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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

GENERAL PRACTITIONER 070.103

S-39

U. S. Employment Service
in Cooperation with
Utah State Employment Service

April 1953

GATB #556
Spring 1948

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY FOR GENERAL PRACTITIONER 070.103

S-39

Summary

During the spring of 1948 the General Aptitude Test Battery was administered to 479 seniors, 49 second-year students in the College of Medicine, and 101 sophomores in the College of Pharmacy at the University of Utah, Salt Lake City, Utah. Only the data for the 49 second-year students in the College of Medicine are included in this report. The grade point average for the five completed quarters of medical study was selected as the criterion. On the basis of mean scores, standard deviations, correlations with the criterion and course analysis, Aptitudes G-Intelligence, V-Verbal Aptitude, N-Numerical Aptitude, and S-Spatial Aptitude were selected for inclusion in the test norms.

GATB Norms for General Practitioner 070.103

Table I shows for B-1001 and B-1002, the minimum acceptable scores for each aptitude included in the test norms for General Practitioner 070.103.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for General Practitioner

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
G	CB-1-H CB-1-I CB-1-J	130	G	Part 3 Part 4 Part 6	~~130~~ 125
V	CB-1-J	115	V	Part 4	115
N	CB-1-D CB-1-I	115	N	Part 2 Part 6	~~115~~ 110
S	CB-1-H CB-1-F	115	S	Part 3	~~115~~ 110

Effectiveness of Norms

The data in Table V indicate that seven of the 10 poor students, or 70% of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. Moreover, thirty-five of the thirty-eight students who made qualifying test scores, or 92%, were good students.

TECHNICAL REPORT

I. Problem

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the Occupation of General Practitioner 070.103

II. Sample

The General Aptitude Test Battery was administered to 49 students in their sophomore year of Medical School at the University of Utah, Salt Lake City, Utah. The junior and senior students of the Medical College were not readily available for testing due to conflicting practice clinics. However, it was felt that the sophomore class had sufficient experience within the College to afford measurable degrees of success. All of these students had similar pre-medical and medical backgrounds which included thorough study of the basic premedical sciences. All but 5 of the 49 students were selected partly on the basis of their performance on the Professional Aptitude Test.

There were no age or experience data available. All of the students were at the same level in their education since they were all members of the same class and had completed the same courses of study.

III. Job Description

General Practitioner 070.103

Engages in such phases of medicine as diagnosing, prescribing medicines for, and otherwise treating, diseases and disorders of the human body, and performing surgery and operations. These persons often specialize in treating one part of the body, or one sex, or the correction of deformities. Must have the experience, educational, and legal qualifications to be recognized as a physician.

Course Description

The first year is devoted to courses in Anatomy, Biochemistry, Physiology, Public Health and Psychiatry. In Anatomy constant effort is made to correlate the several courses with each other and to emphasize the functional approach. Biochemistry and Physiology stress the fundamental principles of the subject and relate these to their clinical application.

In the second year courses in Pharmacology, Pathology, Public Health, Radiology, Bacteriology and Psychiatry are given. These courses provide the students with an adequate background for the introductory courses in Physical Diagnosis, Medicine, Surgery, Pediatrics, and Obstetrics given in the latter part of the second year.

The third year is essentially an in-patient clerkship in which the class is divided into small groups, and the students are assigned patients for study. The student is responsible for the patient's history, physical examination and the laboratory work necessary to make the diagnosis. He follows the patient

carefully throughout his period of hospitalization. Each student's work is carefully checked by the clinical staff during ward rounds and in conference. In addition to this clerkship, each clinical department gives additional didactic courses and clinics for the entire class.

The work of the fourth year is designed to bring the student in contact with medical problems as they are encountered in a clinical practice and to give further training in specialized phases of medicine. The courses given by the several clinical departments are closely correlated. The student is expected not only to read textbooks but to consult the original literature and monographs bearing on the problems he encounters.

A definite goal of the curriculum is to enable students to become efficient, independent, self-teaching physicians, with the ability and desire to keep abreast of advances in scientific medicine during the years following graduation.

Experimental Battery

All of the tests of the GATB were administered to the sample group.

Criterion

Grade point averages were used as the criterion in this study. The College of Medicine exists as a separate entity within the University and the students do not take other courses of study after they are enrolled in the program. Because of this, only the course grades received in the Medical College are included. Since this is a sophomore class the grade point averages for the first 5 quarters were computed for use as the criterion. The natural cutting score would be a grade point average of 1.00, which is the difference between success and failure in the school. However, this places only one person in the low group so the cutting score was arbitrarily set to place approximately 20% in the low group. It is assumed that not more than 20% of the students will drop out before completing the course of study.

Statistical and Qualitative Analysis

Table III shows means, standard deviations, Pearson product-moment correlations with the criterion, and standard errors of correlation for the aptitudes of the GATB. Table IV shows the means, standard deviations, standardized means, standardized standard deviations, Pearson product-moment correlations with the criterion and standard errors of correlation for the tests of the GATB.

The means and standard deviations of the aptitudes and standardized means and standard deviations of the tests are comparable to general population norms with a mean of 100 and a standard deviation of 20.

TABLE III

Means (M), Standard Deviations (σ), Pearson Product-Moment Correlations with the Criterion (r) and Standard Errors of Correlation (σ_r) for the Aptitudes of the GATB

General Practitioner 070.103

N = 49

Aptitudes	M	σ	r	σ_r
G-Intelligence	142.980	11.946	.507	.106
V-Verbal Aptitude	137.571	14.422	.453	.114
N-Numerical Aptitude	132.612	12.936	.392	.121
S-Spatial Aptitude	128.020	10.678	.412	.119
P-Form Perception	126.286	13.705	.119	.141
Q-Clerical Perception	123.000	20.034	.140	.140
A-Aiming	107.204	23.814	-.145	.140
T-Motor Speed	98.918	25.451	.013	.143
F-Finger Dexterity	97.531	16.576	-.011	.143
M-Manual Dexterity	109.776	20.915	-.056	.142

TABLE IV

Means (M), Standard Deviations (σ), Standardized Means (M'), Standardized Standard Deviations (σ') Pearson Product-Moment Correlations with the Criterion (r), and Standard Errors of Correlation (σ_r) for the Tests of the GATB

General Practitioner 070.103

N = 49

Test	M	σ	M'	σ'	r	σ_r
A-Tool Matching	27.980	4.143	124	14	.202	.137
B-Name Comparison	94.102	20.240	123	20	.140	.140
C-H Markings	52.755	5.705	123	15	-.405	.119
D-Computation	35.980	5.105	125	13	.333	.127
E-Letter Series	17.143	3.902	129	14	-.098	.141
F-Two-Dimensional Space	32.327	5.000	123	12	.398	.120
G-Speed	154.041	18.086	118	17	-.050	.143
H-Three Dimensional Space	26.837	3.776	127	11	.394	.121
I-Arithmetic Reason	15.714	2.433	141	14	.354	.125
J-Vocabulary	38.265	6.596	138	14	.442	.115
K-Mark Making	61.367	19.202	80	39	.042	.143
L-Form Matching	35.571	7.057	124	18	-.050	.143
M-Place	92.796	8.516	111	20	-.029	.143
N-Turn	102.898	9.888	104	23	-.073	.142
O-Assemble	28.510	4.141	104	18	-.060	.142
P-Disassemble	26.388	2.905	87	16	.108	.141

On the basis of statistics and course analysis, the significant aptitudes appear to be G, V, N and S.

Aptitude G - Intelligence is basic in the job and course analysis for the learning and comprehension of the underlying principles of medicine. The mean score of 143 is the highest for any aptitude. There is also a low standard deviation for Aptitude G and its correlation with the criterion is significant at the .01 level.

Aptitude V - Verbal Aptitude is a necessary part of reading comprehension, understanding of notes taken from lecture material and facility of expression which are all needed for the learning of a technical profession. Aptitude V also has a high mean and a high correlation with the criterion, significant at the .01 level.

Aptitude N - Numerical Aptitude shows statistical significance for inclusion in the test norms. There is a high mean, low standard deviation, and correlation with the criterion significant at the .01 level. Numerical ability is basic to pre-medical studies such as chemistry, physics and calculus in addition to being useful for studies in Medical College such as biochemistry and radiology.

Aptitude S - Spatial Aptitude is important in the recognition of different forms used in the vivisection laboratories and also in the understanding of two or three dimensional diagrams. It has a relatively high mean, the lowest standard deviation, and its correlation with the criterion is significant at the .01 level.

On the basis of job and course analysis, high means, low standard deviations, and significant correlations with the criterion, Aptitudes G, V, N, and S were selected for inclusion in the test norms. The cutting scores for Aptitudes G and S were set at one standard deviation unit below the mean rounded to the nearest five point score level. This resulted in minimum scores of 130 for Aptitude G and 115 for Aptitude S. In order to obtain better predictive value for the norms, the cutting scores for Aptitudes V and N were set at five-point score levels somewhat lower than one standard deviation below the mean. This resulted in minimum scores of 115 for Aptitude V and 115 for Aptitude N. Thus the test norms consist of G-130, V-115, N-115 and S-115.

For the purpose of computing a tetrachoric correlation coefficient between the test norms and the criterion and applying the Chi Square test, the criterion was dichotomized with those students who had a grade point average of 1.28 or over in the high criterion group and those students with a grade point average of 1.27 or under in the low criterion group.

Table V shows the relationship between test norms consisting of Aptitudes G, V, N and S with critical scores of 130 115, 115, and 115, respectively and the criterion of the grade point averages forGeneral Practitioner Students in the high criterion group have been designated as "good students" and those in the low criterion group as "poor students."

TABLE V.

Relationship Between Test Norms Consisting of Aptitudes G, V, N and S with Critical Scores of 130, 115, 115, and 115, respectively, and the Criterion for General Practitioner 070.103

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Students	4	35	39
Poor Students	7	3	10
Total	11	38	49

$r_{tet} = .84$ $\quad X^2 = 13.067$

$6r_{tet} = .28$ $\quad p/2 < .0005$

The tetrachoric correlation of .84, which is over twice its standard error, indicates a high and significant relationship between the norms and the criterion for this sample. The Chi Square value of 13.067 and p/2 of less than .0005 indicates that there are less than 5 chances in 10,000 that the obtained positive relationship occurred by chance.

VII. Conclusions

On the basis of course analysis, mean scores, standard deviations, correlation coefficients and their combined predictive efficiency, it is recommended that Aptitudes G, V, N and S with minimum scores of 130, 115, 115 and 115 respectively, be used as norms for General Practitioner. The same norms are applicable to the separate-answer-sheet form of the GATB, B-1002.