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U. S. Naval School of Aviation Medicine

U. S. NAVAL AIR STATION
PENSACOLA, FLORIDA

RESEARCH REPORT

Vocational Interests of Naval Aviation Cadets: Preliminary Findings

PROJECT NO. MM 001 077.01.03

Navy—PPO CNATRA, Pensacola, Fla

U. S. Naval School of Aviation Medicine 31 July 1953

Project Number NM 001 077.01.03

"Vocational Interests of Naval Aviation Cadets: Preliminary Findings."

Nathan Rosenberg and Carroll E. Izard, Tulane University

8 pp. 2 tables UNCLASSIFIED

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NAVAL AIR STATION
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JOINT PROJECT REPORT NUMBER 3

The Tulane University of Louisiana
under ONR Project NR 154-098

and

U. S. Naval School of Aviation Medicine
Research Project No. NM 001 077.01.03

VOCATIONAL INTERESTS OF NAVAL AVIATION CADETS: PRELIMINARY FINDINGS

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31 July 1953

Opinions or conclusions contained in this report are those of the authors. They are not to be construed as necessarily reflecting the view or the endorsement of the Navy Department. Reference may be made to this report in the same way as to published articles noting authors, title, source, date, project number, and report number.

SUMMARY

The vocational interests of cadets would seem important for successful completion of Naval Air Training. Therefore, the Kuder Preference Record, a measure of relative preference for nine broad vocational interest areas, was administered to 651 entering Naval Aviation Cadets, 137 DOR attrition cases (voluntary withdrawals from training) and 137 "successful" cadets. The successful cadets were tested near completion of their basic training; from previous experience it is estimated that over 90 percent of these cadets will graduate.

Results indicate:

1. Entering cadets show significantly more interest in scientific, artistic, musical and mechanical activities than a vocationally unselected population. They are less interested in clerical, literary, social service, persuasive, and computational activities.

2. Successful cadets are relatively more interested in mechanical and scientific activities as compared to a group who withdraw from training at their own request. They are less interested in persuasive, literary, and musical activities than the voluntary withdrawal cases. These differences are statistically significant.

3. The voluntary withdrawal group shows an essentially different interest pattern than the group eliminated from training in the Air Force during World War II.

It is concluded:

1. Entering cadets have interest patterns which are different from those found for a vocationally unselected group. Some of these distinguishing interests may arise because of cadets' age or educational level rather than choice of Naval Aviation as a vocation. The factor of selection screening as well as self-selection on the basis of interests, may have partially determined these interest patterns.

2. The Kuder Preference Record shows promise of validity for predicting DOR attrition. The mechanical, scientific, persuasive, literary, and musical interest keys appear the most important for this purpose.

3. Some psychological tests which failed to predict attrition for World War II Air Force cadets may show validity for present day Naval Aviators.

The interest patterns characteristic of successful and DOR groups described in this report if found stable in future populations may provide helpful information to officers in the Naval Air Training Command. For example, when a board decision to retain or eliminate a cadet from training must be made, Kuder interest patterns obtained at the time a cadet enters training might be useful as additional information upon which to base such a decision.

A test of general information based on Kuder interests found important for successful completion of training could provide an indirect measure of interests. The construction of such an instrument is planned and, if valid, could be used for the selection of cadets.

INTRODUCTION

In interviews with cadets who voluntarily withdraw from the Naval Air Training program, an active dislike of flying was one of the most important expressed reasons for withdrawal (1). An attempt was made, therefore, to investigate the importance of interests as a correlate of success in Naval Aviation. This attempt was directed toward an examination of broad interest patterns of cadets through measurement of their vocational interests rather than dealing with specific interests in flying and the training program itself. Since questions about flying and the program are avoided in tests of vocational interests, such measures were considered more subtle, less subject to momentary fluctuations in attitudes that seem present in newly arrived cadets, and of greater general psychological importance.

The Kuder Preference Record, Vocational, Form B, (3) was chosen to measure vocational interests since it is one of the interest questionnaires which has been most widely studied for validity. Form B was selected because it had been administered in World War II to a population of Air Force cadets. The writers feel that Navy and Air Force attrition samples differ in many important characteristics, and the proposed comparison will present definitive evidence with regard to measured vocational interests. Generalizations from World War II Air Force data are often made concerning the importance of many psychological characteristics for selection of pilots. If this Air Force population differs in important respects from other aviation populations, such generalizations should be tempered.

In research, entering Naval Aviation Cadets may be compared to new graduates of the training program in order to identify psychological factors which are important for successful completion of training. These psychological factors might show even greater validity had career Naval Aviators and rejected applicants been compared, groups which should maximize any important differences present.

Results obtained by comparing entering cadets to new graduates often must be adapted before they are useful at the recruitment level. This is especially true of measured vocational interest tests which are known to

be amenable to slanting or faking. This report is concerned with the identification of interest factors important for successful completion of training. Recommendations for the implementation of these findings at the operational level will be made after adaptations necessary for operational use have been tested.

At the outset, certain methodological considerations should be noted. It is reasonable to assume that certain vocational interest patterns may cause cadets to enter Naval Air Training. Once this pre-selection has operated, there may or may not be a relationship between interests and successful completion of training. That is, interests may cause entry into training but they may or may not be predictive of success after pre-selection has occurred. Thus, it is important to consider whether Naval Aviators possess distinguishing interests prior to entry into training.

Should selective drop-out during training occur, it is possible that interests operate as a post-selective device. This implies a correlation between interests and successful completion of training. This correlation is most adequately tested by a longitudinal approach in which entering cadets are tested and then followed through the program to identify successful and non-successful cases. A compromise to this logitudinal study is afforded by the corss-sectional approach. Entering cadets, non-successful cadets, and successful cadets are tested and their mean interest scores compared. Mean scores which differ systematically are interpreted as evidence for a correlation between interests and successful completion of Naval Air Training.

Should training, or factors operating during training, change the interests of entering cadets, the change might contaminate inferences regarding test validity. For example, maturation of cadet interests over an 18 month training period might well influence apparent test validity. In this report, selective drop-out during training is assumed to result from differences in interests between an attrition and successful group. The preceding considerations have been made so that appropriate safeguards will be followed in interpreting the results.

PURPOSE OF THIS STUDY

The following questions are considered in this report:

1. Do the vocational interests of entering Naval Aviation Cadets differ significantly from an unselected vocational group, namely the norm group found in the test manual for the Kuder Preference Record?

2. Do the vocational interests of successful Naval Aviation Cadets differ significantly from an attrition population of cadets who withdraw at their own request?

3. Do the vocational interests of present-day Naval Aviation Cadets differ significantly from a wartime Air Force population of cadets?

PROCEDURE

A. Nature of the Instrument. The Kuder Preference Record (3) is a relative measure of preference for nine broad interest areas: mechanical, computational, scientific, persuasive, artistic, literary, musical, social service, and clerical. A triad form of item is used, from which the subject selects that activity which he likes the most, and that which is liked least. Each of the three activities in a triad had been classified, with the aid of statistical analysis, into one of the above nine interest areas. For example, one triad includes:

N. Be a portrait painter.
P. Conduct research on the causes of earthquakes.
Q. Be a mechanical engineer.

N, P, and Q above are classified in the artistic, scientific, and mechanical interest areas respectively. Each of the nine interest areas are paired against each other a number of times by means of specific activities in the different triads. Weights of 2, 1, and 0 are assigned to first, second, and third choices respectively. Because the subject is forced to choose from each group of three that activity most and least liked, a relative preference for the nine interest areas is obtained. Interest scores so obtained can be compared to those received by an appropriate group.

B. Samples Used:

1. Entering classes 3-53 through 10-53 and classes 16-53 through 23-53 were tested. A total of 16 classes consisting of 651 subjects were included in this group.
2. The successful group consisted of 137 cadets who were tested at Corry Field, approximately nine months after entry into training. Based upon previous experience, it is estimated that over 90 percent of these subjects will graduate.
3. A total of 137 DOR cases (Dropped at own Request) were tested, as many as administratively possible during the period from about 1 January through 1 June 1953.
4. The norm group consisted of 2667 adult men engaged in diversified occupations, obtained from the manual for the Kuder Preference Record.
5. From published Air Force data, results were available for 937 wartime cadets, 721 of whom graduated training and 216 were eliminated (2).

RESULTS

Table I presents a summary of means and standard deviations for the nine interest areas measured on the groups considered. Table II shows critical ratios testing the significance of the differences in mean interests scores for the groups compared.

A. Comparison of Entering Cadet's Interests to Kuder's Norm Group. The norm group consists of "2667 adult men engaged in occupations, with each major occupational group weighted in proportion to its occurrence in the general population (with the exception of unskilled and semi-skilled workers)." (3)

On the average (Tables I and II) entering cadets possess significantly different interests from those found for Kuder's norm group in all nine interests areas measured. Entering cadets are relatively more interested in scientific, artistic, musical, and mechanical activities and relatively less interested in clerical, literary, social service, persuasive, and computational activities.

The practical significance of the difference in interests between the two groups is gauged by the following procedure. The mean interest scores for entering cadets and the norm group are placed on the distribution of scores for the norm and percentile ranks obtained. The following percentile ranks are obtained by this procedure:

	Entering Naval Cadets	Norm Group	Difference Between Entering and Norm Group
Mechanical	50	45	+ 5
Computational	45	49	- 4
Scientific	67	50	+17
Persuasive	48	52	- 4
Artistic	65	54	+11
Literary	30	54	-24
Musical	65	57	+ 8
Social Service	30	50	-20
Clerical	20	52	-32

In a perfectly normal distribution, the mean interest scores for the norm group would all lie at percentile rank of 50, the median score. Deviations from a percentile rank of 50 for the norm group suggest the direction and degree of skewness for the norm distribution. Since all percentile ranks for the norm group appear fairly close to 50, the skewness - if significant - would not appear pronounced. Inspection of the norm distribution for mechanical interest, where the mean score approximates a percentile rank of 45, suggests that mechanical interest scores are slightly skewed toward the high end of the distribution. This explains an apparent contradiction whereby entering cadets show a mean mechanical interest score

equivalent to a percentile rank of 50 on the norm distribution and, at the same time, show significantly greater interest in the mechanical area than the norm.

The extremity of the differences between entering cadets and the norm group is emphasized for the clerical, literary, and social service areas. Entering cadets seem pre-selected with respect to a relative dislike for activities of reading or writing (literary), routine filing or secretarial work (clerical), and activities which contribute to the welfare of people (social service). To a lesser extent, they are pre-selected with respect to a relative liking for activities of the scientific, artistic, and musical interest areas.

Since the norm group is presumably older than the cadet group, it may not be concluded that these differences are all characteristic of Naval Cadets as a vocational group. Some of the differences could reflect changes in interest characteristic of an older age group. Furthermore, cadets undoubtedly represent a population with more education than do the norm group. Thus, some of the differences in interests could be a reflection of educational level which distinguishes the two groups, aside from vocational selection. When these factors are better controlled, it will be possible to isolate which of the interest areas reflect those characteristics of a vocational group and not those for age or educational groupings.

It would seem reasonable that a preference for the scientific area would be the one area most likely to be truly characteristic of Naval Aviators as opposed to vocationally unselected groups.

B. Comparison of Successful Cadets to Voluntary Withdrawals (DOR). Differences in interests between the above two groups suggest the possible usefulness of the Kuder Preference Record as a predictor of DOR attrition. As can be noted from Tables I and II, successful cadets are significantly more interested in mechanical and scientific activities than DOR's. They are significantly less interested in persuasive, literary, and musical interests than DOR's.

From these results, the interest picture for the successful cadet is an individual who has a positive attraction towards activities which involve the use of tools and machinery; he also likes abstract and theoretical activities of a scientific nature. The DOR appears to be an individual who is more interested in activities which involve convincing people (persuasive), reading or writing, and appreciation or participation in musical activities; he is less attracted by mechanical and scientific activities.

In this connection, it should be recalled that entering Naval Aviation Cadets are selected with respect to mechanical aptitude since cadets with very low MCT test scores are not admitted to the training program. These data indicate that mechanical interest, aside from mechanical aptitude, is important for successful completion of the Naval Aviation Training Program. Further study will be made to evaluate the improved prediction of DOR attrition when aptitudes and interests are both considered.

C. Comparison of Entering Cadet's Interests to an Air Force Population. Critical ratios (Table II) reveal some important differences in interest between the above two groups. Entering cadets' interests differ significantly from the Air Force entering cadet population in all areas with the exception of computational and musical activities. The differences between the two groups are particularly pronounced for the literary, clerical and mechanical areas.

Inspection of the mean scores for the Air Force eliminees from training reveals that differences in interest between the two attrition groups are considerable. The Naval Cadet who withdraws voluntarily shows essentially a different interest pattern from the Air Force cadet who was eliminated from training during World War II. The reasons for this difference are not very clear, aside from motivation present during World War II which is not so pronounced today. However, the important fact is that these two populations are different -- at least with respect to interests. Thus, if a test did not show validity on the Air Force population of World War II, this does not necessarily preclude its being valid for present day Naval Aviators. The attempt to use the Kuder in this study was undertaken despite Air Force data which showed it to be invalid for predicting pass-fail during World War II (2).

DISCUSSION

It will be recalled that successful cadets as compared to DOR groups possess higher mean interest scores for mechanical and scientific areas and lower for the persuasive, literary and musical areas. The mean interest scores for entering Naval Aviation Cadets lie between those found for successful and DOR groups for mechanical, literary and musical interest areas (Table I). These findings for the entering group are consistent with the assumption that selective drop-out from training caused the significant differences noted between successful and DOR groups. However, the scientific interest area deserves special comment since the mean scientific interest score for the successful group is 68.42, for the DOR group 61.09, but for entering cadets 70.67. Although entering cadets are more like the successfuls than the DOR, for a definite trend to be present, the mean interest scores for entering cadets should lie between the means for successful and DOR groups. The same reasoning applies for persuasive interest where the mean score for the entering group does not lie between the DOR and successful groups.

It is possible that entering cadets tend to over-rate their interest in scientific activities. Having just reported to Naval Air Training, it is conceivable that they would tend to rate themselves higher in scientific interest merely because they feel they should be high in this interest.

Since further "cross-validation" will be applied to these data in any case, an empirical check will be made for those interest areas apparently important for successful completion of Naval Air Training. Based on the

differences between successful and attrition cases, weights will be given to the interests that distinguish the two groups. From these weights, predictions of pass or DOR attrition will be made for entering cadets. In time, cadets who actually voluntarily withdraw and those who succeed will be determined. These results will be checked against the predictions made, and the actual utility of the Kuder Preference Record for predicting DOR cases will be ascertained. From the results presented in this report, it seems very likely that the measured vocational interests of entering cadets will predict DOR attrition significantly greater than chance expectation.

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TABLE I

MEANS AND STANDARD DEVIATIONS FOR KUDER INTEREST SCORES[•] ON VARIOUS GROUPS CONSIDERED

Entering Naval Aviation Cadets (N = 651)

	Mec	Com	Sci	Per	Art	Lit	Mus	SS	Cle
M	81.45	33.91	70.67	71.68	50.89	38.64	19.59	66.39	41.02
SD	17.83	11.06	14.80	18.81	13.44	13.60	9.55	17.02	11.60

"Successful" Cadets (N = 137)

M	85.84	33.20	68.42	73.93	53.08	35.50	17.19	65.71	42.72
SD	16.33	11.28	14.49	19.85	14.36	11.10	8.58	16.27	12.66

(DOR) Voluntary Withdrawals from Training (N = 137)

M	73.31	33.28	61.09	82.34	50.44	41.12	19.74	69.31	44.88
SD	20.94	12.60	16.42	20.39	16.00	14.39	9.54	16.46	14.08

World War II Air Force Cadets (N = 937)

M	85.98	33.18	67.60	68.36	49.28	46.40	18.96	63.73	46.43
SD	15.57	9.35	12.58	16.84	13.25	13.29	8.96	14.27	12.10

Kuder's Normative Population (N = 2667)

M	78.61	35.26	64.03	74.37	46.12	47.77	16.60	73.71	52.14
SD	22.81	10.58	15.52	20.61	13.56	15.10	9.64	17.53	13.54

[•] Mec - Mechanical, Com - Computational, Sci - Scientific, Per - Persuasive, Art - Artistic, Lit - Literary, Mus - Musical, SS - Social Service, Cle - Clerical.

TABLE II

CRITICAL RATIOS TESTING SIGNIFICANCE OF DIFFERENCE IN MEAN KUDER INTEREST SCORES●

A. Entering Cadets versus Norm Group

	Mec	Com	Sci	Per	Art	Lit	Mus	SS	Cle
C.R.	3.42*	2.81*	10.22*	3.20*	8.08*	14.97*	7.12*	9.76*	21.38*

B. Successful Cadets versus Voluntary Withdrawals (DOR)

C.R.	5.52*	0.06	3.92*	3.46*	1.43	3.62*	2.32**	1.82	1.33

C. Entering Cadets versus World War II Air Force Cadets

C.R.	5.27*	1.38	4.32*	3.61*	2.37**	11.25*	1.34	3.28*	9.02*

● Mec - Mechanical, Com - Computational, Sci - Scientific, Per - Persuasive, Art - Artistic, Lit - Literary, Mus - Musical, SS - Social Service, Cle - Clerical.

* Significant at the 1% level or confidence.
** Significant at the 5% level of confidence.