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The New Medical College Admission Test: Implications for Teaching Psychology

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Abstract

This year's applicants to medical school took a newly revised version of the Medical College Admission Test. Unlike applicants in the past, they were asked to demonstrate their knowledge and use of concepts commonly taught in introductory psychology courses. The new Psychological, Social, and Biological Foundations of Behavior Test asked applicants to demonstrate the ways in which psychological, social, and biological factors influence perceptions and reactions to the world; behavior and behavior change; what people think about themselves and others; the cultural and social differences that influence well-being; and the relationships among social stratification, access to resources, and well-being. Building from the classic biopsychosocial model, this article provides the rationale for testing psychology concepts in application to medical school. It describes the concepts and skills that the new exam tests and shows how they lay the foundation for learning in medical school about the behavioral and sociocultural determinants of health. This article discusses the implications of these changes for undergraduate psychology faculty and psychology curricula as well as their importance to the profession of psychology at large.

Keywords

standardized tests; admissions testing; prehealth education; introductory psychology; undergraduate education

In 2015, applicants to U.S. and Canadian medical schools started taking a newly revised version of the Medical College Admission Test (MCAT).[1] The new MCAT has significant changes. As it has in the past, the MCAT tests concepts in biology, general and organic

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chemistry, and physics. The new exam adds topics in psychology, sociology, and biochemistry and gives greater attention to research methods and statistics than past MCAT exams (Schwartzstein, Rosenfeld, Hilborn, Oyewole, & Mitchell, 2013; AAMC, 2014).

The 2015 MCAT and Psychology

Unlike medical school applicants in the past, 2015 test takers were asked to demonstrate their knowledge and use of concepts that are commonly taught in introductory psychology courses. The new Psychological, Social, and Biological Foundations of Behavior (PSSB) Test asked applicants to demonstrate the ways in which psychological, social, and biological factors influence perceptions and reactions to the world; behavior and behavior change; what people think about themselves and others; the cultural and social differences that influence well-being; and the relationships among social stratification, access to resources, and well-being.

This new section recognizes the critical roles that behavioral and sociocultural factors play in health and illness. It aligns with behavioral and social sciences curricula in medical school that recognize that tomorrow's physicians need to understand how behavior interacts with biological factors to influence health outcomes and how social context and social inequities impact patients' health (Kaplan, Satterfield, & Kington, 2012). The PSBB section recognizes that medical education itself is a cultural and social enterprise influenced by behavioral and social phenomena such as group dynamics, implicit bias, metacognitive skills, behavioral shaping, and role modeling. The new section tests whether applicants have the foundation for learning in medical school about the behavioral and social aspects of health while promoting an awareness of how those same constructs influence the process of learning and professional identity development.

For undergraduate premedical education, these new emphases add to the usual topics covered by the exam. For the discipline of psychology, these changes have profound significance beyond their inclusion in the MCAT. These changes herald a major shift in how psychology is viewed by medical educators and the health care community. Psychology will be considered a science that complements and interacts with biology and chemistry as foundational disciplines for the practice of medicine. Psychology will be part of a seamless integration of these sciences with biology, chemistry, and physics. We can anticipate that there will be an increase in premedical students enrolling in introductory psychology courses and a growing expectation among those students that principles of psychology are a foundational component of their premedical science preparation as future physicians. The new PSBB section, in essence, "raises the floor" regarding foundational knowledge in the

[1]More information about the new MCAT appears in the following: What's on the MCAT2015 Exam? (available at aamc.org/mcat2015exam), an interactive content outline that students can use to learn about the new exam, review example questions, and hear test developers talk about solutions; *The Official Guide to the MCAT Exam* (*MCAT2015*), Fourth Edition (available at aamc.org/officialmcatguide2015), a detailed guide to the MCAT exam that describes the logistics of testing, discusses the knowledge and skills on which students will be tested, and provides 120 practice questions and solutions; Khan Academy MCAT Collection (available at khanacademy.org/mcat), over 800 video tutorials that teach concepts that are targeted by the new exam; Practice Tests and Question Packs (available at aamc.org/mcat2015/ preparing), full-length practice tests that provide exam day simulation, along with question packs that provide practice.

behavioral and social sciences, allowing medical schools to provide more advanced and sophisticated training in psychology from the point of matriculation onward.

The timing for these new changes to the MCAT is excellent in that undergraduate education is in the national spotlight and there have been several recent advances in undergraduate education in psychology. The advancement most closely related to changes in the MCAT is a new conceptual model for teaching introductory psychology (see Gurung et al., 2016). This model emphasizes that psychology is a hub science and that new developments in the discipline are occurring at the intersections between psychology and other disciplines, including medicine. Instructors using this conceptual framework will find it easy to make the connections between psychology and medicine in their classrooms. In addition, the *APA Guidelines for the Undergraduate Psychology Major*, referred to in this issue as *Guidelines 2.0* (APA, 2013), provide learning goals and outcomes for foundation courses in psychology for the first time. It is these foundation outcomes that are important for preparing students for the MCAT. These outcomes map on well with the foundation concepts for social and behavioral sciences that the MCAT is built upon. Moreover, Undergraduate Study in Psychology (Norcross et al., 2016) describes how the introductory psychology course is being taught nationally—with or without a lab, in one semester or two semesters, for majors only. These formats will afford instructors the opportunity to teach the core content for this course in preparation for the new MCAT.

The wider impact of these changes will no doubt influence preprofessional education for other health care professions, such as dentistry, podiatry, optometry, nursing, pharmacy, audiology and physical therapy, among others. Psychological science may be integrated into their training curricula as well, further elevating the importance of psychological knowledge for the health professions.

History and Use of the MCAT Exam

The new changes to the MCAT are the result of a 200-year history of developing a standardized premedical curriculum beginning with the first U.S. medical school at the University of Pennsylvania in 1765. Throughout the 19th century, there was great concern about the low standards and high variability of medical education. Many students had only 2 years of college, and some had only a high school education with little science background. At the turn of the century, medical education was described as “chaotic” (Fishbein, 1940), and the same could be said of “preparatory education.” Academic standards in higher education, including medical schools, barely existed in colleges and universities. Medical schools were unaffiliated with universities, looking more like trade schools, with many part-time faculty, school-specific curricular requirements, and broad criteria for the admission of potential students (Ludmerer, 1999).

In 1905, the newly formed American Medical Association (AMA) Council on Medical Education proposed a minimum 1-year college premedical education based on biology, chemistry, and physics and shortly thereafter commissioned the Carnegie Foundation for the Advancement of Teaching to conduct an independent survey of medical school education. The result was the 1910 publication of *Medical Education in the United States and Canada*

by Abraham Flexner (1910). Flexner recognized that the medical sciences of anatomy, physiology, pathology, and pharmacology placed a burden on the existing 2-year curriculum by requiring semester- or year-long laboratory courses. Therefore, he proposed that "admission to a really modern medical school must at the very least depend on a competent knowledge of chemistry, biology, and physics." Given the laboratory nature of these courses, Flexner could not see how a premedical curriculum could be completed in less than 2 years. Thus, the 2-year premedical prerequisite of biology, chemistry, and physics with labs was born and would remain essentially unchanged for the next 100 years.

The first MCAT was introduced in 1928 and was often referred to as the "Moss Test" after the lead test author who was a physician/surgeon. It covered memory, knowledge of scientific terminology, reading comprehension, and logic in a true and false examination format. For the first time, MCAT enumerated areas of general education and basic science preparation to be covered in the exam, which helped to shape a consensus model of what constituted premedical education. The original MCAT achieved its objective of reducing medical student attrition rates from a high of 50% in the 1920s to 7% in 1946 (McGaghie, 2002).

In all, the MCAT has been revised five times. During the first revision of the MCAT in 1946, a section called "Understanding Modern Society" was added to reflect the desire within medicine to seek students with a broad liberal arts background. In general, medical school admission committees did not consider scores in general knowledge to be of great importance in admission decisions (Glaser, 1957). Contemplating what he regarded to be "schizophrenic" behavior on the part of medical schools, George E. Miller, a pioneering figure in medical school education, remarked,

> On the one hand, medical school catalogues and forceful spokesmen in the field of medical education exhort the student to gain breadth of vision, a sociological and humanistic orientation, a "liberal" education. On the other hand, admissions committees appear for the most part to emphasize academic, particularly scientific achievement. (McGaghie, 2002, p. 1088)

More recent versions of the exam focused largely on the natural sciences. By the third revision in 1977, the MCAT measured science knowledge, scientific problem solving, quantitative reasoning, and reading skills. The fourth revision in 1991 continued in that vein. The 1991 exam was in use through 2014.

The Fifth Review of the MCAT Exam

Like its predecessors, the new exam is designed to help medical school admission committees select students who are academically prepared for medical school. It provides a common metric to evaluate the academic preparation of applicants with different course-taking histories and from institutions with different curricula and grading standards. Used in combination with information about applicants' course completion, grades, grade trends, institutional selectivity, research experience, and other academic information, MCAT scores help paint a picture of applicants' academic preparation (Monroe, Quinn, Samuelson, Dunleavy, & Dowd, 2013; Addams, Bletzinger, Sondheimer, White, & Johnson, 2010).

MCAT scores are used in admissions at the vast majority of U.S. and Canadian medical schools. The MCAT has an established record of predicting a wide range of student outcomes in medical school, including students' grades in medical school, their scores on medical school and national licensing exams, students' time to graduation, and graduation rates (e.g., Julian, 2005; Dunleavy, Kroopnick, Dowd, Searcy, & Zhao, 2013; Callahan, Hojat, Veloski, Erdmann, & Gonnella, 2010; Donnon, Paolucci, & Violato, 2007).

The review that led to the new exam was directed by a 21-member advisory committee empaneled by the Association of American Medical Colleges (AAMC) and called the MR5 Committee (Schwartzstein et al., 2013). The MR5 Committee consisted of medical school deans; admissions, educational affairs, student affairs and diversity officers; basic science and clinical faculty; and prehealth advisors and undergraduate faculty. Membership also included a medical student and a physician resident.

Complementing the MR5 Committee were subcommittees of experts in fields in which MR5 Committee members desired deeper knowledge and debate. Experts in psychology, sociology, anthropology and other behavioral and social science fields were convened in addition to the MR5 Committee. This subcommittee created the blueprints for the new PSBB exam.

Several expert-panel reports informed their work. The first of these was a 2004 Institute of Medicine (IOM) report called *Improving Medical Education: Enhancing the Behavioral and Social Science Content of Medical School Curricula* (IOM, 2004). The IOM panel's recommendations were part of a chorus of recommendations from committees and task forces on teaching and testing in the behavioral and social sciences. The AAMC Behavioral and Social Sciences Foundations for Future Physicians Committee (AAMC, 2011) and the Holistic Review Project Advisory Committee of the AAMC (Addams et al., 2010) served as exemplars in this regard. These committees looked at physician competencies for the future practice of medicine and provided thoughtful rationales on why psychology and other disciplines should be more prominently and explicitly included. Understanding both the causes and potential interventions to the social and behavioral determinants of health were deemed essential for the practice of medicine.

For example, smoking is the single greatest cause of preventable death, and understanding psychological theories of behavior and behavior change is essential for effectively treating patients with addictions. In addition to knowing that a patient smokes tobacco, the physician needs the tools to understand why this behavior occurs, what contingencies support its maintenance, and what experiences or new pieces of knowledge might build intrinsic motivation to stop smoking. The transtheoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992) emphasizes the stages people pass through when trying to change a behavior and suggests appropriate interventions at each stage. Relapse is a common occurrence when attempting to change a health-related habit, and understanding factors predictive of relapse, consequences of relapse, and successful strategies for relapse prevention are crucial aspects of effective patient treatment (Brownell, Marlatt, Lichtenstein, & Wilson, 1986). Motivational interviewing is increasingly seen as an effective strategy for promoting the intrinsic motivation and reducing cognitive–behavioral barriers to changing

unhealthy habits (Miller & Rose, 2009). Principles of health psychology and behavioral medicine build upon foundational psychological principles, many of which are introduced in the introductory psychology courses and tested on the new MCAT.

Impact of Behavioral and Sociocultural Factors on Health and Health Outcomes

The addition of behavioral and social sciences to the MCAT reflects current thinking in medical research, educational scholarship, and the funding priorities of the National Institutes of Health and other federal grant agencies. In many ways, the new MCAT—and particularly, the new PSBB section—reflects contemporary medical research and practice. Many of these changes did not originate with the new MCAT but date to the 1970s when the internist physician George Engel (1977) proposed a new model for illness and health which took into account biological, psychological, social, and environmental influences on illness. Engel called this model the “biopsychosocial model” of illness in contrast to the “biomedical model” of disease which emphasized infectious and acute illnesses. Though the model was known to many academic psychologists, the model was not widely known in medicine. It was not until recent years with more emphases on cognitive psychology, genetics, neurobiology, neuroscience and public health that the model’s relevance became more widely appreciated (Johnson, 2013).

Changes in the epidemiology of disease, evolving population demographics, and increasingly team-based approaches to both research and clinical care provide core examples. These changes compel us to rethink the way the health care workforce is trained and to reexamine the competencies they should acquire. The primary causes of morbidity have changed from acute infectious illnesses to chronic diseases with strong behavioral and social determinants (e.g., smoking for cardiovascular disease, physical inactivity and poor diet for obesity and diabetes; McGinnis & Foege, 1993; Mokdad et al., 2000; Schroeder, 2007). In order to better care for patients with chronic diseases, physicians must be more competent in understanding and promoting behavior change and/or tapping into key social forces that can facilitate better disease management.

Changing population demographics point toward a “graying society” and a “browning America,” with a higher proportion of elderly Americans, and to a more racially and ethnically diverse population. A nuanced understanding of the life course, culture, language, and literacy will become increasingly important for any health care provider to deliver competent care (Greico et al., 2012; U.S. Census Bureau, 2012). For example, it has become increasingly important for medical providers to understand life course development theories (e.g., Erikson, 1980/1959) that include an understanding of the challenges that come with growing older and reflecting back on the “generativity” of one’s life. Working with patients from different cultural backgrounds requires both self-reflection of one’s own culture as well as understanding the developmental processes of cultural identity formation and how they influence interpersonal behavior (e.g., Phinney, 1989).

National Institutes of Health, the National Science Foundation, and other science funders have increasingly supported “team science” or interdisciplinary collaborations as a way to

generate “big ideas” and advance science outside of traditional silos (American Association for the Advancement of Science, 2009). Team science skills require an individual to be literate in multiple disciplines, to think integratively, and to understand the potential contributions each field might make—including psychology in the realm of biomedicine. Team research is very much in evidence in medical research and practice today. As the clear boundaries between biology and psychology blur, clinical and research teams in medicine utilize psychologists and other social scientists. Functional gastrointestinal disorders such as irritable bowel syndrome consider psychological processes in the management of this disorder along with the usual medical procedures. Irritable bowel syndrome patients are often treated by a psychologist who provides hypnosis, cognitive behavior therapy, relaxation procedures or mindfulness therapies along with conventional medical treatments for this disorder. This is not a unique phenomenon in gastroenterology but is replicated on other areas of medicine such as cancer, cardiology, diabetes, and so forth (North, Hong & Alpers, 2007).

And, lastly, the ways in which clinical care is now delivered have evolved to rely more on interprofessional teams, such as doctors, nurses, physiotherapists, and social workers, who are able to empower and engage patients (Reeves et al., 2008). Yet, often these teams do not work effectively. The skills required of a physician in this practice milieu require greater familiarity and use of core social and psychological constructs such as understanding “in-group” versus “out-group” membership and how this identification influences attributions (e.g., Taylor & Doria, 1981), which interfere with communication among health care teams and affects patient treatment (Skjørshammer, 2001). For example, a physician may attribute a medication error made by a nurse (not part of the physician’s in-group) as due to personal negligence but might attribute that same error made by a physician (part of the in-group) as a reflection of a dysfunctional system rather than a personal failing. Psychology is not only seen as important by medical professionals and medical educators; it is seen as essential to the practice of medicine in the 21st century (AAMC, 2011; IOM, 2004).

Blueprints for the Psychological, Social, and Biological Foundations of Behavior Test

The blueprints for the new exam emphasize deep knowledge of central concepts in the natural, behavioral, and social sciences and describe the ways that students should be prepared to demonstrate them (Schwartzstein et al., 2013; AAMC, 2014). The new MCAT includes four test sections:

- Biological and Biochemical Foundations of Living Systems
- Chemical and Physical Foundations of Biological Systems
- Psychological, Social, and Biological Foundations of Behavior
- Critical Analysis and Reasoning Skills

At most colleges and universities, students learn the concepts on the MCAT in year-long introductory courses in biology, organic chemistry, inorganic chemistry and physics, and in semester-long courses in biochemistry, psychology, and sociology.

The PSSB section assesses applicants' knowledge and use of concepts in psychology, sociology, and biology. Like the natural sciences tests, the conceptual framework for the PSBB test is organized around foundational concepts, their related concepts, and scientific reasoning skills. The framework reflects current research about the most effective ways for students to learn and use science, emphasizing deep knowledge of the most important scientific concepts over shallow knowledge of many discrete facts. The blueprints reflect research that says that several of the most important competencies in the sciences ask students to bring together information from different disciplines and to combine scientific knowledge with their inquiry and reasoning skills (American Association for the Advancement of Science, 2009).

The conceptual framework for the PSBB section is organized around five foundational concepts, 12 content categories, and four scientific inquiry and reasoning skills. Figure 1 presents the five foundational concepts and the supporting concepts that are tested by the PSBB test. It also shows how they lay the foundation for learning important parts of the medical school curriculum.

The exam asks applicants to demonstrate the ways that psychological, social, and biological factors influence perceptions (e.g., bottom-up and top-down processing of pain) and reactions to the world (e.g., biological and psychological aspects of stress); behavior (e.g., genetic and environmental influences on personality traits) and behavior change (e.g., learning and attitude change); what people think about themselves (e.g., identify formation) and others (e.g., stereotypes, prejudice and discrimination); the cultural and social differences that influence well-being (e.g., education, assimilation); and the relationships among social stratification, access to resources, and well-being (e.g., social stratification, patterns of social mobility, and poverty). Sixty-five percent of this content comes from introductory psychology, 30% comes from introductory sociology, and 5% comes from introductory courses in biology (AAMC, 2014).

PSBB questions ask test takers to use their scientific reasoning skills to demonstrate that they can work with these foundational concepts and their related concepts. The exam asks test takers to demonstrate the following:

- Knowledge of scientific concepts and principles by showing understanding of scientific principles and by identifying the relationships between closely related concepts
- Scientific reasoning and problem solving by reasoning with scientific principles, theories, and models and by analyzing and evaluating scientific explanations and principles
- Reasoning about the design and execution of research by demonstrating understanding of important concepts in scientific research and by reasoning about ethical issues in research
- Data-based and statistical reasoning by interpreting patterns in data presented in tables, figures, and graphs and by reasoning about data and drawing conclusions about them.

About 20% of the new PSBB questions require application of the scientific method, including interpreting data, critiquing research designs, and evaluating conclusions drawn from hypothetical studies. (Additional detail about the PSBB test, along with sample questions, can be found at www.aamc.org/students/services/343550/mcat2015.html).

Implications for Teaching Undergraduate Psychology

We have addressed many of the benefits to medicine of having entering medical students develop some proficiency in the behavioral and social sciences. In this last section, we consider the implications of the new MCAT for teaching undergraduate psychology.[2]

Probably one of the more significant effects of psychology material being tested on the new MCAT will be a probable increase in the number of premedical and other prehealth students taking psychology courses. Even before the new exam was launched, the AAMC estimated that about two thirds of the 90,000 students sitting for the MCAT each year completed introductory psychology in college. If all students sitting for the new MCAT were to take introductory psychology, then we would predict a 50% increase or 30,000 additional premedical students taking introductory psychology each year. Although, this estimate represents an increase of only 2% above the 1.5 million students now taking introductory psychology (Steuer & Ham, 2008; Gurung et al., 2016), staffing issues could become significant, depending on the number of premedical students and the elasticity of the size of introductory psychology at a given institution. For schools with a relatively large number of premedical students and small, inflexible class sizes, this will create staffing challenges. In contrast, for schools with relatively small numbers of premedical students and large or flexible class sizes, the increase in staffing may be negligible.

Material typically taught in introductory psychology was added to the MCAT because of its importance for studying and practicing medicine in its current form. There was never an intention on behalf of the MR5 Committee that introductory psychology would be altered in any way to accommodate the interests of medicine or would be modified in accordance with material deemed to be most relevant for medicine. It is probably fair to say that most faculty teaching basic science courses do not develop their courses with an eye toward preparing students for the MCAT. Similarly, there is no expectation that faculty preparing their introductory psychology courses will do so with an eye toward what is being tested on the new exam.

As more premedical students enter the introductory psychology course, some schools may consider offering special sections of introductory psychology for these students. As indicated above, the MCAT is based on material that is typically taught in introductory psychology and there is no obvious benefit of creating special sections, at least in terms of preparing for the MCAT. Although premedical students might be attracted to a version of introductory psychology taught with a greater health context, the American Psychological Association (APA) task forces have tended to argue against offering different versions of

[2]It is important to say that some students may decide to prepare for the MCAT independently of formal coursework in psychology as only a handful of medical schools require psychology for admission.

introductory psychology (APA, 2014; Halpern, 2010). A more innovative response to the new MCAT would be to develop a single, integrative, introductory psychology and sociology course. There would be obvious staffing and source material barriers to overcome, but it will be interesting to monitor curricular developments along these lines.

Rather than the MCAT having a unidirectional influence on the teaching of introductory psychology, there are more likely to be synergistic influences between the two. An APA task force recently completed an examination of the college-level introductory psychology course and has made recommendations for its improvement (APA, 2014; Gurung et al., 2016). As earlier described, these recommendations are entirely consistent with the MR5 Committee's assessment of the relevance of psychology for entering medical students.

One of the recommendations of the APA task force was to establish greater "conceptual consistency" in the introductory curriculum. They envision the foundation of the course to be the teaching of the scientific method:

> Students in Intro Psych should learn skills involving the development of scientific reasoning and problem solving, including effective research methods. Students should learn basic skills and concepts for interpreting behavior, studying research, and applying research design principles to drawing conclusions about behavior. (p. 16)

Understanding research methods and analysis involving humans has been surprisingly absent from the premedical curriculum. Given the unique issues involved in human research, having students entering medical school with a greater understanding of research issues involving humans should better prepare students to interpret the biomedical literature than has been the case to date. Introductory psychology introduces students to some of these important research design and analysis issues. Introductory psychology textbooks commonly introduce students to different categories of variables (e.g., independent, dependent and confounding), measures of reliability and validity, and the advantages and disadvantages of different research methods involving humans (e.g., descriptive, correlational, and experimental). Typically, students will be introduced to the nuances of within- and between-subjects designs, and the importance of controlling for practice effects and demographic and individual differences. These are the types of concepts that students should learn in introductory psychology and are critical foundations for interpreting the biomedical literature, but that are generally absent from biology, chemistry, and physics.

In addition to research design, medical schools are increasingly placing importance on learning basic statistical concepts prior to entering medical school. These include basic probability, measures of central tendency, measures of variability, descriptive and inferential statistics, graphical presentation of data, hypothesis formation, systematic and random error, hypothesis testing, and reporting research results. Therefore, examinees will need a basic understanding of these concepts for the MCAT. Some of these concepts are taught in sociology and the premedical basic science courses, but a perusal of introductory science textbooks suggests that these concepts are often taught more thoroughly in introductory psychology than elsewhere in students' premedical studies. Furthermore, learning about the ethics of human research is fundamental to the biomedical research enterprise. The level at

which these concepts are tested on the new MCAT is at the level assumed to be covered in introductory science courses and therefore, examinees should not need additional course work in research methods or statistics to prepare for the new exam.

It is possible that as there is greater appreciation of the relevance of psychological science for future physicians, faculty will select more health-related examples in their introductory course. Among introductory psychology students, health is one of the highest-rated applied topics of interest and is particularly well-suited to teaching scientific thinking and reasoning skills in psychology (Stalder & Stec, 2007). For example, Stanovich (2013), in *How to Think Straight About Psychology* (10th edition), uses a preponderance of medicine and health-related examples with great skill to illustrate critical thinking in psychology.

eThe emphasis on teaching scientific reasoning skills in introductory psychology, as recommended by the APA task force (APA, 2014), and the emphasis on testing these skills on the MCAT constitutes an interesting convergence of interests. Stevens and Whitkow (2014) instituted a scientific thinking module into two of four introductory psychology sections at Willamette University. The activity consisted of students evaluating the design and results of a published study comparing Prozac to saffron for the treatment of depression. Discussions focused on data-based reasoning and critical evaluation of research design. All four sections of the course were tested on sample items from a preview version of *The Official Guide to the MCAT Exam* (2015). The sections did not differ in their performance on content-based MCAT questions, but the sections with the scientific thinking module performed significantly better on the MCAT scientific reasoning questions.

On top of the scientific method foundation, the APA task force foresees the general content of psychology as consisting of five pillars (biological, cognitive, developmental, social and personality, mental and physical health). The five pillars map well onto the foundational concepts of the MCAT PSBB test. Furthermore, the APA task force recommends that “cross-cutting themes” be emphasized, such as cultural and social diversity, ethics, variations in human functioning, and applications, which provide integrative treatments of the five pillars. This goal to move away from the classic “siloed” or isolated treatments of psychology corresponds with an overarching intent of the new MCAT as well.

Lastly, the APA task force recommended that the introductory course be capped with an integrated treatment of important topics. Health and well-being issues such as pandemics, addiction, obesity, global warming, and hunger and poverty are particularly well suited to integrated treatments of psychology. These topics are particularly effective as capstones as they represent applications of psychology with broad relevance that integrate material across the five pillars of content and incorporate the cross-cutting themes identified by the APA task force. The MR5 Committee was particularly concerned about medical students’ isolated learning of scientific material and encouraged a design for the new MCAT that would require integration of knowledge across the sciences. For example, on the PSBB section, MCAT material is tested that requires an integration of biological, psychological, and sociological concepts of behavior. Applying concepts in an integrated fashion is essential for preparing students for the future of medicine, and psychology is well situated to provide a model of integrative science education.

Future Directions and Research Plans

In the 85-year history of the MCAT, there has never been a section devoted to the behavioral and social sciences. The PSBB section of the new exam is the largest departure from the last exam and stimulates the most questions about its likely validity. While the blueprints for the PSBB section reflect the deliberations and work of large numbers of experts, data on the consequences and predictive validity of the new exam are just becoming available.

Twenty U.S. and Canadian medical schools are collecting these data. Even before the new exam was launched, 11 of the 20 medical schools began gathering evidence on the new exam. They administered a prototype of the PSBB test to more than 2,000 medical students. Researchers then followed these students into courses like foundations of psychiatric medicine, epidemiology/public health, neuroscience, and others that teach medical students about the ways in which cognitive and perceptual processes influence understanding of health and illness; how behavior can either support health or increase the risk for disease; how to communicate and collaborate with patients and other members of the health care team; the ways in which patients' social and demographic backgrounds influence their perceptions of health and disease, the health care team, and therapeutic interventions; and the ways in which social and economic factors can affect access to care and the probability of maintaining health and recovering from disease.

Researchers from these 11 schools report median correlations between their students' scores on the prototype exam and grades in these courses ranging from .37 to .41 (AAMC, 2015). They will soon examine the relationships between students' prototype scores and national licensing exams that test psychiatry and include behavioral and social sciences questions. Researchers from the 11 schools will follow their students for another academic year and then report the results.

Now that the new exam is in use, 16 of the 20 schools will examine the consequences and predictive validity of the new exam for applicants who apply to their medical schools. They will look at the premedical experiences of these applicants to see whether more apply with preparation in psychology, sociology, research methods, and statistics. They will see whether PSBB scores add value to the information that applicants already provide about themselves to admissions committees through their applications and transcripts. Like faculty in the first study, they will examine the relationships between PSBB scores and grades in courses and clerkships and on national licensure exams that treat behavioral and social sciences concepts.

If the arguments of experts who advocated for the exam and informed its blueprints are correct, then there should be demonstrable value in admitting students who have strong foundations for learning about the behavioral and social sciences in medical school. Health is a product of the interactions among biology, genetics, behavior, relationships, communities, cultures, and environments. Some of medicine's most promising frontiers for improving health explore the realms of human behavior and social sciences. More and more disease states cannot be addressed without attention to the behavioral or social factors that

cause them, erect barriers against treating them, or can ameliorate or even cure them (AAMC, 2011).

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Biographies

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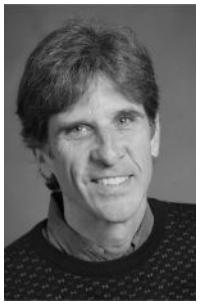

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MCAT Psychological, Social, and Biological Foundations of Behavior Section

Foundational Concept #1	*Foundational Concept #2*	*Foundational Concept #3*	*Foundational Concept #4*	*Foundational Concept #5*
Biological, psychological, and socio-cultural factors influence the ways that individuals perceive, think about, and react to the world.	Biological, psychological, and socio-cultural factors influence behavior and behavior change.	Psychological, socio-cultural, and biological factors influence the way we think about ourselves and others, as well as how we interact with others.	Cultural and social differences influence well-being.	Social stratification and access to resources influence well-being.
1A. Sensing the environment	**2A.** Individual influences on behavior	**3A.** Self-identity	**4A.** Understanding social structure	**5A.** Social inequality
1B. Making sense of the environment	**2B.** Social processes that influence human behavior	**3B.** Social thinking	**4B.** Demographic characteristics and processes	
1C. Responding to the world	**2C.** Attitude and behavior change	**3C.** Social interactions		

How these Competencies Lay the Foundation for Learning in Medical School

Building Block #1	*Building Block #2*	*Building Block #3*	*Building Block #4*	*Building Block #5*
With these building blocks, medical students will be able to learn about the ways in which cognitive and perceptual processes influence their understanding of health and illness.	With these building blocks, medical students will be able to learn how behavior can either support health or increase risk for disease.	With these building blocks, medical students will be able to learn about the ways in which perception, attitudes, and beliefs influence interactions with patients and other members of the healthcare team, as well as patient behavior.	With these building blocks, medical students will be able to learn about the ways in which patients' social and demographic backgrounds influence their perceptions of health and disease, the health care team, and therapeutic interventions.	With these building blocks, medical students will be able to learn about the ways in which social and economic factors can affect access to care and the probability of maintaining health and recovering from disease.

Figure 1.

Shows the five foundational concepts and the supporting concepts that are tested by the Psychological, Social, and Biological Foundations of Behavior section. It also shows how they lay the foundation for learning important parts of the medical school curriculum.