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A COMPARISON OF THE PREDICTABILITY OF ACADEMIC SUCCESS OF NEGRO COLLEGE STUDENTS WITH THAT OF WHITE COLLEGE STUDENTS.

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WHILE ATTEMPTS HAVE BEEN MADE TO CONSTRUCT MEASURES WHICH HAVE VALIDITY FOR PREDICTING ACADEMIC SUCCESS IN COLLEGE, MOST OF THESE TESTS HAVE BEEN DEVELOPED FOR NATIONWIDE TESTING PROGRAMS AND MAY NOT BE AS COMPLETELY VALID FOR MEASURING THE APTITUDE OF MINORITY GROUP HIGH SCHOOL STUDENTS WHO HAVE RESTRICTED ENVIRONMENTAL BACKGROUNDS. TO TEST THE PREDICTIVE VALIDITY OF ONE OF THESE TESTS, A STUDY COMPARED THE CORRELATIONS OF THE SCHOLASTIC APTITUDE TEST (SAT)-VERBAL AND SAT-MATHEMATICAL SCORES WITH THE FRESHMAN GRADE POINT AVERAGES OF NEGRO AND WHITE GROUPS. THE NEGRO POPULATION WAS SELECTED FROM THREE SOUTHERN NEGRO STATE COLLEGES, AND THE WHITE POPULATION WAS SELECTED FROM THREE NON-NEGRO COLLEGES WHO HAD THE LOWEST AVERAGE SCORES ON BOTH FORMS OF THE SAT. ONLY THREE ANALYSES WERE MADE. IT WAS FOUND THAT THERE WERE NO SIGNIFICANT DIFFERENCES IN PREDICTIVE VALIDITIES ASSOCIATED WITH RACE, SUBTEST, AND YEAR. HOWEVER THE INTERACTION OF SEX WITH RACE DID SHOW SOME DIFFERENCES. THE FRESHMAN GRADE POINT AVERAGE WAS FOUND TO BE MOST PREDICTABLE AMONG WHITE WOMEN, AND THE WHITE MEN WERE FOUND TO BE THE LEAST PREDICTABLE GROUP. THIS DOCUMENT WAS PRESENTED AT THE AERA MEETINGS IN 1967. (DK)

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by
Andrew Porter and Julian C. Stanley

Colleges and universities throughout the nation are faced with the problem of increasing enrollment. In most cases it is not possible for a school to grant entrance to all applicants. But on what basis does the school decide who shall be allowed to attend? As a partial answer to this question, attempts have been made to construct tests which have predictive validity for academic success in college. Most of the tests were developed for nationwide testing programs, aimed at the population of high school students interested in attending college. What is the predictive validity of these tests for high school students from minority groups having restricted environmental backgrounds?

One of the most widely used testing programs for prediction of college academic success is that of the College Entrance Examination Board whose principal instruments are the verbal and mathematical forms of the Scholastic Aptitude Test. The present study is a comparison of correlations of SAT-verbal and SAT-mathematical scores, using the criterion of college freshman grade point averages in three Negro southern state colleges with the correlations of those tests, using the criterion of freshman grade point averages in three non-Negro colleges in the same area.

Several empirical investigations have been done to determine possible test bias for Negro students. To be consistent with the present study, let us review only those studies which involved use of the Scholastic Aptitude Test. A series of statistical reports from the University System of Georgia

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was one of the first indications that the SAT-verbal and SAT-mathematical forms predict freshman grade point averages about as well in predominantly Negro colleges as they do in predominantly non-Negro colleges. Hills (1964) summarized many of these reports contrasting the three predominantly Negro four-year colleges with the Georgia Institute of Technology which was predominantly non-Negro. Hills reported that the mean SAT-verbal score for Negro males was approximately 270, with an average standard deviation of approximately 45, and that the mean SAT-mathematical score was approximately 305 with an average standard deviation of approximately 48. In contrast, for Georgia Tech. (non-Negro) males he reported that the mean SAT-verbal score was approximately 500 with an average standard deviation of 87, and that the mean SAT-mathematical score was approximately 580 with an average standard deviation of 77. The average multiple correlation of freshman grade point average with SAT-verbal, SAT-mathematical, and high school grades for Negro males was .57, while the average multiple correlation for Georgia Tech. males was .58. Restriction in range on SAT scores and curtailed distributions for the predominantly Negro colleges, where the tests appeared to have too little "floor," did not appreciably affect the multiple correlations.

Biaggio and Stanley (1964) tested hypotheses concerning the predictability of academic success for Negro students using Hills data reported for the four academic years 1959-60 through 1962-63. Correlations of SAT scores with freshman grade point average were corrected for restriction of range in the case of Negro colleges. Using the corrected correlations as the dependent variable, Negroes were found to be significantly more predictable than non-Negroes for both sexes and both forms of the SAT. Analyses using

correlations not corrected for restriction of range indicated that non-Negro females were significantly more predictable than Negro females with no significant difference between Negro and non-Negro males. Analyses using logarithms of variance errors of estimate as the dependent variable indicated that Negro women were less erratic than non-Negro women with no significant difference between non-Negro and Negro men.

Stanley, Biaggio and Porter extended the Biaggio-Stanley study to include the six academic years 1959-60 through 1964-65. As in their previous study, non-Negro women were found to be significantly more predictable than Negro women with no significant difference between non-Negro and Negro men. The median multiple correlation for predicting freshman grade point averages within the predominantly Negro colleges using the least-squares linear combination of SAT-verbal, SAT-mathematical, plus high school grade point average was .595 for men and .585 for women.

The study concludes that prediction of academic success was good for Negro students attending Negro colleges and would have been better with an easier test. It was noted that a different approach could be taken to the problem of restricted range by "using just a portion of the distribution of scores in the Negro colleges that are well above the floor of the test in order to extrapolate the scores to the left, through the region of piled up scores and beyond." The approach based on a combined distribution of both sexes and both forms of the SAT yielded a ratio of derived variance to actual variance of 1.8 in comparison with a ratio of corrected for attenuation variance to actual variance of 2.2 for the SAT-verbal for men, 3.16 for SAT-verbal for women, 2.4 for SAT-mathematical for men, and 3.6 for SAT-mathematical for women. Stanley, Biaggio and Porter thus concluded that the usual procedure of correction for attenuation resulted in an over correction for their data.

Cleary and Hilton (1966) have investigated the bias of items in the Preliminary Scholastic Aptitude Test. In their research they defined an item of a test to be biased for members of a particular group "if the item produces an uncommon discrepancy between the performance of that group and the performance of other groups." The results of their investigation concerning White versus Negro students indicated that the items in the Preliminary Scholastic Aptitude Test were not biased for those two groups. This does not necessarily mean that the test as a whole shows no bias.

In a subsequent study Cleary (1966) defined a test as having predictor bias if, for members of a subgroup of the population, consistent nonzero errors of prediction are made for members of that group. Cleary's study was an investigation of the prediction of college grade averages from the Scholastic Aptitude Test for non-Negro and Negro students in integrated colleges. Three schools were used in the study, two eastern state supported and one southwestern state supported. Analyses of the regression lines of college grade point average on SAT-verbal and college grade point average on SAT-mathematical showed no reason to reject the hypothesis of within-group parallel slopes. This allowed the further investigation of possible differences in regression line intercepts which would indicate test bias. The two eastern schools did not have significantly different intercepts for either the verbal or mathematical forms of the SAT. The data from the southwestern school indicated a significant difference in intercepts on both forms of the SAT, the bias in both cases was in favor of the Negro student. Cleary concluded there was little evidence that the Scholastic Aptitude Test was biased as a predictor of college grades.

The studies by Biaggio and Stanley and By Stanley, Biaggio, and Porter used designs involving only three coeducational four-year colleges attended chiefly by Negroes versus 15 colleges and universities attended by non-Negroes. Such a design uses all of the data from the University System of Georgia statistical reports and therefore has greater power than a design including fewer schools.

The design is not robust in respect to the assumption of equal within-group error variances because of the 3 to 15 ratio of Negro to non-Negro colleges and the heterogeneity of the non-Negro colleges with respect to size and type (Scheffé, 1959). Further, it does not seem ideal to compare the three coeducational four-year colleges attended by Negroes with a mixture of junior colleges, four-year colleges, technical institutes, and a university attended by non-Negroes, because predictive validity of tests within the non-Negro institutions may be partly a function of size and type.

For these reasons the present authors decided to perform three analyses comparing the three Negro colleges with the three four-year coeducational non-Negro colleges having lowest average scores on both forms of the SAT. (See Table I.) The first design involved crossed, fixed-effects factors of race, sex, subtest, and six academic years, with random-effects factor, college, nested within race, but crossing all the other factors. The dependent variable was the coefficient of correlation between the respective SAT forms and average freshman grades, transformed to Fisher's z. The main effect, sex, tested with 1 and 4 degrees of freedom, was found significant at the .01 level with average z's of .400

for males and .467 for females. However, sex interacted with race significantly at the .01 level again with 1 and 4 degrees of freedom. (See first line of Table III.) The mean z's were non-Negro females, .530; Negro males, .418; Negro females, .404; and non-Negro males, .382. The significant sex main effect appeared to be due wholly to the non-Negro female's high degree of predictability. None of the other sources of variation in the design were significant at the .05 level.

Two more analyses were done which did not include the subtest factor. (See Table II.) One analysis had as the dependent variable multiple-predictor z's from the least squares linear combination of SAT-verbal plus SAT-mathematical and the other analysis had as dependent variable multiple-predictor z's from the least squares linear combination of SAT-verbal plus SAT-mathematical, plus high school grade point average. In both cases the sex and race x sex sources of variation were significant at the .01 level. None of the other sources of variation were significant at the .05 level. Perhaps it should be mentioned that in all three analyses the interaction of sex with year was significant at the .10 level.

An examination of sex x race interaction means is interesting. (See Table III.) As would be expected, the more variables used in the regression equations, the better the prediction. The lowest mean resulted from using a single form to predict success of non-Negro males which was .382, these means are reported as Fisher's z, and the best prediction was .901 for white females using all three variables. The ranking of means across race and sex was the same for prediction using a single SAT form as it was for using both SAT forms. When using both SAT forms and high school grades, non-Negro females were still most predictable with Negro females next, but non-Negro males were slightly more predictable than Negro males.

The conclusions from the three analyses presented here are consistent with our findings in earlier studies. Differences in predictive validities associated with race (other than interaction of sex with race), subtest, and year are small or non-existent. For the criterion of freshman grade point average non-Negro women were found to be more predictable than either Negro women or men, who in turn were more predictable than non-Negro men.

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TALLE III

	Dependent Variable[1]	Negro		Non-Negro	
		Female	Male	Female	Male
RACE x SEX Interaction means	Single form	.404[2] .380[3]	.418 .397	.530 .485	.382 .363
	SAT-V + SAT-M	.509 .470	.517 .478	.523 .481	.459 .430
	SAT-V + SAT-M + High School grades	.744 .629	.701 .604	.901 .716	.718 .617

[1]Dependent variable was a predictive validity correlation or multiple correlation coefficient transformed to Fisher's z.

[2]The first number in each cell indicates a mean z.

[3]The second number in each cell indicates a mean correlation.

TABLE II

Race	Sex	College	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
Negro	Male	A						
		B						
		C						
	Female	A						
		B						
		C						
Non-Negro	Male	D						
		E						
		F						
	Female	D						
		E						
		F						

TABLE I

Subtest	Race	Sex	College	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
SAT-V	Negro	Male	A						
			B						
			C						
		Female	A						
			B						
			C						
	Non-Negro	Male	D						
			E						
			F						
		Female	D						
			E						
			F						
SAT-M	Negro	Male	A						
			B						
			C						
		Female	A						
			B						
			C						
	Non-Negro	Male	D						
			E						
			F						
		Female	D						
			E						
			F						