

The Predictive Validity of the Medical College Admission Test

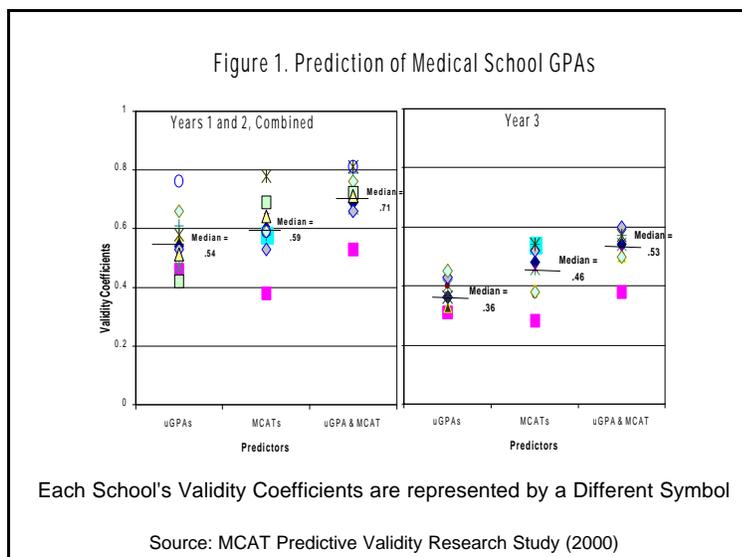
Since the introduction of the revised Medical College Admission Test (MCAT) in April 1991, the AAMC has been investigating its predictive validity. The MCAT Predictive Validity Research Study, reported here, assessed the relationships between information available on medical-school applicants, including all four MCAT scores and undergraduate science and non-science grade-point averages (uGPAs), and the subsequent performance of medical students, as reflected by medical-school grades and licensing examination (USMLE Step) scores for 14 participating schools. The MCAT scores' unique contribution to the prediction of that performance was of particular interest. This incremental predictive-validity approach asks, "How much predictive value does the MCAT add above the use of uGPA alone?"

The original analyses are too extensive to present in this fact sheet. A series of reports was produced for each of the participating schools, including all of the analyses in detail. For this report, the 1992 and 1993 entering-class cohorts are combined, the predictor sets that include the undergraduate institution's selectivity index are dropped (it contributed little to prediction after MCAT scores were included), and the first two years of medical school's grades are cumulated.

Sample

Schools - The 14 schools were selected so that, when pooled, the sample was representative of U.S. medical schools geographically, racially, and ethnically. The

- **MCAT and uGPAs each contribute something unique to the prediction of medical school grades.**
- **The combination of MCAT and uGPAs is more powerful than either predictor alone.**
- **The MCAT is a strong predictor of USMLE scores.**



sample included public and private schools as well as schools with varied curricular approaches, such as traditional, systems-based, or problem-based. Data from both the 1992 and 1993 entering classes were collected.

Students - The number of medical students in a school's cohort ranged from 65 to 148 (with a median of 126 for the 1992 cohort and 107 for 1993) for first-year data.

For the USMLE predictions, the entire national cohort was used. Many in the 1993 cohort had not yet taken the USMLE Step 3 licensure examination (approximately 5 years after matriculation) at the time of the analysis, so only the 1992 cohort's results are reported for Step 3.

Analyses

In regression analyses, the predictors (uGPAs and MCAT scores) are used to predict the criterion (grades or USMLE scores). In order to compare the predictive power of uGPAs and MCAT scores, three predictor sets were used in the analyses:

- (1) uGPAs alone,
- (2) MCAT scores alone,
- (3) MCAT scores and uGPAs.

For the prediction of grades, analyses were completed separately for each institution, and averaging the two cohorts' values. In Figure 1, results are summarized across institutions by plotting the schools' validity coefficients (multiple R's, corrected for restriction in range) and marking the median value.

Figure 2 compares the validity coefficients for the three USMLE Step examinations, across the different predictor sets.

Summary of Results

The ranges in validity coefficients illustrated in Figure 1 is one of the more profound results of this study: the predictive value of all preadmission data varies greatly among medical schools. The highest validity coefficient for the combined predictors (Set 3) is .81, predicting Cumulative GPA. For that school, almost two-thirds of the variance ($.81^2 = .66$) in first- and second-year grades is predictable using uGPAs and MCATs. The lowest validity coefficient is .28, predicting one school's third-year grades, where both predictors together manage to predict less than 10% of the variance.

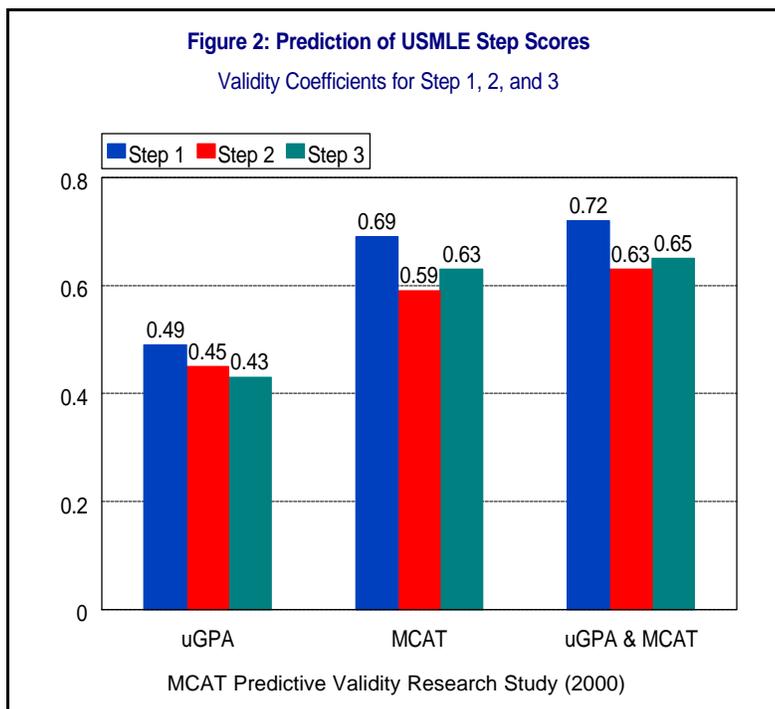
The median increase in the validity coefficients as a result of adding MCAT scores to uGPAs (comparing Set 3 to Set 1) is .17. While apparently modest, these increases approximately double the proportion of variance explained by uGPAs alone. The median increase in the validity coefficients as a result of adding MCAT scores to uGPAs (Set 3 compared to Set 1) are .23, .18, and .22, for the Steps 1, 2 and 3, respectively, and the proportions of variance explained double or more (see Figure 2).

From these figures, it is clear that the MCAT and uGPAs each contribute something unique to the prediction of medical school grades, and so the combination is more powerful than either predictor alone (e.g., .71 combined vs. .54 for uGPAs and .59 for MCATs in Cumulative GPA.) In contrast, the contribution of uGPAs to USMLE Step scores is largely subsumed by that of MCAT scores, and so adds little to the predictive power of the combination (e.g. .65 vs. .43 for uGPAs and .63 for MCATs in Step 3.) MCAT scores alone are almost as accurate predictors of USMLE scores as the two together. Grades in the clinical third year are the least predictable of the criterion variables.

Discussion

The two types of criterion variables used in this study, medical school grades and licensure examination scores, have fundamental differences that are important to consider when interpreting these results. One distinction is that GPAs are school dependent, requiring analysis within school, while the USMLE scores are comparable across medical schools.

The other relevant difference between the two types of criterion variables is that the USMLEs are multiple-choice



examinations, similar in format to that of three of the four sections of the MCAT. Any variation among persons that is unique to performance on multiple-choice questions would be present and consistent on both the MCAT and the USMLE scores, increasing their correlation. While it might be tempting to discount this part of the relationship between the MCAT and USMLE as artifactual, this would be reasonable only if the licensure examinations were being used as a proxy for "medical school performance." Prediction of performance on the USMLE examinations, including whatever variation is induced by methodological factors, is a valid and important role of the MCAT.

Not only do the grading criteria vary among medical schools, but so also do the relationships between the knowledge, skills, and abilities a student brings to medical school and what they achieve. To a large extent for medical school GPAs, and to a lesser extent, for USMLE scores (seen in analyses not reported here), the predictive value of all of the preadmission variables varies greatly. The strength of the relationships between preadmission variables and outcomes may be reflections of the medical schools' missions. The performances that they encourage and reward with good grades will differ, as will the amount of remedial assistance they offer students at risk for poor performance.

For Additional Information: Ellen R. Julian, Ph.D., Assistant Vice President and Director of the MCAT, 202-828-0692, E-mail ejulian@aamc.org. This and past issues of CIME are available at <http://www.aamc.org/meded/edres/cime>.