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Admissions: Standardized tests

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ADMISSIONS

STANDARDIZED TESTS

SCIENCE, VERBAL, OR QUANTITATIVE SKILLS: WHICH IS THE MOST IMPORTANT PREDICTOR OF PHYSICIAN COMPETENCE?

Karen Glaser, Mohammadreza Hojat, J. Jon Veloski, Robert S. Blacklow, Carla E. Goepf

The relative importance of medical school applicants' science problem solving, reading, and quantitative skills as measured by the Medical College Admission Test (MCAT) was studied in predicting competence measured by the three parts of the National Board Examinations (NBE). Subjects were 1,628 physicians graduated from Jefferson Medical College between 1978 and 1985. The results of bivariate and multiple correlations indicated that scores on the science problems subtest were better predictors of the basic science component of physician education (Part I scores of the NBE) than were the reading scores. Both the science problems and reading skills predicted clinical science scores equally well (Part II scores of the NBE). Reading skills scores contributed more than the science problems subtest in predicting scores on an examination of patient management skills (Part III of the NBE). Scores of the quantitative skills subtest did not contribute to any prediction. These findings suggest that the great emphasis placed by medical school admissions committees on science problem solving scores of the MCAT is justifiable if performance in the basic science component of medical education is taken as the target outcome measure. However, if clinical skills in medical practice are taken as a target criterion, then at least equal emphasis should be placed on reading skills scores of the MCAT. It is discussed that there may be a potential value in improving the reading skills of medical school students in order to enhance their clinical and patient management competence. Implications of these findings in support of the new MCAT are discussed.

Educational and Psychological Measurement. 1992; 52(2):395-405.

**A VALIDITY STUDY OF THE WRITING SAMPLE SECTION OF
THE MEDICAL COLLEGE ADMISSION TEST**

*Mohammadreza Hojat, James B. Erdmann, J. Jon Veloski, Thomas J. Nasca,
Clara A. Callahan, Ellen Julian, Jeremy Peck*

Problem Statement and Background: This study examined the validity of the Writing Sample section of the current Medical College Admission Test (MCAT) and tested the hypothesis that the Writing Sample scores would be more closely associated with indicators of clinical competence than with basic sciences achievement measures.

Method: In a longitudinal design, 1,776 matriculants at Jefferson Medical College between 1992 and 1999 were studied. Top, middle, and bottom scorers on the Writing Sample were compared on measures of performance in the basic and clinical sciences during medical school and beyond.

Results: The research hypothesis was supported. Scores on the Writing Sample were significantly associated with indicators of clinical competence, even when statistical adjustments were made for scores differences in other sections of the MCAT.

Conclusions: Findings support the validity of the Writing Sample from a number of perspectives.

Academic Medicine. 2000; 75(October Supplement):S25-S27.

Available online at publisher's site:

<http://www.academicmedicine.org/pt/re/acmed/pdfhandler.00001888-200010001-00008.pdf>

**PREDICTIVE VALIDITY OF THE MCAT FOR STUDENTS
WITH TWO SETS OF SCORES**

Mohammadreza Hojat, J. Jon Veloski, Carter Zeleznik

This study addresses the question of which set of scores for those students who retake the Medical College Admission Test (MCAT) yields a better predictive validity. The sample was comprised of 304 students who retook the MCAT prior to entering Jefferson Medical College between 1978 and 1981. Five sets of MCAT scores were considered as predictors in the study: earlier, later, higher, and lower sets of MCAT scores and the average of the earlier and later scores for each MCAT subtest. Twenty-five criteria were used, including grades earned in the freshman and sophomore years and scores on the subtests of Part I and Part II of the examinations of the National Board of Medical Examiners. Correlational techniques, such as bivariate and multiple correlation analyses and canonical correlation followed by redundancy analysis, were utilized. The magnitude of redundancy indices indicated that the set of MCAT scores in which the earlier and later scores were averaged was the best predictor, followed by the earlier, lower, higher, and later sets of MCAT scores. The implications of these findings for the admissions process and for validity studies are discussed.

Journal of Medical Education. 1985; 60:911-918.

**DELAYS IN COMPLETING MEDICAL SCHOOL:
PREDICTORS AND OUTCOMES**

Leonard M. Rosenfeld, Mohammadreza Hojat, J. Jon Veloski, Robert S. Blacklow, Carla E. Goepf

This study addresses whether delayed graduation due to academic difficulties in the early years of medical school can be predicted early and whether such difficulties are likely to be manifested in later clinical clerkships and residency. A group of 103 graduates who entered Jefferson Medical College between 1970 and 1984 and who required more than four years to complete their studies due to academic difficulties were compared with a random sample of 120 on-time graduates. Statistically significant differences were observed between delayed and on-time graduates on measures of performance before, during and after medical school in the favor of on-time graduates. Scores of 8 on the Medical College Admissions Test (MCAT) and an undergraduate science grade-point average of 3.25 were found to be pivotal points below which the likelihood of delayed graduation was higher than the likelihood of on-time graduation. Discriminant analysis indicated that 76% of delayed and on-time graduates could correctly be classified into their respective groups by using admissions variables. These findings suggest that predictors of delayed graduation can be detected early in medical school and that the academic difficulties that resulted in delayed graduation are likely to continue through postgraduate training. Recognition of the chronic nature of these differences should alert medical schools to monitor carefully the performance of students who are delayed because of academic difficulties and provide appropriate support on a continuing basis to enhance performance.

Teaching and Learning in Medicine. 1992; 4(3):162-167.

THE OVERALL VALIDITY OF THE NEW MCAT

J. Jon Veloski, Mohammadreza Hojat, Carter Zeleznik

This study was designed to provide information about the overall relationship(s) between the new MCAT scales and selected measures of academic performance. The study sample was comprised of data on 213 students who matriculated at Jefferson Medical College in 1978. The data included, in addition to the new MCAT scales, course grades obtained in the freshman and sophomore years and scores achieved on Part I of the National Board Examinations. Three statistical correlation techniques were used in analyzing the data: simple, multiple and canonical correlation.

Approximately 46% of the variance in the new MCAT linear composites and Part I of the NBME were accounted for in the canonical correlations of $R_{c1}=.61$ and $R_{c2}=.38$. Loadings of the canonical components indicated that the new MCAT scales measure performance in the science problems, chemistry, and physics as well as a verbally related dimension. Excluding the science problems, biology, chemistry, and physics from the global analysis did not change significantly the overall indices of relationships. The findings of this study support the validity of the new MCAT as an overall predictive measure of performance in the freshman and sophomore years of medical school.

Proceedings of the Twentieth Annual Conference on Research in Medical Education, Washington, DC, November 1981; 129-134.

**PREDICTIVE VALIDITY OF THE MCAT AS A FUNCTION
OF UNDERGRADUATE INSTITUTIONS**

Carter Zeleznik, Mohammadreza Hojat, J. Jon Veloski

The question of whether the predictive ability of the Medical College Admission Test (MCAT) differed for students from different undergraduate institutions was addressed in this study. Two groups of students were studied: group 1 comprised 1,859 students who entered Jefferson Medical College between 1964 and 1977, and group 2 consisted of 999 students who entered the college between 1978 and 1982. Ten undergraduate institutions with at least 20 matriculants in each group were selected for analysis. Group 1 students had taken the old version and group 2 the new version of the MCAT. Scores on the Science subtest of the old MCAT were used as the predictor for group 1, and scores on the Science Problems subtest of the new MCAT were used as the predictor for group 2. First-year and second-year medical school grade-point averages and total scores on the Part I and Part II examinations of the National Board of Medical Examiners were the performance measures used. Validity coefficients were derived of the predictive value of the MCAT scores at each of the 10 undergraduate institutions. Striking differences were found in validity coefficients among these institutions. These differences raise questions about the predictive validity of the MCAT when scores for different undergraduate institutions are combined in deriving the coefficients. Possible explanations, implications for admissions decisions and validity studies, and limitations of these findings are discussed.

Journal of Medical Education. 1987 ;62:163-169.
Reprinted in *The Advisor, 1987; 7(3):1-4.*

**LONG-RANGE PREDICTIVE AND DIFFERENTIAL VALIDITIES OF THE
SCHOLASTIC APTITUDE TEST IN MEDICAL SCHOOL**

Carter Zeleznik, Mohammadreza Hojat, J. Jon Veloski

This study was designed to determine the predictive and differential validity of the Scholastic Aptitude Test (SAT). Data derived from a longitudinal study of 1,284 students who entered Jefferson Medical College in the years 1965 through 1974 were analyzed. The students were divided into four groups according to their earned scores on the verbal and quantitative scales of the SAT.

When analysis of variance was applied to the data, a significant relationship was found between SAT scores and academic achievement levels in medical school. Those students who scored high on the SAT achieved higher grades (scores) on the standardized measures of achievement and those who scored low on the SAT scored lower on the standardized measures. The validity of the SAT as a predictor of future academic performance was supported by our findings.

Educational and Psychological Measurement. 1983; 43:223-232.

**THE RELATIONSHIP BETWEEN MCAT SCIENCE SUBTEST SCORES
AND PERFORMANCE IN MEDICAL SCHOOL: THE IMPACT
OF THE UNDERGRADUATE INSTITUTION**

Carter Zeleznik, J. Jon Veloski, Samuel Conly, Jr., Mohammadreza Hojat

This study was designed to examine the validity of the Medical College Admission Test (MCAT) Science subtest as a predictor of student performance in medical school. Consideration was given to the undergraduate college attended by each student. Jefferson Medical College, in association with eight undergraduate institutions from which it accepts a large number of students, established a cooperative Longitudinal Study. Summary statistics were computed on mean MCAT scores, National Board Examination scores, and other performance measures. Data were collected on the students entering medical schools in the years 1965 through 1977, using the "old MCAT." Results obtained in this study indicated considerable variations in correlations between MCAT science scores and measures of medical school performances. The findings suggested that, based on the MCAT science scores and the undergraduate institution attended by the individual, it is possible to predict the degree of a student's success in some areas of medical school. It was concluded that the MCAT could be considered not a "nationally standardized" test but one requiring standardization in relation to many factors.

Proceedings of the Nineteenth Annual Conference on Research in Medical Education, Washington, DC, October 1980; 257-262.