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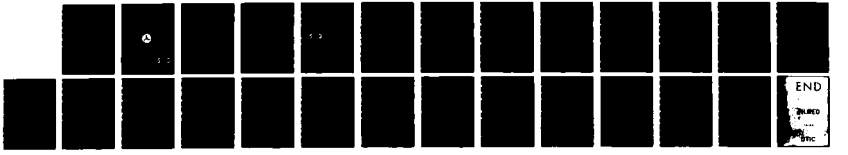

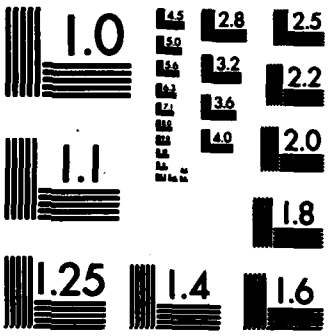

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STUDIES OF POSTSTRIKE AIR TRAFFIC CONTROL SPECIALIST TRAINEES: I. AGE, BIOGRAPHIC FACTORS, AND SELECTION TEST PERFORMANCE RELATED TO ACADEMY TRAINING SUCCESS

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16. Abstract
The August 1981 strike of air traffic control specialists (ATCS's) and their subsequent firing led to the air traffic strike recovery program, which included the unprecedented hiring and basic training of over 8,000 ATCS applicants in a 2-year period. A new selection procedure was also implemented which included a job-related aptitude test (Multiplex Controller Aptitude Test) and a test to determine the level of prior knowledge of ATCS procedures (ATC Occupational Knowledge Test) for assigning extra rating points in the selection rating process. This report presents three studies that provide comparisons of prestrike and poststrike characteristics of ATCS trainees. Results indicate that: (i) Academy pass rates for the poststrike selection procedure were higher for all rating ranges; the overall pass rate for those selected from the new procedure was 63 percent vs. 56 percent from the old procedure. (ii) There was a linear relationship between age at entry and pass/fail status at the end of initial screening; overall pass rates were higher for those within "aviation experience" categories than for those in a "no experience" group, but a similar decline in performance with age was evident. (iii) Since the strike, the biographic composition of the population applying for positions as ATCS's has changed; e.g., two-thirds of the poststrike applicants have no prior experience in aviation. The most important biographic predictor of minority pass/fail status was age, with physical science high school grades second; for nonminorities, the most important predictors of pass/fail status were the math high school grades and age, in that order. The several sets of findings have relevance both to selection and to recruitment practices for ATCS's.

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AGE AND PERFORMANCE IN AIR TRAFFIC CONTROL SPECIALIST TRAINING

Allan D. VanDeventer and Nancy E. Baxter

Introduction.

Previous research on the relationship between age at entry into the Federal Aviation Administration (FAA) air traffic control specialist (ATCS) occupation and performance in training and on the job has led to the conclusion that both retention rates and rated job performance decrease dramatically as age increases (1,2). This research became the basis of a 1972 law allowing the FAA to limit entry age to 30 years or younger for en route and terminal ATCS's. Other research has indicated that military instrument flight rules (IFR) air traffic control (ATC) experience is predictive of higher success rates in FAA ATCS training while visual flight rules (VFR) ATC and pilot experience are not (1,2). Since that research was conducted, the FAA has implemented (i) the age rule, (ii) selection based on aptitude tests for all entrants, and (iii) a rigorous nonradar control aptitude screening phase that must be passed soon after entry into the FAA. Research based on the new program has confirmed the findings noted above regarding IFR and VFR ATC experience (3).

In order to facilitate the agency's recovery from the loss of the majority of the ATCS work force following the strike of the Professional Air Traffic Controllers Organization (PATCO), exemptions allowing entry up to age 35 for selected groups with certain kinds of ATC or pilot experience were considered by management as a temporary policy during the FAA air traffic recovery program. The groups identified for exemption were defined somewhat differently from those used in prior research. The purposes of the present study were (i) to examine the relationship between age at entry and performance in the current initial screening phases of ATCS training, and (ii) to determine whether the identified ATC/pilot groups and the no-experience group differed in relationships between age and performance in those phases.

Method.

Subjects. A biographical questionnaire was administered on a voluntary basis at the beginning of the initial ATCS screening phases to trainees who entered the FAA Academy between June 1977 and September 1982. Performance, age, and preemployment experience data were available on 8,573 trainees (88.5 percent of the total population). Based on responses to questions regarding pre-FAA experience, trainees were divided into the following groups:

EXPERIENCE GROUP (EXP)

IFR - Those who indicated 12 months or more of military IFR ATC operations experience.
VFR - Those who indicated 18 months or more of military VFR ATC operations experience and who did not meet the requirements for classification in the IFR group.
ATR - Those who indicated they had an airline transport rating (ATR) or a commercial pilot rating in combination with an IFR rating and who did not meet the requirements for classification in the IFR or VFR groups.

NO EXPERIENCE GROUP (NO EXP)

NO EXP - All others not classified above.

Results.

For all groups combined, the results indicated a dramatic linear relationship between age at entry and pass/fail status at the end of initial ATCS screening. Those 22 years old and younger had a 78-percent pass rate; those 31 years old or older had a 52-percent pass rate. Overall pass rates were higher for those in the EXP group than for those in the NO EXP group, but a similar decline in performance with age was evident (Figure 1).

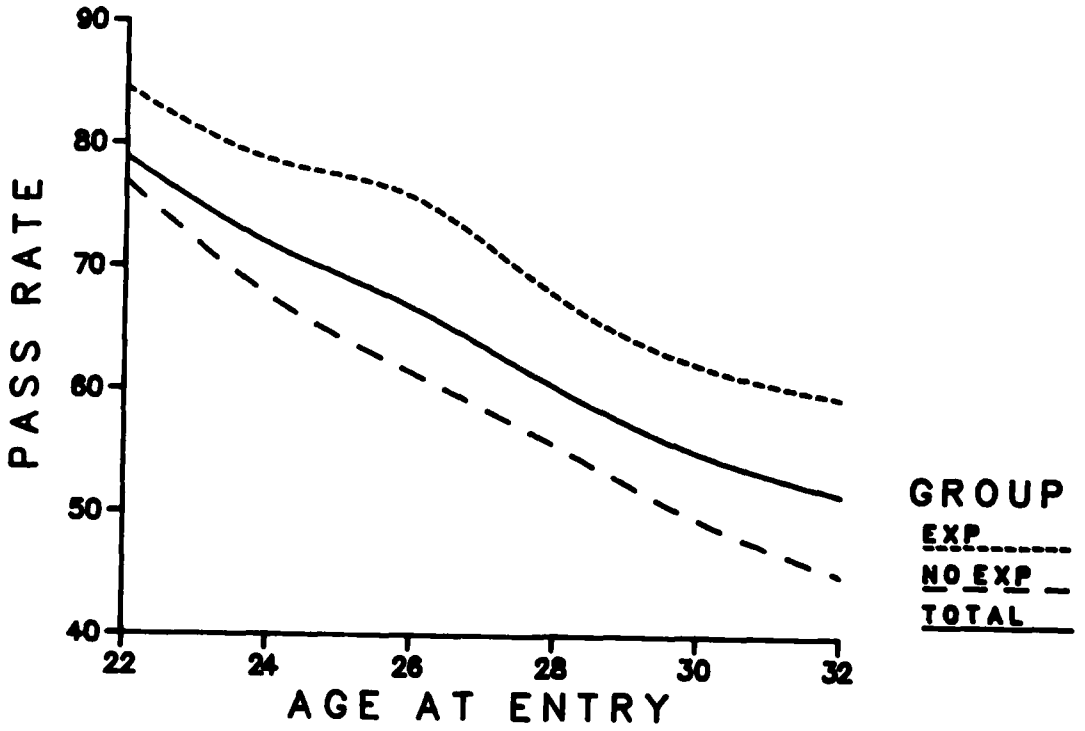

Figure 1. Pass rates by age and experience.

TABLE I. NUMBER ENTERING (N) AND PASS RATE (P) BY AGE AND EXPERIENCE GROUPS

AGE GROUP	NO EXP		VFR		ATR		IFR	
	N	P	N	P	N	P	N	P
UP TO 22	515	77%	30	80%	63	81%	88	89%
23-24	1,112	68%	119	76%	151	80%	407	79%
25-26	1,244	61%	127	69%	215	78%	396	77%
27-28	1,173	56%	100	56%	240	66%	408	72%
29-30	980	50%	82	54%	314	62%	344	65%
31 AND UP	255	45%	25	60%	73	59%	112	60%
TOTAL	5,279	60%	483	66%	1,056	70%	1,755	73%
MEAN AGE	26.2		26.1		27.0		26.5	

The pass rates by age and experience type are summarized in Table I. An analysis of variance of experience type with the Academy nonradar score as the dependent measure was significant ($p<.001$). Tukey posthoc tests indicated significant differences beween the NO EXP and IFR/ATR groups and a significant difference between the VFR and IFR groups. No other group differences were significant.

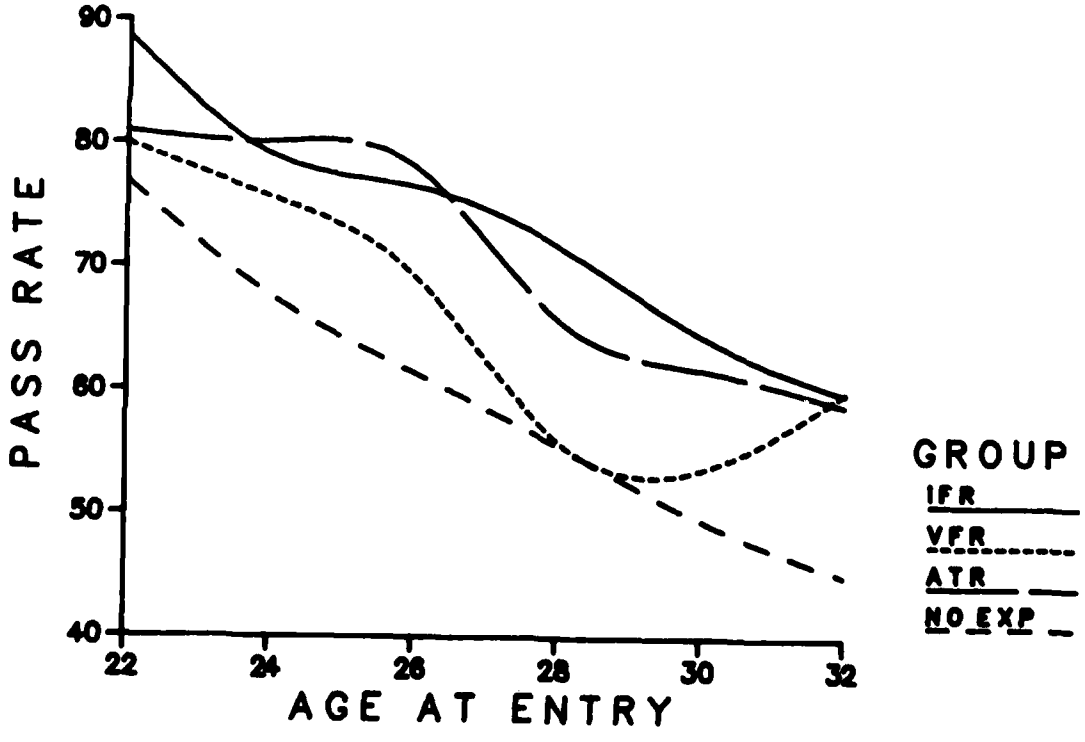

Figure 2. Pass rates by age and experience type.

As can be seen in Figure 2, the performance of the VFR experience group is variable across the age groups (this may be due to the much smaller sample). The IFR and ATR groups show very similar performance. All groups show a similar trend with age.

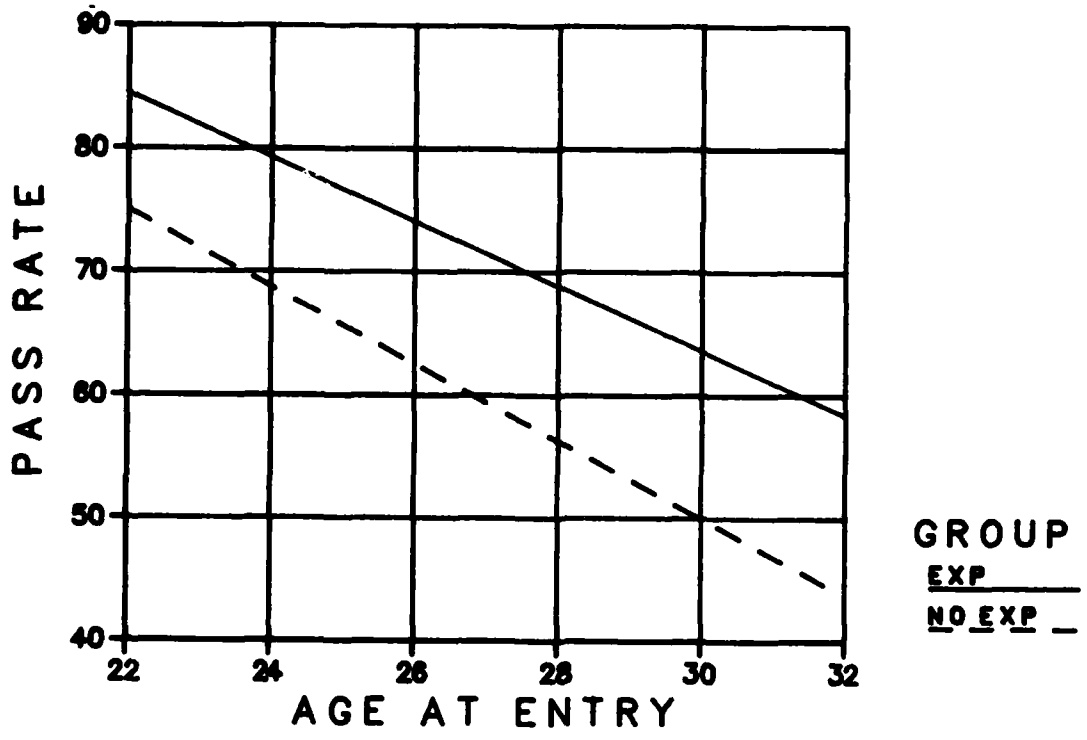

Figure 3. Age - pass rate regression lines.

The calculated regression lines of age and pass rates are plotted in Figure 3 for the combined EXP group and the NO EXP group. Inspection of those lines indicates that the performance of the EXP group matches that of the NO EXP group approximately 4-5 years younger (e.g., the pass rate of the 32-year-old EXP group matches that of the 27-year-old NO EXP group).

Discussion.

Performance in ATCS nonradar screening shows a very marked inverse relationship with age at entry into the FAA ATCS training program. This drop is even more dramatic considering the fact that (i) the group is relatively young (mean age 26), (ii) the group has been screened for aptitude and extreme selection has taken place, and (iii) the age range is attenuated. The cause(s) of such a strong age-related effect is/are not clear. It is probable that they are cognitive in nature and have an inhibiting effect on early performance in learning the ATCS job.

The superior performance of the IFR group is similar to previous findings (3). The difference between the VFR and NO EXP groups is larger in this study (which used 18+ months experience to define the VFR group) than the findings of previous studies (3) that used a 6-month definition. Since the present study found no significant differences in scores between VFR and NO EXP, and since the VFR pass rates were highly variable by age, the present findings are viewed as inconclusive regarding performance differences between VFR and NO EXP groups. The ATR group showed similar Academy performance relative to the NO EXP group as in previous research (1); however, it should be noted that the same research showed a higher post-Academy attrition for pilots; overall, they had a retention rate equal to that of the nonexperienced group.

The regression lines of the EXP and NO EXP groups are shifted by approximately 5 years (among the older trainees). This finding was viewed as lending support to the strike recovery program change in ATCS selection procedures that involved a temporary adjustment of the age rule to 35 years for the identified experience group as a whole.

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A COMPARISON OF PRESTRIKE AND POSTSTRIKE ATCS TRAINEES: BIOGRAPHIC FACTORS ASSOCIATED WITH ACADEMY TRAINING SUCCESS

William E. Collins, Carol A. Manning,
and Deborah K. Taylor

Introduction.

The October 1981 strike of the members of the Professional Air Traffic Controllers Organization, and their subsequent firing by the President, led to the air traffic strike recovery program which included the unprecedented hiring and basic training of over 8,000 ATCS applicants in a 2-year period. This study examined the relationship between autobiographic factors reported by poststrike air traffic control specialist (ATCS) trainees and their success in the FAA Academy screening program in Oklahoma City.

One purpose of this study was to compare the poststrike trainees with a group of prestrike trainees to determine whether they differed significantly on any biographic variables. It was anticipated that trainees who entered the Academy after the strike would differ from those who entered prior to the strike. Before the strike, nearly 50 percent of the trainees were ex-military air traffic controllers. However, after the strike, it was expected that the group of Academy trainees would be much less experienced because (i) publicity about the high salaries of ATCS's might attract a different group of applicants, (ii) the number of applicants required to replace the striking controllers far exceeded the number of applicants with prior military ATC experience, and (iii) applicants with any substantive ATCS experience bypassed the Academy screening program and went directly into field training as a temporary strike recovery strategy.

The second purpose of this study was to identify biographical factors related to success in the screening program for possible use in efforts to improve recruitment of potentially successful applicants. In a previous study (2), prestrike trainees' responses to a biographical questionnaire (BQ) were used to identify several factors which were significantly related to performance in the screening program. Among these factors were age, prior ATC experience, high school math grades, overall high school grades, the number of times the applicant took the ATC aptitude test, and self-ratings of future performance. If the population of ATCS applicants has changed since the strike, then biographical factors related to performance in the screening program may also have changed.

Method.

Subjects for this study were 8,159 students who entered training at the FAA Academy between September 1981 and April 1983. A voluntary BQ was administered to all consenting students on their arrival at the FAA Academy, along with a battery of research tests designed to improve ATCS selection procedures. The BQ contained 96 items that inquired about such areas as types of previous experience, education, degree of interest in aviation, number of times the ATCS aptitude test was taken, whether the student

prepared for the ATCS aptitude test, reason for wanting to become an ATCS, likelihood of remaining in the ATCS occupation for some time, importance of factors influencing career choice, whether right or left handed, economic situation of family while growing up, marital status, and tobacco and alcohol usage. Data regarding the trainee's age, sex, minority status, and pass/fail status in the screening program were also available.

Results.

Comparison of Prestrike and Poststrike Samples. The first analysis compared demographic characteristics of the poststrike sample described above with a sample of 6,059 prestrike trainees who completed another version of the BQ. These statistics are shown in Table I. The table shows that, while the trainees in both groups have about the same average age, they differ on other characteristics. A slightly lower percentage of females entered the FAA Academy poststrike. The percentage of minority entrants dropped 6 percent to about half of their previous level of representation. The percentage of entrants having college degrees increased about 10 percent since the strike. The largest differences between the samples can be seen in the percentage of trainees who had prior ATC experience and the percentage receiving veteran preference points. While before the strike, only about 30 percent of the trainees had no prior aviation experience, since the strike, over two-thirds of the trainees had no aviation experience. Before the strike, about 60 percent of the trainees received veteran preference points, but since the strike, that percentage decreased to just over 30 percent.

TABLE I. COMPARISON OF ACADEMY PRESTRIKE AND POSTSTRIKE ATCS TRAINEES

	PRESTRIKE (N=6,059)	POSTSTRIKE (N=8,159)	
AVERAGE AGE	26.5	26.3	
SEX	83	85	% MALES
	17	15	% FEMALES
EDUCATION	14	9	% HIGH SCHOOL ONLY
	48	44	% SOME COLLEGE
	38	48	% COLLEGE DEGREE
MINORITY REPRESENTATION	13	7	% MINORITIES
	87	93	% NONMINORITIES
PRIOR EXPERIENCE	30	68	% NO PRIOR EXPERIENCE
	20	17	% AVIATION EXPER ONLY
	50	15	% PRIOR ATC EXPERIENCE
VETERAN STATUS	60	31	% RECEIVING VET PREF POINTS
	40	69	% NOT RECEIVING VET POINTS

Relating Biographical Factors to Performance.

Restriction of Sample. The purpose of this part of the study was to examine the relationship between responses to BQ items and success in the Academy screening program, with the goal of improving recruitment procedures. The analyses for this part of the study used data obtained from only the poststrike trainees. Certain trainees were eliminated from the analyses because they were not representative of typical poststrike ATCS applicants. For example, trainees who entered the Academy between September 1981 and December 1981 were eliminated because the confusion surrounding the strike and the Academy's need to accommodate a large number of trainees suddenly may have affected trainees' performance (and responses to the BQ) in an unusual way. Additionally, trainees who claimed to have prior ATC experience were eliminated because recruitment efforts will likely be directed towards attracting applicants who have no previous experience. Trainees who repeated the screening program were also eliminated because their performance is usually atypical of that of trainees with no prior entry. Finally, participants in special entry programs involving pretraining in ATC were eliminated from the analyses because their performance is also atypical of that of other trainees. The data from the BQ were then recoded so that all responses were either ordinal or dichotomous.

After eliminating nonrepresentative trainees from further analysis, those remaining represented the kind of inexperienced applicants toward whom a recruitment program would likely be targeted. Thus, if a relationship were found between biographical factors and success in the screening program, the information might be a useful supplement for current recruiting practices. Furthermore, the FAA has a special interest in recruiting qualified minority applicants. If biographical factors different from those which predicted Academy success for nonminority trainees were found to predict Academy success for minority trainees, that information could be used to identify target areas where recruitment should be emphasized, or to identify minorities who should be encouraged to submit an application.

Factors Related to Pass/Fail Status. Rather than include all 96 BQ items in a regression model, it was decided to identify a subset of items significantly related to the trainees' pass/fail status and use these items in subsequent regression analyses. Identification of related items was based on chi-square and correlational analyses of the relationship between each variable and pass/fail status. A .005 level of significance was adopted for analyses for the nonminority group because the large number of observations for the group (4,673) allows detection of very small differences. The minority group contained 212 trainees; consequently, a .05 significance level was adopted for those analyses.

Table II shows the items related to pass/fail status for both minorities and nonminorities. Several items were removed from consideration because they related to factors not easily discussed during a recruitment interview. Among these items were how long the candidates had been married, whether or not they smoked, and whether they were right or left handed.

TABLE II. FACTORS POSITIVELY RELATED TO PASS/FAIL STATUS FOR MINORITY AND NONMINORITY TRAINEES

MINORITY TRAINEES (N=212)

+ Had good high school grades in (1) physical science, (2) biology, (3) English, (4) social studies, and (5) business courses
  Had high overall high school grade average
  Attended college (graduating from college is not related)
+ Younger age
+ Did not prepare for the ATCS aptitude test
+ Predicted own performance would be at the top of all ATCS's in country
+ Often flies in an airplane
+ Success at the Academy was also marginally related to:
  Not being in the Armed Forces
  Good high school math grades

NONMINORITY TRAINEES (N=4,673)

+ Obtained high school diploma granted by school
  Had good high school grades in (1) math, (2) physical science, (3) biology, (4) social studies, (5) English, (6) business, (7) physical education, and (8) vocational or agricultural courses.
  Had high overall high school grade average
  Graduated from college (attending college is not related)
+ Younger age
+ Was not a member of the Armed Forces
+ Took the ATCS aptitude test only once
+ Rated chances of staying in ATC work < 3 years unlikely
+ Predicted performance would be at the top of all ATCS's in country
+ Assigned low importance ratings to following factors:
  Work which benefits others
  Work in which you can create something new
  Work you can do as fast or slow as you want
  Work in which you are sure of having a job even in hard times
  Ability to control the amount of work you have to do.
+ Assigned a low importance weight to the factor
  "Work in which you get a good salary" (marginal relationship)

It can be seen that high school grades and overall high school grade averages predict success for both minority and nonminority trainees. However, while grades in math were most highly correlated with Academy success for nonminority trainees, they were the least predictive of high school grades for minorities. The high school course for which the grades best predicted minority success was physical science. Graduating from college was related to success for nonminority trainees, but not for minorities. However, attendance in college was related to minority success.

Several studies have shown that age at entry has a high negative correlation with success in the screening program (1), and that relationship was found to occur with these samples. Trainees who had not been in the Armed Forces were more successful than those who had been in the military. Also, in both groups, trainees who predicted they would rate among the top group of controllers throughout the country performed better than those who predicted they would be average controllers.

Some factors were related to Academy success for only the nonminority trainees. Nonminority trainees who considered salary and job stability unimportant or were not concerned about their ability to control their work had higher pass rates than those who were concerned about these factors.

The variables involving taking the OPM aptitude test more than one time and having prepared for the test are negatively related to pass/fail status because previous exposure to the test improves subsequent test performance but does not improve the likelihood of success in the screening program. Analyses of testing data have shown that (i) as an applicant repeats the test, his or her test performance usually improves, and (ii) performance at the Academy is more closely related to the original than to the final OPM test score. Thus, nonminority candidates who repeat the test to earn a higher score, often do not pass the screen. On the other hand, many minority applicants do not repeat the test but are coached before their first attempt by someone who has access to it. Coaching may improve test performance but does not improve the likelihood of successfully completing the screening program.

Regression Analyses.

The variables identified above for each group were entered as predictors into separate regression analyses for the minority and nonminority trainees. A series of model comparisons was then performed to identify a set of variables that (i) would predict an Academy pass/fail status as well as a full model containing a greater number of variables, and (ii) consists of information that could be easily obtained by a recruiter during an interview.

Minorities. For the minority trainees, a "full" regression model containing all the variables identified in Table I had a squared multiple correlation of .22, which was significantly different from zero, $F(16,183)=3.23$, $p < .0001$. A "reduced" regression model containing only the variables age, physical science high school grades, and self-rating of performance potential (which had a squared multiple correlation of .13) was then compared with the full model; the full model predicted pass/fail status no better than the reduced model, $F(13,183) = 1.69$, $p > .05$.

These results suggest that using information about the trainees' age, high school physical science grades, and self-rating of future success would be just as predictive of Academy success as the "full" set of variables and is more parsimonious in the recruitment situation. Table III shows the set of variables identified in the regression analysis and their associated beta weights. The beta weights show that age is the most important variable and

is negatively related to pass/fail status. Physical science grades were almost as important as age in predicting Academy success, while the self-rating was somewhat less important than the other two variables.

TABLE III. SET OF VARIABLES SIGNIFICANTLY PREDICTING ACADEMY PASS/FAIL STATUS FOR MINORITY CANDIDATES

Variable	Beta weight
Age	-.22
Physical science high school grades	.20
Of all air traffic controllers, where do you think you will perform?	.15

Nonminorities. For nonminority candidates, the "full" regression model containing all the variables identified in Table II had a squared multiple correlation of .09, which was significantly different from zero, $F(23,4623) = 21.01$, $p < .0001$. The full model was compared with a "reduced" model containing only the variables age, math high school grades, and self-assessment of future performance. This reduced regression model had a squared multiple correlation of .07, a reduction of only 2 percent from the proportion of variance accounted for by the full model. Table IV shows the variables contained in the reduced model and their beta weights. It is apparent that the high school math grade is the most important variable included in the model, while age is second, and the self-assessment is third. These results suggest that a candidate who had good high school math grades, is young, and is confident about his or her chances of success as an ATCS is likely to succeed in the FAA Academy screening program.

TABLE IV. SET OF VARIABLES SIGNIFICANTLY PREDICTING ACADEMY PASS/FAIL STATUS FOR NONMINORITY CANDIDATES

Variable	Beta weight
Math high school grades	.20
Age	-.13
Of all air traffic controllers, where do you think you will perform?	.08

Conclusions.

Since the strike, the composition of the population applying for positions as ATCS's has changed. More than two-thirds of the poststrike applicants have no prior experience in aviation. Consequently, recruiting efforts may have to be directed towards attracting qualified candidates from areas outside of aviation.

The variables found to be predictors of pass/fail status in the Academy screening program could be incorporated in recruitment efforts. Recruiters might target their efforts to attract qualified candidates towards colleges or junior colleges because such institutions are likely to have a good supply of young applicants who earned good grades in high school. Recruiters should attempt to encourage candidates to apply while they are young because the likelihood of success in the screening program decreases as they grow older. They should refrain from training applicants to take the ATCS aptitude test before their official testing session and should refrain from encouraging applicants to repeat the test if they fail the first time.

This study has identified a set of variables that could be used by recruiters to identify both minority and nonminority candidates who might be successful in the FAA Academy screening program. Age, high school grades, and self-assessment of future performance were the most important predictors of Academy success for both minorities and nonminorities, but the order of importance depended on which group was considered. The most important predictor of minority pass/fail status was age, with physical science high school grades second. For nonminorities, the most important predictor of pass/fail status was the math high school grade, and age was second in importance.

This information may provide a guideline to aid in identifying various categories of applicants who might be successful in the FAA Academy screening program. The variables described in this study were not intended to be used for screening purposes, but instead to target individuals who might be most strongly encouraged to proceed with the application process.

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A FOLLOWUP EVALUATION OF THE NEW APTITUDE TESTING PROCEDURES FOR SELECTION OF FAA AIR TRAFFIC CONTROL SPECIALISTS

Allan D. VanDeventer, Ph.D

Introduction.

The air traffic control specialist (ATCS) developmental process in the en route and terminal options may be viewed as consisting of four parts, each of which must be successfully completed in order to achieve journeyman status as a radar ATCS (see Table I). The first part consists of two stages of selection screening, one prior to hire and the other immediately following entry into the Federal Aviation Administration (FAA). The rationale for these screening procedures is to determine as early as possible whether or not the person has sufficient aptitude to complete the long and costly on-the-job training (OJT) necessary to become a journeyman controller.

TABLE I. THE ATCS DEVELOPMENTAL PROCESS

PART	LOCATION	EVALUATION METHODS
1. SELECTION SCREENING		
FIRST STAGE	OFFICE OF PERSONNEL MGMT.	APTITUDE TESTS
SECOND STAGE	FAA ACADEMY NONRADAR	JOB SIMULATION
2. NONRADAR TRAINING	FIELD FACILITY	OJT AND CHECKOUT
3. PLACEMENT SCREENING	FAA ACADEMY RADAR	JOB SIMULATION
4. RADAR TRAINING	FIELD FACILITY	OJT AND CHECKOUT

In October 1981, the Office of Personnel Management (OPM), in conjunction with the FAA, implemented a new first-stage selection procedure for ATCS's. As was the case for the prior OPM selection procedure (implemented in 1964--reference 1), the new procedure is based primarily on aptitude tests that have been demonstrated to have validity for prediction of successful performance in the second stage of screening--the ATCS nonradar screening phases at the FAA Academy (2,3). The new procedure retained the Abstract Reasoning Test (ABSR), OPM Test 157, that had been used in the prior procedure. A new, highly job-related aptitude test, the Multiplex Controller Aptitude Test (MCAT), OPM Test 510, was added in two forms (MCATA and MCATB) as was a new procedure for granting credit for prior ATCS experience, the Occupational Knowledge Test (OKT), OPM Test 512 (4).

In the new procedure, an applicant's total weighted score (TWS) is computed by the formula:

$$TWS = 2*(MCATA) + 2*(MCATB) + 1*(ABSR)$$

which was derived based on the research preliminary to implementation of the new battery. This is then converted to a scale with a mean of 70 and a maximum of 100--the transmuted composite (TMC)--by the formula:

$$TMC = 70 + (TWS-160) * (30/95)$$

where 160 is the mean TWS, 30 is the range between the TMC mean (70) and the TMC maximum score (100), and 95 is the range between the mean TWS (160) and the maximum TWS (255). The TWS mean and maximum were those used in the research on the battery prior to implementation. The mean of 70 on the TMC is the cutoff designated by OPM for the part of qualification based on aptitude testing. This is intended to qualify approximately 50 percent of those tested on the basis of aptitude tests.

For those achieving a TMC of 70 or greater, extra credit points are added for experience based upon the applicant's performance on the OKT as follows:

OKT SCORE	POINTS
0 - 51	0
52 - 55	3
56 - 59	5
60 - 63	10
64 +	15

However, the result may not exceed 100. This is referred to as the earned rating. To this number 0, 5, or 10 veteran preference points are added to arrive at the selection rating used to rank and select candidates (final rating). Veteran preference points are not predictive of performance on the job, rather they are added as a matter of national policy/law. This final figure and other basic qualifications (e.g., experience/education, medical) are used to establish eligible applicants on registers for selection.

The purpose of this study was to evaluate the results of the initial operational administration of the new selection battery relative to the previous selection procedure. The performance in initial (pass/fail) nonradar qualification training at the FAA Academy was used as the criterion.

Methods.

Subjects were 3,746 ATCS trainees selected from the new procedure and 1,780 (2 did not have full data sets) ATCS trainees selected from the prior procedure during the period August 1981 through December 1982. Entrants during this time period were selected since (i) during the initial two-thirds of this time period, the transition from the old procedure to the new procedure was in process and, thus, selections were occurring from both procedures, (ii) enough selections on the new procedure needed to occur to get a reasonable sample across the new rating distribution, and (iii) after

December 1982, the criterion (Academy nonradar phase scores) evidenced some change due to grading standardization improvements at the Academy. Numbers of subjects included in various analyses varied slightly due to occasional missing data. (NOTE: All percentages are rounded to whole numbers.)

Results.

Data were available to compare the earned rating, veteran preference points, and final ratings for the old and new selection procedures. For Academy entrants, the means, standard deviations, and restricted validity coefficients (using both Academy score and pass/loss status as criteria) for the two procedures are detailed in Table II. The earned rating shows substantially higher correlations for the new selection procedure, while final rating correlations are essentially the same. This effect is clearly due to the strong negative correlation for veteran preference points in the new selection procedure sample.

TABLE II. OLD AND NEW SELECTION PROCEDURE PARAMETERS AND VALIDITY COEFFICIENTS

	EARNED RATING	VETERAN POINTS	FINAL RATING
OLD SELECTION PROCEDURE			
N = 1,778 (INCLUDES WITHDRAWALS)			
RESTRICTED MEAN	89.39	1.70	91.09
RESTRICTED STANDARD DEVIATION	6.46	2.50	6.78
RESTRICTED CORRELATION WITH PASS/LOSS STATUS	.26	.00	.24
N = 1,541 (EXCLUDES WITHDRAWALS)			
RESTRICTED MEAN	89.68	1.75	91.42
RESTRICTED STANDARD DEVIATION	6.44	2.50	6.77
RESTRICTED CORRELATION WITH ACADEMY SCORE	.32	-.03	.30
NEW SELECTION PROCEDURE			
N = 3,746 (INCLUDES WITHDRAWALS)			
RESTRICTED MEAN	88.18	1.58	89.76
RESTRICTED STANDARD DEVIATION	5.23	2.59	5.19
RESTRICTED CORRELATION WITH PASS/LOSS STATUS	.31	-.15	.24
N = 3,417 (EXCLUDES WITHDRAWALS)			
RESTRICTED MEAN	88.38	1.54	89.92
RESTRICTED STANDARD DEVIATION	5.21	2.56	5.20
RESTRICTED CORRELATION WITH ACADEMY SCORE	.40	-.18	.31

The differences due to veteran preference points are likely due to changes in the population of persons entering the Academy program during this period of time. As part of the FAA recovery from the Professional Air Traffic Controllers Organization strike, those with 2 years or more of pre-FAA ATC experience were hired directly into FAA ATC field facilities, bypassing the Academy screening programs. Previous research has shown that those with such background experience are more successful at the Academy (5). It is also likely that this exemption affected the new selection procedure more than it did the old selection procedure, since it was implemented during the switchover. Additional analyses were conducted to determine if this was the case (see Table III).

TABLE III. PASS RATES BY VETERAN PREFERENCE AND EXPERIENCE

	SELECTION PROCEDURE			
	OLD		NEW	
	N	PASS %	N	PASS %
NO VETERAN PREFERENCE	1,194 (67%)	56%	2,658 (71%)	67%
VETERAN PREFEERENCE	584 (33%)	56%	1,088 (29%)	52%
VETERAN PREFERENCE				
WITH ATC EXPERIENCE	293 (50%)	62%	263 (24%)	65%
WITH PILOT EXPERIENCE	110 (19%)	54%	212 (19%)	59%
WITH NO EXPERIENCE	181 (31%)	47%	613 (56%)	44%

Pass rates of those with and without veteran preference points were the same under the old procedure, while under the new procedure nonveterans had a pass rate 15 percentage points higher than veterans. This difference appears to be due to differences in the proportion of the veterans with ATC experience. More than twice the percentage of those with veteran preference points had ATC experience under the old procedure (50 percent) as the new procedure (24 percent). Moreover, the quality of the ATC experience appears to have been different. Of those with veteran preference and ATC experience under the old procedure, 49 percent had more than 6 months' experience in an IFR ATC facility, and the group as a whole had pass rates 6 percentage points higher than those for nonveterans. Under the new procedure, only 38 percent had more than 6 months' experience in an IFR ATC facility, and the group pass rate was 2 percentage points lower than that for nonveterans.

Unrestricted population estimates of the standard deviation were not available for the old selection procedure ratings, so it was not possible to correct them for restriction in range and make a comparison. However, all scores were available on the 1981 applicant population for the new selection procedure. Unrestricted standard deviations were calculated, and the validity coeffients for the new selection procedure were corrected for restriction in range using the Thorndike Two Variable Case correction procedure (6). The results (see Table IV) yielded validity coefficients of

TABLE IV. CORRECTED CORRELATIONS FOR NEW SELECTION PROCEDURE

	TMC	EARNED RATING	FINAL RATING
APPLICANT POPULATION 1981			
N = 44,949			
UNRESTRICTED MEAN	71.51	71.82	73.13
UNRESTRICTED STANDARD DEVIATION	11.84	12.20	12.50
8/81 - 12/82 ACADEMY ENTRANTS			
N = 3,746 (INCLUDES WITHDRAWALS)			
RESTRICTED CORRELATION			
WITH PASS/LOSS STATUS	.26	.31	.24
CORRECTED CORRELATION			
WITH PASS/LOSS STATUS	.54	.61	.51
N = 3,417 (EXCLUDES WITHDRAWALS)			
RESTRICTED CORRELATION			
WITH ACADEMY SCORE	.33	.40	.31
CORRECTED CORRELATION			
WITH ACADEMY SCORE	.65	.71	.62

0.51 (pass/loss criterion) and 0.62 (Academy score criterion) for the final rating. Earned rating validity coefficients were higher (0.61 and 0.71) due to the veteran preference points effect. TMC validity coefficients were lower than earned rating coefficients. This pattern indicates that the addition of extra points for OKT performance increases the validity of the procedure.

TABLE V. ACADEMY PASS RATES BY FINAL RATING RANGE FOR NEW AND OLD SELECTION PROCEDURES

	SELECTION PROCEDURE			
	OLD		NEW	
FINAL RATING	N	PASS %	N	PASS %
70-79	56	30%	34	29%
80-84	251	38%	587	44%
85-89	482	49%	1,499	59%
90-94	462	59%	1,042	70%
95-99	298	64%	413	78%
100+	231	75%	171	83%
TOTAL	1,780	56%	3,746	63%

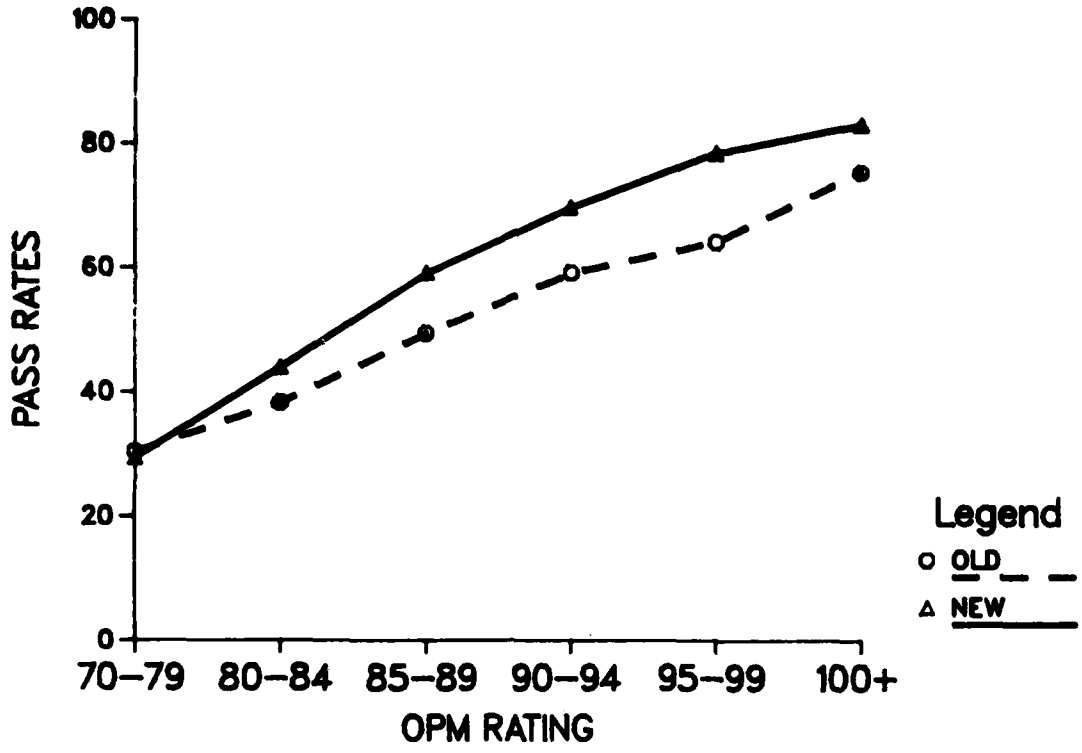

Figure 1. ATCS pass rates by selection ratings for poststrike entrants 8/11/81 - 12/03/82

Table V and Figure I compare the pass rates by rating ranges for the new and old selection procedures. Academy pass rates for the new procedure were higher for all but the 70-79 rating ranges. The overall pass rate for those selected from the new procedure was 63 percent, while that for those selected from the old procedure was 56 percent--an increase in passes of 7 percent for this period of time. An even larger increase in pass rates would be possible if a higher cutoff were used to determine eligibility.

Conclusions.

The use of job-related aptitude tests such as the MCAT and job knowledge tests such as the OKT have increased the pass rates in initial qualification training, thus reducing costs due to attrition. It also appears that the new selection procedure has resulted in improved validity for the selection of ATCS applicants, although the increase in validity was vitiated by the reduced level of pre-FAA ATC experience among veterans in the sample studied. Use of similar aptitude tests and procedures for the selection of ATCS's in the military (where veteran preference points are not necessary) and in other countries may be beneficial.

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