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This study compared handicapped with able-bodied university freshmen to determine if high school rank and aptitude test scores were valid predictors of college grades for the handicapped. The subjects were 17 female and 32 male severely handicapped students enrolled at the University of Missouri. Analysis of high school rank (HSR), School and College Ability test scores (SCAT), and first semester grade point average (GPA) showed no significant differences between able-bodied and handicapped college freshmen. Prediction indices based upon the able-bodied alone appeared to predict GPA for handicapped students as well as or somewhat better than special prediction tables based upon only handicapped norms. However, high school rank was the single poorest predictor of GPA for handicapped students. If only one predictor were available, the most appropriate would be the scholastic aptitude test score. (NS)

Predicting College Grades of Handicapped Students At the University of Missouri *

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As more college and universities begin to admit handicapped college students, the question of prediction of academic success for this group will become more important. The University of Missouri, Columbia, admits handicapped students using the same basic criteria applied to able-bodied students. Once enrolled, handicapped students are expected to carry a minimum equivalent full-time course load of 13 credits per semester.

High school counselors, vocational rehabilitation counselors, and college admission personnel have often asked counselors at the University if indices used to predict college grades of able-bodied students are applicable to handicapped students. These questions and the apparent feasibility of studying the prediction of academic success of handicapped compared to able-bodied college students at the University of Missouri prompted this study in the spring of 1967.

Typically, a combination of high school rank and academic aptitude test scores has been used for prediction of college success. Bloom and Peters, 1961 found correlations of +.52 to +.66 with first semester GPA, with a median value of +.61. However, it has been suggested that handicapped students might constitute a special group not represented in orginal norm groups studied. It has also been hypothesized that varibles other than test results must be used as predictors of academic success for handicapped students.

Lerner and Martin (1955), presenting the relationship between test findings and college achievement of 59 physically handicapped college students stated, "It would appear that no single measure available at the time of college admission can be relied upon to predict college achievement, although high school average reliable than any other single measure".

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It was the purpose of this study to (1) present normative data comparing handicapped with able-bodied University freshmen and (2) determine if University of Missouri prediction tables based upon able-bodied students were valid for predicting grades of handicapped students.

Subjects

Subjects were 17 female and 32 male severly handicapped students who met regular University admission requirements and were admitted from 1963 to 1966. Median age at admission was 18 for both males and females with ranges of 17-24 and 17-21 respectively. Subjects came from the states of Arkansas, Colorado, Indiana, Iowa, Missouri, New York, North Dakota, and South Dakota; and from Canada and Mexico. All met the criteria of: (1) enrolled as a first semester freshman and (2) remained enrolled at least one semester. These handicapped students were mainly enrolled in the divisions of Arts and Science, with only 15% of the students enrolled in other divisions. These include Education, Agriculture, and Engineering.

The sample included 2 legally blind, fifteen with orthopedic deformities affecting 3 or more limbs, 24 with orthopedic deformities of one or both lower limbs, 4 with spinal impairment, and 3 with other onthodepic deformities. Twenty seven were confined to wheelchairs, 9 on crutches and 13 ambilatory without aids.

Data available for both handicapped and able-bodied students included High School Rank (HSR), Cooperative School and College ability Test (SCAT) verbal score, Quantitative score and Total score, and first semester grade point average (GPA). HRS and SCAT scores were available in normalized T-scores derived from the University of Missouri Freshman Placement Test norms used at the time of the student's admission.

The test adminstration differed somewhat between the able-bodied and the handicapped student. Handicapped students were permitted assistance comparable to the type of assistance they would received while in school. In the case of students who require assistance in writing, proctors aided the students in marking the answers.

Other standandization proceedures were maintained. In most cases, however, subjects were permitted to work beyond the designated timelimit, but the administer noted the responses given at the time limit. Both scores, regular time and total time were reported but only the standardized score was used in this evaluation. Norms for both methods of administration are being prepared to evaluate the effort of extended test time.

Data for able-bodied students was obtained from prediction tables of the first semester academic success published at the University of Missouri by (Prediger, Krauskopf and Callis, 1963). Analysis of test data of 2,917 freshmen had been made for nine University divisions-by-sex groupings with a partial analysis for all University males and females. The monograph also included normative test data and eight prediction tables based upon regression equations using HRS and SCAT total in the prediction of first semester GPA.

Procedure

Means and standard deviations of the data available were compiled to compare handicapped to able-bodied freshmen. To evaluate the second purpose of the study, a regression equation was derived using two prediction variables, HRS and SCAT Total score. First semester GPA's for all handicapped students were predicted using this equation. Next, first semester GPA's for the same group of handicapped students were predicted based upon the Prediger, et. al. (1963) tables. Finally, the actual first semester GPA's for the group of handicapped students under study were compared with the two predictions.

Results and Discussion

In Table A means and standard deviations for each predictor variable and first semester GPA are presented for handicapped students and able-bodied freshmen, grouped by sex. Two variable means, male Verbal and Quant., showed significantly higher ($p.=.05$) than the

mean Verbal score of able-bodied male freshman. Mean Quant. scores, however, were significantly lower (p.=.05) than the mean Quant. scores of able-bodied male freshman. All other variable means were not significantly different from the population mean. Total population scores for the variable noted in Table A were not available for the non-handicapped students.

The data in Table A indicate, with the exception of male SCAT Verbal and SCAT Quant. mean scores, that performances of handicapped students in high school, on the SCAT, and during their first semester at the University of Missouri is not significantly different from performance of able-bodied students. That handicapped male students as a group did not perform as well as all the freshmen able-bodied male students on the SCAT Quant. score might be explained by the fact that 24 percent of able-bodied males were enrolled in the College of Engineering whereas, only 6 percent of handicapped male students were so enrolled. The mean SCAT Quant. score of engineering students is 58.0. A comparison of able-bodies males not enrolled in engineering and male handicapped students might negate the differences found.

This might also account for the difference between handicapped males and able-bodied males on the SCAT Verbal score since the mean engineering score on this section was found to be 50.7. Data on non-engineering,able-bodied males was not readily available to test this hypothesis, which nevertheless, appears plausible since SCAT Total score means of able-bodied and handicapped students are nearly identical.

Table B presents the correlation of four predictors variables and multiple correlations with the GPA criterion. The single best predictor of GPA for both handicapped males and females and the entire handicapped group is SCAT Total score. The poorest single predictor for both handicapped groups and the total handicapped group is HSR. A combination of SCAT Verbal and Quant. scores for the females, SCAT Quant. and HRS for the males and HRS and SCAT Total group revealed the highest multiple correlations.

A multiple regression equation based upon the total sample of handicapped students was computed using the two best predictor variables,HRS and SCAT Total. The least squares regression equation

derived was GPA =-.614 + .0406 SCAT Total + .0118 HSR. The amount of variance from the actual GPA using the derived equation was .43. The amount of variance from the actual GPA of the predicted GPA using the Prediger, et. al. (1963) prediction Tables was found to be .46. The difference between the two variances was not sufficient to conclude that the prediction ability of one has more power than the other.

The coefficients of correlations in Table B, although similar to the coefficients available for able-bodied students, differ in one significant area. The single best predictor of first semester GPA for able-bodied students is HSR (Bloom and Peters, 1961). For handicapped students this variable is the poorest predictor. Several reasons why this difference occurs might be:

1. Handicapped students occasionally receive their high school training in special classes or special schools.
2. The number of graduating students in special classes (used as a base for high school rank) is generally small reducing individual ranks.
3. The handicapped student in high school may have been graded somewhat higher than able-bodied peers (halo effect).
4. An interruption in high school sequence may have occurred with "hospital-school" or tutoring becoming necessary.

To further contrast predictive methods, a gross, pass-fail type ofexpectancy table comparing predicted GPA's of 2.00 or better and GPA's of less than 2.00 was prepared and is given in Table C.

Available prediction tables based upon able-bodied students data predicted placement with 84 percent accuracy. The derived regression equation based upon handicapped student data predicted placement with 75 percent accuracy. While not a significant difference, the results indicate that available prediction tables are at least as good as, if not somewhat better, than specially derived tables in prediction ability.

Implications

The result of this study have implications for counseling and guidance personnel in secondary schools, rehabilitations agencies and colleges as well as for college admission personnel.

First, there appeared to be no significant differences between able-bodied and handicapped college freshmen in terms of 1st semester GPA, total scholastic aptitude test score, and high school rank.

Secondly, prediction indices based upon able-bodied alone appeared to predict first semester GPA for handicapped students as well as or somewhat better than special prediction tables based upon only handicapped norms.

However, contrary to data available for able-bodied students (Bloom and Peters, 1961) and suggestions regarding handicapped students (Lerner and Martin, 1955), high school rank was the single poorest predictor of first semester GPA for handicapped college students. This implies that counseling and admissions personnel should be very cautious in predicting college success for handicapped students using only high school rank. Rather, a combination of high school rank and scholastic aptitude test scores will predict beginning college success most efficiently. If only one predictor were available, the most appropiate would be scholastic aptitude test score.

Because of the heterogeniety of geographical background and handicaps of the students studied, it is believed that these results could be generalized to other institutions of higher learning.

Table A: T-Score Means and

Standard Deviations of Able-Bodied

and Handicapped Freshmen at the University of Missouri

		1st Sem. GPA		SCAT Verbal		SCAT Quant.		SCAT Total		HSR	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Female	Able-bodied	2.28	.84	52.6	9.9	49.9	10.1	51.5	10.2	53.6	9.2
	Handicapped	2.27	.62	51.06	14.35	49.59	13.54	50.94	13.80	53.35	9.92
Male	Able-bodied	1.90	.85	*49.9	9.5	*53.4	9.6	51.8	9.6	48.1	9.6
	Handicapped	1.92	.95	53.41	9.78	50.09	9.23	52.34	10.38	48.62	8.37
Total	Handicapped	2.04	.73	52.59	11.62	49.92	10.98	51.86	11.69	50.27	9.20

* = $p < .05$, two-tailed test

Table B: Zero Order

and Selected Multiple Correlations with
First Semester GPA for Handicapped Students

		Zero Order				Multiple			
	N	Verbal	SCAT Quant.	Total	HSR	Total HSR	Verbal HSR	Quant. HSR	Verbal Quant.
Female	17	.686	.632	.688	.394	.698	.697	.645	.717
Male	32	.577	.644	.701	.331	.703	.500	.708	.697
Total	49	.536	.574	.613	.371	.634	.564	.582	.612

Table C: Prediction of First Semester GPA

(above or below 2.00) of Handicapped Students
using derived equation vs. existing prediction table

Actual Grades Received		Correct vs. Incorrect Predictions (hits vs. misses)	
	N	Derived equation	Prediction Table
2.00 and better	30	22hits 4 misses	25 hits 3 misses
less than 2.00	19	15 hits 8 misses	16 hits 5 misses
Total N=	49	37 hits 12 misses	41 hits 8 misses

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