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**SELECTING QUALIFIED CANDIDATES TO THE UNITED STATES
NAVAL ACADEMY USING COLLEGE APTITUDE TEST SCORES**

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**NAVY PERSONNEL RESEARCH
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San Diego, California 92152**

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NPRDC Special Report 82-20

March 1982

**SELECTING QUALIFIED CANDIDATES TO THE UNITED STATES
NAVAL ACADEMY USING COLLEGE APTITUDE TEST SCORES**

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Selection	Midshipmen	Aptitude test									
Naval Academy	Prediction	Performance									
Officer	College	Test evaluation									
20. ☒ ABSTRACT (Continue on reverse side if necessary and identify by block number) The Naval Academy has a continuing need to select high quality applicants. Comparisons were made of the relative validity of the highest college aptitude test score (HIGHCATS) and the average college aptitude test score (AVECATS) in the selection of applicants to the Naval Academy. On a sample of 588 midshipmen for the class of 1983, it was found that: (1) the validity of the AVCATS was significantly higher than that of the HIGHCATS, (2) rank order position changed when midshipmen were evaluated on the											

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AVECATS instead of the HIGHCATS, and (3) more applicants were predicted to attain an academic quality point ratio of 2.7 when the AVECATS was used as the selection score instead of the HIGHCATS. Thus, applicants should be selected on their AVECATS instead of their HIGHCATS.



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FOREWORD

This research was sponsored by the United States Naval Academy and was part of advanced development subproject Z1167-PN.04 (selection of career-oriented officers), which is aimed at improving the performance of Naval Academy midshipmen. The results are intended primarily for use by the Naval Academy.

Appreciation is expressed to RADM Robert W. McNitt, USN (Ret.) for his support in all phases of this research and to Mr. Gene Hillman of the Naval Academy's admissions office for coordinating the data collection and providing it to the Navy Personnel Research and Development Center.

JAMES F. KELLY, JR.
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SUMMARY

Problem

For several years, the Naval Academy has used widely-administered commercial measures of scholastic aptitude to assess academic potential. College applicants may take such tests as frequently as they desire and must submit all scores. The Naval Academy uses only the highest score for selection. This strategy may introduce prediction errors.

Objective

The objective of this effort was to compare the relative validity of the average college aptitude test score (AVECATS) and the highest college aptitude test score (HIGHCATS) in predicting academic success at the Naval Academy.

Approach

For each subject, scores were examined to identify both the HIGHCATS and AVECATS. The college aptitude tests included the verbal and math subtests of the Scholastic Aptitude Test (SAT) and/or the American College Test (ACT).

Validities for predicting Naval Academy academic performance were computed for HIGHCATS and AVECATS. The measure of performance was midshipman's academic quality point ratio (AQPR) at the end of plebe year. Validities, midshipmen rank order, and predicted AQPR were compared between HIGHCATS and AVECATS.

Results

1. There were large changes in position when midshipmen were rank ordered on the AVECATS instead of on the HIGHCATS.
2. For the total score, verbal subtest, and math subtest, the validity of the AVECATS was significantly higher than that of the HIGHCATS.
3. More applicants were predicted to attain a higher AQPR when the AVECATS was used as the selection score than when HIGHCATS was used.

Conclusions

1. The AVECATS is a better predictor of Naval Academy performance than is the HIGHCATS.
2. A better qualified group of applicants would be selected for admission to the Naval Academy if AVECATS were used as the selection score.

Recommendation

Applicants to the Naval Academy should be selected based on their AVECATS instead of their HIGHCATS.

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INTRODUCTION

Problem and Background

To select the applicants to the Naval Academy most likely to succeed in the officer training program, there is a continuing need to improve selection procedures. For several years, the academy has used widely-administered commercial measures of scholastic aptitude to assess academic potential. College applicants may take such tests as frequently as they desire and must submit all scores. The Naval Academy uses only the highest score for selection. This strategy may introduce prediction errors.

It has been postulated that the average score is the best indicator of a group of scores that measure the same ability (Ferguson, 1966). This theory is supported by Gulliksen (1965) in his discussion of doubling the length of a test. He demonstrated that adding a parallel test to the original test increased its reliability and validity.

Objective

The objective of this effort was to compare the relative validity of the average college aptitude test score (AVECATS) to the highest college aptitude test score (HIGHCATS) in the prediction of academic success at the Naval Academy.

APPROACH

Sample

The applicant sample included 6883 applicants who submitted more than one college aptitude test score to the Naval Academy (class of 1983).

The midshipman sample included 588 midshipmen of the Naval Academy class of 1983 who met the following criteria:

1. Their HIGHCATS was available from the Educational Testing Service and/or the American College Testing Program.
2. They had received a final plebe academic quality point ratio.
3. They had submitted more than one college aptitude test score.

Measures

The predictors included the scores on the verbal and math subtests of the Scholastic Aptitude Test (SAT) and the American College Test (ACT).

The necessary college aptitude test score data were available only for the class of 1983. At the time of data analysis, academic performance for this class was limited to plebe year. However, results obtained from earlier Naval Academy classes, based on academic performance for all 4 years, demonstrated that college aptitude test score validities for plebe academic performance did not differ significantly from those for the third, second, and first class years.¹ Further, a comprehensive review of validity studies

¹Validities found for class of 1981 were .43 for plebe year, .46 for third class year, .44 for second class year, and .44 for first class year.

among civilian colleges revealed no systematic differences between the validities of the 4-year college cumulative grade point averages and those of the first-year college grade point averages (Angoff, 1971). Consequently, the criterion was the midshipman's grade point average at the end of plebe year, referred to as the academic quality point ratio (AQPR).

Analyses

1. Comparison between SAT and ACT scores. Initially, separate analyses were performed for the SAT and the ACT scores. However, results from both analyses were similar and both the SAT and the ACT scores were found to be reliable and valid (Angoff, 1971; Hills, 1979). Therefore, ACT scores were converted to SAT equivalencies (United States Naval Academy, 1978).

2. Comparison between HIGHCATS and AVECATS. The difference between each midshipman's HIGHCATS and AVECATS was examined. Further, each midshipman was ranked within the sample on his or her HIGHCATS and, subsequently, on AVECATS; the difference in rank order position for each midshipman was examined.

3. Comparison of validities. On the midshipman sample, the validities of the HIGHCATS and AVECATS were compared on the total, verbal subtest, and math subtest scores. Further, all midshipmen were classified into the following subgroups on both their HIGHCATS and AVECATS: upper 20 percent, upper 40 percent, upper 60 percent, upper 80 percent, and total group. The mean AQPRs of the HIGHCATS subgroups were compared to the mean AQPRs of the AVECATS subgroups.

4. Comparison of applicant predicted scores. For each applicant, predicted AQPR was derived for their HIGHCATS and AVECATS. For both HIGHCATS and AVECATS, the number of applicants selected at various predicted AQPR cutoff points was examined.

RESULTS AND DISCUSSION

Differences Between HIGHCATS and AVECATS

The distribution of HIGHCATS and AVECATS (total score) for the midshipmen is shown in Table 1. AVECATS tended to be lower than HIGHCATS. For instance, 277 midshipmen scored 1250 and above in the HIGHCATS distribution, while only 122 midshipmen scored 1250 and above in the AVECATS distribution. Table 2, which presents differences between HIGHCATS and AVECATS (verbal and math subtest scores), indicates a nonconstant drop between HIGHCATS and AVECATS. Some midshipmen dropped as little as 10 points, while others dropped more than 90. Changes in rank order position between HIGHCATS and AVECATS are shown in Table 3. There is a wide distribution of number of positions change with an average change of about 64 positions.

Differences Between Validities

A comparison of validities by total test, verbal subtest, and math subtest for the midshipmen sample is shown in Table 4. The validity of the AVECATS was significantly higher than that of the HIGHCATS for both subtests and for the total score. For the verbal subtest, the AVECATS accounted for nearly twice the variance of the HIGHCATS in the criterion; for the math subtest, the AVECATS accounted for 62 percent more variance; for the total test, the AVECATS accounted for 60 percent more variance.

Table 1
Distribution of Highest College Aptitude Test Scores (HIGHCATs)
and Average College Aptitude Test Scores (AVECATs) (N = 588)

Score	HIGHCATS		AVECATS	
	Number of Midshipmen	Percentage	Number of Midshipmen	Percentage
Less than 950	3	0.5	9	1.5
950 to 1049	13	2.2	62	10.5
1050 to 1149	92	15.6	180	30.6
1150 to 1249	203	34.5	215	36.6
1250 to 1349	187	31.8	98	16.7
1350 to 1449	76	12.9	21	3.6
More than 1450	14	2.4	3	0.5
Total	588	99.9	588	100.0

Table 2
Differences Between HIGHCATS and AVECATS (N = 588)

Difference (in points)	Verbal Subtest (Number of Midshipmen)	Math Subtest (Number of Midshipmen)
Less than 10	73	57
10 to 19	75	104
20 to 29	115	116
30 to 39	95	119
40 to 49	56	68
50 to 59	53	40
60 to 69	35	33
70 to 79	26	20
80 to 89	26	10
More than 89	34	21
Total	588	588

Table 3
Changes in Rank Order Position Between HIGHCATS
and AVECATS (N = 588)

Positions Changed	Number of Midshipmen	Percentage
Less than 21	156	26.5
21 to 40	115	19.6
41 to 60	86	14.6
61 to 80	80	13.6
81 to 100	59	10.0
101 to 200	82	13.9
More than 200	10	1.7
Total	588	99.9

Table 4
Comparison of Validities Between HIGHCATS
and AVECATS (N = 588)

Test and Score	Mean	SD	r	r ²
<u>Verbal Subtest</u>				
HIGHCATS	578	68	.261	.068
AVECATS	539	66	.342*	.117
<u>Math Subtest</u>				
HIGHCATS	662	61	.345	.119
AVECATS	627	62	.442*	.195
<u>Total Score</u>				
HIGHCATS	1240	103	.376	.141
AVECATS	1167	105	.479*	.229

*p < .001.

Mean AQPRs of HIGHCATS and AVECATS subgroups are plotted by college aptitude test score group in Figure 1. Except for one subgroup (total), all AVECATS subgroups attained higher mean AQPRs than did the corresponding HIGHCATS subgroups.

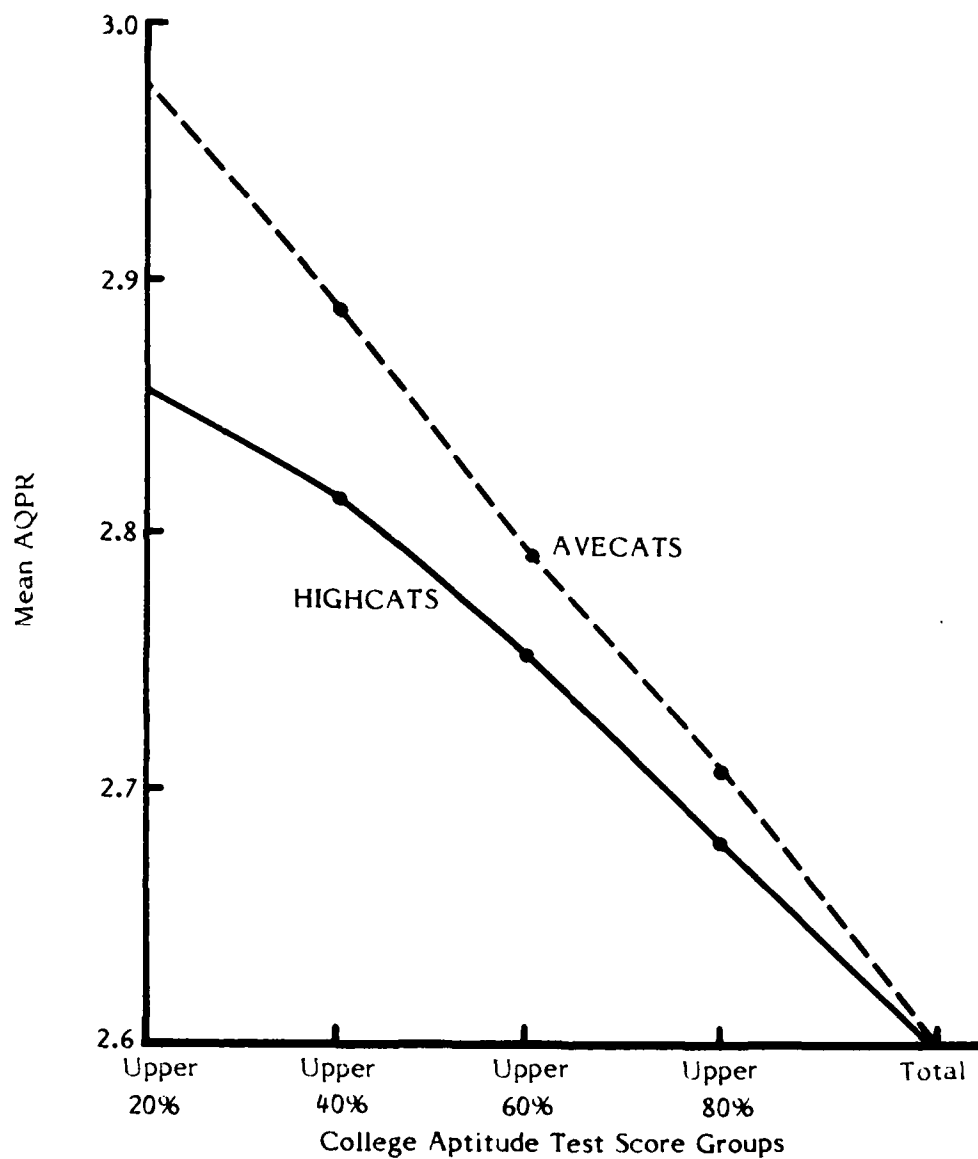


Figure 1. Mean AQPR by college aptitude test score group.

Differences Among Predicted AQPR

Figure 2 presents the number of applicants that would be selected at various AQPR cutoff points for both HIGHCATS and AVECATS. A higher AQPR was predicted for more applicants when the AVECATS was used as the selection score than when the HIGHCATS was used. For example, an AQPR of 2.7 or more was predicted for 1074 applicants using AVECATS as the predictor, but only for 873 applicants using HIGHCATS.

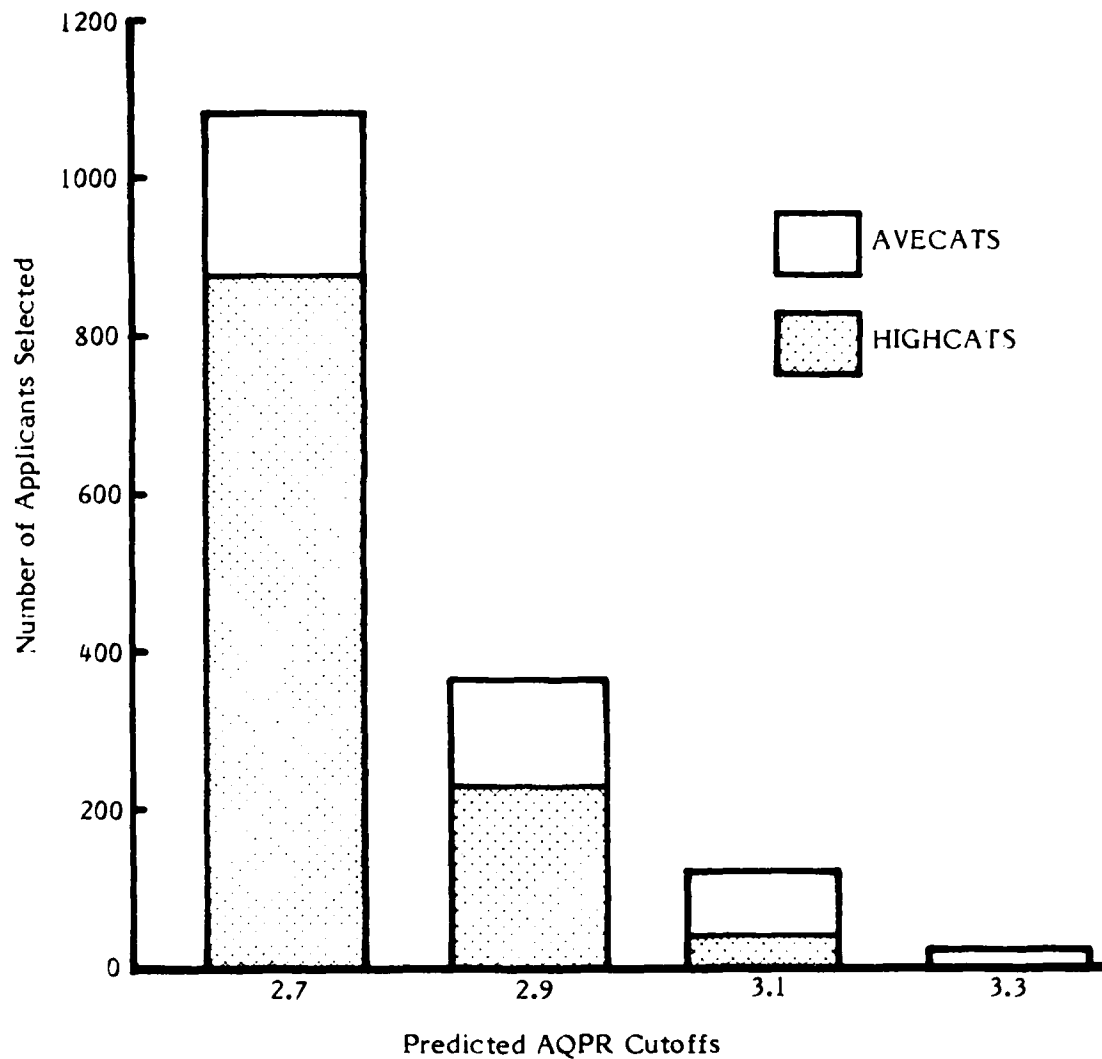


Figure 2. Number of applicants selected at various predicted AQPR cutoff points (N = 6882).

CONCLUSIONS

1. The AVECATS is a better predictor of Naval Academy performance than is the HIGHCATS.
2. A better qualified group of applicants would be selected for admission to the Naval Academy if AVECATS were used as the selection score.

RECOMMENDATION

Applicants to the Naval Academy should be selected on the basis of their AVECATS instead of their HIGHCATS.

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