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Using a structural competency framework to teach structural racism in pre-health education

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ABSTRACT

The inclusion of structural competency training in pre-health undergraduate programs may offer significant benefits to future healthcare professionals. This paper presents the results of a comparative study of an interdisciplinary pre-health curriculum based in structural competency with a traditional premedical curriculum. The authors describe the interdisciplinary pre-health curriculum, titled Medicine, Health, and Society (MHS) at Vanderbilt University. The authors then use a new survey tool, the Structural Foundations of Health Survey, to evaluate structural skills and sensibilities. The analysis compares MHS majors ($n = 185$) with premed science majors ($n = 63$) and first-semester freshmen ($n = 91$), with particular attention to understanding how structural factors shape health. Research was conducted from August 2015 to December 2016. Results suggest that MHS majors identified and analyzed relationships between structural factors and health outcomes at higher rates and in deeper ways than did premed science majors and freshmen, and also demonstrated higher understanding of structural and implicit racism and health disparities. The skills that MHS students exhibited represent proficiencies increasingly stressed by the MCAT, the AAMC, and other educational bodies that emphasize how contextual factors shape expressions of health and illness.

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Racial disparities in health and healthcare reflect implicit biases embedded in the U.S. healthcare system. Research shows that physicians “unwittingly perpetuate health-care disparities” by making clinical decisions based on implicit racial stereotypes (Chapman et al., 2013). Implicit racial bias has also been linked to “unconscious” physician preference for white patients and “poor ratings of interpersonal care” in interactions with patients of color (Cooper et al., 2012). Meanwhile, minority patients receive fewer recommended treatments for diseases ranging from cancer to HIV to heart disease to neurologic disorders, leading to persistent racial gaps in health-care outcomes (Ayanian et al., 2014; Saadi et al., 2017). Researchers also find that implicit bias impacts administrative decisions ranging from what services are provided to which neighborhoods are chosen when opening new physicians’ offices

(Ansell and McDonald, 2015).

These concerns are not new. For instance, psychiatric researchers began tracking the race of patient populations in the late 1950s, and the first studies demonstrating physician over-diagnosis of schizophrenia in African American men appeared soon thereafter (Metzl, 2010). Attention to the effects of bias and racism in medicine have gained new valence in the present-day, however, as activists, clinicians, and scholars call attention to the precarity and sanctity of black life and as U.S. society struggles with larger existential questions of racial equity and justice. (“Black Lives Matter,” “White Coats Matter”). Taking up this call, physicians “challenge” medicine to address racism more directly (Bassett, 2015), policy experts voice concern about ACA repeal on low-income and minority populations (Vollman, 2017), and the *New England Journal of Medicine* (Culp-Ressler, 2015), *JAMA* (Williams and Wyatt, 2015), the Institute of Medicine (Nelson, 2002) and the National Institute of Health (Ginther et al., 2011) join the call to address racism and stigma in healthcare.

A fundamental question underlies current efforts to address racism in medicine: what are the best ways to train healthcare providers to diagnose and treat the pernicious effects of racism and

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bias on health and well-being? For much of the past four decades, medical education promoted a cultural competency framework that targeted provider and system bias in ways that aimed to improve clinician-patient communication (Kripalani et al., 2006). Starting in the 1980s, mental-health agencies mandated that clinicians demonstrate “cultural and linguistic competence” that met the diverse “needs presented by consumers and their communities” (Cross et al., 1989). By the early 2000s, the U.S. Department of Health and Human Services defined a series of national standards for “culturally and linguistically appropriate” care, such as “ensuring that patients receive ... effective, understandable, and respectful care provided in a manner compatible with their cultural health belief and practices.” (“Teaching Cultural Competence”; Agency for Healthcare Research and Quality, 2014). Soon thereafter, cultural competency became a requisite component of the curricula in U.S. medical schools (Kripalani et al., 2006; Gregg and Saha, 2006; Burgess et al., 2010).

Cultural competency promoted important recognition of ways that clinician bias regarding race, ethnicity, and other factors impeded healthcare delivery during an era when U.S. medicine was often loath to do so (National Juneteenth Medical Commission; Jones et al., 1991). Yet growing evidence suggested that a focus on interpersonal communication left larger questions of systemic bias in healthcare unaddressed. Indeed, despite decades of cultural competency education, studies consistently show low levels of physician recognition of the ways health systems contribute to health disparities (Kaiser Family Foundation, 2002; Sequist et al., 2008; Taylor et al., 2006; Britton et al., 2016). Only a minority of physicians who recognize racial/ethnic and socioeconomic disparities in the US health system agree that health system disparities affect their patients (Kendrick et al., 2015). Moreover, research suggests that white providers’ understanding of health system-related disparities reflects a dominant color-blind ideology in which physicians are more likely to identify individual shortcomings than structural barriers faced by minority patients (Malat et al., 2010; Wear, 2003; Fox, 1990).

More broadly, recent political events in the U.S. make abundantly clear that racism and bias reside, not just in individual attitudes or interactions, but within larger systems, structures, and institutions. For instance, calls for police sensitivity training in the aftermath of the 2014 police shooting of Michael Brown in Ferguson, Missouri, were exposed as insufficient when it became clear that deep tensions also resulted from systemic racism in the police force (Berman and Lowery, 2015), zoning rules that classified white neighborhoods as residential and black neighborhoods as commercial or industrial, urban renewal plans that shifted black populations from central cities like St. Louis to inner-suburbs like Ferguson, and segregated public housing projects that replaced integrated low-income areas (Rothstein, 2014).

These and other developments raise the specter that, when teaching healthcare providers and students about racism and bias in medicine, medical education need also conceptualize and intervene into forms of racism that physician and public health scholar Camara Jones describes as “structural, having been codified in our institutions of custom, practice, and law” and manifest through differential access to “the goods, services, and opportunities of society by race.” (Jones, 2000) Picking up this formulation, the White Coats 4 Black Lives movement calls for national medical school curricular standards that include “strategies for dismantling structural racism” (“White Coats For Black Lives”).

This paper contributes to a growing body of literature that posits *structural competency* as a conceptual framework for bridging this gap between individual and institutional bias, or between what racism in medicine is and what it does (Metzl, 2010; Metz and Hansen, 2014; Metz and Roberts, 2014; Donald, et al. 2017; Neff

et al., 2016). Whereas cultural competency focused mainly on identifying clinician bias and improving communication at moments of clinical encounter, structural competency emphasizes diagnostic recognition of the economic and political conditions that produce health inequalities in the first place. Structural competency calls on healthcare providers and students to recognize how institutions, markets, or healthcare delivery systems shape symptom presentations and to mobilize for correction of health and wealth inequalities in society (Hansen and Metz, 2016). As Metz and Hansen (2014) describe it, “if stigmas are not primarily produced in individual encounters but are enacted there due to structural causes, it then follows that clinical training must shift its gaze from an exclusive focus on the individual encounter to include the organization of institutions and policies, as well as of neighborhoods and cities, if clinicians are to impact stigma-related health inequalities” (p. 127).

Structural competency emerged in the context of North American medical education, in conversation with literature of critical race studies, sociology, economics, urban planning, anthropology, and social determinants, along with engagement with the “cultural humility” framework furthered by narrative medicine (Metz and Hansen, 2014). It also aims to foster dialogue with structurally inflected models globally, such as the “social medicine model” developed in Latin America (Tajer, 2003) and global frameworks that aim to educate socially accountable health workforces (e.g. Training for Health Equity Network, 2011). Structural competency also finds common cause with the new “syndemic vulnerability” conceptual framework for understanding how diseases or health conditions that arise in populations are exacerbated by the social, economic, environmental, and political milieu (Lancet, 2017).

To date, most structural competency interventions have targeted healthcare providers and medical students (School of Public Health at University at Albany, Garcia, 2015, Pérez, 2014). Here we assess whether structural competency training is beneficial in pre-health baccalaureate settings as well, and in ways that potentially enhances how traditional pre-med education teaches students about diversity issues more broadly. Traditional pre-health education often separates pedagogy about the biological aspects of illness from training in other disciplines and approaches, with far more emphasis on the former topics than on the latter ones (Dalen and Alpert, 2009). As we show, a structural competency approach integrates scientific and medical advances with economics, sociology, anthropology, critical race studies, urban planning, epigenetics, and other frameworks in order to explore social and economic structures that contribute to inequities in the distribution of illnesses, as well as biases that surround attitudes about illness and health.

In what follows, we briefly detail an interdisciplinary pre-health curriculum, the Medicine, Health, and Society (MHS) major at Vanderbilt University, that integrates structural competency frameworks into semester-long baccalaureate courses. We then present the comparative results of a new evaluation tool, the Structural Foundations of Health Survey, developed to evaluate structural skills and sensibilities. We use the survey to evaluate three groups of students at Vanderbilt University—incoming pre-med freshmen, graduating premed science majors, and graduating MHS majors—with particular attention to student analysis of how political, cultural, economic, and social factors such as institutional racism shape assumptions about conditions including cardiovascular disease, obesity, and depression.

We hypothesized that MHS majors would identify and analyze relationships between structural factors and health outcomes in deeper ways than did premed science majors or incoming first-year students, while also demonstrating higher understandings of structural factors in their approaches to race, intersectionality, and

health disparities. As such, we aimed to assess whether MHS raised the structural competency of MHS students relative to that of students who undertook other courses of study. We particularly aimed to assess the value added of advanced instruction in structural approaches to race, racism, and inequity, as well as the implicit and explicit biases that seemed to exist in freshmen and persist in non-MHS majors.

Our focus on baccalaureate education rests in the belief that honing this kind of integrated knowledge during the undergraduate years becomes an ever more significant and applicable skill-set for the next generation of health practitioners. Research increasingly uncovers how the pathologies of social and institutional systems impact the material realities of people's lives. Epigenetics, for instance, demonstrates at the level of gene methylation how high-stress, resource-poor environments can produce risk factors for disease that last for generations (Slopen et al., 2014). Responding to this expanding knowledge base, the MCAT now asks students to demonstrate aptitude in the influences of culture and community on health behaviors and outcomes, basics of the U.S. healthcare system, social determinants of health, and changes in health policy (Association of American Medical Colleges, 2011; Association of American Medical Colleges, 2015).

These and other developments suggest the importance of addressing matters such as race, culture, and bias through interdisciplinary pedagogic approaches that emphasize frameworks such as place, economy, politics, or history—a luxury not often afforded in oft-crowded professional-school curricula. Despite increasing emphasis on the social foundations of health in pre-medical education, as recently as 2013–2014, less than half of all U.S. universities and colleges offered an undergraduate course on health disparities (Benabentos et al., 2014).

Moreover, while a number of programs now encourage pre-medical students to take introductory psychology and sociology courses in preparation for the behavioral and social sciences section of the MCAT, it remains unclear whether these courses sufficiently train students to understand frameworks of race and equity at the core of structural health disparities (Frazier and Twohig, 2012).

1. Medicine, health, and society

In 2007, Vanderbilt University established a pre-health major called Medicine, Health, and Society (MHS) that combined coursework in health sciences, humanities, and social sciences (Metzl and Petty, 2017). The MHS major emphasized interdisciplinary study of health and illness in ways that encouraged students to think critically about how complex social issues impact health, health care, and health policy. Demand was remarkable. Enrollment rose from 40 students in the first year, to 160 students in 2009, to more than 300 students in 2012. By 2015 MHS enrolled more than 500 undergraduate majors.

Faced with growing numbers of students, MHS faculty met over the course of academic year 2012–2013 to reshape the MHS curriculum in ways that emphasized respect for clinical advances alongside critical attention to the social, cross-cultural, racialized, and gendered determinants of health. As Fig. 1 details, the revised 36-credit-hour MHS major that emerged in fall 2013 introduced a host of new interdisciplinary core courses, including offerings on racial and ethnic health disparities, structural aspects of mental health, economic determinants of health, politics of health, health activism, disability studies, and critical perspectives on global health (Vanderbilt University Center for Medicine Health and Society, 2015).

Structural competency became the central unifying rubric in this curricular reformulation. MHS faculty developed a number of structural competency-based interventions, including:

- Three new concentration areas (Intersectionality, Inequality, and Health Justice; Health Policies and Economics; Health Behaviors and Sciences) that combined pre-health science classes with courses that emphasized how cultural, economic, demographic and biological factors impact health, and two others (Global Health; Medicine, Humanities, and the Arts) that emphasized cross-cultural and literary structures of meaning.
- A new course called Designing Healthy Publics studied how buildings, cities, and urban planning structure the health of populations.
- A new class on Community Health Research analyzed how health disparities are created and maintained by structural policies and practices.
- A number of classes on race, ethnicity, and health explored ways that historical, cultural, institutional, economic and political factors shaped patterns of morbidity, food distribution networks, medication reimbursement rates, injury patterns, and other factors.
- Structural immersion assignments added to medical humanities courses explored tensions between individual and social welfare in literary texts.
- Faculty-student colloquia that developed focus areas for classroom emphasis (e.g. structural understandings of race, health politics, critical analysis of representations of health).

Meanwhile, in-classroom assignments and activities were bolstered through course-related structurally competent immersion interventions such as,

- Service learning through placement in refugee resettlement agencies.
- Student-provided Spanish translation services in low income health clinics.
- In-course emergency room rotations.
- Attendance at legislative hearings on healthcare policy and the Affordable Care Act in Tennessee.

Pertinent to this paper, a majority of Vanderbilt students continued to pursue traditional pre-health degrees as pathways to professional schools. Most premed students majored in interdisciplinary sciences such as neuroscience, molecular and cell biology, biomedical engineering, or others courses of study that emphasized life sciences along with smaller numbers of required general education courses in the humanities and social sciences (Baum & Rains, 2016).

Overall, MHS and traditional premed major applicants to medical school were accepted at roughly comparable rates. For instance, the 2016 medical school acceptance rates for applicants from the three most popular premedical majors at Vanderbilt were 72% for Neuroscience, 78% for Molecular and Cellular Biology, and 88% for MHS, compared to a national average of 42% (Grundy and Rains, 2016).

Beneath the numbers, however, this divergence of two types of pre-health tracks at the same school—one (premed) that accentuated the traditional sciences, another (MHS) that promoted cultural and structural analysis alongside science prerequisites—allowed us to measure whether a curriculum based in structural competency might impart different analytic skills than did traditional premed tracks, while at the same time preparing students for their post-college careers.

2. Structural foundations of health survey

We devised an evaluation instrument called the Structural Foundations of Health Survey (2016) to assess and compare

MHS Major Requirements ^a		Examples of MHS course titles and Structural Competency content
One core course	<p><i>Core courses</i></p> <ul style="list-style-type: none"> • Politics of Health • Racial and Ethnic Health Disparities • Fundamental Issues in MHS • Theories of the Body • American Medicine in the World • Masculinity and Men's Health 	<ul style="list-style-type: none"> • <i>Politics of Health</i> (core course): Addresses U.S. health policy and political dimensions of various health-related issues. Students critically evaluate the content of research, popular press articles, and websites • <i>Racial and Ethnic Health Disparities</i> (core course): Addresses historical, cultural, institutional, economic and political factors that shape health disparities in the United States. Students evaluate strategies to eliminate the disparity and address the root structural cause of the health outcome.
Four courses from chosen concentration area	<p><i>Concentration areas</i></p> <ul style="list-style-type: none"> • Global Health • Health Behaviors and Health Sciences • Health Policies and Economies • Intersectionality, Inequality, and Health Justice • Medicine, Humanities and the Arts • Critical Health Studies 	<ul style="list-style-type: none"> • <i>Economic Demography and Global Health</i> (concentration course): Addresses economic consequences of demographic change in developing and developed countries. Students learn links between socioeconomic status, economic growth, and health. • <i>Global Health and Social Justice</i> (concentration course): Examines global health institutions, policies, and practices. Students learn anthropological, sociological, and scientific approaches to global health problems.
One disciplinary course from affiliated department ^b	<p><i>Disciplinary courses</i></p> <ul style="list-style-type: none"> • Health economics • History of medicine • Sociology of medicine • Medical anthropology • Women's health • Health psychology 	<ul style="list-style-type: none"> • <i>Community Health Research</i> (concentration course): Examines environmental and policy contexts of behavior while considering social and psychological influences. Students evaluate interventions to prevent HIV, diabetes, and hypertension.
Six elective courses from a MHS-approved list	Of the 6 electives, up to 4 may be biomedical prerequisites for premedical, prenursing, and pre-social work students.	<ul style="list-style-type: none"> • <i>Medicine and Literature</i> (Disciplinary Course): Explores health, illness, and identity through works of literature. Students learn narrative analysis and writing skills.

Fig. 1. Medicine, health and society (MHS) curriculum overview.

^aEach course counts 3 credit-hours toward the 36-credit-hour major in MHS.

^bThe disciplinary course is a distribution requirement; it may be taken as part of the concentration or elective courses.

students' recognition of ways structural and institutional factors shape health outcomes. Based on our review of the literature, no validated instrument existed at the time of this study to test undergraduate student knowledge of structural factors as they pertained to health. Existing educational research in this area relied on self-reported understanding of the factors contributing to health disparities, self-reports about the existence or importance of racial disparities in health, or true/false and multiple choice style questions (Agrawal et al., 2005; Bussey-Jones et al., 2005; Vela et al., 2008). Another area of inquiry queried perceptions of fairness in the healthcare system (Kaiser Family Foundation, 2002; Wilson et al., 2004; Britton et al., 2016; Kendrick et al., 2015).

The instrument aimed to assess awareness of health disparities and cultural differences, as well as structures and structural biases that produce them. We particularly emphasized core structural competency themes from the MHS curriculum, including the ability to identify how economic, historical, and social conditions produce inequalities; rearticulate cultural differences in structural terms; recognize structural racism; and detect the ways that racial structures impact, not just the health of minority populations, but those of dominant groups.

As part of instrument development, MHS faculty crafted measurements of structural competency based on an analysis of course

syllabi and in dialogue with existing frameworks (e.g., the AAMC's Core Competencies for Entering Medical Students). A small, randomly selected group of MHS students completed the instrument in 2015 to assess the measures. We edited according to their feedback and analysis of their responses. Analysis of preliminary data then validated the evaluation instrument (Metz et al., 2017).

The survey asked respondents about the underlying structural causes of conditions commonly attributed to lifestyle or biology: obesity, heart disease, depression. In contrast to existing survey methods, this approach allowed assessment of the primary frameworks respondents used to understand inequalities in health. In response to critiques that most health disparities and cultural competency education focuses on racial minorities in contrast to a white referent group (Daniels and Schulz, 2006), the survey also asked respondents to analyze depression based on an anti-depressant advertisement featuring a white woman.

3. Methods

We collected data from graduating second-semester MHS-major seniors at Vanderbilt University in 2015 and 2016. We also collected data from two comparison groups at Vanderbilt: second-

semester seniors not majoring or minoring in MHS who self-identified as planning careers in medicine (“premed seniors”), and first-semester freshmen in their first two weeks of college who identified as planning careers in health professions. MHS seniors completed the survey online as part of their graduation exam in 2015 and 2016. We recruited premed seniors in 2015 through a study announcement linked to the anonymous online survey emailed to all students on Vanderbilt’s Health Professions Advisory Office (HPAO) listserv. Freshmen were recruited in the first week of the fall semester through an email announcement with a survey link sent to all students enrolled in the Introduction to Chemistry course taken by most pre-health students in their first year of college. The addition of the freshmen to the analysis was meant to gauge whether structural awareness resulted from students self-selecting into the MHS major or training in the MHS curriculum. Students at Vanderbilt cannot declare a major until the sophomore year. Both premed seniors and freshmen were offered incentives to participate (\$20 Amazon gift cards). Of the 216 graduating premed seniors applying to medical or dental school (Baum & Rains 2015), 70 (32.4%) responded to the survey; seven surveys were then invalidated by the authors due to failed completion. 97 (13.2%) of the 729 freshmen enrolled in Introduction to Chemistry responded. Average survey completion time was 30 min for all groups. The Vanderbilt University IRB granted exempt status for this study.

The complete Structural Foundations survey has been described elsewhere (Petty and Metzl, 2017). Here we briefly summarize key measures relevant to the analysis presented in this paper, including professional preparation related to health inequalities, identification and explanation of the factors underlying disparities in obesity and heart disease, and responses to a pharmaceutical advertisement of an anti-depressant.

3.1. Health disparities-related professional preparation

Self-reported health disparities and related professional preparation was measured through 4 items on a 5-point scale ranging from poor (1) to excellent (5) preparation. Students self-reported their understanding of relationships between socioeconomic status (SES) and health, knowledge of the American health system, knowledge of the Affordable Care Act (ACA), and ability to work cooperatively with diverse populations. These areas of knowledge reflected the AAMC (2014) “Core Competencies for Entering Medical Students.”

3.2. Educational and career characteristics

The survey queried MHS curriculum exposure and career plans. Since non-MHS majors can enroll in most MHS courses, we asked participants to indicate how many MHS courses they had previously taken to measure exposure to the MHS curriculum.

3.3. Obesity

To assess structural competency, we asked participants to identify and explain geographic disparities in childhood obesity. Understanding of childhood obesity was chosen as an indicator of structural competency because explanations commonly invoke narratives of individual choice (lazy, weak will) or assumptions of deficiencies in culture and lifestyle instead of structural explanations such as food access (Azzarito 2008). The survey presented a map of the U.S. from the *Trust for America’s Health* report (Levi, et al., 2010) in which the U.S. South contained eight of the ten states with the highest rates of childhood obesity. Participants were asked to select the three most important factors explaining this disparity from a list of 14 items that included individual-level factors (e.g.,

genetics, individual lifestyle choices), AAMC cultural competency factors (cultural background, health literacy, health traditions and beliefs, physician bias) (AAMC, 2015), and structural competency factors as defined by Metzl and Hansen (2014) (access to health-care, health delivery system, insurance, institutional racism, medicalization, income, neighborhood, social policies).

3.4. Heart disease

Next, we asked participants to explain a health disparity framed explicitly by race. We cited a statistic that, “African-American men are 30% more likely to die from heart disease than non-Hispanic white men” (U.S. Department of Health and Human Services, 2015). Here as well, presented closed- and open-ended questions to assess whether respondents phrased answers in relation to individual factors, “cultural” stereotypes about cardiovascular disease (Pollock, 2012), or structural factors.

3.5. Depression

To detect student recognition of ways racial structures also potentially shape the health of privileged groups, we presented students with a pharmaceutical advertisement of an anti-depressant ad showing a woman who appeared to be white who smiled while holding up a white-diapered infant above text that read, “I got my playfulness back!” The survey asked a series of open-ended questions: 1) “What is your initial response to this advertisement?” 2) “What messages does the advertisement convey about mental illness?” 3) “What role might social, political, economic, or cultural factors play in shaping the message of the advertisement?” Again, we coded individual versus structural factors, with particular attention to text regarding racial, cultural, or systemic understandings of mental illness.

3.6. Analysis

The analysis began by extracting key descriptive statistics from close-ended responses. Two independent PhD-level coders systematically compiled data from completed surveys, and all results were double-checked by the study’s two principal authors (JM, JP). We pooled MHS data from 2015 to 2016 for analysis. We then used logistic regressions to examine group trends. We analyzed all data using IBM SPSS Statistics 24.

For the open-ended responses, an interdisciplinary research team comprised of the three authors of this paper, representing psychiatry, sociology, and MHS, independently read all surveys using a thematic coding strategy (Braun & Clarke, 2006). The authors, blinded to which cohort each student came from, then met to create thematic codes. We focused primarily on student analysis of how political, cultural, economic, and social factors such as institutional racism shape illness and health. Agreement was 0.92.

4. Results

4.1. Closed-ended responses

Table 1 reports sample characteristics of the premed seniors, freshmen, and MHS seniors. Thirty-nine percent of MHS respondents identified as premed, and most of the remaining MHS students planned careers in nursing or other health professions (e.g. dentist), public health, healthcare administration, and consulting. Most freshmen claimed to plan careers in medicine (84.6%) and almost a third (29.3%) intended to major in MHS. The majority of premed seniors (68.3%) and all but one freshman (98.9%) reported enrolling in no MHS courses.

Table 1
Sample characteristics.^a

	MHS N = 185		Premed Senior N = 63		Freshmen N = 91	
	% (M)	N (SD)	% (M)	N (SD)	% (M)	N (SD)
Career plans^b						
Premed	38.9	72	88.9	56	84.6	77
Nursing	9.7	18	0	0	4.4	4
Other healthcare provider	20.5	38	11.1	7	9.1	10
MHS curriculum exposure						
Enrolled in 0 courses	0.5	1	68.3	43	98.9	90
Enrolled in 1–2 courses	13.5	25	28.6	18	1.1	1
Enrolled in 3 or more courses	89.5	159	3.2	2	0	0

^a Data are from 339 students who responded to survey about the pre-health professional curriculum in 2015–2016.

^b Percents may not add to 100 because students can choose more than one.

As expected, a majority of MHS seniors self-reported high levels of *health disparities-related professional preparation* including knowledge of the relationship between SES and health (95.1% excellent/good) and the US healthcare system (56.2% excellent/good) (Fig. 2). A substantial percentage also reported high levels of knowledge on the Affordable Care Act (48.1% excellent/good). These percentages were consistently higher than responses by premed seniors and first-year students ($p < 0.001$). MHS seniors also reported higher levels than premed seniors but not freshmen in preparation to work with diverse populations (74.6% versus 93.5%; $t = -4.225$, $p < 0.001$).

Analysis of the obesity and heart disease prompts (Table 2, Fig. 3) supported these findings. MHS seniors were significantly more likely than the other groups of respondents to identify structural factors (e.g. neighborhood, access, health delivery system, institutional racism, income) to explain health inequalities. For instance, MHS seniors were over 3 times more likely than premed seniors to identify a structural factor as one of the three most important factors in explaining disparities in cardiac mortality

(OR = 3.27, 95% CI = 1.37–7.82), and almost 6 times more likely to identify any structural factor as one of the three most important factors in explaining geographic disparities in childhood obesity (OR = 5.87, 95% CI = 2.89–11.92). In particular, MHS students were almost 3 times as likely as premed seniors to select institutional racism in response to the heart disease prompt (OR = 2.801, 95% CI = 1.565–5.105). Compared to premed seniors, MHS seniors were less likely to select an individual factor (e.g. lifestyle) to explain childhood obesity (OR = 0.412, 95% CI = 0.234–0.726) and equally likely to select an individual factor in the case of racial disparities in cardiac mortality.

We observed a strong, positive association (Fig. 4) between identification of structural factors that explained childhood obesity and cardiac mortality and number of MHS courses taken ($X^2 = 31.785$, $p < 0.001$). The identification of structural determinants of health for obesity and cardiac mortality significantly increased with the number of MHS courses taken by students in all groups. A majority (81%) of the students who did not identify any structural factors as one of the three most important determinants

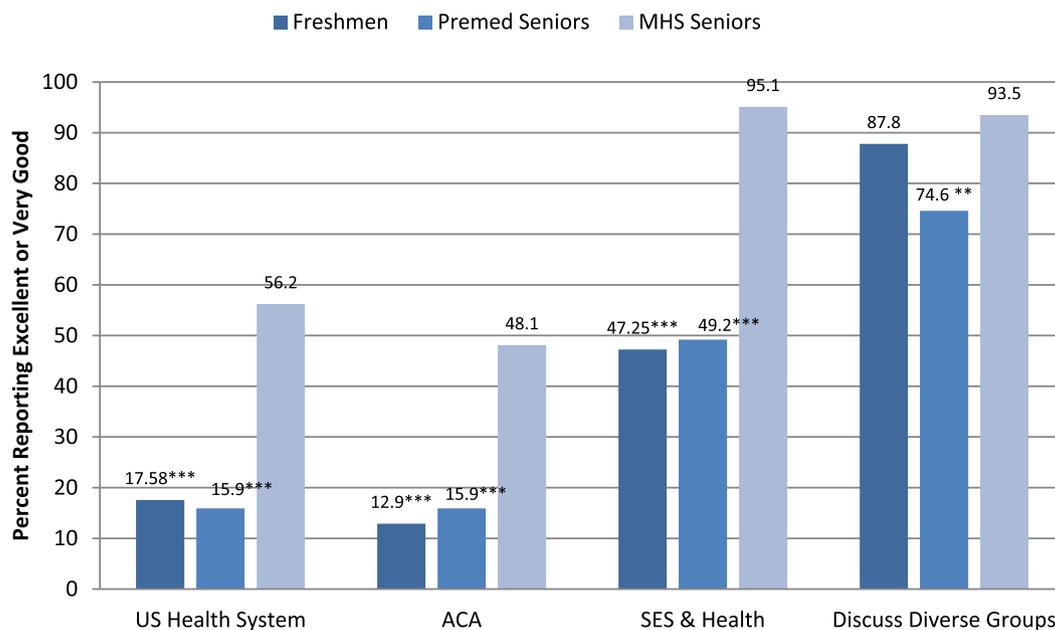


Fig. 2. Percent reporting excellent or very good knowledge of select topics: MHS seniors, premed seniors, and freshmen.^{a, b}

^aData are from 339 students who responded to survey about the pre-health professional curriculum in 2015–2016.

^bStudents indicated their professional preparedness in each of these areas on a scale of 1 (poor preparation) to 5 (excellent preparation).

Note: asterisk indicates that the difference between the indicated group and MHS seniors is significant at * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 2

Odds ratios for identification of factors shaping of childhood obesity, heart disease mortality, and depression: MHS seniors, premed seniors, and Freshmen.^a

	MHS v. Premed		MHS v. Freshmen	
	OR	95% CI	OR	95% CI
Racial heart disease mortality disparity, reporting:				
Structural factor	3.270**	1.37–7.82	4.456***	2.031–9.777
Cultural factor	0.719	0.401–1.291	2.758***	1.641–4.638
Individual factor	0.907	0.510–1.615	0.361	0.216–606
Geographic disparity childhood obesity, reporting:				
Structural factor	5.87***	2.89–11.92	4.456***	2.253–8.813
Cultural factor	1.256	0.634–2.489	1.650	0.916–3.004
Individual factor	0.412**	0.234–0.726	0.258***	0.052–0.437
Reporting institutional racism				
Geographic obesity	1.366	0.527–3.539	5.698*	1.306–24.861
Heart disease mortality	2.801***	1.565–5.015	4.856***	2.716–8.716
Depression				
Identifying race	0.91	0.50–1.68	4.083***	1.767–9.432
Analyzing race	0.632	0.323–1.237	3.148**	1.464–6.772

Note: asterisk indicates that the difference between the indicated group and MHS seniors is significant at * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

^a Data are from 339 students who responded to survey about the pre-health professional curriculum in 2015–2016.

of cardiac mortality and childhood obesity had taken zero MHS courses.

Analysis of the depression prompt revealed that respondents in all groups were equally unlikely to identify or discuss structures that might enable privilege such as money, health insurance, or free time, when the object of analysis was a white woman (Fig. 5). These numbers were consistently lower than those observed in the obesity or heart disease prompts, though by design we did not mention race or privilege in our formulation of the questions. Instead, we aimed to assess whether students would consider these factors without prompt, thereby reading against the “invisibility” of

whiteness in the rhetorics surrounding health disparities (Sue, 2004). Overall, compared to freshmen, MHS seniors were four times as likely to analyze SES (OR = 4.083, 95% CI = 1.767–9.432) and three times as likely to analyze whiteness (OR = 3.148, 95% CI = 1.464–6.772). We observed no significant differences between MHS and premed seniors.

4.2. Open-ended responses

To further examine how respondents articulated relationships between culture, race, and structure, we coded the explanations of respondents who chose “cultural background,” “health literacy,” or “health traditions and beliefs” as one of their three explanatory factors. Again, to varying degree, all groups attributed racial or ethnic health disparities to “cultural” beliefs and practices in the closed-ended responses, and MHS seniors were as likely as premed seniors and more likely than freshmen to select a cultural factor to explain disparities in cardiac mortality. The open-ended responses to open-ended prompts suggested deeper level differences between the three groups regarding the types of reasoning that students used to explain the relationships between structure, culture, and disparity/privilege. As predicted from the close-ended results, MHS responses more frequently linked structural and cultural explanations. Moreover, MHS seniors were less likely to reflect a monolithic view of African American culture. The most common themes in MHS students’ cultural explanations included health seeking, trust, and lack of knowledge. Common attributes in premed seniors and freshmen replies included monolithic African American culture, vagueness, and lack of knowledge.

4.3. Monolithic culture

Premed seniors and freshmen often assumed causal linkages in which monolithic culture (e.g., *their background*) produced unhealthy action (*tolerate more pain*) which then produced disease, while at the same time assuming a unified, static notion of “African American” culture distinct from white culture or U.S. culture.

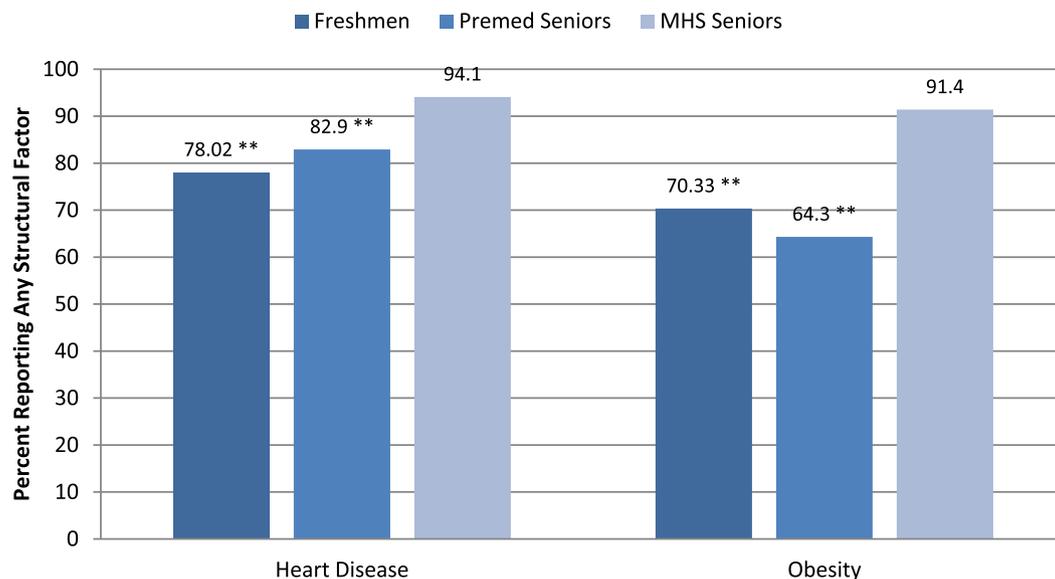


Fig. 3. Percent selecting one or more structural factor in response to cardiac mortality and childhood obesity prompts: MHS seniors, premed seniors, and freshmen.^{a, b}

^aData are from 339 students who responded to survey about the pre-health professional curriculum in 2015–2016.

^bStudents selected 3 most important factors from a list of 14 factors. Structural factors included: access to healthcare, health delivery system, insurance, institutional racism, medicalization, income, neighborhood, and social policies.

Note: asterisk indicates that the difference between the indicated group and MHS seniors is significant at * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

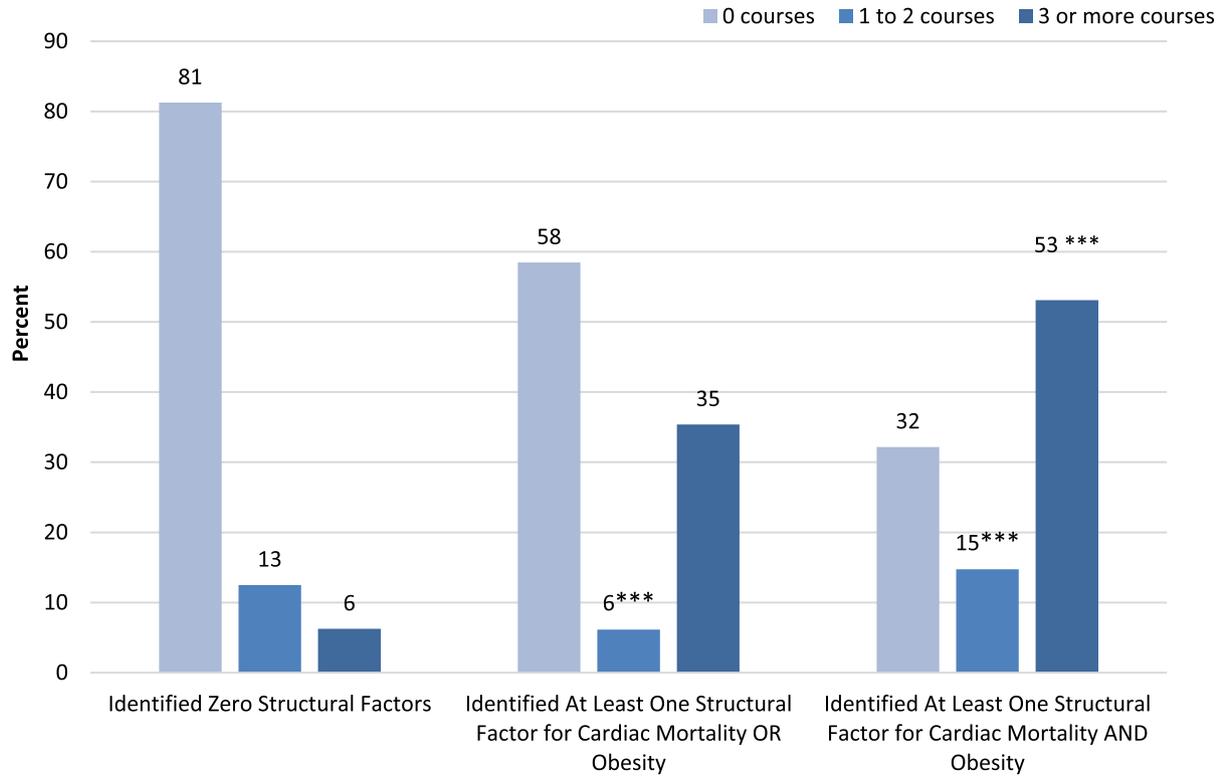


Fig. 4. Percent of students identifying structural factors for cardiac mortality and childhood obesity, by number of MHS courses.^a

^aData are from 339 students who responded to survey about the pre-health professional curriculum in 2015-2016.

Note: asterisk indicates that the difference between the indicated group and 0 courses is significant at * $p < 05$, ** $p < 01$, *** $p < 001$.

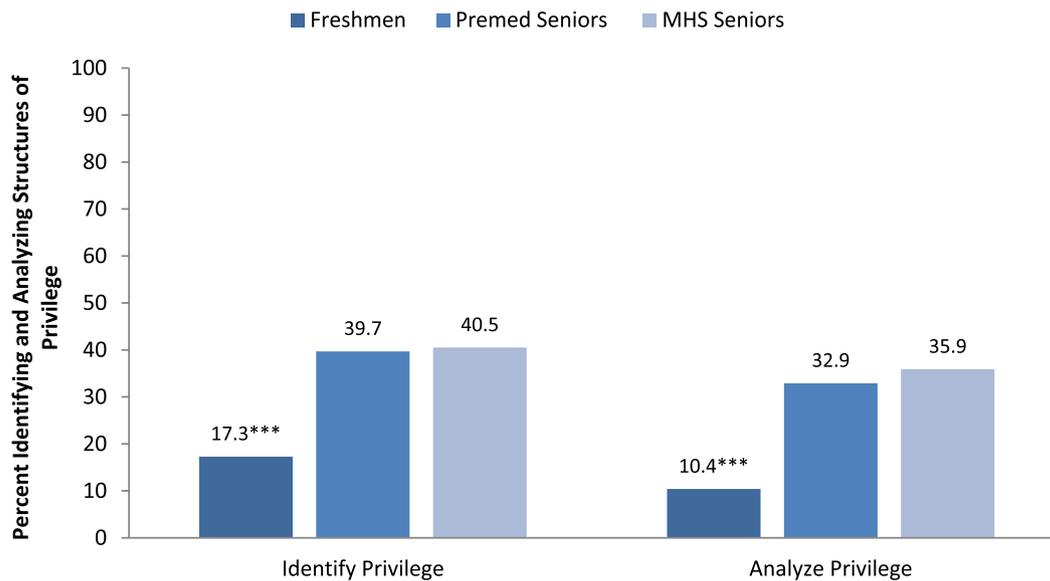


Fig. 5. Percent identifying and analyzing whiteness in response to an anti-depression advertisement: MHS seniors, premed seniors, and freshmen.^a

^aData are from 339 students who responded to survey about the pre-health professional curriculum in 2015-2016.

Note: asterisk indicates that the difference between the indicated group and MHS seniors is significant at * $p < 05$, ** $p < 01$, *** $p < 001$.

Typical responses to the cardiovascular and obesity questions included

Perhaps the cultural norm is to try to tolerate more pain, including chest pain ... (Premed senior #9)

There is more of a cultural influence on African American men than white men. The culture surrounding food intake is less healthy ... (Premed senior #17)

Their background consists of slavery so they may eat less healthy food like biscuits and gravy ... (Premed senior #3)

While some MHS students similarly assumed monolithic “culture” based on race (“*African American men have poor health seeking behavior*”), their responses frequently demonstrated added structural explanations to for cultural ones. For instance,

... residential segregation concentrates many black men in poor neighborhoods, where healthy foods and exercise facilities cannot be accessed, but where there are a lot of fast food restaurants (MHS, 2015 #42)

African American men are less likely to have health insurance than non-Hispanic white men ... leads to males skipping yearly physicals and putting off seeing a doctor until symptoms are severe. (MHS, 2016 #67)

To be sure, scholars (James, 2004; Airhihenbuwa et al., 1996) have long associated culturally specific health beliefs and practices with expressions of illness. However, MHS students also demonstrated key structural competency components (Metzl and Hansen, 2014) including recognizing how structures shaped the social construct of disease, developing an extra-clinical language of structure, and rearticulating “cultural” formulations in structural terms.

4.4. Cultural vagueness

As might be expected, freshmen approached culture in somewhat vague terms, or in ways that assumed that culture equated to ethnicity, history, or other factors linked to minority populations. For instance, a typical freshman response to the cardiovascular question sounded as follows,

I think the choices made are influenced by cultural background, which could lead to heart disease (Freshman, #54)

Both groups of seniors rarely provided vague accounts of culture [*Cultural background can have a big impact on health* (MHS #143), *diet is important* (premed #59)].

4.5. Health seeking

MHS student explanations reflected the claim that health seeking behavior is shaped by cultural beliefs, and they often referred to health seeking in relation to masculinity, distrust related to discrimination, and access.

African-American men may have less access to healthcare because they are less likely to visit a doctor and consequently less likely to be referred to specialists. In other words, institutional racism may prevent these men from being referred to these specialists which are essential in preventing and treating heart problems. Secondly, African American males tend to avoid going to the doctor because of cultural traditions of pride and

strength, and health beliefs in which they do not like to show weakness ...

Many black men do not have adequate health care, so it is not that they do not take care of their bodies as well as white men, but rather do not go the doctor as often as white men. The lack of trust of doctors also plays apart in black men's infrequent doctor visitations which is a result of history of abuse and misuse on the part of physicians ...

No premed seniors or freshmen referenced health seeking behaviors.

4.6. Lack of knowledge

Both MHS and premed seniors explained racial disparities in cardiac death as a consequence of deficits in education and knowledge.

African American men tend to be less educated so they may be less likely to understand their health conditions and treatment options. In turn, they may perceive themselves as having a more passive role in their own health and be less proactive in seeking healthcare (Premed sr #38)

MHS seniors were somewhat less likely to address knowledge gaps but more likely to use the cultural competency language of health literacy.

Additionally, health literacy determines an individual's ability to navigate the healthcare system and recognize warnings in their own health (MHS #18)

Health literacy because if these African American men understood how they can get heart disease and ways to prevent it their risks would lower (MHS #97).

4.7. Genetics

Considerable differences regarding the role of genetics or genetic explanations of illness were seen among the three groups. As was the case with culture, freshmen and premed seniors often presented genetic explanations as causal in ways that directly explained morbidity and mortality of minority populations. Representative responses included,

African Americans men may be more susceptible to deadly consequences of heart disease due in part to their genetic makeup ... (Freshman, #19)

Genetically African Americans have a higher incidence of developing heart failure at younger ages due to genetic factors such as high blood pressure and cholesterol ... (Premed senior #43)

... genetic factors must play an important role in this because the difference is so high between african american and Caucasian. (Freshman, #60)

Some first year students who provided genetic explanations in the open-ended responses also addressed lower individual income. However, these students rarely addressed large-scale social forces such as neighborhood, segregation, or food access.

Cultural difference often appeared as a correlate to genetics in these explanations in ways that seemed to amplify problems with

approaching health disparities as a results of given characteristics shared by all members of a racial or ethnic group rather than as the outcome of underlying social processes,

Genetic issues like high bp are unique to some races. Lower literacy among AA males = less health literacy and knowledge about how to protect self, leading to low income = worse health and choices. (Freshman, #8)

I think that there is a little bit of ignorance about food nutrition ... different regions of the country have different genetics because many people grow up and stay in the same area, which limits the genetic pool. (Premed senior #36)

To be sure, genetic advances greatly furthered understandings of health and illness, and it could be argued that many of these statements find resonance in scientific literature. At the same time, rhetoric about gene pools or implicit associations between genetics and education seemed to reinforce thorny assumptions about genetics and racial difference (Nelson, 2016).

MHS majors were considerably less likely than freshmen and premed seniors to argue that racial differences directly produced genetic components. Their responses often framed genetics within contexts of social or institutional factors of within caveats about the limits of genetic expertise:

Cultural background and genetic factors might create a genetic predisposition for heart disease in African American men. However, physicians may think of this statistic and jump to conclusions for African-American men when there is actually a deeper issue. (MHS, 2016 #55)

African American men may be more susceptible to deadly consequences of heart disease due in part to their genetic makeup but institutional racism may also play a part as African American men may be less likely to be diagnosed with heart disease, as compared to non-Hispanic white men. (MHS, 2015 #22)

MHS students were the only respondents who addressed epigenetic explanations for illness that articulated how social and environmental factors such as education, nutrition, history, or social conditions impacted genetic expression:

There is evidence to suggest that stress on pregnant mothers causes alterations in gene expression which are linked to higher rates of CVD later in life ... (MHS, 2016 #7),

... genetics- stems from ancestors and their experiences with extreme racism, stress and strain on bodies ... (MHS, 2015 #51).

4.8. Structural racism

To varying degrees, all groups pointed to the pernicious effects of structural racism on health. Here as well, subtle linguistic differences marked the three groups. Freshmen rarely identified institutional racism by name, and when they did they again tended to contrast its effects with genetics:

"I believe that while institutional racism and access to a good neighborhood with strong, accessible healthcare services are important, the reduction of racism in the US indicates that the genetic predispositions towards various diseases of different races cannot be ignored." (Freshman, #21)

Premed seniors more frequently demonstrated structural understandings of the relationships between racism and ill-health and also often mentioned individual-level bias:

Access has to do with poverty and I would assume its a subdivision of racism ... (Premed senior #4)

Physical bias can and does occur on subtle and unconscious levels. (Premed senior #40)

MHS seniors, however, demonstrated the most integrated responses:

The primary factor leading to this disparity is institutional racism. African American men are systematically discriminated against in the way they interact with structural institutions like schools, employment, and the government. The stress of discrimination leads to higher cortisol levels, which heightens risk of heart disease as their bodies are trapped in a perpetual flight or fight response ... (MHS, 2016 #22)

The first factor I chose was institutional racism. Though not explicit in law or policy, institutional racism creates a wide variety of barriers and blockages. These subtle institutionalized ideologies relegate bodies based on race into select areas for living which are not by chance - these are areas with poorer conditions or problems that wealthier and racially dominant groups choose not to live in. Institutional racism leads to barriers of access to education and employment, further creating SES disparities which a fundamental cause of disease and poor health. (MHS, 2015 #12)

Of note, standard true/false or self-reported curriculum evaluations would likely have categorized all groups of students as having similar levels of understanding of racism.

4.9. Privilege

Prompts for the pharmaceutical advertisement were vague by design, and did not mention race or geography. Instead we presented a commercialized image with multiple possible triggers.

Overall, roughly half of the students seemed attuned to the medicalization of sadness, gendered assumptions about good mothering, and the marketing of psychiatric medications. Race and gender figured prominently in these replies, almost uniformly critiquing the "targeting" of white women as a marketing strategy:

It's targeting white females, specifically mothers (Freshman, #9).

Since women are more likely to be diagnosed with depression, this ad targets women so that the drug company can make as much money as possible ... (Premed senior #22)

By portraying a white, seemingly middle class mother, this demographic is also subtly the target of the advertisement. (MHS, 2015 #26)

Multiple students also described the lack of diversity in the image,

... may ignore black mothers who suffer from mental illness (Premed senior #6)

I just think it is so problematic that people of color do not get to see themselves in these advertisements (Premed senior #18).

However, relatively few responses connected race and gender to larger social or socioeconomic formations. Among the exceptions,

This ad plays on the idea that mental illness is a 'white woman' disease, which is an idea that permeates society today. (Premed senior #39)

The advertisement is promoting the dangerous assumption that mental illness (depression) is only for white, higher socioeconomic status, women, who are plagued by trivial ills associated with their privileged status in society, excluding minority and other groups from the diagnosis of depression. (MHS, 2015 #9)

Primarily, this advertisement appeals to a demographic of people who enjoy a certain amount of political and socioeconomic privilege. Thus, it can be assumed that many people that relate to this advertisement have the means to afford (or adequate insurance to cover) antidepressants. (MHS, 2016 #44)

Not a single student referenced genetics in response to the image.

5. Discussion

Our findings suggest that students who graduated from an interdisciplinary pre-health curriculum (MHS) identified and analyzed relationships between structural factors and health outcomes at higher rates and in deeper ways than did premed science majors and first-term freshmen. While all groups demonstrated awareness of the impact of cross-cultural factors on health outcomes, MHS majors consistently demonstrated advanced skills that implied more nuanced understandings of structures underlying these outcomes. For instance, MHS students detailed structural or institutional racism as an explanatory factor for disparities in complex ways, and more commonly defined these disparities as arising from socioeconomic differences, discrimination, or policies that resulted in intended or unintended racial consequences. Perhaps most important, these types of analytic skills rose in all students in direct proportion to the number of MHS courses taken.

Meanwhile, premed seniors were no more likely than were first-term freshmen to identify structural factors as causes of heart disease or obesity disparities. In the case of heart disease, premed seniors were more likely than premed freshmen to identify a cultural factor (Table 2). These findings suggest that premed seniors learned cultural skills but not structural ones as part of the premed curriculum, particularly in relationship to racial disparities.

To be sure, many schools cannot support freestanding curricula. Yet we hope our analysis suggests the salience of integrating structural frameworks into existing courses in order to more fully address structural disparities in addition to individual-level biases.

Our findings are potentially limited by response rates. While a majority of MHS seniors completed the survey, a smaller subset of premed seniors and freshmen did so. Thus, findings are not representative of all premed seniors and freshmen. MHS students also at times gave longer or fuller answers, perhaps because the survey corresponded to course material with which they were familiar. However, all groups were informed that the survey was ungraded and carried no impact on graduation. Premed freshmen were potentially those most interested in MHS or the premed curriculum, given their declarations of future majors and careers.

Our initial survey also focused on health disparities in the U.S. and did not at this stage assess recognition of the structural aspects of global health. To be sure, such engagement would involve more than simply adding "global" examples, particularly since

interventions in many parts of the world already incorporate languages of communal responsibility and solidarity that can seem lacking in the current U.S. healthcare context. Rather, we would aim to productively highlight continuities and disjunctures between various geographical interventions into the health effects of socioeconomic disparities and racisms.

Perhaps most important, students demonstrated difficulty in recognizing implicit structural assumptions about whiteness and privilege—a discrepancy that suggests the need for better pedagogy and assessment focused on mainstream as well as minority bodies and communities.

At the same time, our data suggests that structural competency is a skill set that develops from training; and, that improving awareness about structural equity and well-being results, not just from challenging students' implicit biases or sensitivities, but from imparting analytic skills.

Of course, it may well be argued that MHS students simply reproduced the structural language and analysis emphasized by their coursework. But this is in part the point—the skills that these students demonstrated represent ones increasingly relevant, in an era of epigenetics, neighborhood effects, and social determinants, to address how contextual factors shape expressions of health and illnesses (Robert Wood Johnson Foundation, 2010; Goldstein and Holmes, 2011). Indeed, MHS students showed enhanced ability to diagnose issues such as structural determinants of health and structural stigma while at the same time also demonstrating deeper self-critical understandings of the "cultural" components of cultural competency.

Our study also contributes to an evolving literature suggesting that teaching students about the "social" foundations of health needs to begin sooner in the educational process, during the baccalaureate years, when access to interdisciplinary pedagogies remains accessible, and when semester-long courses can promote frameworks that help future health-care providers conceptualize links between health justice and social change.

Of course, social engagement has long been central to the practice of medicine. But the language and skills needed to promote social justice seem all the more salient at the present moment, when structures needed to sustain health equity in the U.S. appear particularly under attack. At times like these, communal networks and safety nets that sustain well-being for everyone take backseat to rhetorics that falsely promise health only for select persons or groups. Meanwhile, faced with growing disparity, data suggests that clinicians feel increasingly unconfident in "their capacity to meet their patients' social needs," and that their failure to do so "impedes their ability to provide care" (Goldstein and Holmes, 2011). Increasing numbers of physicians also cite structural factors, such as restrictive insurance policies or lack of time with patients, as reasons to leave clinical practice (Pathman et al., 2002).

To be clear, we view our intervention, as well as a number of recent studies that address similar concerns (Neff et al., 2016; Hansen and Metzl, 2017), as midway points between theory and practice. Structural competency emerged in its initial iterations as a theoretical framework that conceptualized ways that U.S. medicine might better engage with the "social" aspects of health-related social inequities and determinants. The first steps in operationalizing this model, of which this paper is part, have involved educating physicians and clinicians-to-be. While such an approach helped refine the model, it potentially raised as many questions as it answered about the real-world applicability of structural competency. Moving forward, interventions and studies will need assess ways that clinicians' and health systems' implementations of structural competency might lead to differing clinical practices and outcomes. Such assessment might involve following students trained in structural competency over time. Or, it might implement

a set of standards through with competency is made manifest by way of categories such as better social histories, career decisions to work with certain populations, commitment to stratifying by race when conducting quality improvement measurements, enhanced patient advocacy, more targeted social and political interventions, or other mechanisms.

Put another way, we in no way wish to overstate the impact of the nascent structural competency model. At the same time, we hold that our data suggest that the “helplessness” surrounding structural inequity can be met with training and intervention into the mechanisms through which such inequities emerge and are propagated. Pre-medical education can thereby become a jumping off-point, not just for scientific training, but for developing medical models of social betterment and change.

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