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# MCAT® Validity Data Report

July 2024

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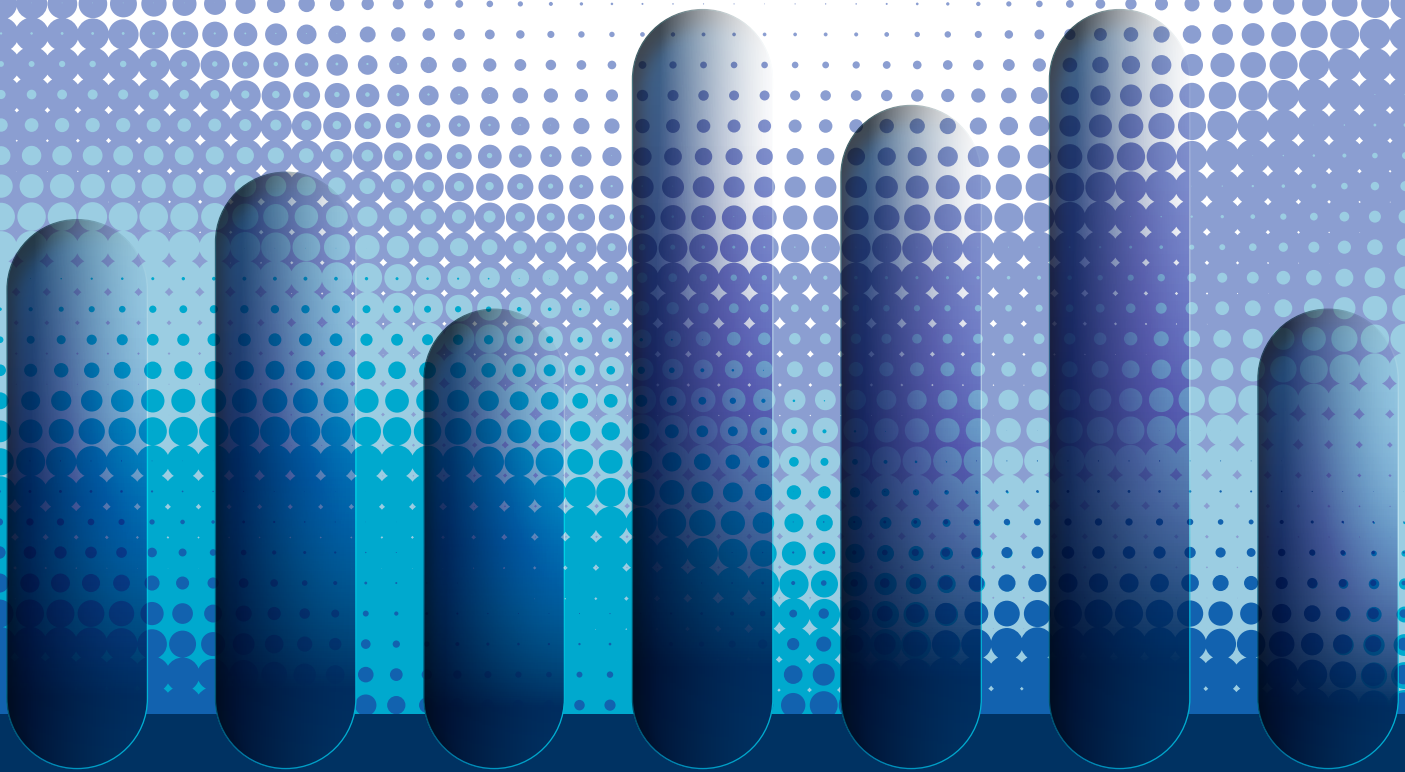
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# MCAT® Validity Research

The AAMC conducted a 10-year-long, multisite study to determine how well scores from the Medical College Admission Test® (MCAT®) predict students' performance in medical school. This work was led by the AAMC MCAT Validity Committee (MVC), a group of educators, admissions officers, researchers, and prehealth advisors from 17 medical schools and undergraduate institutions in the United States and Canada. The schools were diverse geographically and in missions, goals, curricula, and grading systems. The MVC began its work in 2012 and concluded in 2022.

The MCAT predictive validity study followed two cohorts of students — those who matriculated in 2016 and 2017 — from each of the participating 17 medical schools and collected data on their academic performance in medical school through graduation. The MVC analyzed the data to examine how well MCAT scores and undergraduate GPAs predicted these students' performance on the United States Medical Licensing Examination (USMLE) Step 1 and Step 2 Clinical Knowledge (CK) exams, their progression through medical school, and their eventual graduation in four or five years. They also examined locally defined outcomes tied to the curriculum, academic support offerings, and learning environment of each school in the study.

This report summarizes the findings from this longitudinal validity study. Data from this study show that:

- MCAT scores strongly predict medical student performance in preclerkship and clerkship courses, as well as on USMLE Step 1 and Step 2 CK exams.
- Some students, however, perform better in medical school than their MCAT scores predict, and others perform less well.
- MCAT scores predict students' performance better than undergraduate GPAs.
- Using MCAT scores and undergraduate GPAs together, however, provides improved predictions for students' likely success in medical school than using either metric alone, including predicting if a student will pass Step 1 and Step 2 CK exams, if they will progress to year three on time or with an extra year, and if they will graduate within four or five years.

MVC research sought answers to the following important questions, in three areas of study. For a complete list of the MVC's publications and to learn more about their research areas, visit [aamc.org/mcatadmissions](https://aamc.org/mcatadmissions). 

## Predicting Academic Performance

- How well do MCAT scores predict students' performance in the first year of medical school?<sup>1</sup>
- Do applicants from different backgrounds, who enter medical school with similar ranges of MCAT scores and undergraduate GPAs, perform similarly in the curriculum?<sup>2</sup>
- Can MCAT scores and undergraduate GPAs predict DO student performance on the Comprehensive Osteopathic Medical Licensing Examination of the United States (COMLEX-USA) Level 1 and Level 2-Cognitive Evaluation licensure exam?<sup>3</sup>

## Academic Preparation

- How do MCAT examinees from different socioeconomic backgrounds prepare for and perform on the exam?<sup>4</sup>
- How can mentors best help students strategically prepare for the exam?<sup>5</sup>
- How do examinees from lower socioeconomic backgrounds differ in their uses of effective test preparation, preparation resources, and learning strategies (as discussed in A. Swan Sein et al., unpublished data, 2024)?

## Admissions Decision-Making

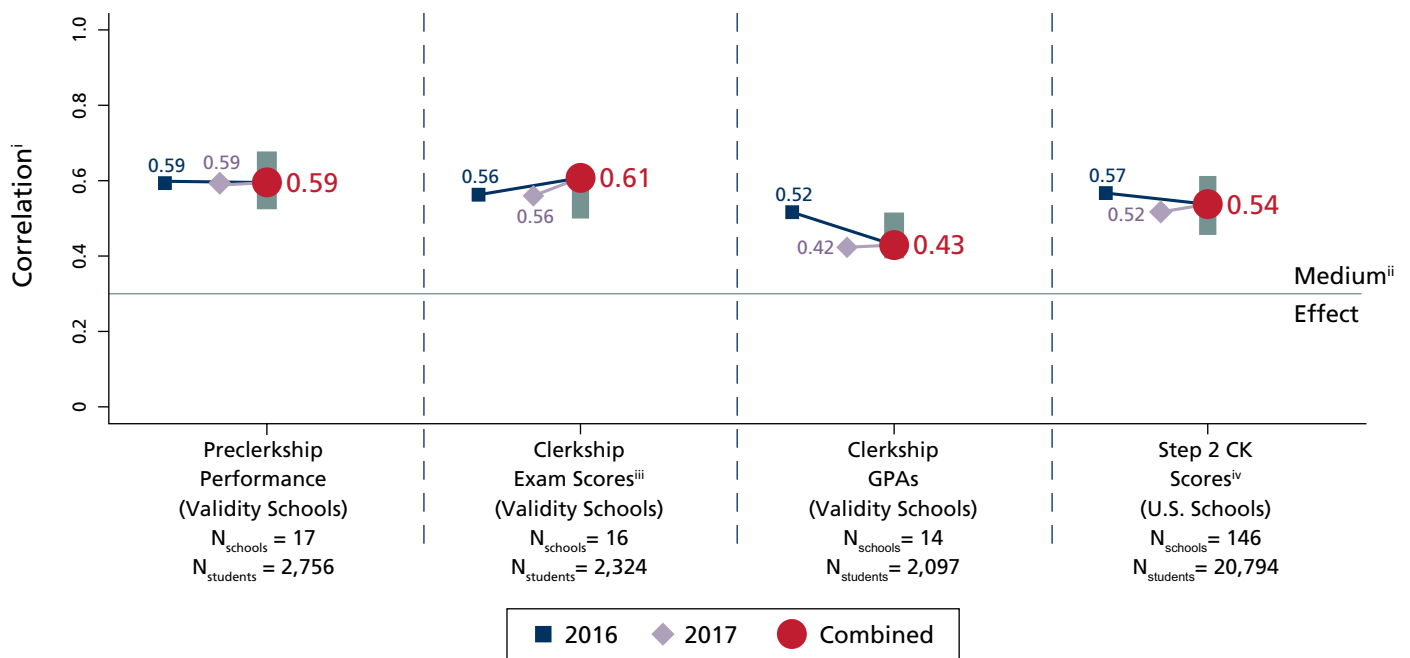
- How do structural racism and inequality affect educational opportunity and academic achievement?<sup>6</sup>
- Can admissions committees admit more diverse classes by considering applicants with wider ranges of MCAT scores?<sup>7</sup>
- How does focusing on equity-based recruiting, standards, selection, and support in medical school admissions create a more diverse medical student body (as discussed in N.F. Anachebe et al., unpublished data, 2024)?

# MCAT Scores Predict Medical School Performance

Correlational analyses were done at each school to examine how well MCAT total scores predicted students' preclerkship performance, clerkship exam scores, clerkship GPAs, and Step 2 CK scores from the first attempt.<sup>2,8</sup> Correlations for each performance outcome were grouped together to identify the midpoint of these correlations across all schools for the two entering classes combined, as well as the midpoints for the 2016 and 2017 matriculating classes separately. Conducting these correlational analyses by school and entering class allows us to see how the correlations of MCAT scores and student performance outcomes vary across schools, each of which has its own approach to teaching, evaluating, and supporting students, which also may change over time.

Figure 1 shows the median correlation and interquartile range of MCAT scores with outcomes for the combined 2016 and 2017 cohorts and for each cohort separately. The preclerkship and clerkship findings are based on local outcomes from participating validity schools, and the Step 2 CK findings are based on national data from U.S. medical schools.

**FIGURE 1. Median correlations of MCAT total scores with students' preclerkship, clerkship, and USMLE Step 2 CK performance.**



Across all outcomes, the median correlation of MCAT total scores with the performance outcomes ranged from 0.42 to 0.61. By comparison, the threshold for a medium-effect size in the social sciences is 0.3.<sup>9</sup> The median correlations of MCAT scores with preclerkship, clerkship, and Step 2 CK performance outcomes were medium to large, with some small cohort differences that were consistent with prior research.<sup>10</sup> Data not shown in Figure 1 also demonstrated large correlations between MCAT scores and Step 1 performance across cohorts.<sup>2</sup> This means that MCAT total scores provide important signals of students' readiness for the heavy knowledge acquisition in the first two years of medical school and in their application of that knowledge in their clinical years.

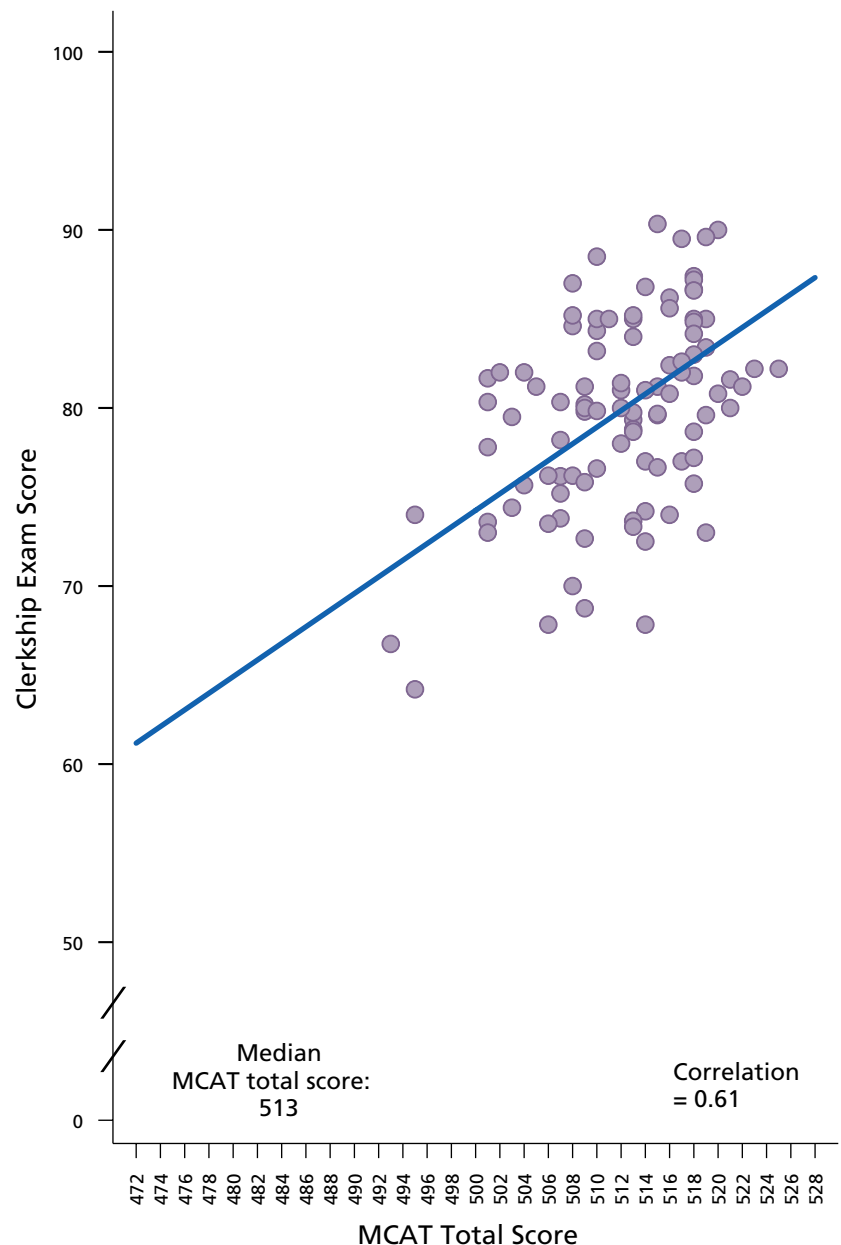
# Variability of Predictive Validity

Although MCAT scores are good predictors of student performance, the strength of prediction varies from one medical school to another. Many factors may contribute to this variability. Medical schools vary in their curricula, academic support offerings, and learning environments, which are tailored to their schools’ educational goals and their students’ needs. Research shows that MCAT scores are only one signal of future student success and that other factors also shape performance.

Figure 2 shows how well MCAT scores predict the clerkship performance of students at a single medical school. At this school, the correlation between MCAT scores and clerkship exam performance was 0.61. Figure 2 shows that:

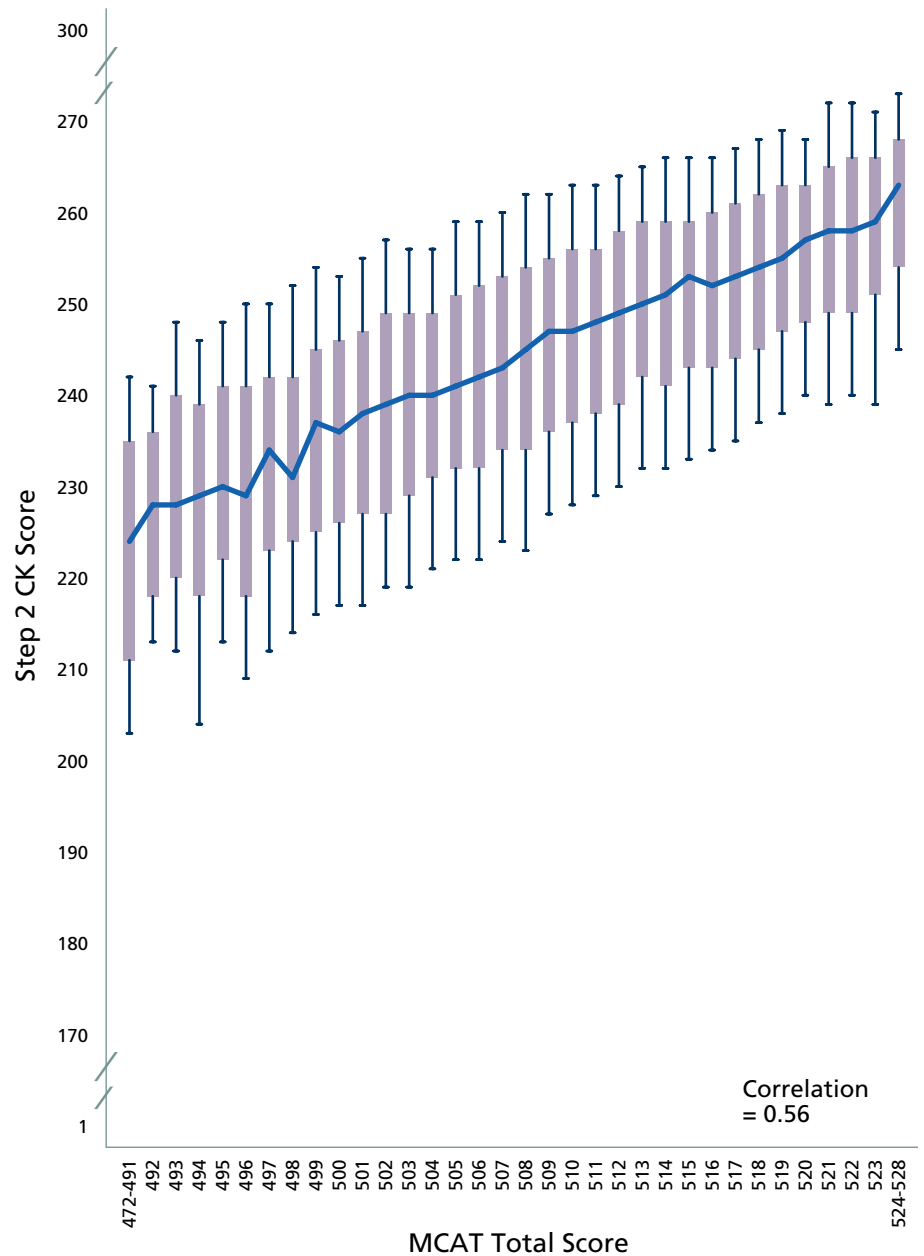
1. This validity school accepts students with a wide range of MCAT total scores.
2. On average, participants admitted with higher MCAT total scores show higher clerkship performance.
3. Individual medical student performance is variable. Some students outperform what might be expected based on their MCAT score, while others underperform.

**FIGURE 2. Scatter plot of clerkship exam scores by MCAT total score for students at one validity school.†**



Similarly, Figure 3 demonstrates that across U.S. medical schools, students with higher MCAT scores obtained higher scores from their first attempts at the Step 2 CK exam. These data suggest that students' premedical preparation, as measured by the MCAT exam, provides important building blocks that support their learning in medical school; however, as in Figure 2, for each MCAT score, some students performed better than expected while others performed less well. This is likely due to the significant learning and experience students gain during medical school. Students learn at different rates, respond to curricular approaches in different ways, and experience different levels of student support. This variability contributes to the variability in student success.

**FIGURE 3. Distribution of USMLE Step 2 CK scores by MCAT total score for students at U.S. medical schools.<sup>vi</sup>**



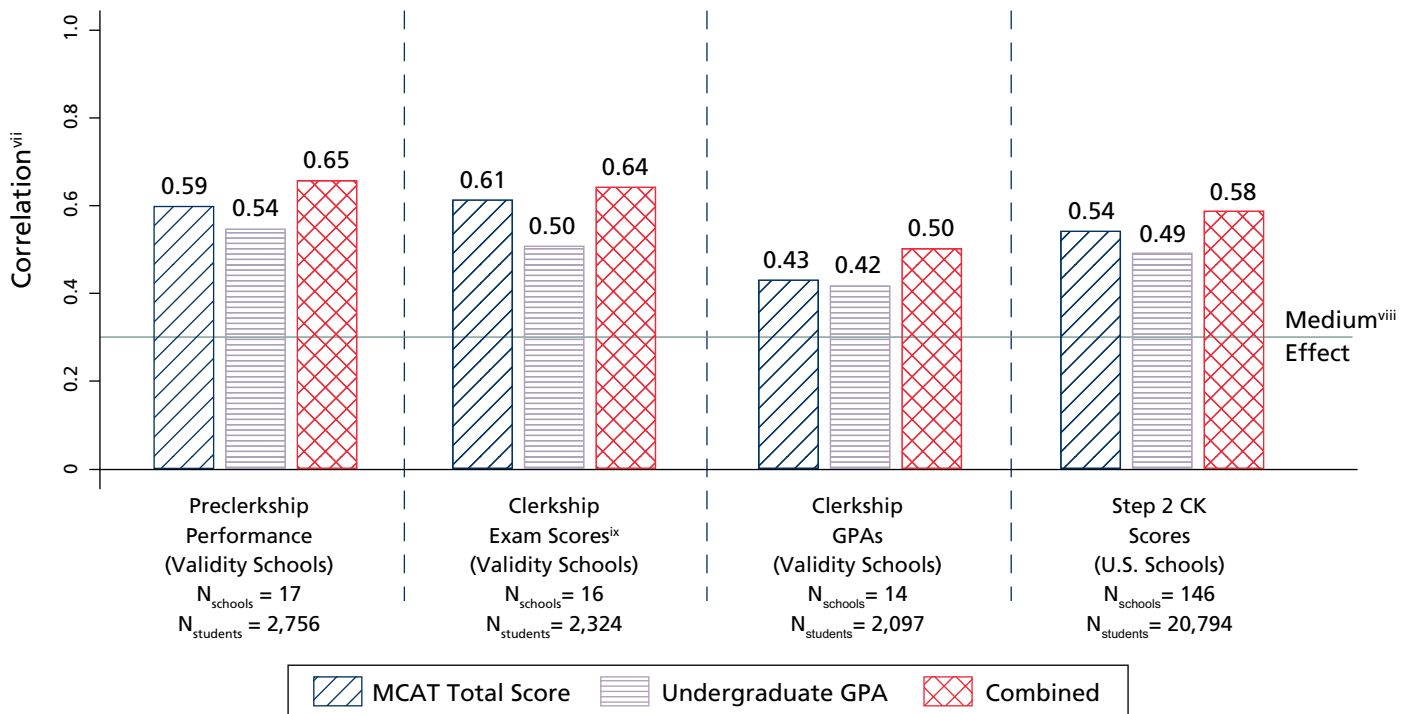


# Together, MCAT Scores and GPAs Make the Best Performance Predictor

MCAT scores consistently predict students' performance in medical school better than undergraduate GPAs; however, using MCAT scores and undergraduate GPAs together provides a better prediction of future performance in medical school than using either academic metric alone.<sup>2</sup> Undergraduate GPAs help explain why some students perform better than their MCAT scores predict, while others perform less well.

Figure 4 illustrates the correlations of MCAT scores alone, undergraduate GPAs alone, and MCAT scores and undergraduate GPAs examined together with student performance on preclerkship, clerkship exam scores, clerkship GPAs, and Step 2 CK scores. For each outcome, the median correlations were larger for MCAT scores than for undergraduate GPAs. Importantly, for each outcome, median correlations of MCAT scores and undergraduate GPAs examined together were larger than those for either MCAT scores or GPAs alone.

**FIGURE 4. Median correlations of MCAT scores and undergraduate GPAs alone and together with preclerkship, clerkship, and USMLE Step 2 CK performance.**



Both undergraduate GPAs and MCAT scores provide important information about applicants' academic strengths and weaknesses. Omitting either factor when assessing applicants' readiness for medical school can result in schools overlooking capable candidates and or struggling to support students academically. When evaluating students' readiness for medical school, MCAT scores should always be used within the context of other important information regarding applicants' experiences, attributes, and other academic data. This practice is foundational to holistic review and is a best practice recommended by the AAMC and professional testing standards.<sup>11</sup>

# MCAT Scores and GPAs Predict Important Milestone Student Success Outcomes

In addition to student performance in preclerkship, clerkship courses, and licensure exams, the MVC also studied important milestone student success outcomes, including passing the USMLE Step 1 and Step 2 CK exams, progressing to year three on time or with an extra year, and graduating within four or five years. The data supported the same findings, demonstrating the value of the MCAT exam in predicting these milestone outcomes. The data also showed that higher undergraduate GPAs can compensate for more modest MCAT total scores when predicting applicants' future performance in medical school. The same is true for MCAT total scores: Higher MCAT scores can sometimes compensate for more modest undergraduate GPAs. A careful review of an applicant's transcripts, experiences, and other information in their application will likely add insight and clues for judging discrepant MCAT scores and undergraduate GPAs.

This finding supports the process of holistic review, which carefully considers the full range of rich data that applicants provide about their experiences, attributes, and academic preparation. Admissions committees may admit applicants with modest MCAT scores and GPAs who stand out as capable of succeeding in the unique curriculum and contributing to the school's educational environment and its overall mission and goals. This validity research shows that MCAT scores are only one signal of students' likely success and that these myriad factors also shape performance.

**The AAMC releases national data on these important milestone outcomes for the most recent cohorts every year. For current student success outcomes data by MCAT score and undergraduate GPA, please visit [aamc.org/mcat-data](https://aamc.org/mcat-data). ↗**

**In addition, schools that participate with American Medical College Application Service® (AMCAS®) have access to their own local student data** in the "Integrated Admissions Reports" section of the **AMCAS for Schools webpage**. ↗ Here, you can view your school's MCAT and GPA data on accepted and matriculated students, and track their success outcomes from USMLE Step 1 through graduation.

## References

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- 11 Education testing and assessment. American Educational Research Association, American Psychological Association, National Council on Measurement in Education. In: *Standards for Educational and Psychological Testing*. American Educational Research Association; 2014:198.

# Appendices

## Appendix A. Summary of Medical Student Performance Outcomes

Performance Outcome	Description
Preclerkship performance.	Preclerkship performance is based on each student's mean performance across preclerkship courses. <sup>a</sup>
Passing United States Medical Licensing Examination (USMLE) Step 1 (first attempt).	The Step 1 pass-fail outcome from each student's first attempt at the exam.
Clerkship exam score.	The clerkship exam score is based on the mean score across the exams administered in clerkship rotations. <sup>b</sup>
Clerkship GPA.	The clerkship GPA is based on the mean performance across core clerkship courses, using each validity school's rating or grading scale. <sup>c</sup>
USMLE Step 2 CK score (first attempt).	The Step 2 CK score from each student's first attempt at the exam.
Passing USMLE Step 2 CK (first attempt).	The Step 2 CK pass-fail outcome from each student's first attempt at the exam.
Progressing to year three on time.	Progression is based on moving from year two to year three within the expected calendar year.
Graduating in four years.	Graduation within the expected calendar year.
Graduating in five years.	Graduation within one extra year of the expected calendar year.

### Notes

- a Each school identified the preclerkship courses that have reliable performance measures (e.g., written exams, practical exams, case studies, and other evaluations). Examples of preclerkship courses are: biochemistry, cell and molecular biology, cardiovascular and pulmonary systems, behavioral medicine and health, health care ethics, introduction to clinical anatomy, and community engagement. Although the selected courses vary widely in the extent to which they relate to the knowledge and skills tested by the MCAT® exam, most teach natural sciences subjects. Because the courses selected by each validity school made up the majority of preclerkship courses at the school, the measure of performance used here (with a range from 0 to 100) correlated highly with the preclerkship GPAs calculated by the medical schools or with class ranks at each school.
- b The clerkship exam scores are from the National Board of Medical Examiners Clinical Science Subject Exams.
- c Each clerkship "grade" reflects a student's overall evaluation based on a combination of clinical performance evaluations, exam scores, and other evaluations required by each clerkship at each school.

## Appendix B. MCAT® Validity Committee Members

### **Catherine R. Lucey, MD, Chair**

*Executive Vice Dean and Vice Dean for Education*  
University of California, San Francisco School of Medicine

### **Aaron Saguil, MD, MPH, FAAFP, COL, Vice Chair**

*Associate Dean, Regional Education, San Antonio*  
Uniformed Services University of the Health Sciences F. Edward, Hébert School of Medicine

### **Michelle A. Albert, MD, MPH**

*Associate Dean for Admissions*  
University of California, San Francisco, School of Medicine

### **Leila Amiri, PhD**

*Assistant Dean for Admissions and Recruitment*  
University of Illinois College of Medicine

### **Ngozi F. Anachebe, MD, PharmD**

*Associate Dean of Admissions and Student Affairs*  
Morehouse School of Medicine

### **Rhona Beaton, MAT**

*President-Elect*  
National Association of Advisors for the Health Professions, Inc.  
*Assistant Director of Health Professions*  
Union College

### **Kevin Busche, MD, BSc, FRCPC**

*Assistant Dean for Undergraduate Medical Education*  
University of Calgary Cumming School of Medicine

### **Julie A. Chanatry, PhD**

*Chair, Health Sciences Advisory Committee*  
Colgate University

### **Hallen Chung, MA**

*Director of Admissions*  
University of California, San Francisco, School of Medicine

### **Daniel M. Clinchot, MD**

*Vice Dean for Education*  
*Associate Vice President for Health Sciences Education*  
The Ohio State University College of Medicine

### **H. Liesel Copeland, PhD**

*Assistant Dean for Medical Education and Admissions*  
Rutgers Robert Wood Johnson Medical School

### **Francie S. Cuffney, PhD**

*Immediate Past-President*  
National Association of Advisors for the Health Professions, Inc.  
*Department Head, Biology*  
Meredith College

### **Martha L. Elks, MD, PhD, FACP, FACE**

*Senior Associate Dean for Educational Affairs*  
Morehouse School of Medicine

### **Kristen Goodell, MD**

*Associate Dean of Admissions*  
Boston University Aram V. Chobanian & Edward Avedisian School of Medicine

### **Joshua T. Hanson, MD, MPH**

*Associate Dean of Student Affairs*  
University of Texas Health Science Center at San Antonio Joe R. and Teresa Lozano Long School of Medicine

### **Demondes Haynes, MD, FCCP**

*Associate Dean of Medical School Admissions*  
University of Mississippi Medical Center School of Medicine

### **Loretta Jackson-Williams, MD, PhD, FACEP**

*Vice Dean for Medical Education*  
University of Mississippi Medical Center School of Medicine

### **Robert Liotta, MD, CAPT**

*Associate Dean of Recruitment and Admissions*  
Uniformed Services University of the Health Sciences F. Edward Hébert School of Medicine

### **Stephanie C. McClure, MD, FACP**

*Senior Associate Dean for Student Academic Affairs*  
Meharry Medical College

### **Kadian McIntosh, PhD**

*Director of Research and Analytics*  
University of Arizona College of Medicine - Tucson

**Chad S. Miller, MD, FACP, SFHM**

*Senior Associate Dean for Undergraduate Medical Education*  
Saint Louis University School of Medicine

**Cindy A. Morris, PhD**

*Assistant Dean for Admissions*  
Tulane University School of Medicine

**Remo Panaccione, MD, FRCPC**

*Director of Admissions*  
University of Calgary Cumming School of Medicine

**Aubrie Swan Sein, PhD, EdM**

*Director, Center for Education Research and Evaluation*  
Columbia University Vagelos College of Physicians and Surgeons

**Doug Taylor**

*Associate Dean for Student Affairs, Admissions and Records*  
East Tennessee State University James H. Quillen College of  
Medicine

**Carol A. Terregino, MD**

*Senior Associate Dean for Education and Academic Affairs*  
*Associate Dean for Admissions*  
*Chair of the Admissions Committee*  
Rutgers Robert Wood Johnson Medical School

**Barton Thiessen, MD, FRCPC, CAAM, DiMM**

*Assistant Dean for Admissions*  
*Chair, Committee on Admissions*  
Memorial University of Newfoundland Faculty of Medicine

**Mike Woodson, PhD**

*Director of Admissions*  
Tulane University School of Medicine

## Figure Notes

### Figure 1. Median correlations of MCAT total scores with students' preclerkship, clerkship, and USMLE Step 2 CK performance.

- i. Medical students' most recent MCAT total scores at the time of matriculation were correlated with each performance outcome. Analyses were conducted separately for each school with 30 or more students who had data available for each performance outcome. Sample correlations were corrected for range restriction on MCAT total scores and total undergraduate GPAs due to the selective nature of the admission process,<sup>8</sup> but not for unreliability in MCAT total scores or medical student outcomes. Corrections for range restriction were made at the institution level. At each medical school, the applicants from an admission cycle served as the reference population. Using established statistical methods, the observed correlations were adjusted to reflect what the correlations would be if there had been no selection; that is, if all applicants had been selected for admission.
- ii. According to J. Cohen in "A Power Primer" (1992),<sup>9</sup> a correlation coefficient of 0.10 is considered a small association in the social sciences; a correlation coefficient of 0.30 is considered a medium correlation; and a correlation of 0.50 or greater is considered a large correlation.
- iii. For this outcome, analyzing the 2016 and 2017 data together at each school resulted in a higher median correlation than the median correlations resulting from analysis of each cohort separately.
- iv. These data are based on students who took the Step 2 CK exam for the first time by the end of 2020.

### Figure 2. Scatter plot of clerkship exam scores by MCAT total score for students at one validity school.

- v. The results are for the 98 medical students who entered with scores from this version of the MCAT exam at this validity school in 2016 or 2017, whose clerkship exam scores were available. The median MCAT total score for the students in this analysis was 513 and based on the most recent score at the time of matriculation. The corrected correlation between MCAT scores and clerkship exam scores was 0.61.

### Figure 3. Distribution of USMLE Step 2 CK scores by MCAT total score for students at U.S. medical schools.

- vi. These data include Step 2 CK scores from the first attempt for U.S. medical students who matriculated in 2016 and 2017 (N = 25,177). The jagged, diagonal line shows the median Step 2 CK score for these students by their most recent MCAT total score at the time of matriculation. The purple vertical boxes show the Step 2 CK scores from the 25th to the 75th percentiles, and the blue vertical lines show the Step 2 CK scores from the 10th to the 25th percentiles and from the 75th to the 90th percentiles by MCAT total score. Numbers of students admitted with MCAT scores at the bottom and top of the MCAT score scale were too small to compare with those at other points; therefore, results for students admitted with MCAT total scores from 472 to 491 are reported together, as are the results for those who scored from 524 to 528.

**Figure 4. Median correlations of MCAT scores and undergraduate GPAs alone and together with preclerkship, clerkship, and USMLE Step 2 CK performance.**

- vii. Medical students' most recent MCAT total scores at the time of matriculation and total undergraduate GPAs were correlated with each performance outcome. Analyses were conducted separately for each school with 30 or more students who had data available for each performance outcome. Sample correlations were corrected for range restriction on MCAT total scores and total undergraduate GPAs due to the selective nature of the admission process,<sup>9</sup> but not for unreliability in MCAT total scores or medical student outcomes. Corrections for range restriction were made at the institution level. At each medical school, the applicants from an admission cycle served as the reference population. Using established statistical methods, the observed correlations were adjusted to reflect what the correlations would be if there had been no selection; that is, if all applicants had been selected for admission.
- viii. According to J. Cohen in "A Power Primer" (1992),<sup>9</sup> in the social sciences, a correlation coefficient of 0.10 is considered a small association; 0.30, a medium correlation; and 0.50 or greater, a large correlation.
- ix. These data are based on students who took the Step 2 CK exam for the first time by the end of 2020.





**Association of  
American Medical Colleges**  
655 K Street, NW, Suite 100, Washington, DC 20001-2399  
T 202 828 0400  
aamc.org