons represented 3.8% of the total input. Reasons for discharge included the following percentages: discharge due to inaptitude accounted for 35.4%, discharge due to enuresis resulted in a loss of 4.1%, and discharge due to character and behavior disorders represented 60.5%. Recruits discharged from the Navy for other reasons, such as physical disability, were not considered for inclusion in this study.

## Procedure

Biographical information was collected for the 3268 recruits in the sample. These variables included: years of education completed, number or arrests, number of expulsions or suspensions from school, number of grades failed, marital status, and scores for the Armed Forces Qualification Test (AFQT), the General Classification Test (GCT), and Mechanical Aptitude (MECH). Responses to the 115-item Recruit Temperament Survey (RTS) were collected and the odds-for-effectiveness scores were computed for the recruits.

## Recruit Temperament Survey (RTS)

This questionnaire consists of 115 yes-no personal history and adjustment statements. All "yes" responses are scored as 1, "no" responses as 0. Responses were summed to obtain a total RTS score. According to the test authors, an RTS total score less than 40 would be indicative of a greater likelihood of a recruit's successful completion of his tour of duty than a recruit's total RTS score of 40 or more. During the last few years, the mean total RTS score has ranged between 25 and 29 for recruits during initital training.

## Odds for Effectiveness

Odds for effectiveness were computed for the recruits in this sample. Each man's score for AFQT, years of education completed, number of arrests other than

traffic violations, and number of expulsions and suspensions from school were
entered into the equations to produce his chances, or odds, in 100 of successfully
completing his first tour of duty.

## Criterion

An unsuitability discharge by reason of inaptitude, eneuresis, or character
and behavior disorder was used as the indication of non-effectiveness whereas
effectiveness was the successful completion of recruit training.

## Analyses

The statistical analyses computed to differentiate the effective from the non-
effective recruit were divided into two parts. The first analysis involved the
study of variables which distinguished these two groups and the second phase ex-
plored the utility of these variables as predictors. The z-test of proportionality
was used with the 115 RTS items; correlations and intercorrelations were computed
for these items and with the criterion; t-tests were calculated between the means
of variables for the two groups; and multiple regression analyses were conducted
for the predictive phase of the study.

### Results

## Analysis of the RTS

• Using the z-test of proportionality, the mean responses or proportions for
the 115 items of the RTS differed significantly for every item in the comparison
of the non-effective recruits with the effective recruits. In addition to computing
the intercorrelations of these 115 RTS items, correlations of every item with the
dichotomous criterion of effectiveness/non-effectiveness were also calculated. The
results of these analyses yielded highly significant correlations and intercor-
relations which were used to form a cluster of seventeen significantly related and
interrelated RTS items. This cluster was composed of the following items:

1. Has nervousness ever made you miss school, work, or fun?

2.  Do other people often take advantage of you?

3.  Does being in a large group of people make you feel upset?

4.  Do you feel you will have trouble making good in the service?

5.  Have you ever been so nervous that you had to stay home for a rest?

6.  Can you stand as much pain as others can? (This item was reversed in the summation of the cluster to make the direction comparable for all items.)

7.  Right now, do you feel like you would like to back out and go home?

8.  Are you often bothered by nightmares or frightening dreams?

9.  Do you expect to have trouble in learning to take orders?

10.  Have you ever been so excited or upset that you actually got sick?

11.  Are you bothered by dizziness?

12.  Do you find it hard to keep your mind on a task or job?

13.  Do you cry easily?

14..  Are you bothered by nervousness?

15.  Do you tend to go all to pieces when you are rushed?

16.  Do your hands shake enough to bother you?

17.  Did you join the Navy mostly because someone else wanted you to?

## Comparisons of Recruit Characteristics

Comparative analyses for the significance of differences between the two subgroup means were computed for the biographical variables, cognitive scores, odds-for-effectiveness scores, the RTS cluster, and total RTS score. Significant differences were obtained between the means for all of the variables except for the comparison of the means for the two groups using the variable of being jailed or not which resulted in non-significant differences. Because the two criterion subgroups were matched on scores for AFQT, the difference between the means for

this variable was non-significant. These results (presented in Table I) indicated
that for the non-effective recruits their mean scores for GCT and MECH were lower
than the mean GCT and MECH scores for the effective recruits. The non-effective
recruits were more likely to be married or divorced than the effective group. For
the school-related variables the mean number of years of education completed was
lower for the non-effective recruits; they had failed more grades of school and
stated that they had been expelled or suspended from school more than once as com-
pared with those recruits who had not been discharged from initial training. Even
though more recruits in the non-effective group reported that they had been charged
with or suspected of a crime, there were no significant differences between the
two groups for the variable of being jailed or not. The scores for odds for effec-
tiveness were significantly higher for the effective group; the chances out of 100
that the typical effective recruit would successfully complete his first tour of
duty were greater than the odds for the typical non-effective recruit. As indicated
by the differences between the means for the RTS cluster and the total RTS score,
the effective recruits had many more personal problems or difficulties than the
effective recruits.

(Insert Table I about here.)

## Prediction of Premature Attrition of Navy Recruits

The final step in the study was to perform the multiple regression analysis
to determine the predictive validity of these variables. The sample was randomly
divided into validation and cross-validation subsamples. For the validation sample,
eleven variables were related to the criterion to obtain correlation ratios (etas)
and criterion weights were then assigned to the levels of each variable. Nine
linearized variables with significant etas were then entered into the multiple
regression analysis. A combination of four variables resulted in a significant

multiple R of .509; these four variables included the RTS cluster, GCT, MECH, and expulsions or suspensions from school. When the base-score equation was applied to the cross-validation sample, the resultant cross-validity was .451. When the RTS cluster alone was cross-validated, the correlation obtained was .503. These results indicated that the RTS cluster was the most significant predictor of premature attrition for recruits in this sample.

By perusing the cumulative percentages in Table 2 it is possible to determine the efficacy of the RTS cluster in differentiating the effective group from the non-effective group. For example, by using an RTS cluster score of ten, the percentage of non-effective recruits accurately identified would be 46.3%, whereas the percentage of falsely indicated effective recruits would be 9.3%. By using this example for screening purposes, 53.7% of the non-effective recruits and 90.7% of the effective recruits would have been accepted into the Navy. On the other hand, if a cutting score of 16 or 17 were used to reject recruits from the Navy, the percentage of non-effectives identified would be 9.1% and the percentage of effectives would be .8. If this 9.1% of the non-effective recruits had been rejected during the recruiting phase, only .8% of the effective recruits would have been lost to the Navy.

●                            (Insert Table 2 about here.)

### Discussion

The comparisons of the effective and non-effective recruits indicated that these two groups differed for all of the characteristics entered into the analyses. The typical non-effective recruit had more school difficulties, had completed fewer years of education, had lower cognitive scores, had lower odds-for-effectiveness scores, and had more personal difficulties and adjustment problems, as reflected on the RTS, than the typical effective recruit.

The importance of these findings lies in the utility of these characteristics in differentiating men on the basis of subsequent effectiveness. The costs of

premature attrition are extremely high; the amount of present and subsequent dis-

appointment, dissatisfaction, and unhappiness is probably large for every discharg

recruit. For the Navy the costs are also high, for instance, the expenditure in

actual dollars per recruit is approximately $12 per day. At the Recruit Training

Center, San Diego, 1643 recruits were prematurely separated during 1972 after an

average stay of 33 days. As can be seen, these separations represent a substantia

expenditure of money, time, and effort. Selection of applicants into the all-

volunteer force, as well as a reduction in costly attrition from the Navy, could

be improved by the applicability of a technique which identifies those men who

have outstanding chances of successfully completing their first tours of duty.

The use of the RTS or the RTS cluster as a selection device may be helpful

to the recruiter in addition to the tables for the odds for effectiveness. At

present, the recruiter also considers an applicant's scholastic and police history.

The implementation of the RTS as a selection device could be supported or rejected

if a pilot study were conducted at a recruiting station where a sample of appli-

cants could complete the RTS. These results would then be compared with the

applicants' subsequent RTS responses collected at the Recruit Training Center.

These comparisons would be used to determine the reliability of the RTS. If the

test-retest reliability is high, actuarial tables for the RTS could also be compiled

for the recruiter's use in conjunction with his other selection measures.

The application of the RTS as a predictor of successful performance in various

occupational specialties would also be beneficial for classification interviewers

who must frequently depend solely upon cognitive scores for assigning a man to a

specific rate. An inaccurate assignment of a man to an occupational specialty

could result in dissatisfaction which frequently leads to costly turnover, psych-

iatric admissions, and absonteeism. If found to be predictive of effectiveness

within occupational specialties, the RTS could be used to help improve classificatio

decision-making.  The use of the RTS as a selector and predictor, therefore,
merits consideration.

## Abstract

During 1972, 1643 recruits were discharged from RTC, San Diego for the
following psychiatric reasons:  35.4% for inaptitude, 4.1% for enuresis, and
60.5% for character and behavior disorders.  Comparative analyses between
these 1643 recruits (non-effectives) and a control sample of 1625 (effectives)
were computed for the means of biographical variables, cognitive scores, odds-
for-effectiveness scores, a personal history questionnaire (RTS), and a
cluster of 17 items from the RTS.  Significant differences were obtained for
all of the variables except one.  Using a multiple-regression analysis on the
validation sample, four variables emerged as significantly related to the crite-
rion (R=.509).  When applied to the cross-validation sample, the variables of
the RTS cluster, GCT, MECH, and expulsions or suspensions from school resulted
in a cross-validity of .451.  The most powerful predictor was the RTS cluster,
which accounted for 23% of the unique variance.  These results indicated that
the RTS cluster should be used during the recruiting phase in addition to the
selection techniques presently used.

## Footnotes

This study was proposed by Captain Allen McMichael, Staff of Chief of Naval Air Training, Naval Air Station, Pensacola, Florida 32508. The opinions expressed are those of the authors and are not to be construed as necessarily reflecting the official policy of the Naval service.

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## Table I

### Comparisons of Recruit Characteristics for Effective and Non-effective Recruits

| | Discharged Recruits | | Recruits Not Discharged | | t-test |
|---|---|---|---|---|---|
| | $\overline{X}$ | s.d. | $\overline{X}$ | s.d. | |
| AFQT | 36.05 | 21.76 | 36.25 | 21.83 | - .24 |
| GCT | 42.92 | 11.27 | 45.92 | 10.89 | - 6.11*** |
| MECH | 44.64 | 9.14 | 46.37 | 7.94 | - 4.63*** |
| Marital status (Single = 1, married = 2, divorced = 3) | 1.14 | .40 | 1.12 | .34 | 2.61** |
| Years of education completed | 10.95 | 1.48 | 11.31 | 1.31 | - 7.06*** |
| Number of grades failed (0, 1, or 2 or more) | .55 | .66 | .42 | .59 | 5.74*** |
| Expelled or suspended more than once | .12 | .33 | .03 | .17 | 10.37*** |
| Been jailed or in detention home | .28 | .48 | .25 | .43 | 1.57 |
| Charged with or suspected of a crime | .23 | .42 | .18 | .38 | 3.54*** |
| IRQ Cluster | 8.60 | 5.05 | 3.46 | 3.79 | 32.27*** |
| Total IRQ | 53.23 | 21.52 | 32.32 | 17.26 | 28.47*** |
| Odds for effectiveness | 71.08 | 14.11 | 74.40 | 13.62 | - 6.20*** |

* p < .05
** p < .01
*** p < .001

## Table 2

### Cumulative Percentages of the IRQ Cluster for Effective and Non-effective Recruits

| IRQ Cluster Score | Cumulative Percent for Discharged Recruits | Cumulative Percent for Recruits not Discharged |
|---|---|---|
| 0 | 100.0 | 100.0 |
| 1 | 95.9 | 77.7 |
| 2 | 90.0 | 58.3 |
| 3 | 84.0 | 45.9 |
| 4 | 77.9 | 36.0 |
| 5 | 73.2 | 27.7 |
| 6 | 67.3 | 23.1 |
| 7 | 62.6 | 18.9 |
| 8 | 57.7 | 14.5 |
| 9 | 52.9 | 11.6 |
| 10 | 46.3 | 9.3 |
| 11 | 40.9 | 7.3 |
| 12 | 34.9 | 5.4 |
| 13 | 28.4 | 4.1 |
| 14 | 20.8 | 3.0 |
| 15 | 15.1 | 2.0 |
| 16 | 9.1 | .8 |
| 17 | 3.1 | .3 |

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During 1972, 1643 recruits were discharged from RTC, San Diego, for the following psychiatric reasons: 35.4% for inaptitude, 4.1% for enuresis, and 60.5% for character and behavior disorders. Comparative analyses between these 1643 recruits (non-effectives) and a control sample of 1625 (effectives) were computed for the means of biographical variables, cognitive scores, odds-for effectiveness scores, a personal history questionnaire (RTS), and a cluster of 17 items from the RTS. Significant differences were obtained for all of the variables except one. Using a multiple-regression analysis on the validation —

sample, four variables emerged as significantly related to the criterion (R-.509). When applied to the cross-validation sample, the variables of the RTS cluster, GCT, ECH, and expulsions or suspensions from school resulted in a cross validity of .451. The most powerful predictor was the RTS cluster, which accounted for 23% of the unique variance. These results indicated that the RTS cluster should be used during the recruiting phase in addition to the selection techniques presently used.