

Are Questions the Answer? The Effect of Popular Study Resources on USMLE Step 1 Performance

Jacob Johnson, M.D.^{1,2*}, Eric Jordan, M.D.^{1,3*}, William Burton Ph.D.¹, Sharon Silbiger, M.D.¹

¹Albert Einstein College of Medicine, Bronx, NY

²Massachusetts General Hospital, Boston, MA

³Kaiser Hospital, San Francisco, CA

*JJ and EJ contributed equally to this project.

Disclosures

- **No financial interest in any of the companies, resources, or programs.**

USMLE Step 1 Examination

- **United States Medical Licensing Examination required for licensure**
- **Step 1 has 322 multiple choice questions on basic science material**
- **Average score: 225 (SD = 20)**
- **Passing score of 188 typically necessary for continuation of medical education**

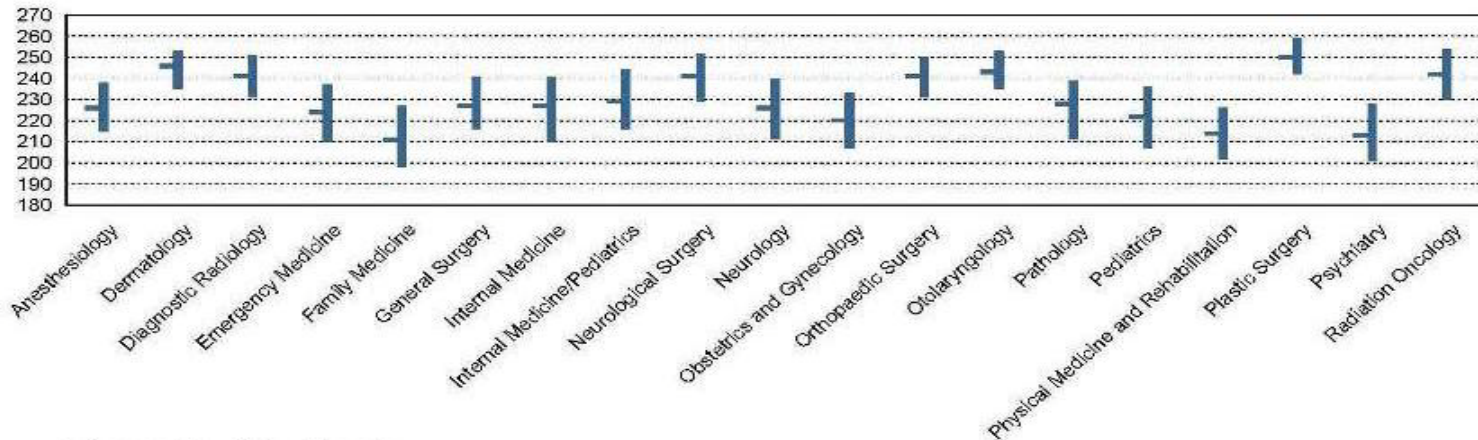
USMLE Step 1 and Residency

- **82% of program directors cited the Step 1 examination score as a factor in selecting the applicant for an interview, the highest of any category.**
- **63% of all residency programs use a 'target score' cutoff when considering residency applications.**

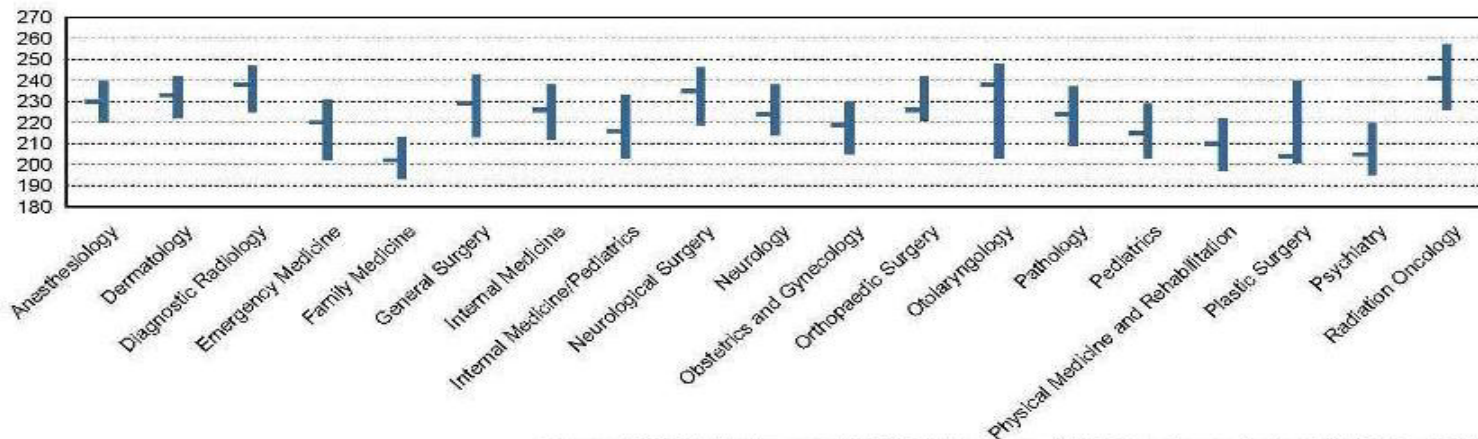
National Step 1 Scores

USMLE Step 1 Scores of Matched Applicants by Preferred Specialty and Applicant Type

U.S. Seniors



Independent Applicants



Comparison of Resources

	Commercial Courses	Review Texts	Question Banks
Description:	<ul style="list-style-type: none"> • Live and online lectures. • A “complete” study package. • Recent arrival of Doctor’s In Training (DIT), an online, more affordable option. 	<ul style="list-style-type: none"> • Subject based or comprehensive texts. • Traditionally the backbone of studying. 	<ul style="list-style-type: none"> • Thousands of vignette style questions. • Modeled off USMLE-style questions. • Detailed answer explanations. • Online with personalized detailed performance statistics.
Examples:	Kaplan, Falcon, DIT	First Aid, Goljan Pathology, BRS series	Kaplan, USMLE World, USMLERx, USMLEasy
Cost:	\$700-\$9000	\$20-\$50	\$200-\$300
Past Studies:	No association with Step 1 score	No past studies	No past studies

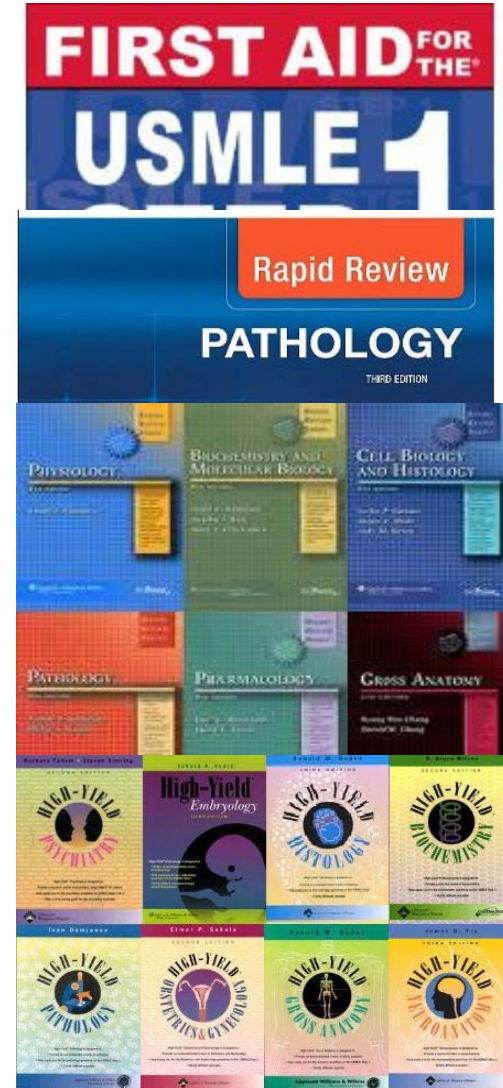
Question Banks



Commercial Courses



Review Books



Purpose

- **To determine which resources influence USMLE Step 1 score.**

Albert Einstein College of Medicine

- Pass/Fail system for 1st and 2nd year courses
- USMLE Step 1 is typically taken between 2nd and 3rd year of medical school
 - After completing basic science courses and prior to beginning clinical clerkships
- Students were given 8 weeks to study in 2011
- Clinical clerkships cannot be started until Step 1 is completed

Survey

- Online survey sent to the entire Albert Einstein College of Medicine Class of 2013
- Distributed July 2011 – about 6 weeks after taking USMLE Step 1 and soon after receiving the results
- Students were informed that a detailed survey regarding their study methods was going to be sent out
- Incentivized: \$5 electronic gift certificate to either Amazon.comTM or StarbucksTM

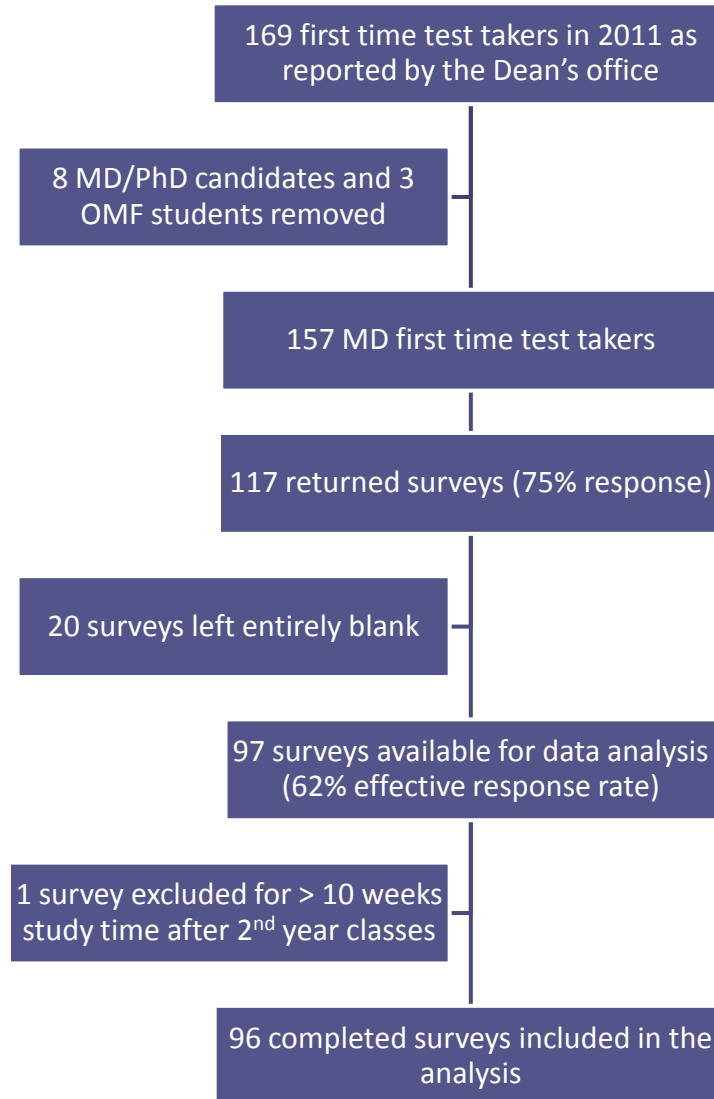
Survey

- Asked students to qualify and quantify their usage of different study materials
- Book resources and commercial courses were rated on a 5-point scale indicating degree of use
 - 'Primary resource', 'Used', 'Lightly used', 'Looked at', and 'Did not use'
- Question Banks were assessed by number of completed questions.

Data Pairing

- **Survey responses were paired with official MCAT score, Basic Science grades, and Step 1 Score by the Dean's office.**
- **De-identified survey responses and paired data were sent to the investigators.**

Survey Respondents

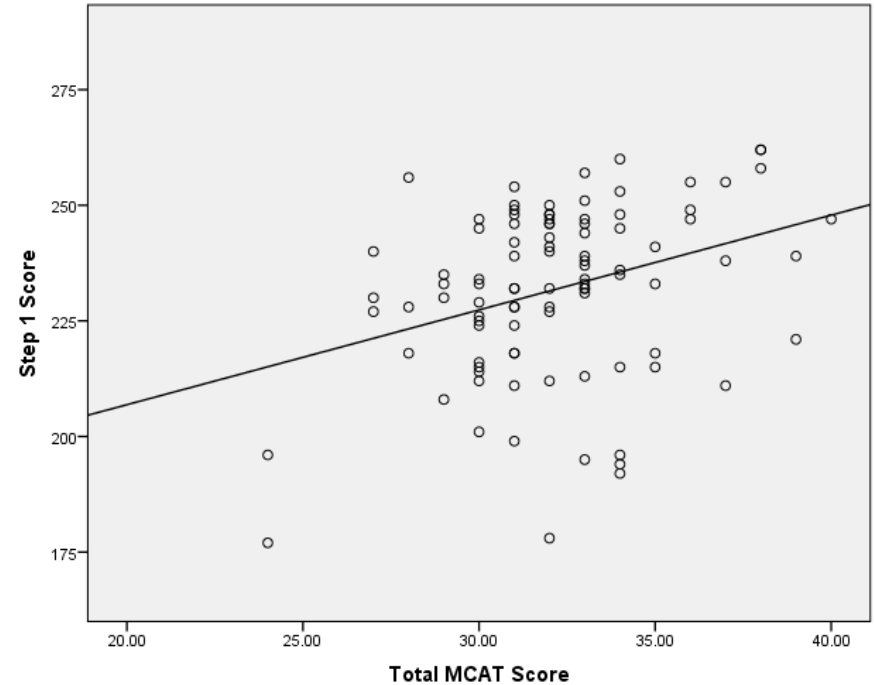
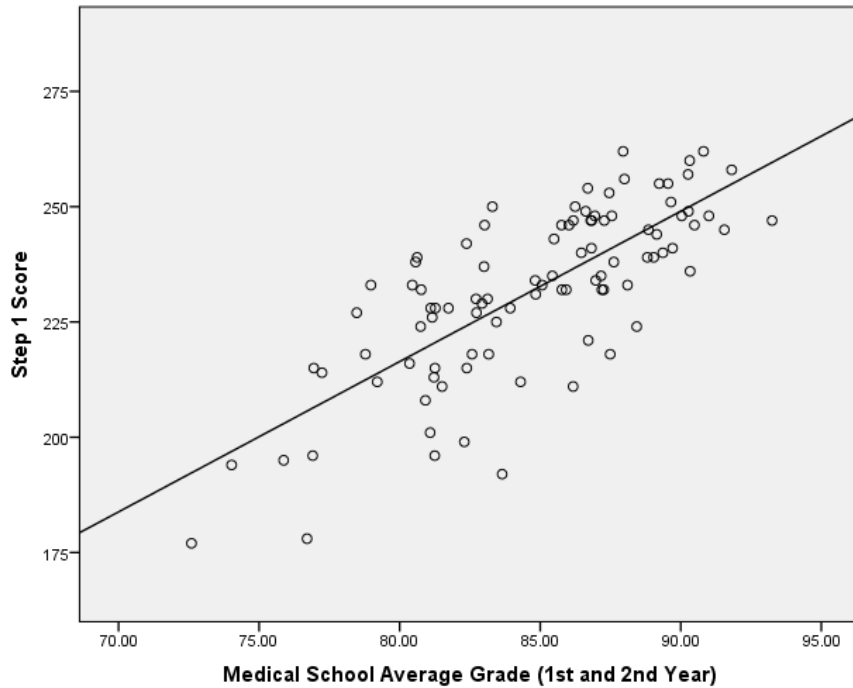


Predetermined Baseline Controls

- **Baseline academic ability associated with Step 1 performance**
 - MCAT
 - Basic Science course grades
- **Number of hours studied (motivation)**
 - Avg hours per day * Avg days per week * Total weeks studied
 - Nearly all students keep to detailed study schedule making recall much easier.

Baseline Factors

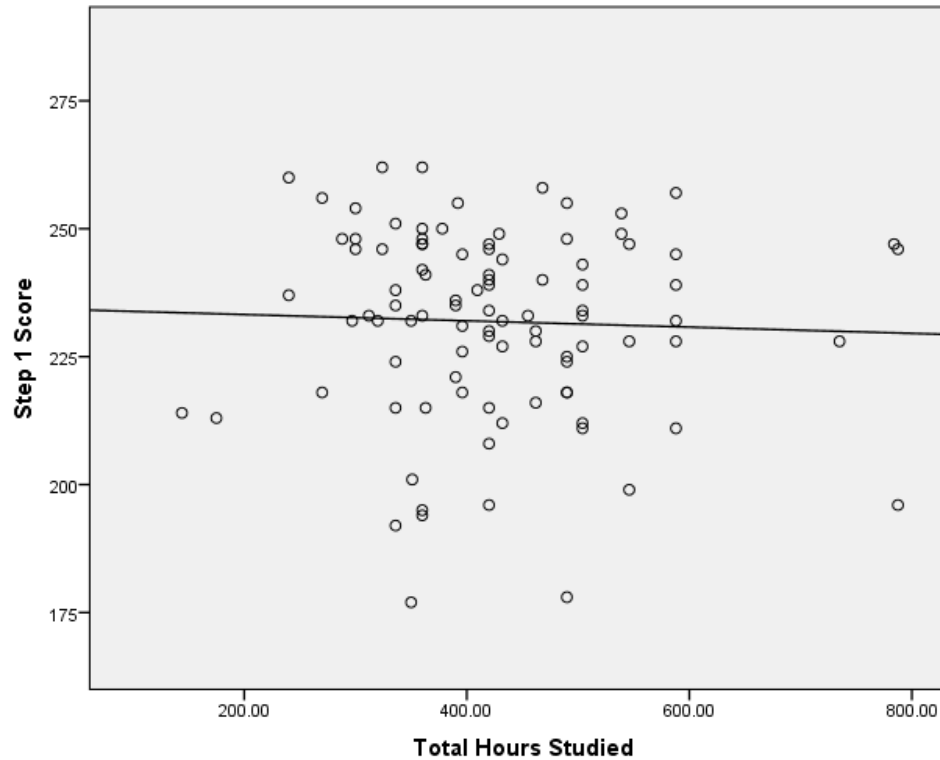
Past Performance Correlated with Step 1 Score



	Step 1 Score	
	Pearson Correlation	P value
1 st and 2 nd year average grade	.759	$P < 10^{-18}$
Total MCAT	.328	$P = 0.001$

Baseline Factors

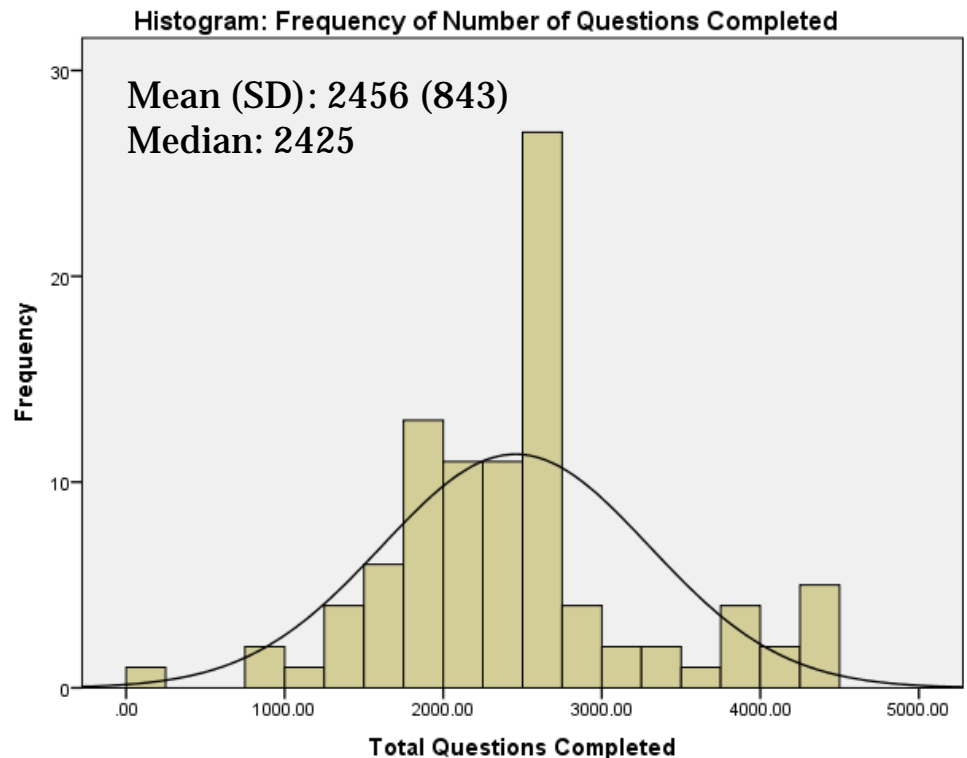
Total Hours Studied and Step 1 Score



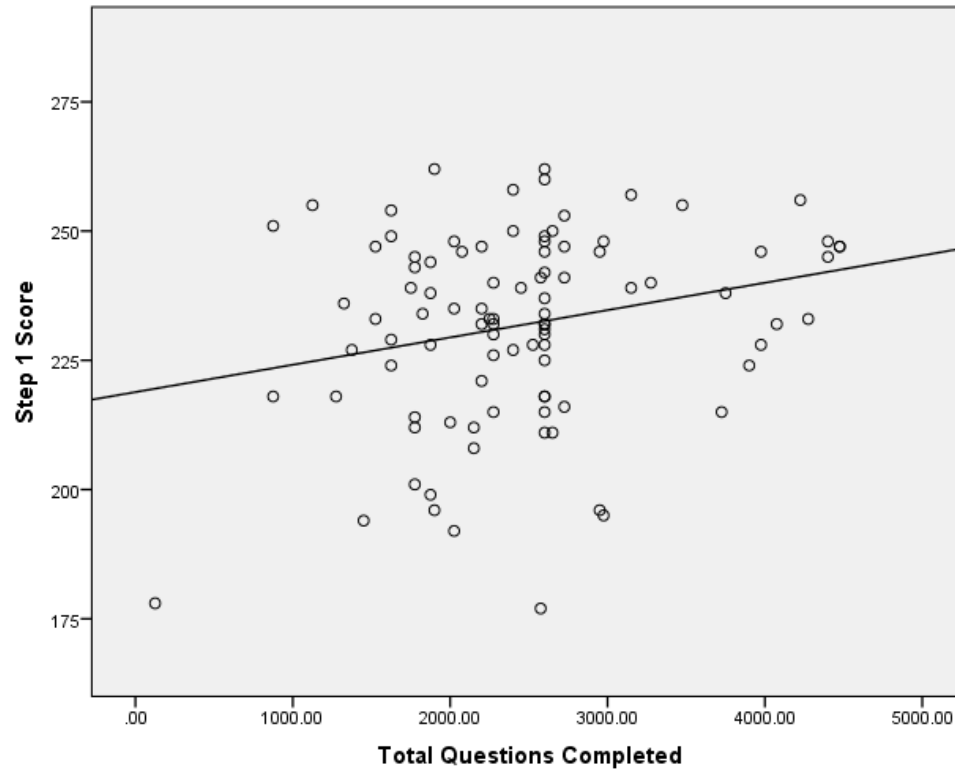
	Step 1 Score	
	Pearson Correlation	P value
Total Hours Studied	-.039	P = .707

Number of Questions Completed

- Question banks serve primarily as a learning tool rather than an evaluation tool.
- Each question has a detailed answer explanation.
- Full length practice tests (NBME questions) are not included as these exams provide no correct answers or explanations.
- The NBMEs are primarily an evaluation tool than a learning tool.



Correlation of Questions to Step 1 Score



	Step 1 Score	
	Pearson Correlation	P value
Total Questions	.241	.018

Correlation of Questions to Baseline Factors

		Total Hours	Basic Science Course Average	Total MCAT
Total Questions	Pearson Correlation	.103	.023	.009
	P value	.317	.828	.931

- Total Questions completed is NOT correlated to any baseline variable.
- It is not that those students who did better in classes also just did more questions
- Also, those who did more questions did not study more.

Linear Regression Prediction Model

	Standardized Beta	Sig	Beta or "Effect"
Total Questions Completed	0.224	P = .0006	0.005
Basic Science Grades	0.721	P < 10 ⁻¹⁷	3.1
Total MCAT Score	0.111	P = .095	0.692
R Squared: .637			

- Total practice questions were significantly correlated with Step 1 score when controlled for possible confounding factors.
- The degree of this effect is 0.005 points per question, or a **1 point increase in Step 1 score per 200 questions.**
- The overall strongest predictor of Step 1 score is performance during the first 2 years of medical school.

Controlling for Study Time:

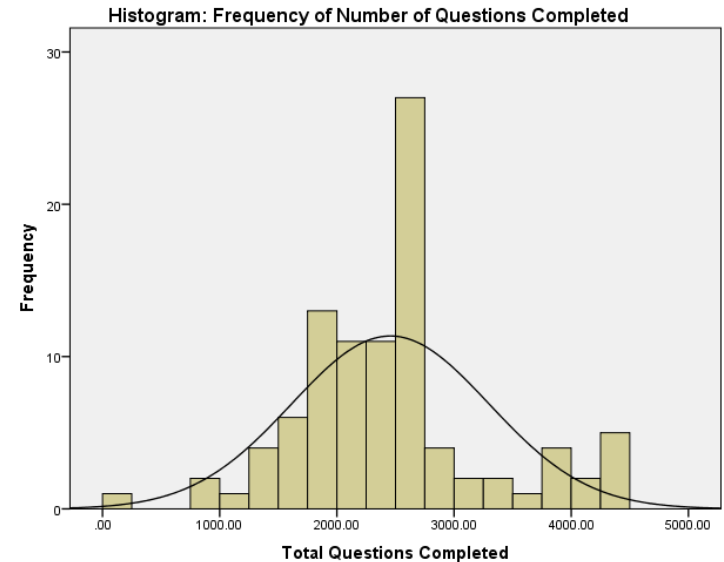
Maybe those students who did more questions just studied more?

	Effect	Sig
Total Questions	.005	P = 0.00035
Basic Sciences Average	3.141	P < 10 ⁻¹⁷
Total MCAT	.590	P = 0.157
Total Hours	-.015	P = 0.13
R Squared:	.646	

- The model remained unchanged even after controlling for study time.

Are All Questions created equal?

	%Students (#) who used the Qbank	Min	Max	Mean (SD)
UWorld	100% (96)	125	2200	1838 (443)
Kaplan	43% (41)	0	2200	347 (617)
UWORLD Assessments	75% (72)	0	400	271 (172)
NBMEQs*	92% (88)	0	1200	398 (242)



***NBMEQs is an evaluation tool, not a learning tool. There are no answer explanations and thus are not counted in our total questions completed analysis.**

***Other questions banks were not used by Einstein Students, in fact, only 1 student reported even looking at another question source.**

Linear Regression Prediction Model: Are All Questions Equal?

Resource	Effect	Sig	# Questions for 1 point score increase
UWorld Questions	.008	P = 0.004	123
UWorld Assessments	.006	P = .43	175
Kaplan Questions	.003	P = .12	325
NBMEQs	.001	P = 0.83	968
UWorld + UWorld Assessments	.008	P = .001	131

*Basic Science Grades, Total MCAT, and Total Hours studied are controlled for in this analysis

- USMLE World shows the greatest effect.
- According to our data a student who completes the entire Uworld Qbank would increase his/her score by 20 points (1 SD on Step 1) as compared to the same student who does 0 USMLE World Questions.

What about Non-Question Resources?

Degrees of use for non-Question Bank Resources					
	None	Looked At	Used	Heavy Use	Primary
First Aid Text	1	0	2	2	94.9
Goljan Text	26.5	12.2	20.4	29.6	11.2
DIT Course	66.3	2	3.1	6.1	22.4

Other Resources Used	% of Students
BRS Series	12.2%
High Yield Series	3.1%
Goljan Lectures	7.1%
Kaplan Lectures	6.1%
Class Notes	2.0%
Other Qbank	1.0%

- Only 3 Non-Question resources were used by >15% of the sample population.
- Nearly everyone used First Aid as a primary resource.

Non-Question Resources

Pearson Correlation:

Resource	Pearson Correlation	P Value
Goljan Pathology	.114	P = .265
First Aid	-.009	P = .928
DIT	-.124	P = .222

Linear Regression Prediction Model:

Resource	Effect	Sig
Goljan Pathology	0.0949	P = .21
First Aid Text	0.0508	P = .46
DIT Course	-0.0198	P = .79

*Basic Science Grades, Total MCAT, and Total Hours studied are controlled for in this analysis

No significant effect of the Non-Question resources.

Benefits of Questions

- **Increased familiarity with the vignette-style format**
 - Each question is similar to those seen on the USMLE Step 1 exam
- **Active learning**
 - Requires users to be engaging and thinking
- **Endurance**
 - Exam is 8 hours long and a total of 322 questions

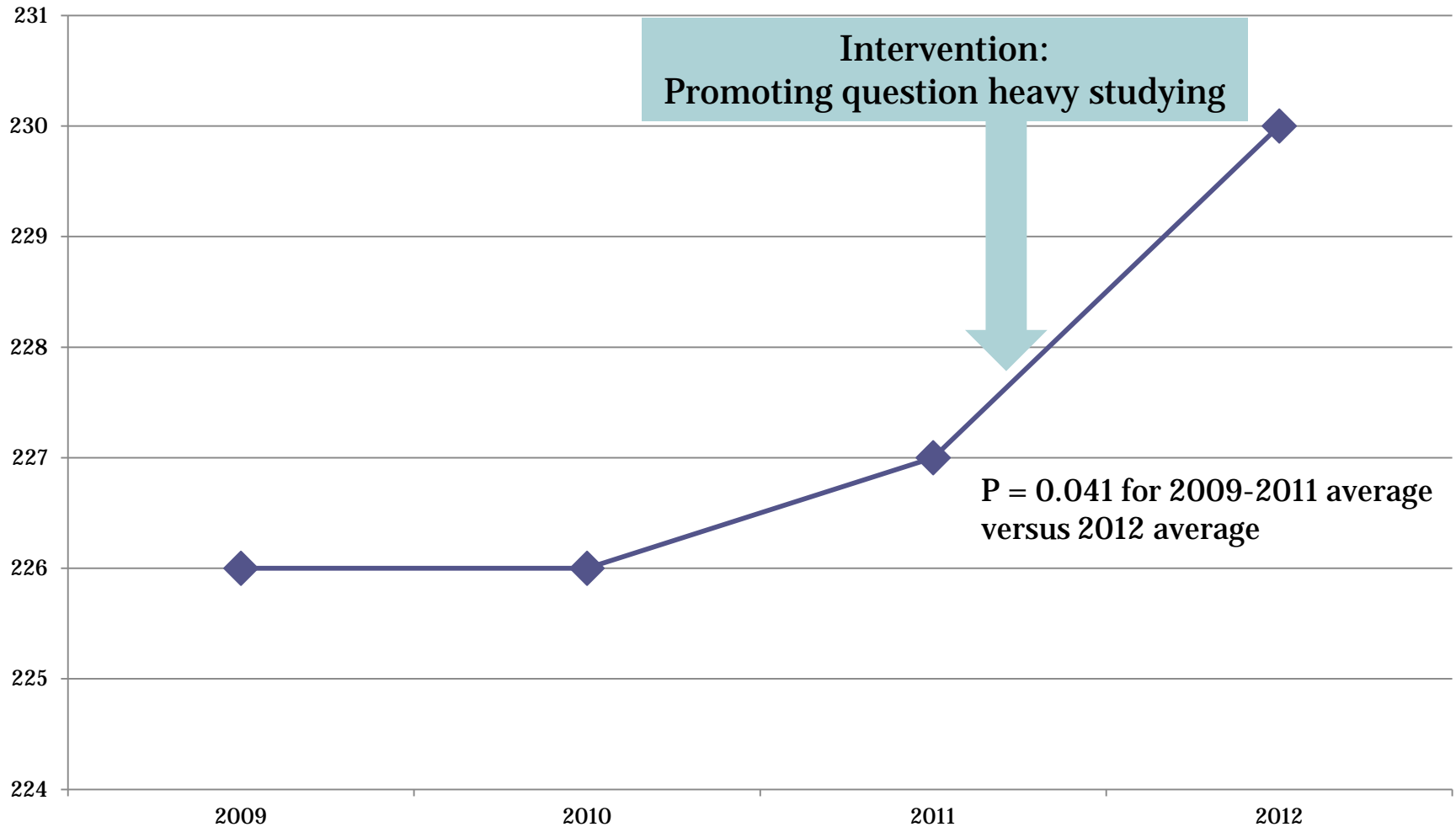
Limitations

- Single medical school
- Voluntary incentivized survey
- Hard to quantify non-question bank resources
 - Hard to analyze First Aid
- Many resources were sparsely used and could not be analyzed

Take Home Message: What to tell medical students?

- **Even at pass/fail institutions, performance during pre-clinical courses influence Step 1 score**
- **Questions banks should be a central component of all Step 1 study strategies**
- **Recommend USMLE World**

Einstein's Mean Step 1 Score 2009-2012



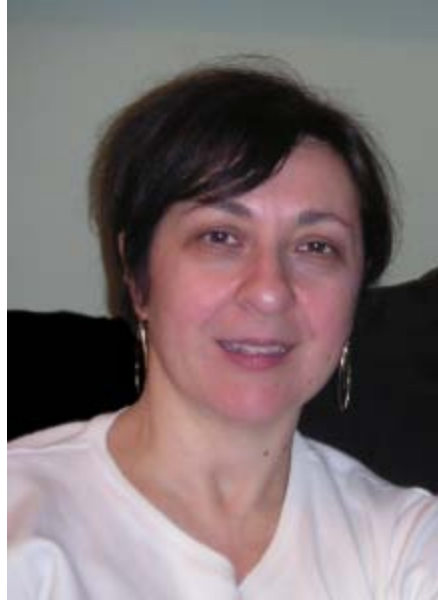
Conclusions

- The USMLE Step 1 examination will remain the most important test in medical school
- Question banks are the most effective and efficient study method
- Due to considerable time constraints while preparing for this examination, emphasis on question banks may be beneficial.

References

1. National Resident Matching Program, Data Release and Research Committee: Results of the 2012 NRMP Program Director Survey. National Resident Matching Program, Washington, DC. 2012.
2. <http://www.kaptest.com/Medical-Licensing/Step1/s1-comprehensive.html>
3. <http://www.falconreviews.com/v3/live-overview/USMLE-STEP-1.html#tabs>
4. Werner LS, Bull BS. The effect of three commercial coaching courses on Step One USMLE performance. *Med Educ.* 2003;37:527-31.
5. Zhang C, Rauchwarger A, Toth C, O'Connell M. Student USMLE step 1 preparation and performance. *Adv Health Sci Educ Theory Pract.* 2004;9:291-7.
6. <http://www.doctorsintraining.com>
7. Julian ER. Validity of the Medical College Admission Test for predicting medical school performance. *Acad Med.* 2005;80:910-7.
8. Basco WT Jr, Way DP, Gilbert GE, Hudson A. Undergraduate institutional MCAT scores as predictors of USMLE Step 1 performance. *Acad Med.* 2002;77:S13–S16.
9. Way DP, Biagi B, Clausen K, Hudson A. The effects of basic science pathway on USMLE Step 1 scores. *Acad Med.* 1999;74: S7–S9

In Memory Of



Dr. Sharon Silbiger
1956-2012

