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HUMAN RESOURCES

COMPARATIVE PERFORMANCE OF LOW-ABILITY AIRMEN

By

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Lackland Air Force Base, Texas

January 1970

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AIR FORCE HUMAN RESOURCES LABORATORY
AIR FORCE SYSTEMS COMMAND
Lackland Air Force Base, Texas

FOREWORD

The work reported in this study was accomplished under Project 7719, Development of Procedures for Increasing the Efficiency of Selection, Evaluation, and Utilization of Air Force Personnel; Task 771902, Research on Prediction and Assessment of Adaptability of Low Ability Airmen to Air Force Life.

This report has been reviewed and is approved.

John G. Dailey, Colonel, USAF
Commander

ABSTRACT

The military accessions program "Project 100,000," established in 1966, has as one of its goals enlistment in the military services a yearly minimum of 100,000 men who have previously been declared ineligible for military service because of failure to meet required mental or, in some cases, physical standards. This study was conducted to evaluate the progress of these marginal ability personnel who enlisted in the United States Air Force. Data were collected on their performance in training and during assignment to jobs throughout the Air Force. The analysis revealed that their adaptability to the Air Force and job performance were at a lower level than that of the control subjects.

SUMMARY

Grunzke, M.E., Guinn, Nancy, & Stauffer, G.F. *Comparative performance of low-ability airmen.* AFHRL-TR-70-4. Lackland AFB, Tex.: Personnel Research Division, Air Force Human Resources Laboratory, January 1970.

Problem

In response to a request of the President of the United States, the Department of Defense established in 1966 a military accessions program entitled "Project 100,000." The goal of this project is to enlist into the military services a yearly quota of 100,000 men who have previously been rejected because of failure to meet minimum mental ability or, in some instances, physical standards. The purpose of Project 100,000 is to give to a broader segment of the Nation's youth the opportunity to serve in the country's defense and, at the same time, to improve their competence and prepare them for a more productive life upon return to civilian status. This study was conducted to evaluate the progress and performance of these marginal ability personnel who enlisted in the Air Force during the period 1 April 1967 through 31 March 1968.

Approach

A total of 26,915 male airman accessions designated as Project 100,000 accessions, including all Category I and Category IV personnel and a 10 percent random sample of Category II and Category III individuals, served as experimental and control subjects. Mental category status of each airman was defined in terms of his score on the Armed Forces Qualifying Test (AFQT), the measuring device used to determine whether or not an individual meets acceptable mental standards for induction or enlistment. Data collected as of 31 December 1968 on performance of the subjects in training and during assignment to jobs throughout the Air Force were analyzed to assess their effectiveness. Various performance measures were used as indicators of success in the Air Force. To depict the differences more clearly, the total group of subjects was divided into subgroups based on race, education, and AFQT and AQE test scores.

Results

In general, individuals in the lower mental ability levels differed significantly from their contemporaries in the upper mental categories on all performance measures studied. Compared with the higher mental ability groups, the low-level mental ability groups had a lower percentage completing basic military training, more disciplinary actions, more unsuitability discharges, a higher attrition rate from technical training, more shifts in Air Force specialties, and a lower percentage attaining the skilled level and the grade of E-3 or higher. This general trend was also found when mental ability categories were compared on Specialty Knowledge Test mean percentiles and mean Airman Performance Ratings; all differences between adjacent means were not statistically significant, however. Differences in race and educational background by category were not found to be universally significant. In general, the performance of high school non-graduates was lower than that of high school graduates; Negroes were lower than Whites. For satisfactory completion of basic military training, however, Negroes excelled Whites for those categories where race differences were found to be significant.

Conclusions

The comparisons of mental ability groups indicated that the majority of the lower mental ability personnel were performing at a significantly lower level of proficiency than their contemporaries at the higher levels. However, more definitive research and analyses must be completed to determine whether this will be a continuing trend or whether more experience for these individuals will bring them up to higher and more acceptable proficiency levels. The next two years will be critical in determining whether these personnel can develop sufficient skills to be favorably considered for reenlistment or, if they return to civilian life, whether they will have been enabled to develop a marketable skill.

This summary was prepared by Nancy Guinn, Personnel Systems Branch, Personnel Research Division, Air Force Human Resources Laboratory.

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COMPARATIVE PERFORMANCE OF LOW-ABILITY AIRMEN

I. INTRODUCTION

In all the military services and, in particular, the United States Air Force, there has been over the years considerable emphasis on the development and utilization of effective personnel selection and job classification procedures. With the greater demands imposed on the serviceman as a function of technological advances not only in weapons systems but in all spheres of military operations, the requirement for selectivity has become even more crucial in recent years. To meet some of the needs implicit in these advancements, military personnel managers have responded by seeking ways to attract and enlist individuals with greater ability, thereby gradually closing the door to more and more individuals who possess marginal mental ability.

Considered in terms of total force efficiency, the approach has immediate merit. The premise has been succinctly stated in a discussion of the use of personnel selection tests (Brokaw & Holdrege, 1960).

A basic reason for using tests to select men for training lies in the fact that it costs less to test a man than it does to attempt to train him and discover he is untrainable.

Another study contributing to the rationale for a selective approach to enlistment has demonstrated that unsuitability discharges from the Air Force can be significantly reduced by increasing aptitude minimums for enlistment, raising the entry age level to 18 years, and requiring that enlistees have at least a high school education (Flyer, 1959).

During periods of reduced international military involvement, increased selectivity is feasible because the drain on national manpower resources is not excessive. However, with the occurrence of war or national emergency, the requirement for military manpower becomes highly demanding. The Selective Service Law requires that, during war and national emergencies, the services accept any registrant who achieves a percentile score of 10 or higher on the Armed Forces Qualifying Test (AFQT) regardless of educational level or aptitude test scores.

By 1965, the increases in selectivity for enlistment had introduced such high mental standards that the Air Force and other services were deferring substantial numbers of personnel in the manpower pool. A majority of these individuals,

classified as Category IV on the basis of an AFQT score between the 10th and 30th percentiles, were being rejected because they failed to qualify on supplementary tests or did not possess the necessary educational prerequisites.

In August 1966, Secretary of Defense Robert McNamara announced a program in which individuals previously rejected because of failure to attain certain mental or physical standards would be accepted for military service. This program was entitled "Project 100,000," signifying the total number of New Mental Standards (NMS) and medical remedial individuals that would be accepted for military service each year (Office of the Secretary of Defense, 1967).

In a message to Congress in March 1967, President Lyndon Johnson emphasized the merits of this program.

With intensive instruction, practical on-the-job training, and corrective medical measures, these young men can become good soldiers. Moreover, the remedial training they receive can enable them to live fuller and more productive lives. It is estimated that about half the men who enter the Armed Forces under this program will come as volunteers, the other half as draftees.

This will be a continuing program. The Nation can never again afford to deny to men who can effectively serve their country, the obligation — and the right — to share in a basic responsibility of citizenship.

In January 1967, the Air Force began participating in Project 100,000. Men with marginal mental ability and those who, with certain types of remedial surgery, could meet minimum standards within a specified period of time, were accepted into military service. They were to be utilized in the Nation's defense program while, at the same time, they were being provided an opportunity to improve their competence and productivity as well as develop a saleable skill for use when they returned to civilian status.

From the beginning, the policies set forth by the Secretary of Defense to govern Project 100,000 specified that minimum standards of performance would not be reduced, but that every effort would be made to bring these men up to satisfactory performance levels.

The purpose of this study was to analyze available data, both biographical and longitudinal, to determine whether Category IV individuals who have been enlisted in the Air Force can assimilate training and perform at a satisfactory level on their job assignments.

II. PROCEDURE

Since the goal of Project 100,000 is to enlist, train, and utilize marginal ability men, the experimental design was tailored to accommodate the operational program. These personnel were enlisted and channeled through Air Force orientation and training programs along with regular enlistees with the exception that special training procedures were introduced where necessary, and assignments to technical training schools and on-the-job training programs were made in occupational areas in which the probability of successful performance was most favorable. Some of the changes in technical training programs that have been introduced to aid the slow learner include daily quizzes to identify weaknesses, detailed homework assignments, individualized remedial study, increased individual counseling, improved presentation techniques utilizing audiovisual training aids, step-by-step practical work projects, "hands-on" training to learn by doing, simplification of course material, resequencing of subject matter, and decreased student-to-teacher ratio. Figure 1 depicts the movements through the training programs to prepare airmen for work in Air Force specialties.

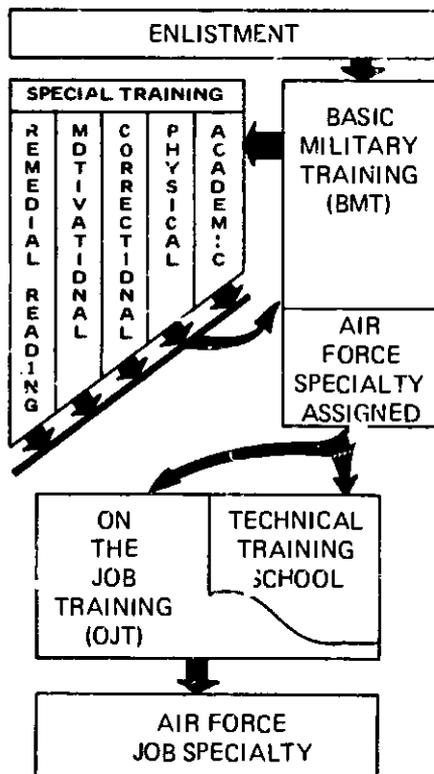


Fig. 1. Channels for progression through training to job assignment.

The data presented cover 26,915 male airman accessions, designated for this study as Project 100,000 personnel to include both experimental and control groups, who enlisted during the period from April 1967 through March 1968. These data represent their status as of 31 December 1968. The subjects included all Category I and Category IV male airman accessions and a ten percent random sample of all Category II and Category III personnel who enlisted during the specified time period. All medical remedial accessions were excluded from the analyses. Category IV accessions comprised the experimental group, and Categories I, II, and III personnel served as the control group. The mental status categories as identified on the basis of AFQT percentile are as follows:

Category	AFQT Percentile Range
I	93- 99
II	65- 92
III	31- 64
IV	10- 30
V	0- 9

After enlistment and upon arrival at the 3720th Basic Military School at Lackland Air Force Base, Texas, enlistees who were deficient in basic reading abilities were scheduled for special training in the Proficiency Unit. When their reading ability had improved to at least a sixth-grade level as measured by United States Armed Forces Institute (USAFI) tests, the trainees were transferred to the standard Basic Military Training (BMT) program. The proficiency program is of variable length for each trainee, with a 65-day maximum, after which movement to BMT is required.

The New Mental Standards airmen of Project 100,000 were found to be assigned to 89 out of the 238 Air Force specialties for work or training. Considering the goal of success in training and effective use of marginal ability manpower on the job, the analytical process was to assess the performance of these individuals in the training situation and to evaluate their performance throughout enlistment.

Data regarding the progression and performance of these airmen were forwarded to the Personnel Research Division, the agency designated as the central office for consolidating the longitudinal data and maintaining the Project 100,000 tape files. The personnel record of each participant was flagged for reporting purposes, and the consolidated base personnel offices throughout the Air Force (overseas and Zone of Interior) were asked

to provide periodic reports on each individual. However, it was emphasized that the operating units should not be informed concerning the identity of Project 100,000 personnel, both the experimental and the control subjects.

Since it has been found helpful in studies of this nature to subdivide accumulated data according to race and educational background in order to more clearly depict differences, the subdivisions of Negro vs. White and high school graduate vs. non-graduate were employed in some of the data presentations.

In addition, since the range of ability represented by the AFQT 10th through 30th percentiles (Category IV) was considered excessive, these data defining the experimental group were subdivided into two categories: those cases within the AFQT 10th through 20th percentile range and those within the 21st through 30th percentile

range. Moreover, an audit of the accessions revealed certain anomalies between AFQT and Airman Qualifying Examination (AQE) scores. Based on previous correlational research between these two tests (Madden & Valentine, 1967; Valentine, 1968), it was felt a more definitive measure of mental ability could be achieved by further subdividing the two AFQT Category IV groupings based on the AQE General Aptitude Index (AI). One group contained those cases with an AQE General AI above 35 and the other contained those with a General AI of 35 or below. With these subdivisions, four experimental groups were formed out of the original single Category IV group. Table 1 shows the number of individuals in each of the experimental and control subgroups. For the discussion and data presentations in the remainder of the report, the designations Categories 1 through 7 refer to the subgroups as defined in Table 1.

Table 1. Subgroup Definition and Distributions for Project 100,000 Study

Project 100,000 Mental Ability Category	AFQT Mental Ability Category	AFQT Percentile Range	AQE General Aptitude Index	White HS Graduate	White HS Non-Grad	Negro HS Graduate	Negro HS Non-Grad	Total
1	I	93-99	-	6,173	45	22	-	6,240
2	II	65-92	-	3,150	66	54	3	3,273
3	III	31-64	-	2,738	128	296	25	3,187
4	IV	21-30	Above 35	4,204	171	1,567	42	5,984
5	IV	21-30	35 & Below	1,442	96	557	11	2,106
6	IV	10-20	Above 35	1,606	651	1,324	314	3,895
7	IV	10-20	35 & Below	889	459	746	136	2,230
Total				20,202	1,616	4,566	531	26,915

III. DESIGN

In an Army report on marginal manpower and the implications of their utilization for military service, concern was expressed about the need for a more comprehensive evaluation of these personnel (Department of the Army, 1965). It was noted that few attempts have been made to evaluate marginal personnel in a systematic and comprehensive manner. A change in educational level, an increase in aptitude scores, completion of a training course, and comments by the trainees or by instructors were not considered as significant criteria for determining the contribution that an individual can make in the armed services. Even such measures as

promotions, decorations, proficiency measures, and disciplinary actions were subject to question since documentation in the records is subject to considerable variance. However, job proficiency as measured by individual performance tests or job proficiency tests was considered to be a relatively valid method of assessing the effectiveness of training. To this was added the requirement for determining the differences between individuals who received training and those who did not.

The effects of special training for marginal personnel can be determined only by comparing the performances of men who have, and similar men who have not, been given such training. Satisfactory performance by marginal men who have

received special training does not in itself serve as a measure of the effectiveness of the training, since there is no way of knowing how these men would have performed without the training (Department of the Army, 1965, p.7).

Since the Air Force classification and assignment procedure assigns enlistees either to a technical training school or directly to a job without formal training, there was an excellent opportunity to compare individuals under both conditions. The Specialty Knowledge Test score, a measure of acquired knowledge within the assigned occupational specialty, provided a usable performance criterion. In addition, other variables dealing with achievement in training and performance on the job were used as criterion measures of success in the Air Force. Although some of these variables were among those criticized in the Army study, the standardized method of data collection seemed to justify their inclusion in this study. The distributions for the various performance measures are presented in Tables 5 through 12 in the appendix. The measures include basic training completion, disciplinary action, unsuitability discharge, academic elimination from technical training, change of job specialty, attainment of skilled level, and attainment of grade E-3 or higher.

For each of the variables, comparisons were made between experimental and control groups. Chi square tests were computed for a majority of the criterion measures to test the significance of the differences among the various subgroups - in particular, among all seven categories of mental ability, among the upper categories (1, 2, and 3), among the lower categories (4, 5, 6, and 7), between Categories 4 and 5, and between Categories 6 and 7. An evaluation of the racial and educational differences by category was also made. All differences reported as significant were signifi-

cant at or beyond the .05 level. In those instances where differences were not found to be significant, the data were collapsed to simplify interpretation. As has been noted, the AFQT/AQE mental ability categories (Categories 1 through 7) as defined in Table 1 are used in the figures and tables to display the results of the various analyses.

IV. RESULTS AND DISCUSSION

Completion of Basic Military Training

The first comparison was based on satisfactory completion of Basic Military Training which is received immediately after enlistment. The data were categorized as indicated in Table 5 in the appendix. Figures 2 and 3 provide graphic representations of the performance of both the experimental and the control group during Basic Military Training. Results of chi square tests indicated that there were significant differences in performance among the various categories, with poorer performance exhibited in the lower levels of mental ability. The differences between the lowest categories, 6 and 7, were not significant, and may be combined to simplify interpretation. Due to the small number of Negroes in the upper categories, Categories 1, 2, and 3 were combined for racial comparisons. No significant differences between races were found for the upper categories; however, significant racial differences were found for each of the lower categories where Negroes excelled Whites for each educational level. Although basic training does not impose heavy intellectual demands on the trainee, significant differences in performance were found between the high school graduate and non-graduate groups for each of the lower categories (4 through 7), with the White high school non-graduates displaying the greatest inability to adapt to the rigors

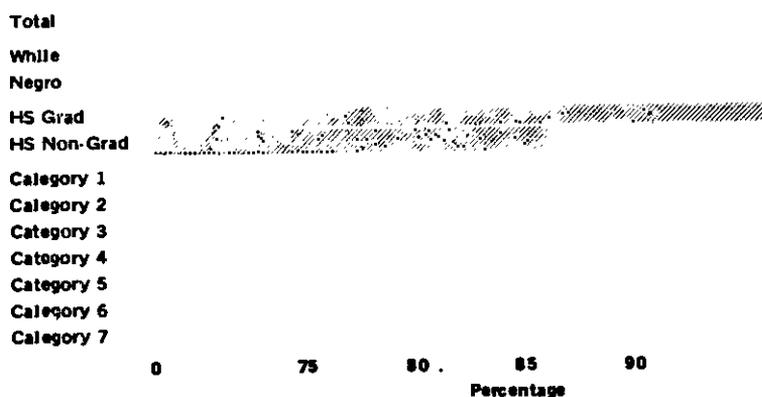


Fig. 2. Percentage attaining completion of basic military training by subgroup.

Category 1
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 2
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 3
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 4
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 5
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 6
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 7
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad

Fig. 3. Percentage attaining completion of basic military training by race and education subgroups of mental ability categories. (Asterisks indicate computations based on 25 cases or less.)

of military training. Since fairly reliable measurement of mental ability had been accomplished by using two psychometric measures, another explanation was sought to account for these differences. If a factor other than mental ability were operating, it might be hypothesized as persistence or some form of achievement motivation that appears in the high school group but is lacking in the dropouts. Whether training methods can be developed to accommodate this group is worthy of question.

Adaptability to the Air Force

The three criterion measures selected to assess adaptability to the Air Force were assignment to control roster, record of disciplinary action, and unsuitability discharge. If an individual is not performing at a satisfactory level of competency, he is counseled and advised to improve. If an in-

adequate response prevails, a formal letter is presented to the individual advising him that he has been placed on a control roster for a period of from 90 to 120 days. Unless performance improves during this period, the individual is required to meet an evaluation board to be considered for an unsuitability discharge from the service. It is interesting to note that only 16 of the entire 26,915 subjects were placed on a control roster. Although the majority of these individuals were in the lower mental ability categories, the total number was considered insignificant, and comparisons are not presented.

The record of disciplinary action can be used as an indicator of an individual's attitude and his identification with the concepts and goals of military service. If feelings of dissatisfaction and frustration in training on the job develop, behavior necessitating formal disciplinary action might be

precipitated. The number of disciplinary actions received by each subgroup is given in Table 6 in the appendix. Since Figures 4 and 5 tend to exaggerate the differences among subgroups for illustrative purposes, it should be noted that the differences in rate of disciplinary action among categories were fairly small (.5 to 2 percent), and such action was used on a relatively limited basis overall (1.2 percent). However, it appears that more disciplinary problems were encountered with the lower levels of mental ability than with the higher levels. Although no significant differences were found among Categories 1, 2, and 3, or among Categories 4, 5, 6, and 7, chi square results did indicate that there were significant differences between the combined upper and lower categories (Categories 1 through 3 combined vs. Categories 4 through 7 combined). For an analysis of race and educational differences, the categories were grouped into upper and lower category combinations; for both of these combinations significant differences were found between both the race and the educational subgroups. Figure 5 shows these distinct differences; the Negro high school non-graduates had the highest percentage across both category combinations. This apparently greater need for discipline within the high school non-graduate groups lends credence to the motivational

factor discussed earlier as an explanation of performance differences in basic training.

Similar patterns were found with regard to unsuitability discharges. Figure 6 and Table 7 in the appendix reflect the number and percentage of unsuitability discharges by subgroup. Results of chi square tests indicated significant differences among categories, with the lower levels of mental ability receiving more unsuitability discharges than the upper categories. However, the differences were not significant between Categories 4 and 5 or between Categories 6 and 7. Significant racial differences were found for the combined lower categories, 4 and 5 combined vs. 6 and 7 combined.

Educational subgroup differences were found to be significant for Categories 2, 3, 4 and 5 combined, and 6 and 7 combined. For a majority of categories, Negro high school graduates received fewer unsuitability discharges than their White high school contemporaries. Figure 7 gives a clear picture of the race and educational differences by category. It seems that the high school non-graduates not only received more unsuitability discharges than high school graduates, but there was greater variability among the mental ability groups for these individuals.

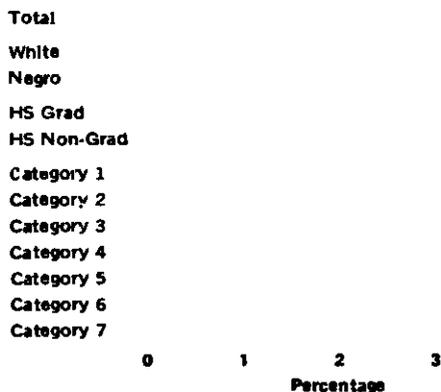


Fig. 4. Percentage requiring disciplinary actions by subgroup.

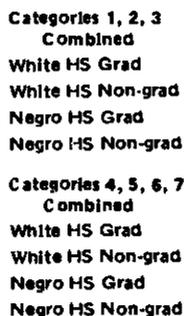


Fig. 5. Percentage requiring disciplinary actions by race and education subgroups of combined mental ability categories.

0 2 4 6 8 10
Percentage

Fig. 6. Percentage receiving unsuitability discharges by subgroup.

- Category 1**
- White HS Grad
- White HS Non-grad
- Negro HS Grad
- Negro HS Non-grad
- Category 2**
- White HS Grad
- White HS Non-grad
- Negro HS Grad
- Negro HS Non-grad
- Category 3**
- White HS Grad
- White HS Non-grad
- Negro HS Grad
- Negro HS Non-grad
- Category 4**
- White HS Grad
- White HS Non-grad
- Negro HS Grad
- Negro HS Non-grad
- Category 5**
- White HS Grad
- White HS Non-grad
- Negro HS Grad
- Negro HS Non-grad
- Category 6**
- White HS Grad
- White HS Non-grad
- Negro HS Grad
- Negro HS Non-grad
- Category 7**
- White HS Grad
- White HS Non-grad
- Negro HS Grad
- Negro HS Non-grad

Percentage

20

Fig. 7. Percentage receiving unsuitability discharges by race and education subgroups of mental ability categories. (Asterisks indicate computations based on 25 cases or less.)

Performance in Technical Training

Validation studies for the four AQE aptitude indexes (General, Administrative, Mechanical, and Electronics) used by the Air Force to assign individuals to technical training have traditionally shown positive correlations between the aptitude scores and technical school performance. Since AQE scores also relate to AFQT scores, better performance or lower attrition in technical school might be expected of personnel at the higher mental ability levels. The data depicted in Figures 8 and 9 and Table 8 in the appendix reveal a trend in this direction. Chi square results indicated that the differences in academic attrition among categories were significant at or beyond the .05 level; but the differences between Categories 6 and 7 were insignificant. Because of the small number of cases in the various race and educational subgroups, the results of chi square tests relative to these differences must be interpreted with caution. While Negroes had a significantly greater attrition rate than Whites for the total group, significant racial differences were found only for Categories 2, 3, and 6 and 7 combined. It was also noted that, for the total group, differences between high school graduates and non-graduates were quite evident, with a rather distinct increase in the Negro high school non-graduate group for the low

mental ability personnel. These differences were statistically significant for Category 3 and for Categories 6 and 7 combined. Two additional factors must be kept in mind in interpreting the academic elimination rate. First, the final academic elimination rate could not be computed from the data since some of these individuals were still in technical training as of the close-out date for data collection, 31 December 1968. When all individuals have completed their technical training courses, the academic elimination rate might possibly be somewhat higher. Also, as has been frequently stated, statistics comparing technical training school graduation vs. elimination do not always reflect the true performance of individuals; rather, they may represent the philosophy or school policy concerning the production ratio that will prevail. Since much emphasis has been placed on the importance of successfully training as many students as possible, it is conceivable that performance standards were somewhat reduced. In addition, a number of special programs have been introduced to help students acquire knowledge. Therefore, using attrition vs. graduation from technical school as a measure of successful performance may not be valid. Use of some measure of job performance as the ultimate success criterion for low mental ability personnel appears to be imperative.



Fig. 8. Percentage of academic eliminees from technical training by subgroup.

Category 1
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad

Category 2
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad

Category 3
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad

Category 4
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad

Category 5
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad

Category 6
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad

Category 7
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad

0 5 10 15 20 25
 Percentage

Fig. 9. Percentage of academic eliminees from technical training by race and education subgroups of mental ability categories. (Asterisks identify computations based on 20 cases or less.)

Change in Job Specialty

The frequency with which an individual changes jobs is a measure of job satisfaction, adequacy of performance in the job, and overall adaptability. This is an especially important measure if the job change reflects a movement into a different type of job or specialty. The records of Project 100,000 experimental and control subjects were screened to determine the number of individuals within each ability category who had made at least one transfer to a job specialty different from the specialty into which they had originally been assigned. The data were separated into two major groups: those who received technical school training and those who were assigned directly to an Air Force job after completing basic training. Figures 10 and 11 and Table 9 in the appendix show shifts in Air Force specialty for technically trained personnel; Figure 12 and Table 10 in the appendix indicate the shifts for the directed duty assignees. For those assigned to technical training, it seems that the number of changes in job specialty increased as mental ability decreased. Chi square results indicated that category differences were significant at or beyond the .05 level; however, Categories 4 and 5 and Categories 6 and 7 can be combined. In addition, significant racial differences were found for Categories 4 and 5 combined, and significant educational differences were found for both combined lower categories, 4 and 5 and 6 and 7. Information was not available to discern whether the shifts occurred during technical training or after graduation from training. It is likely that the majority of the changes reflected a move from one technical

school to another; such action would be an alternative to direct academic elimination and could decrease the differences in technical school performance between mental ability groups.

It is apparent from Figure 12 that the significant differences in specialty shift were noticeable between mental ability groups. However, the relationship between mental ability category and specialty shift was not a linear one. Categories 2 and 4 had quite different rates from the other categories. This could be due to several factors. Perhaps those individuals displaying more ability were reassigned to jobs where their capabilities could be more fully utilized, whereas those with less ability were reassigned in an attempt to find job assignments where they could function at a more acceptable level. For each category level, both racial and educational differences were found to be insignificant.

Comparison of the overall rate of shifts in specialties for technical training and directed duty personnel indicated fewer shifts for the directed duty group. This could be due to the fact that the individual who works in the directed duty situation may not be subjected to as much stress concerning academic deficiency as the individual in the technical school environment. As a result, he may not seek to change specialties or be directed into a different specialty by the management staff. It is also likely that the individual in a directed duty assignment may not be aware of the possibilities of changing to another job and consequently makes the best of an undesirable situation.

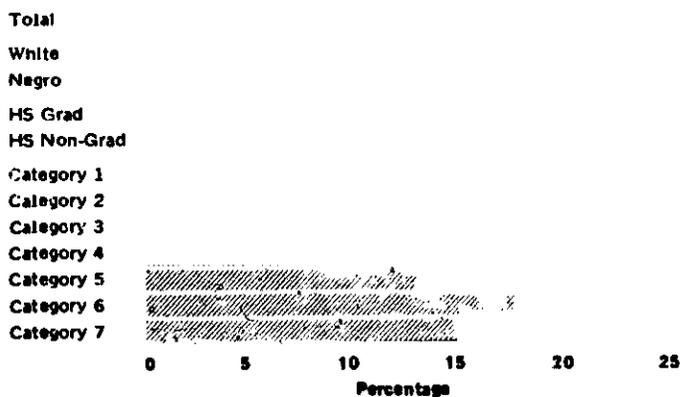


Fig. 10. Percentage of specialty changes among technical school graduates by subgroup.

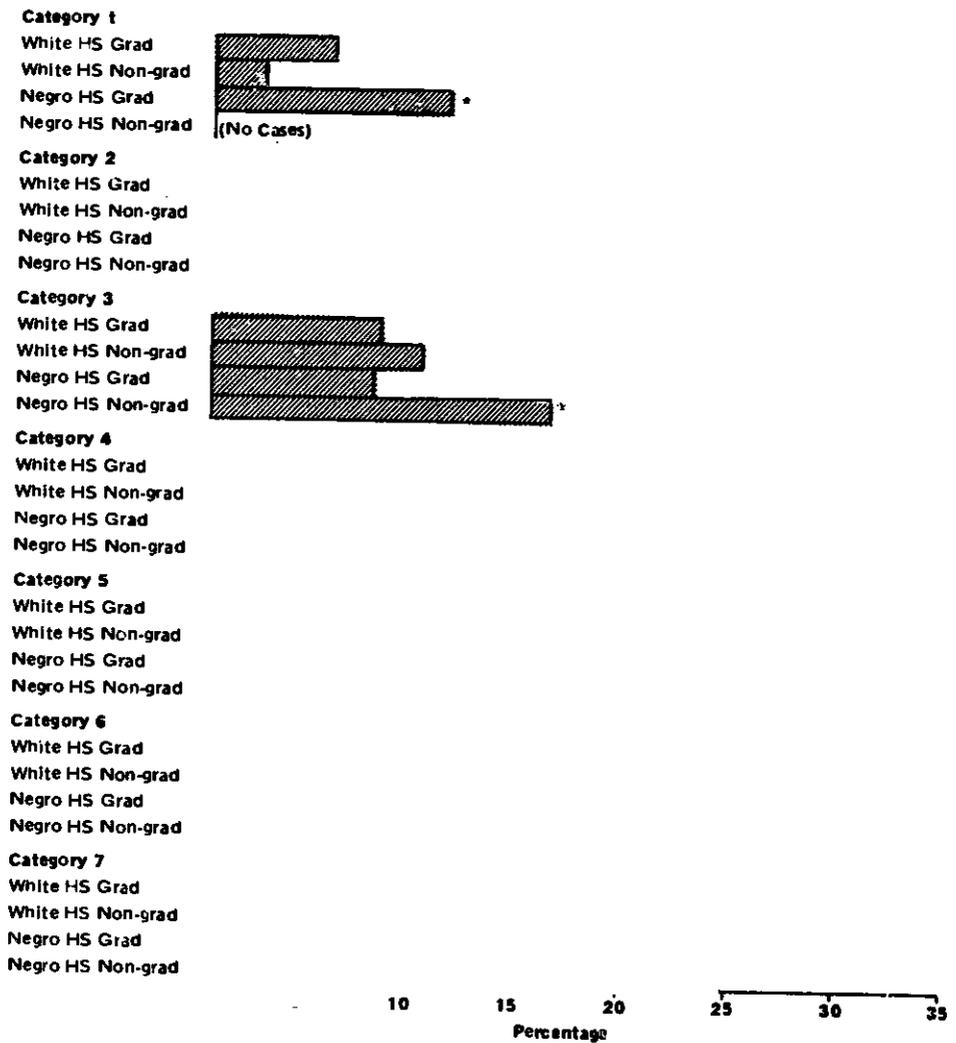


Fig. 11. Percentage of specialty changes among technical school graduates by race and education subgroups of mental ability categories. (Asterisks identify computations based on 20 cases or less.)

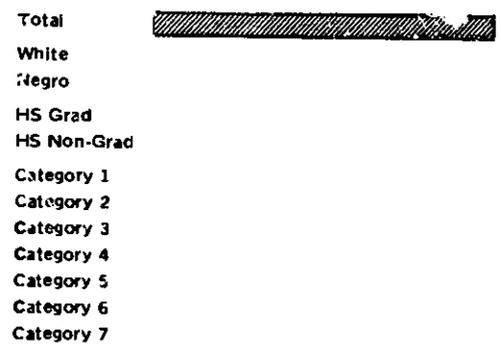


Fig. 12. Percentage of specialty changes among directed duty assignees by subgroup.

Specialty Knowledge Test Performance

As an airman gains experience within his job specialty, he is provided an opportunity to take job knowledge tests. The specialty knowledge testing program in effect at the time of data collection (prior to 31 December 1968) provided for evaluation of job knowledge at three levels of proficiency: semi-skilled or 3-level, skilled or 5-level, and supervisory or 7-level. As of the close-out date for this study, approximately 38 percent of the 26,915 subjects in the group had progressed to a point at which they had taken one or two tests; 4,300 airmen had taken a 3-level test, and 10,150 airmen had taken a 5-level test. Table 2 indicates the comparative performance, in mean percentile scores, for each mental ability group at the two basic skill levels. For the semi-skilled level (3-level), results of t-tests between means indicated that there were significant differences at or beyond the .05 level between adjacent categories except for Categories 3 and 4. For the skilled level (5-level), differences were significant between all adjacent categories except for Categories 5 and 6 combined and 6 and 7 combined. Although Category 4 differed significantly from Categories 5, 6, and 7, these three lower categories did not differ significantly from each other. It should be noted that the control groups represented performance across the complete spectrum of Air Force specialties, whereas the experimental group members were evaluated in about one-third of the specialties. It is conceivable that an analysis which

considered only specialties to which the experimental groups were assigned would result in even greater differences.

Percentage at Skilled Level

Progression through the skill stages within a job specialty can be assessed between contemporaries by noting the percentage at a skill level as of a particular time period, in this instance, the close-out date of 31 December 1968. Since the span of accessions encompassed a year, the enlistments between April and September of 1967 were analyzed to determine the percentage of subjects who had advanced to the skilled level. Figures 13 and 14 and Table 11 in the appendix contain the results. Significant differences were found among the categories, with quite apparent differences among the lower mental ability groups. The significant differences between Categories 4 and 5 and between Categories 6 and 7 suggested that the individuals with the relatively high AQE General AI scores progressed in their careers more normally than their contemporaries with lower AQE General AI scores. Racial differences were statistically significant for Category 3 only. Figure 14 illustrates the distinct differences between high school graduates and non-graduates. Chi square results revealed that these differences were statistically significant for Categories 2, 4, and 6. Once again, motivation or desire to achieve may be reflected in these findings.

Table 2. Specialty Knowledge Test Mean Percentile Scores for Mental Ability Categories

Mental Ability Category	Mean Percentile Score	
	3-level SKT (Semi-skilled)	5-level SKT (Skilled)
1	61.55	69.71
2	54.33	60.64
3	49.16	51.92
4	48.54	43.79
5	31.71	39.84
6	44.65	41.66
7	32.90	39.49

Total
 White
 Negro
 HS Grad
 HS Non-Grad
 Category 1
 Category 2
 Category 3
 Category 4
 Category 5
 Category 6
 Category 7

Percentage
 Fig. 13. Percentage attaining skilled level by subgroup.



Fig. 14. Percentage attaining skilled level by race and education subgroups of mental ability categories. (Asterisks identify computations based on less than 30 cases.)

Grade Level Achieved

Promotion to the next higher grade has traditionally been recognized as a mark of success on the job and in the service. Because of the short period of time that the members of this group had been in the service (i.e., a maximum of 21 months), they were contending for grade awards which all members will eventually achieve. Therefore, the differentiating measure relative to grade must be the average length of time to achieve the grade, or at a specified time period, the percentage of a contemporary group that has attained a specific grade. Using the 31 December 1968 cutoff date, the mental ability groups were compared in terms of attainment of grade E-3 (airman first class) or higher. Figures 15 and 16 and Table 12 in

the appendix show these comparisons. Chi square results indicated significant differences among the categories; however, the differences between Categories 4 and 5 and between Categories 6 and 7 were not significant. Racial differences were not significant except for Categories 6 and 7 combined. In Figure 16, the differences between high school graduates and non-graduates were again noteworthy. For Categories 2, 3, and 6 and 7 combined, these differences were statistically significant at or beyond the .05 level. Although grade level may well be used as one indication of success in a military career, the important issue is to determine whether the performance of the individuals who are behind in grade attainment is acceptable, marginal, or completely unsatisfactory.

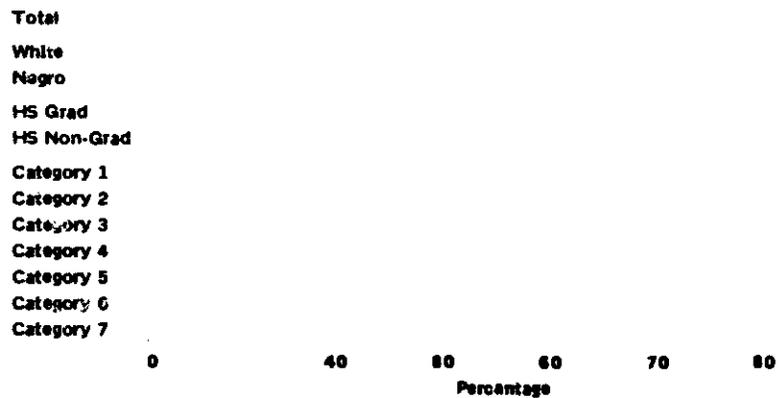


Fig. 15. Percentage attaining grade E-3 or higher by subgroup.

Category 1
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 2
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 3
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 4
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 5
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 6
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad
Category 7
 White HS Grad
 White HS Non-grad
 Negro HS Grad
 Negro HS Non-grad

50 60 70 80 90
Percentage

Fig. 16. Percentage attaining grade E-3 or higher by race and educational subgroups of mental ability categories. (Asterisks identify computations based on 25 cases or less.)

Performance Rating

After working for a supervisor for a specified period of time or after attending a training course and subsequently at six-month intervals, an airman is rated on his performance. Each rating can be converted to a numerical value from 1 through 9. Table 3 indicates for each mental ability group the mean overall numerical performance rating. Further grouping was made on the basis of three categories of assignment from Basic Military Training. Not all differences between adjacent categories were statistically significant, although the trend indicated that those in the higher levels of mental ability did receive better performance ratings. For the technical school graduates, differences between all adjacent categories except for

Categories 2 and 3, 4 and 5, and 6 and 7 were statistically significant. For the directed duty assignees, mean differences between Categories 3 and 4, 4 and 5, and 6 and 7 were not significant. The differences between individuals receiving technical training and those directly assigned to the job were insignificant with the exception of Category 1. For this category, personnel were found to be significantly better performers if they were assigned directly to the job rather than to technical training and then to the job. This inference should be made with reservations, however, since the rating difference is most likely an artifact that is affected by the amount of time that the ratee has been assigned to the supervisor and the type of tasks that he is being asked to perform.

**Table 3. Airman Performance Report
Mean Ratings for
Mental Ability Categories**

Mental Ability Category	Mean APR Rating		
	Tech School Trainee	Directed Duty Assignee	By-Pass Specialist
1	7.97	8.31	8.29
2	7.86	7.90	7.97
3	7.75	7.57	8.03
4	7.54	7.47	7.24
5	7.41	7.45	8.00 ^a
6	7.07	7.15	6.73 ^a
7	7.24	7.21	7.50 ^a

^aBased on less than 20 cases.

Research is now in progress which should help in unravelling the many questions in this area. A comparison of the difficulty level of work assigned to directed duty assignees as opposed to technical school graduates could reflect the difference in performance ratings between the two types of assignees. When compared over similar time periods, an airman who first goes to technical training and then to a job may not have as much opportunity to display his level of proficiency as the person directly assigned. Typically, during the early phases of a duty assignment, it appears that the more technical tasks tend to be assigned to directed duty personnel. However, an individual who has attended technical training tends to gradually inherit the more complicated tasks as he progresses in his military tour. Therefore, the effects of technical training may be latent or have long term payoffs that are not readily apparent at an early stage of evaluation.

In addition, technical training prepares the individual to perform over the entire range of tasks considered necessary for performance within his Air Force specialty. The specific job requirements at the early stage of an airman's career may require performance of only a limited number of such tasks; thus, the directed duty assignee with more time at fewer tasks can likely exhibit better performance than the technical school airman who may be better prepared to perform a broad spectrum of tasks. However, the acquired knowledge of the technical school graduate should be reflected in later performance reports when greater demands are placed on the individual.

The by-pass specialist is an individual who comes into the Air Force with experience in an occupational specialty. By demonstrating his proficiency through performance on the appropriate 3-level Specialty Knowledge Test (since designated Apprentice Knowledge Test), such an enlistee can be assigned directly to a job at the semiskilled level. In this study, the small numbers at the low ability levels made interpretation of results rather meaningless and precluded the drawing of any inferences. Nevertheless, though the numbers in this group were small, the overall trend reflected good performance.

Results Summarized

The data that have been analyzed cover a one-year period of Air Force accessions, with the length of time in service ranging from 9 months to 21 months. The results for each of the performance measures are summarized in Table 4. It is apparent from this comparison of mental ability categories that, at this point in time, individuals at the lower levels of mental ability were performing at a significantly lower level of proficiency than their contemporaries at the higher levels.

Table 4. Mental Ability Category Percentages for Performance Measures

Performance Measure	Percentage of Mental Ability Category Represented						
	1	2	3	4	5	6	7
Completed Basic Military Training	98.3	97.6	96.9	94.4	95.7	92.0	91.8
Received Disciplinary Actions	0.6	0.5	0.9	1.7	1.1	2.0	1.6
Received Unsuitability Discharges	2.2	2.5	3.8	4.8	3.9	5.4	5.5
Eliminated from Technical Training	1.4	2.4	2.7	4.6	8.4	8.3	9.5
Changed Job Specialty							
Technical School Trainees	6.5	7.9	8.8	12.3	13.3	17.9	15.2
Directed Duty Assignees	6.7	7.7	4.3	6.7	3.9	8.9	6.3
Attained Skilled Level	39.7	41.4	43.6	36.6	26.9	27.8	16.6
Attained Grade E-3 or Higher	68.5	70.5	70.7	68.6	69.7	52.1	49.7

Note. - Brackets combine those categories where differences were not statistically significant.

V. CONCLUSIONS

Since this preliminary analysis has indicated that performance may be reduced as a function of mental ability level, more definitive research and analyses are needed to determine whether the demonstrated trend will continue or whether more

experience for these individuals will bring them up to higher and more acceptable proficiency levels. The next two years will be critical in determining whether these personnel can develop sufficient skills to be favorably considered for reenlistment or, if they return to civilian life, whether they will have been enabled to develop a marketable skill.

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APPENDIX. SUBGROUP DISTRIBUTIONS FOR PERFORMANCE MEASURES

Table 5. Subgroup Distributions for Satisfactory Completion of Basic Military Training

Mental Ability Category	White HS Graduates		White HS Non-Graduates		Negro HS Graduates		Negro HS Non-Graduates	
	Total N	Completed Basic Tng	Total N	Completed Basic Tng	Total N	Completed Basic Tng	Total N	Completed Basic Tng
1	6,173	6,066	45	44	22	21	-	-
2	3,150	3,077	66	61	54	54	3	3
3	2,738	2,657	128	120	296	287	25	24
4	4,204	3,955	171	139	1,567	1,515	42	37
5	1,442	1,380	96	80	557	544	11	11
6	1,606	1,471	651	550	1,324	1,274	314	288
7	889	827	459	377	746	722	136	122

Table 6. Subgroup Distributions for Disciplinary Actions

Mental Ability Category	White HS Graduates		White HS Non-Graduates		Negro HS Graduates		Negro HS Non-Graduates	
	Total N	Received Disc Action	Total N	Received Disc Action	Total N	Received Disc Action	Total N	Received Disc Action
1	6,173	32	45	3	22	0	-	-
2	3,150	13	66	0	54	2	3	0
3	2,738	21	128	2	296	3	25	1
4	4,204	53	171	6	1,567	39	42	6
5	1,442	12	96	2	557	8	11	2
6	1,606	11	151	22	1,324	32	314	12
7	889	9	459	12	746	9	136	5

Table 7. Subgroup Distributions for Unsuitability Discharges

Mental Ability Category	White HS Graduates		White HS Non-Graduates		Negro HS Graduates		Negro HS Non-Graduates	
	Total N	Received Unsuitability Discharge	Total N	Received Unsuitability Discharge	Total N	Received Unsuitability Discharge	Total N	Received Unsuitability Discharge
1	6,173	138	45	1	22	1	-	-
2	3,150	76	66	6	54	1	3	0
3	2,738	93	128	11	296	15	25	3
4	4,204	206	171	16	1,567	58	42	4
5	1,442	56	96	15	557	12	11	0
6	1,606	95	651	43	1,324	52	314	22
7	889	39	459	42	746	32	136	10

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Table 8. Subgroup Distributions for Academic Elimination from Technical Training

Mental Ability Category	White HS Graduates		White HS Non-Graduates		Negro HS Graduates		Negro HS Non-Graduates	
	Total N	Eliminated from Tech Tng	Total N	Eliminated from Tech Tng	Total N	Eliminated from Tech Tng	Total N	Eliminated from Tech Tng
	1	4,684	65	37	3	15	0	.
2	2,388	52	48	3	38	4	3	0
3	1,963	51	94	7	196	3	18	1
4	2,724	113	77	7	1,069	57	19	0
5	1,103	86	48	3	452	45	4	1
6	831	45	328	34	708	61	160	28
7	520	39	265	35	471	36	79	17

Table 9. Subgroup Distributions for Specialty Changes Among Technical School Graduates

Mental Ability Category	White HS Graduates		White HS Non-Graduates		Negro HS Graduates		Negro HS Non-Graduates	
	Total N	Changed Specialty	Total N	Changed Specialty	Total N	Changed Specialty	Total N	Changed Specialty
	1	5,215	337	35	1	17	2	.
2	2,484	193	53	5	40	6	2	0
3	1,936	169	84	9	192	16	18	3
4	2,591	287	65	20	991	139	19	4
5	1,092	134	46	9	450	67	4	1
6	763	126	294	55	648	110	148	40
7	527	71	268	60	469	58	82	15

Table 10. Subgroup Distributions for Specialty Changes Among Directed Duty Assignees

Mental Ability Category	White HS Graduates		White HS Non-Graduates		Negro HS Graduates		Negro HS Non-Graduates	
	Total N	Changed Specialty	Total N	Changed Specialty	Total N	Changed Specialty	Total N	Changed Specialty
	1	442	30	3	0	1	0	.
2	399	31	6	5	10	0	.	.
3	552	21	26	2	76	5	4	0
4	1,120	67	57	5	456	37	15	2
5	224	9	27	2	80	2	7	0
6	626	53	213	25	573	50	113	8
7	266	14	88	9	231	13	31	3

Table 11. Subgroup Distributions for Attainment of Skilled Level

Mental Ability Category	White HS Graduates		White HS Non-Graduates		Negro HS Graduates		Negro HS Non-Graduates	
	Total N	Attained Skilled Level	Total N	Attained Skilled Level	Total N	Attained Skilled Level	Total N	Attained Skilled Level
1	3,187	1,268	25	7	12	6	-	-
2	1,705	706	31	12	29	13	1	0
3	1,584	724	77	18	160	57	16	1
4	2,453	909	164	35	891	348	39	8
5	869	230	94	19	348	104	10	2
6	676	197	195	35	528	171	120	19
7	359	63	176	24	285	52	41	4

Table 12. Subgroup Distributions for Achievement of Grade E-3 or Higher

Mental Ability Category	White HS Graduates		White HS Non-Graduates		Negro HS Graduates		Negro HS Non-Graduates	
	Total N	Achieved E-3 or Higher	Total N	Achieved E-3 or Higher	Total N	Achieved E-3 or Higher	Total N	Achieved E-3 or Higher
1	6,173	4,234	45	2	22	16	-	-
2	3,150	2,227	66	30	54	42	3	2
3	2,738	1,954	128	79	296	204	25	15
4	4,204	2,871	171	107	1,567	1,081	42	27
5	1,442	1,008	96	67	557	384	11	9
6	1,606	919	651	228	1,324	767	314	114
7	889	472	459	175	746	421	136	41

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13. ABSTRACT

The military accessions program "Project 100,000," established in 1966, has as one of its goals enlistment in the military services a yearly minimum of 100,000 men who have previously been declared ineligible for military service because of failure to meet required mental or, in some cases, physical standards. This study was conducted to evaluate the progress of these marginal ability personnel who enlisted in the United States Air Force. Data were collected on their performance in training and during assignment to jobs throughout the Air Force. The analysis revealed that their adaptability to the Air Force and job performance were at a lower level than that of the control subjects. ()

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