

MCAT
Medical College
Admission Test



MCAT 101: Characteristics and Use of the Medical College Admission Test (MCAT)

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MCAT® is a program of the
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Today's Topics:

- Characteristics of the Current Medical College Admission Test (Scott)
- The Role of GPA, MCAT, and Other Information in Medical School Admissions (Dana)



Characteristics of the Current Medical College Admission Test



Topics to be Covered

- Structure of the MCAT
 - Science and non-science content
 - Cognitive skills/competencies assessed
- Test scores
- Test administrations
- Test-taking policies
- Validity evidence



MCAT Test Sections

- Section 1: Physical Sciences (PS)
- Section 2: Verbal Reasoning (VR)
- Section 3: Writing Sample (WS)
- Section 4: Biological Sciences (BS)



Section 1: Physical Sciences

- Designed to assess examinees' introductory-level knowledge of physics and general (inorganic) chemistry concepts and the application of these concepts to solving scientific problems
- 52 multiple-choice items per form:
 - 39 passage-based items (7 passages)
 - 13 “stand-alone” items
 - 4 options per item
 - 70 minutes of testing time



Section 1: Physical Sciences

- Cognitive skills/competencies assessed
 - Items designed to require one (or more) of 7 different cognitive skills/competencies
 - 4 of these require “higher-order” cognitive processing of scientific information



Section 1: Physical Sciences

- Taxonomy of cognitive skills/competencies
 - Identification of Main Ideas
 - Identification of Components in a Situation and Relationships Among Them
 - Seeking Clarification
 - *Hypothesis Testing*
 - *Evaluation Processes*
 - *Flexibility and Adaptability in Scientific Reasoning*
 - *Reasoning Using Quantitative Data*



For example, items classified in the “Flexibility and Adaptability in Scientific Reasoning” category may ask students to:

- Use given information to solve a problem
- Arrive at a conclusion based on the evidence
- Determine the implications of results for real-world situations
- Develop a general theory or model based on the given information
- Etc.



Section 2: Verbal Reasoning

- Designed to assess examinees' ability to understand, evaluate, and apply information and arguments presented in prose text
- 40 multiple-choice items per form:
 - All items are passage-based (7 passages)
 - Passages drawn from the Natural Sciences, Social Sciences, and Humanities
 - 4 options per item
 - 60 minutes of testing time



Section 2: Verbal Reasoning

- Taxonomy of cognitive skills/competencies
 - Comprehension
 - *Evaluation*
 - *Application*
 - *Incorporation of Information*
- All but Comprehension require “higher-order” cognitive processing of passage information



Section 3: Writing Sample

- Designed to assess examinees' ability to develop a central idea, synthesize concepts, present ideas cohesively and logically, and write clearly
- Two open-ended essay prompts per form:
 - Each essay separately timed
 - 60 minutes of testing time (30 minutes per essay)



Section 4: Biological Sciences

- Designed to assess examinees' introductory-level knowledge of biology and organic chemistry concepts and the application of these concepts to solving scientific problems
- 52 multiple-choice items per form:
 - 39 passage-based items (7 passages)
 - 13 “stand-alone” items
 - 4 options per item
 - 70 minutes of testing time



Section 4: Biological Sciences

- Cognitive skills/competencies assessed
 - Same as for Physical Sciences section



MCAT Scores

- Multiple-choice sections: Scores reported on numeric scale ranging from 1 (low) to 15 (high)
- Writing Sample: Scores reported on alphabetic scale ranging from J (low) to T (high)
- Total Score: Sum of three multiple-choice scores (range = 3 to 45), with Writing Sample score appended to end (e.g., 28Q)



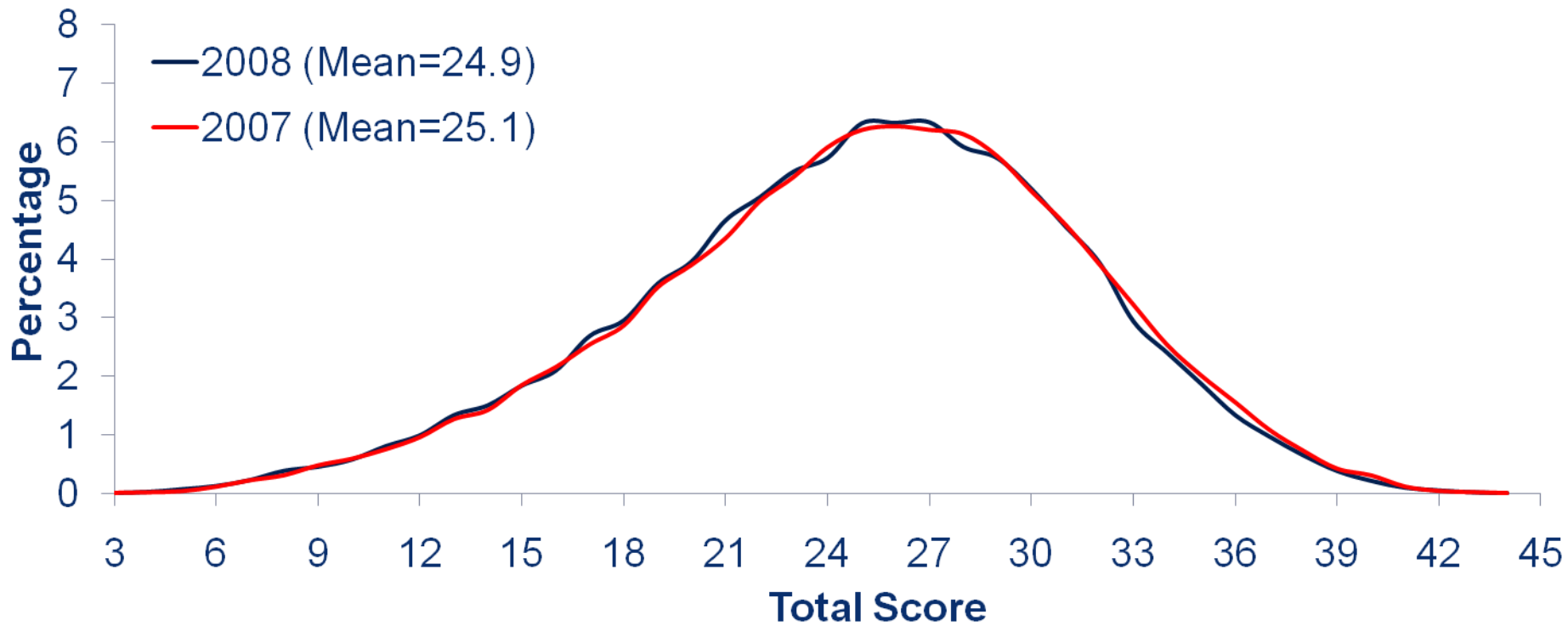
MCAT Scores: 2008 Results

- Number of exams administered = 75,809
- Multiple-choice sections
 - PS: Mean = 8.2 (SD = 2.4)
 - VR: Mean = 8.0 (SD = 2.5)
 - BS: Mean = 8.7 (SD = 2.5)
 - Total: Mean = 24.9 (SD = 6.4)



2007 and 2008 Total Scores

- Total Score = Sum of PS, VR, and BS



MCAT Scores: 2008 Results

- Writing Sample section
 - 75th percentile = Q
 - 50th percentile = O
 - 25th percentile = M



MCAT Test Administrations

- Computer-based administrations
- Scheduled from late-January to mid-September
- In 2009, there are 28 administrations scheduled
- Each administration is scheduled to take 5 hours and 5 minutes, including 45 minutes scheduled for “non-testing” activities (e.g., tutorial, breaks, etc.)



MCAT Test-Taking Policies

- Examinees may take the MCAT up to three times per year
- There are no lifetime limits on the number of times that an examinee may take the MCAT
- Scores from all examinee attempts on the MCAT are reported to medical schools



MCAT Validity Evidence

- Construct validity
- Predictive validity regarding various outcome variables
 - GPA
 - USMLE Step Exams
 - Graduation Rates



MCAT Validity Evidence

- Construct validity
 - *Science* article (Application of Bloom's Taxonomy Debunks the "MCAT Myth", Zheng, Lawhorn, Lumley, & Freeman, 2008)
 - 45% of MCAT BS items rated as demanding "higher-order thinking"
 - Results compared favorably to other exams (e.g., AP-Bio, GRE-Bio, undergraduate introductory biology, and medical school courses)



MCAT Validity Evidence

- Prediction of 1st year GPA
 - *Science* article (Standardized Tests Predict Graduate Students' Success, Kuncel & Hazlett, 2007)
 - *Medical College Admission Test* = .59
 - Law School Admission Test = .53
 - Pharmacy College Admission Test = .50
 - Graduate Record Exam-Subjects = .45
 - Graduate Record Exam-Total = .41
 - Grad. Management Admission Test = .41



Figure 1. The Relationship between MCAT Total Scores and Step 1 and Step 2-CK Scores for All 2000-2002 Matriculants.

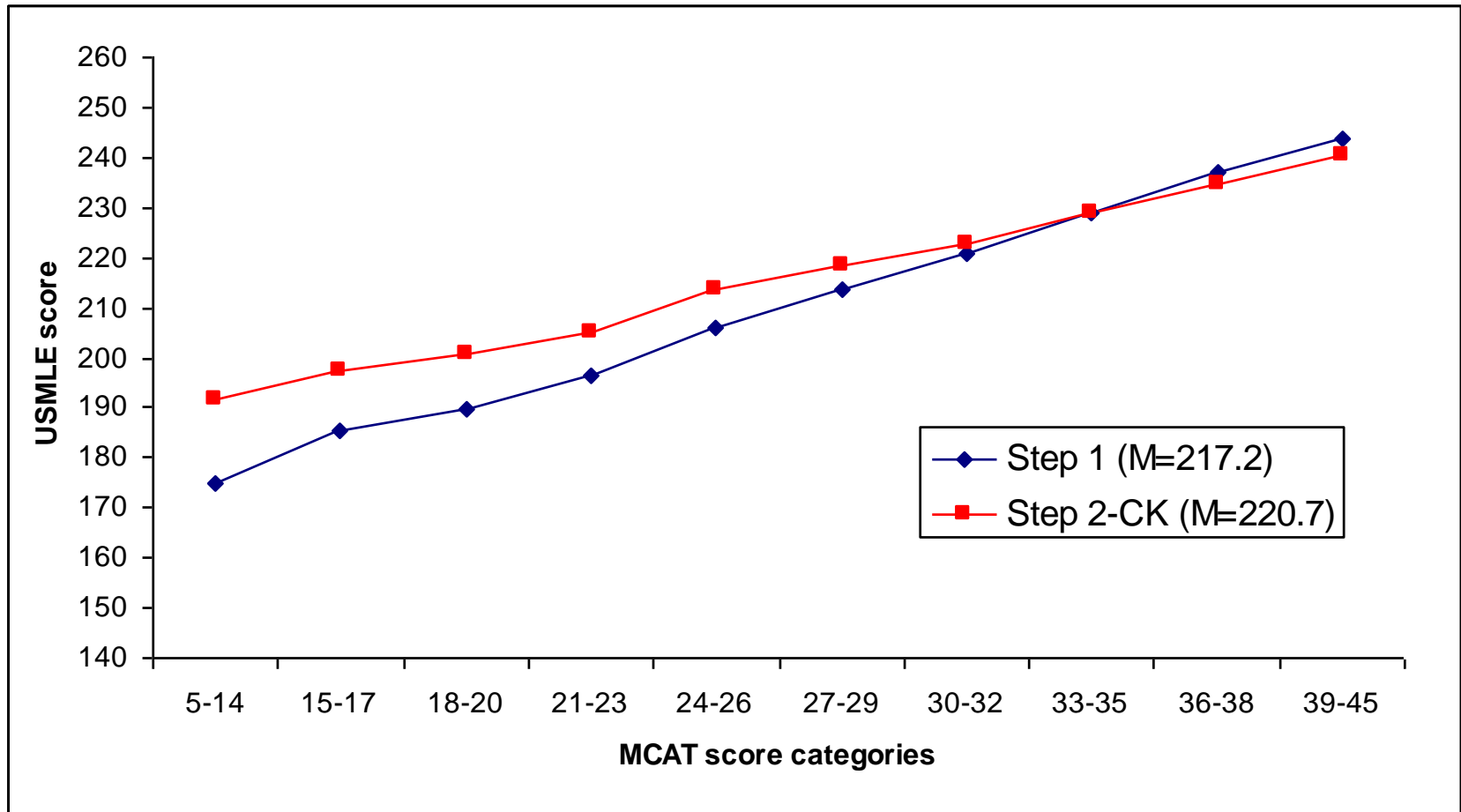


Figure 2. The Relationship between MCAT Total Scores and Step 1 and Step 2-CK Pass Rates for All 2000-2002 Matriculants.

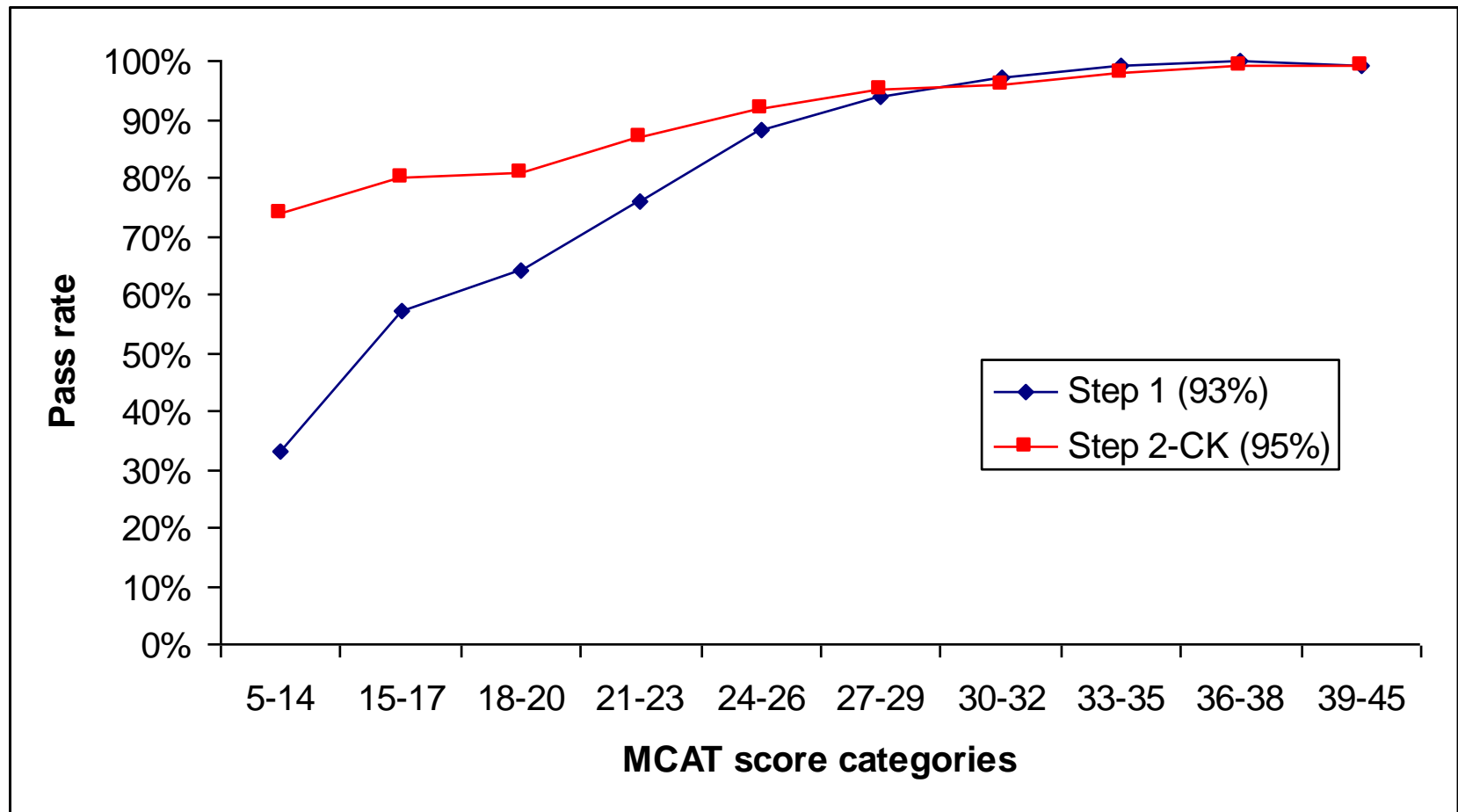
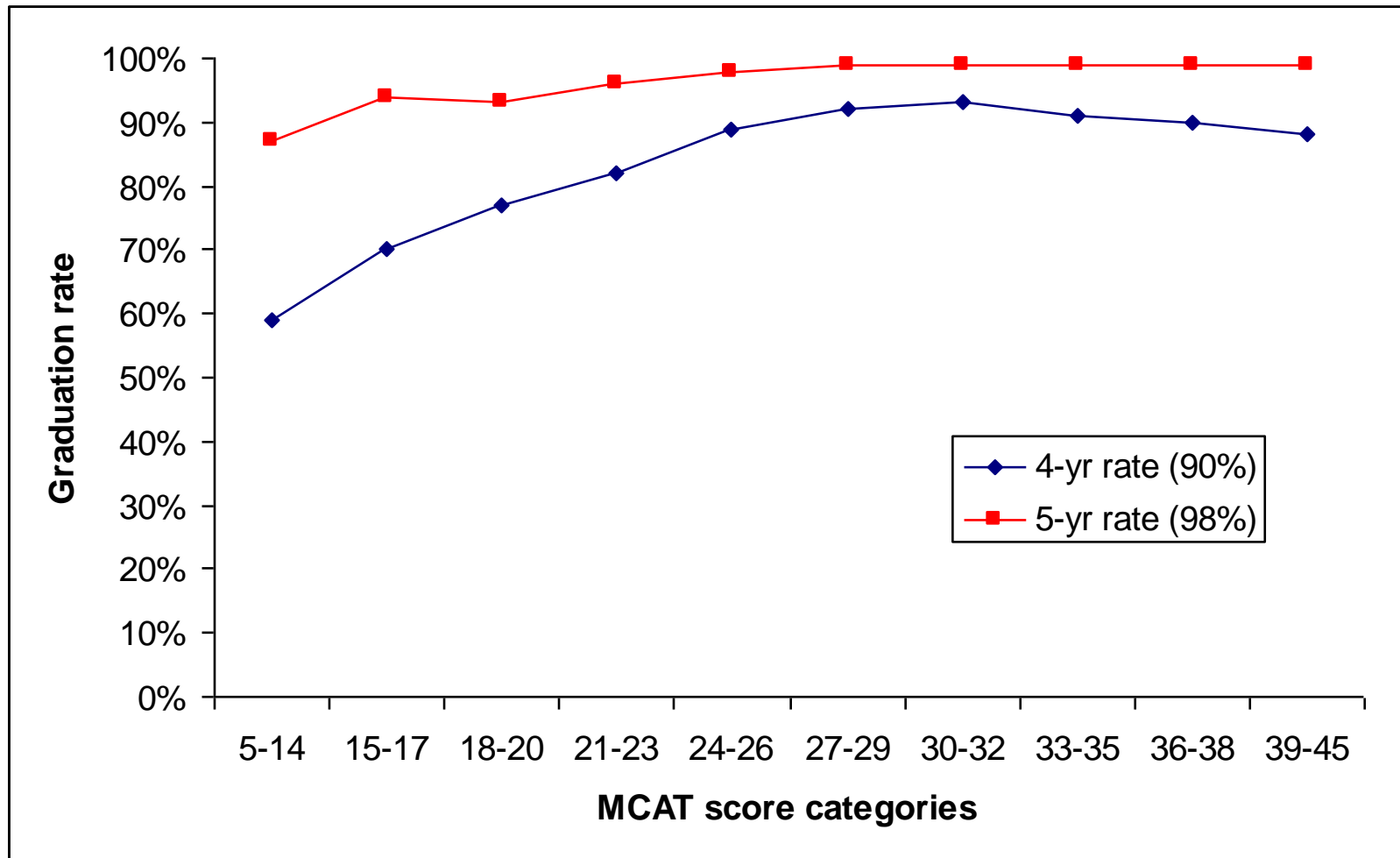


Figure 3. The Relationship between MCAT Total Scores and 4- and 5-year Graduation Rates for All 2000-2002 Matriculants.



MCAT Validity Evidence (cont'd)

- On average, higher scores on USMLE exams are associated with higher MCAT scores across the full range of MCAT scores
- USMLE pass rates and 4-year graduation rates also are associated with higher MCAT scores; however, increases tend to level off at MCAT scores of 27-29
 - These results may vary across medical schools due to differences in curricula, support programs, graduation requirements, etc.
- In comparison, 5-year graduation rates tend to be high throughout the range of MCAT scores



The Role of GPA, MCAT, and Other Information in Medical School Admissions



Medical School Admissions Survey

Administered to admissions officers in 142 medical schools in summer 2008

- Preceded by visits to 8 U.S. and Canadian medical schools
- 90% response rate (n = 129)
- 120 schools with complete data
 - 70 U.S. public
 - 43 U.S. private
 - 7 Canadian public



Research Questions

- What application data do admissions committees use?
- What are the results of admissions committees' work?



What application data do admissions committees use?



Categories of Application Data

- We describe four categories of application data:

Categories	Examples
Academic	GPA and MCAT scores
Experiential	Medical/clinical research experience
<i>Demographic</i>	<i>State residency</i>
Combination	Interview



Importance Ratings: Invitation to Interview

- Both academic and experiential data were rated as important in deciding which applicants to interview
- Of the application data rated as ≥ 3 (on the 5-point scale):
 - 5 (of 13) were experiential
 - 7 were academic
 - 1 was a combination

Data Used	Imp
GPA: Cum. undergraduate total	3.7
GPA: Cum. science/math	3.6
MCAT Total scores	3.5
Comm. service/vol. – med./clin.	3.3
MCAT Biological Sciences scores	3.3
Letters of eval/recommendation	3.3
MCAT Verbal Reasoning scores	3.2
Personal statements	3.2
Medical/clinical work experience	3.1
MCAT Physical Sciences scores	3.1
Completion of premed course reqs	3.1
Comm. service/vol. – not med./clin.	3.1
Leadership experience	3.0

Importance Ratings: Offer of Acceptance

- Admissions committees also rated both academic and experiential data as important when making offers of acceptance
- The variables rated as most important (mean ≥ 3.5) were:
 - Interview recommendation
 - Letters of recommendation
 - Undergraduate GPAs
 - Community service-medical/clinical

Data Used	Imp
Interview recommendation	4.5
Letters of eval/recommendation	3.7
GPAs: Cum. science/math	3.6
GPAs: Cum. undergraduate total	3.6
Comm. service/vol. – medical/clin.	3.5
MCAT Total scores	3.4
Personal statements	3.3
MCAT Biological Sciences scores	3.3
Medical/clinical work experience	3.3
MCAT Verbal Reasoning scores	3.2
Comm. service/vol. – not med/clin.	3.2
Leadership experience	3.1
MCAT Physical Sciences scores	3.1
Completion of premed course reqs	3.1

What are the results of admissions committees' work?



Percentage of 2005 -2007 Applicants Accepted into Medical School.

GPA Total	MCAT Total										All
	5-14	15-17	18-20	21-23	24-26	27-29	30-32	33-35	36-38	39-45	
3.80-4.00	4% 3/84	9% 17/187	19% 99/515	28% 397/1,425	48% 1,462/3,060	74% 3,791/5,114	86% 4,901/5,731	89% 3,948/4,414	92% 2,250/2,449	93% 847/911	74% 17,715/23,890
3.60-3.79	3% 6/213	5% 18/385	13% 130/982	21% 480/2,273	35% 1,524/4,312	60% 3,816/6,392	77% 4,535/5,899	84% 3,074/3,671	86% 1,326/1,541	89% 366/412	59% 15,275/26,080
3.40-3.59	3% 8/318	4% 24/592	11% 134/1,261	16% 397/2,461	28% 1,213/4,396	46% 2,882/6,266	63% 3,303/5,218	73% 1,932/2,635	76% 701/920	84% 174/208	44% 10,768/24,275
3.20-3.39	1% 4/364	3% 18/629	9% 114/1,282	16% 378/2,339	21% 714/3,446	33% 1,424/4,311	46% 1,598/3,451	55% 852/1,544	61% 287/470	71% 61/86	30% 5,450/17,922
3.00-3.19	1% 3/489	3% 16/626	7% 76/1,041	14% 232/1,683	18% 390/2,125	26% 598/2,311	35% 632/1,811	39% 297/772	52% 112/215	54% 20/37	21% 2,376/11,110
2.80-2.99	1% 3/411	2% 9/463	4% 31/754	13% 127/974	17% 197/1,169	21% 215/1,034	26% 180/702	27% 94/343	39% 32/83	54% 13/24	15% 901/5,957
2.60-2.79	0% 1/333	2% 8/328	6% 24/391	10% 53/520	12% 66/533	17% 83/490	22% 66/300	27% 33/124	36% 12/33	--	11% 348/3,056
2.40-2.59	0 0/224	2% 3/188	2% 5/226	7% 17/255	10% 24/243	11% 22/200	20% 27/133	27% 11/41	17% 2/12		7% 111/1,522
2.20-2.39	0% 0/160	2% 2/98	3% 3/101	7% 7/105	8% 7/89	8% 5/65	13% 5/39	8% 1/12	--	--	5% 32/676
2.00-2.19	0% 0/83	6% 3/47	0% 0/34	9% 3/32	0% 0/25	5% 1/19	8% 1/12	--	--		4% 10/262
1.47-1.99	0% 0/26	5% 1/22	7% 1/15	0% 0/13	7% 1/15	--	--	--			4% 4/106
All	1% 28/2,705	3% 119/3,565	9% 617/6,602	17% 2,091/12,080	29% 5,598/19,413	49% 12,837/26,200	65% 15,249/23,300	76% 10,244/13,560	82% 4,723/5,730	88% 1,484/1,683	46% 52,990/114,850

Take aways

- Admissions officers use a wide range of academic and experiential data in deciding who to interview and accept.
- Some applicants with very high MCATs and GPAs don't get accepted. Some with more modest MCATs and GPAs do.
- Interview ratings, letters, undergraduate grades, and community service are important application data.



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