



REVIEWS

Medical Schools as Racialized Organizations: How Race-Neutral Structures Sustain Racial Inequality in Medical Education—a Narrative Review

Max Jordan Nguemeni Tiako, MD, MS^{1,2,3}, Victor Ray, PhD⁴, and Eugenia C. South, MD, MS^{3,5}

¹Department of Medicine, Brigham and Women's Hospital, Boston, MA, USA; ²Harvard Medical School, Boston, MA, USA; ³Urban Health Lab, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA, USA; ⁴Department of Sociology, University of Iowa, Iowa City, IA, USA; ⁵Department of Emergency Medicine, University of Pennsylvania, Philadelphia, PA, USA.

In 2021, The American Association of Medical Colleges released a framework addressing structural racism in academic medicine, following the significant, nationwide Movement for Black Lives. The first step of this framework is to “begin self-reflection and educating ourselves.” Indeed, ample evidence shows that medical schools have a long history of racially exclusionary practices. Drawing on racialized organizations theory from the field of sociology, we compile and examine scholarship on the role of race and racism in medical training, focusing on disparities in educational and career outcomes, experiences along racial lines in medical training, and long-term implications. From the entrance into medical school through the residency application process, organizational factors such as reliance on standardized tests to predict future success, a hostile learning climate, and racially biased performance metrics negatively impact the careers of trainees of color, particularly those underrepresented in medicine (URiM). Indeed, in addition to structural biases associated with otherwise “objective” metrics, there are racial disparities across subjective outcomes such as the language used in medical trainees’ performance evaluations, even when adjusting for grades and board exam scores. These disadvantages contribute to URiM trainees’ lower odds of matching, steering into less competitive and lucrative specialties, and burnout and attrition from academic careers. Additionally, hostile racial climates and less diverse medical schools negatively influence White trainees’ interest in practicing in underserved communities, disproportionately racial and ethnic minorities. Trainees’ mental health suffers along the way, as do medical schools’ recruitment, retention, diversity, and inclusion efforts. Evidence shows that seemingly race-neutral processes and structures within medical education, in conjunction with individuals’ biases and interpersonal discrimination, may reproduce and sustain racial inequality among medical trainees. Medical schools whose goals include training a more diverse physician workforce towards

addressing racial health disparities require a new playbook.

KEY WORDS: Racialized organizations; Structural racism; Racial disparities; Medical education; Workforce diversity.

J Gen Intern Med 37(9):2259–66

DOI: 10.1007/s11606-022-07500-w

© The Author(s) under exclusive licence to Society of General Internal Medicine 2022

BACKGROUND

In response to the COVID-19 pandemic and the 2020 nationwide uprising supporting Black lives, the Association of American Medical Colleges (AAMC) released a framework for addressing and eliminating racism at the AAMC, in academic medicine and beyond.¹ The first step of the AAMC’s framework is to “begin self-reflection and educating ourselves.” Indeed, historical and contemporary patterns of racial exclusion fundamentally shape medical schools, and current institutional structures often serve to entrench rather than dismantle racial inequality for students, faculty, and patients. Decades of evidence demonstrating a lack of improvement in workforce diversity and disparities in trainee and faculty experiences suggest as much.

This narrative review synthesizes scholarship on race and racism in medical training to demonstrate that medical schools are racialized organizations with longstanding institutionalized structures that prioritize the dominant racial group and negatively impact the careers of non-White individuals, particularly those underrepresented in medicine (URiM). For this review, we define URiM as those who identify as Black, Hispanic, and Indigenous. We apply the sociological theory of racialized organizations to show how racial structures within medical schools impact trainees’ educational and health outcomes and have implications for organizational health, patient care, and society at large. We conclude with a call to action for medical schools and organizations such as the AAMC to use existing evidence to create structural solutions for structural problems.

Received July 13, 2021

Accepted March 23, 2022

Published online June 16, 2022

THEORY OF RACIALIZED ORGANIZATIONS

The theory of racialized organizations² posits that formal and informal organizational processes privilege certain racial groups at the expense of others, as “the meanings encoded in the concept of race provide a template for organizational action.” Organizations distribute resources in ways that constrain (or enable) the expression of individual agency or the ability to shape one’s future. Resources include tangibles like financial assets and less tangible factors like mentorship and professional development opportunities. The theory argues that Whiteness functions as a credential, providing greater access to leadership or the benefit of uneven application of formal rules and policies.

Certainly, whether non-White individuals are considered “racially palatable or not overly concerned with race” shapes if and how they are hired, promoted, and accepted within organizations.³ Many procedures considered race-neutral—like expectations of code-switching (which draws on White norms) or “aptitude tests” (which partially measure racialized patterns of access to resources)—reinforce the relegation of some non-White people to an inferior status. In other words, seemingly race-neutral rules, processes, and structures in conjunction with individual biases and discrimination may limit or enhance individuals’ potential and achievements along racial lines.

A readily observable way that organizations shape resource distribution and agency is through segregation. Historical segregation was designed to concentrate resources. Within present-day organizations, non-White people are typically relegated to less remunerative jobs, with little authority.⁵ These processes of organizational segregation create a path-dependency that helps justify contemporary patterns of racial inequality within medical schools as “just the way things are.” For instance, the Flexner report, whose recommendations led to the closure of all but two historically Black medical schools,⁶ continues to have ripple effects limiting Black agency. A recent study showed historically Black medical schools would have trained approximately 30,000 additional Black physicians,⁷ which is particularly important, as Black physicians are more likely to work in Black and underserved communities.⁸ Scholars have applied the theory of racialized organizations to various organizational settings, including education and business.^{9,10} Below, we expand on a recent introduction of the theory and its application to medical schools.¹¹

MEDICAL SCHOOL ADMISSION

While formally race-neutral measures are used to grant admission to medical school, longstanding patterns of racial exclusion impact students’ performance. Thus, the Medical College Admission Test (MCAT), college grades, and extracurricular activities such as clinical shadowing carry the residue of historical and contemporary patterns of racial discrimination. Studies show URIM applicants have lower MCAT scores than

non-URIM applicants.¹² Rather than solely being a marker for intelligence and ability to handle rigorous medical training, the MCAT partially reflects access to resources and thus unwittingly serves as a barrier to entry for some URIM students.¹³

Structural racism’s impact on non-Whites’ economic standing also influences the admissions process. URIM applicants are disproportionately from low-income households and overrepresented in the lowest strata of the AAMC’s parental education and occupational indicator, compared to non-URIM applicants.¹⁴ Socioeconomic status is a strong predictor of MCAT performance.¹⁵ Applicants with midrange MCAT scores are often overlooked, despite evidence that they succeed in medical school when admitted, and schools that accept more applicants with midrange scores have more diverse matriculating classes.¹⁶ Additionally, URIM applicants report lacking shadowing and extracurricular educational opportunities valued in the admissions process.¹⁷ The overreliance on test scores and mainstream extracurriculars are institutionalized mechanisms of racial exclusion shaping URIM applicants’ agency by curtailing their career options. Furthermore, URIM applicants report experiencing racial bias during medical school interviews.¹⁸

MEDICAL STUDENT EXPERIENCES AND EDUCATIONAL OUTCOMES

Discriminatory processes of racial sorting do not end upon medical school admission. During medical school, racialized processes that impact careers can be classified into broad overlapping categories, including learning climate and culture, preclinical experiences, clinical experiences, career opportunities, and the residency application process. Empirical research on the path through medical school shows a gap between public commitments to diversity and non-discrimination and the racialized reality of medical training. Ultimately, these racial structures affect students’ career prospects and trajectories, including experiencing discrimination,^{19,20} a sometimes hostile learning climate, and having lower odds of success in various outcomes such as grades, matching into residency, career advancement, and trainees’ health and well-being.

Learning Climate and Culture

Over one-fifth of medical students, the vast majority being non-URIM, have a physician parent or grandparent; scholars describe these students as the “doctor dynasty.”^{21,22} These family experiences and connections give non-URIM students advantages in their ability to navigate medical school and greater familiarity with the hidden curriculum, including, but not limited to, signals in the learning environment that shape students’ experiences such as the allocation of resources, as well as social and cultural capital inherent to the doctor dynasty. This difference in capital materializes as early familiarity with medical jargon and access to networks of potential

mentors.²³ The result is that White students, in particular, benefit from a more pronounced sense of belonging, which serves as a buffer against stress and anxiety. On the other hand, URIM students report a sometimes hostile learning environment characterized by racial stereotyping and discrimination, low social support, lack of understanding from peers, feeling stigmatized as “out of place,” and a low sense of belonging.^{19,20,24,25} In a nationwide sample of medical students ($n=3756$), 64% of participants reported a hostile racial climate. Additionally, 81% and 94% respectively reported witnessing discrimination towards students and negative role-modeling, such as physicians speaking negatively about Black patients.²⁶

Socioeconomic status may partially explain such experiences. Many URIM students contribute financially to their families, despite their reliance on student loans.²⁰ This is especially true for Black students, who carry a significantly greater debt burden at matriculation due to the racial wealth gap.¹⁴ Furthermore, people tend to associate Blackness with lower status occupations,²⁷ which likely exacerbates the existing class-based divide and informs the aforementioned negative attitudes and hostile behaviors towards Black students. Additionally, professionalism, an important factor in evaluations, is often codified in classist, Eurocentric standards of appearance and behavior and has historically been used to police, reprimand, and penalize students outside of this mold.²⁸ An example is discrimination against Black hairstyles,²⁹ so common in broader society that the CROWN (Create a Respectful and Open World for Nature Hair) act has been introduced in state and federal legislatures to forbid natural hair discrimination.³⁰

Preclinical Years

Formally neutral evaluation processes are often discriminatory in practice, with non-White, especially URIM students judged more harshly. On paper, the expectations for all students are the same; in reality, students of color face an additional set of race-based expectations. During the preclinical phase of medical school, URIM students feel that faculty and colleagues devalue their contributions. However, faculty often conscripts URIM students into educating their colleagues specifically about racial inequality and health disparities.³¹ This unwanted role of “racial ambassador” shifts the responsibility for educating students from faculty to students while also taking away from URIM students’ learning experiences. Similarly, URIM students report facing expectations to fulfill additional responsibilities such as serving on leadership committees and helping other URIM students navigate training, a phenomenon known as the minority tax.^{19,20} While leadership opportunities can enhance career opportunities; when excessive, they have the potential of becoming hindrances to academic success.

Social interactions are also shaped by race, as URIM students report that their colleagues scrutinize their same-race friendships and gatherings yet demonstrate a lack of appreciation for diversity, undermining the potential of intergroup

relationships.²⁰ A social and learning environment where many URIM students feel unwelcome and unsupported may activate stereotype threat. Stereotype threat occurs when “cues in the environment make negative stereotypes associated with an individual’s group status salient, triggering physiological and psychological processes—including anxiety, negative cognitions, and emotions, decreased working memory capacity—that have detrimental consequences on student performance.”³² Indeed, some URIM students report a lack of confidence and self-doubt which they feel is exacerbated by experiences of tokenization and the pressure of being one of few members of their racial/ethnic group.²⁰

A hostile racial climate may impact some students’ testing experiences: Black students are at greater risk of lower self-confidence in their cognitive abilities than White students.³³ High stereotype threat environments are associated with testing anxiety and worse performance, including US Medical Licensing Exams (USMLE).^{34–36} URIM students on average have lower USMLE scores than their non-URIM counterparts.³⁷ Of note, greater premedical debt is associated with worse USMLE performance.^{38,39} These *contextually* conditioned outcomes are often interpreted as *individual failings*, laundering structural discrimination by blaming those affected. In contrast, the racialized organizations perspective locates the source of measured racial differences in entrenched biases built into facially neutral processes.

Clerkship Years

The unacknowledged credential of Whiteness also shapes clinical rotations. Students of color perceive that their White colleagues receive better treatment, and are better incorporated into the social aspects of the workplace, likely translating to more invited involvement in clinical care.²⁰ Discrimination and lack of inclusivity from physicians, staff, and patients⁴⁰ likely contribute to stereotype threat. A recent study showed that Black clerkship students had the highest rate of stereotype threat (82%), followed by Asian (45%) and Hispanic students (43%) compared to a minority of white students (4%).⁴¹ Such experiences yield clerkship grading disparities; URIM students are less likely to receive *honors*, regardless of other characteristics related to academic performance.⁴²

The subjectivity of evaluations, influenced by social interactions with clinical supervisors and susceptible to racial biases, contribute to grading disparities. For instance, regarding measures deemed objective, Black students are more likely to be described with grindstone-like adjectives such as “competent,” whereas White students are more likely to be described with superlatives such as “excellent” and “outstanding.”⁴³ Beyond comments from clinical supervisors, clerkship directors’ summaries contribute to disparities in the distribution of *honors*. In a single-school study, on average, compared with non-URIM students, URIM students received slightly lower clerkship director ratings (one-tenth of a point on the clerkship assessment scale) and, subsequently, half as many

honors grades across all clerkships. This cumulative unequal impact is called the *amplification cascade*, where slight initial differences compound across domains, creating significant racial differences in long-term outcomes.⁴⁴

Residency Application Process

As we demonstrate above, URIM applicants are systemically disadvantaged from the beginning. It is no surprise then that they receive fewer residency interview invitations.⁴⁵ Grades, USMLEs, research publications, and honor society membership are impacted by institutionalized racial disadvantage, shaping how students fare during the residency application process. Because of an overreliance on numeric and categorical metrics like USMLEs and AOA membership, programs tend to extend interview invitations to a minority of high-achieving applicants. For instance, 12% of internal medicine applicants receive 50% of interview invitations.⁴⁶ And yet, score cutoffs systematically reduce many URIM applicants' chances of even being considered.^{45,47}

Such processes affect the odds of matching into residency. A 10-year audit of graduate medical education placements showed lower 4-year matching odds for Asian (0.85, 95% CI 0.78–0.92) Hispanic (0.88, 95% CI 0.78–0.99), Black (0.63, 95% CI 0.57–0.70), and Native American students (0.60, 95% CI 0.43–0.84) compared to White students, adjusting for sex and step 1 score. However, these matching odds even out at the 6-year mark.⁴⁸ In other words, students of color are more likely to go through the match multiple times before matriculating into residency. Still, evidence suggests that USMLE Step 1 scores are not the best predictor of performance during residency, despite being the most critical selection criteria.^{49–51}

Certainly, board scores are predictive of first-time specialty board passing odds, but only at a threshold beyond which the difference between applicants in terms of success odds is negligible,^{52–54} yet beyond using cutoffs to grant interviews, program directors cite board scores as a leading factor when ranking applicants.⁵⁵ This raises the need to deemphasize board scores above the threshold and support trainees who may have lower success odds at specialty board examinations. Some argue that the forthcoming shift from numerical scoring to pass/fail for USMLE step 1 will level the playing field, but it remains to be seen;⁵⁶ other measures like the more clinically relevant USMLE step 2 may replace step 1 in importance, as suggested by a recent study of orthopedic surgery program directors.⁵⁷

Access to Opportunity

Career advancement opportunities beyond grades and standardized test performance include extracurricular such as research experiences and membership in honor societies, such as the prestigious Alpha Omega Alpha (AOA), the medical honor society. Having research experience, publications, and membership in AOA are important criteria in the residency

application process.⁴⁷ But, these metrics themselves are racially skewed. Access to mentors is a crucial component to succeeding in research, but a multi-year study of students' theses at a prestigious medical school showed effective mentorship was strongly associated with students receiving the highest honors; and adjusting for gender and academic performance, URIM students still had the lowest odds of being awarded highest honors.⁵⁸ Similarly, A large national study showed Black and Asian applicants were respectively six and two times less likely to be AOA members compared to White applicants regardless of objective characteristics otherwise associated with membership such as clerkship grades and USMLE scores.⁵⁹

IMPACT ON CAREER TRAJECTORY AND MENTAL HEALTH

Effects on Career Trajectory

The abovementioned processes steer URIM students into less remunerative specialties, congruent with stereotypes about intelligence, capability, and monetary worth. In addition to lower odds of matching by year four, URIM trainees' careers are affected in terms of specialty (and thus earning potential), and advancement in academia. URIM students enter medical school expressing more interest in serving underserved communities;⁸ but this interest is often conflated with an interest in primary care. Many trainees report feeling a particular lack of mentorship and belonging when interested in surgical specialties.⁶⁰ Black and Native physicians are more likely to practice primary care compared to their colleagues.⁶¹ While students' interests change for multiple reasons, these factors are often influenced by racialized experiences.

Racialized occupational sorting limits the number of potential mentors available to URIM students, impacting students' trajectories. A longitudinal study showed that role model exposure significantly increased students' odds of going into the role model's specialty, especially for lifestyle-friendly specialties.⁶² However, these more lucrative specialties are the least racially diverse,⁶¹ and lack of faculty diversity renders it challenging to identify mentors invested in URIM students' success. A study of orthopedic surgery showed that URIM representation among faculty and residents was associated with a greater likelihood that URIM medical students at that institution would apply in orthopedic surgery.⁶³ Furthermore, the more lucrative specialties (e.g., dermatology, ophthalmology) tend to place a higher value on USMLEs when evaluating applicants.⁶⁴ And while the growing debt burden is often cited as a driver of students choosing more lucrative specialties, this has been empirically challenged; in fact, students going into primary care are most indebted by graduation, while those choosing lucrative specialties have the least debt.⁶⁵

Even when they choose lucrative specialties, URIM students remain disadvantaged by the selection process. A study

of orthopedic surgery applicants showed that matriculation rates were consistently highest for White applicants over 10 years, followed by Asian, then Hispanic applicants, and lowest for Black applicants.⁶⁶ The authors highlight that while Black applicants had more volunteering experiences, White and Asian applicants had higher USMLE scores and were more likely to be in AOA. They posit that URIM applicants are competitive for orthopedic surgery from a holistic perspective but discounted in part due to the overreliance on USMLEs and AOA membership.

During residency, residents of color experience a hostile learning environment and pressures to serve as racial ambassadors.⁶⁷ For example, a national study showed that racial discrimination was highly prevalent among surgery residencies, and residents who reported discrimination were more likely to experience burnout and thoughts of attrition.⁶⁸ Black faculty report workplace discrimination and barriers to career advancement,^{69,70} and are twice as likely to consider leaving academia,⁷¹ half as likely to be promoted at each rank,⁷² and half as likely to be granted federal research awards compared to White faculty.⁷³ Even after adjusting for “prior achievements,” topic choice accounts for more than 20% of disparities in NIH funding between Black and White scientists due to low award rates for research at the community and population level.⁷⁴ It is no surprise then, that while underrepresented in medicine, Black physicians are even further underrepresented in academia, making only 3.6% of faculty, compared to 5.8% of physicians overall.

The racialized nature of medical schools also has implications for the career trajectories and inclinations of White students. Studies show that White students who attend school with greater racial diversity are more likely to rate themselves as highly prepared to care for minority populations and value equitable access to care more strongly.⁸ There is also a positive association between medical schools’ positive racial climate and gains in students’ intentions to practice in underserved areas and work with minority patients at graduation compared to matriculation.⁷⁵ Such positive effects of a racially diverse environment are evident in the long run, with studies showing that through multiple pathways, a diverse physician workforce would significantly contribute to addressing racial healthcare disparities.⁷⁶

Impact on Mental Health

The racialized experiences of medical training not only affect trainees’ careers, but also their mental health. Black medical students, especially Black men (who are further underrepresented, accounting for approximately a third of all Black medical school graduates, a gender gap unique to this group⁷⁷) have higher levels of depression and anxiety and report low social support and harmful coping mechanisms.³³ Additionally, Black medical students with greater racial identity centrality have increased odds of depression, specifically in association with experiences of discrimination.^{78,79} A

recent, nationwide study focused on minority medical students found that microaggressions are ubiquitous, and increased frequency of experiencing microaggressions was associated with higher odds of reporting depressive symptoms.⁸⁰ A previous nationwide and diverse study of medical students had shown that a hostile racial climate, witnessed discrimination, and negative role modeling in medical school were associated with worsened depression over time for all medical students, regardless of race, even after adjusting for students’ personal experiences of mistreatment.²⁶

This mental health impact extends into residency, as residents, too, report racialized burdens and racial discrimination. A study showed that Black, Asian, and Hispanic surgery residents were 21, 6, and 2 times more likely to report discrimination than their White counterparts. Those residents who experienced racial discrimination were twice more likely to report suicidality.⁸¹ On the other hand, racial diversity within residency programs may be protective against mental illness. A study of interns from 38 institutions across 10 specialties ($n=1138$) found that a higher proportion of URIM interns was protective against depression among participants across racial groups, with a more significant effect on URIM interns.⁸²

Beyond Medical Training

The racialized nature of medical schools also has consequences for organizational diversity efforts. Medical students who report experiencing microaggressions more often also report lesser satisfaction with their medical schools are less likely to recommend their school to friends, and express interest in giving back as alumni.⁸⁰ In other words, the racialized nature of medical education likely unwittingly harms schools’ diversity efforts. Given the evidence that greater medical school diversity has a positive impact not only on minority trainees’ experiences and outcomes but also on those of White trainees and their career trajectories in terms of serving underserved communities, the racialization of medical schools likely hampers the often-stated goal of contributing to achieving health equity.

CONCLUSION

As racialized organizations, medical schools stunt the careers of physicians of color and uphold the status-quo in racial representation among physicians through facially “race-neutral” but ultimately biased processes. Still, medical schools and associated governing bodies of medical education, including the AAMC, can address these racialized barriers by shifting how they distribute resources to students, as evidenced by various successful examples. As has been recommended by others,⁸³ it is paramount that these organizations leverage existing evidence to expand access to medical education, foster safe learning environments and allocate resources that will adequately, and equitably train the next

generation of physicians to help address longstanding health inequities.

Corresponding Author: Max Jordan Nguemni Tiako, MD, MS; Department of Medicine, Brigham and Women's Hospital, Boston, MA, USA (e-mail: mnguementiako@bwh.harvard.edu).

Declarations:

Conflict of interest: The authors declare that they do not have a conflict of interest.

REFERENCES

1. AAMC. Addressing and Eliminating Racism at the AAMC and Beyond. <https://www.aamc.org/addressing-and-eliminating-racism-aamc-and-beyond>. Published 2021. Accessed October 3, 2021.
2. Ray V. A Theory of Racialized Organizations. *Am Sociol Rev*. 2019;84(1):26-53. <https://doi.org/10.1177/0003122418822335>
3. Thornhill T. Racial Salience and the Consequences of Making White People Uncomfortable: Intra-Racial Discrimination, Racial Screening, and the Maintenance of White Supremacy. *Sociol Compass*. 2015;9(8):694-703. <https://doi.org/10.1111/soc4.12287>
4. Tamayo-Sarver JH, Hinze SW, Cydulka RK, Baker DW. Racial and Ethnic Disparities in Emergency Department Analgesic Prescription. *Am J Public Health*. 2003;93(12):2067-2073. <https://doi.org/10.2105/AJPH.93.12.2067>
5. Nelson JL, Vallas SP. Race and inequality at work: An occupational perspective. *Sociol Compass*. 2021;1-14. <https://doi.org/10.1111/soc4.12926>
6. Steinecke A, Terrell C. Progress for whose future? the impact of the Flexner report on medical education for racial and ethnic minority physicians in the United States. *Acad Med*. 2010;85(2):236-245. <https://doi.org/10.1097/ACM.0b013e3181c885be>
7. Campbell KM, Corral I, Infante Linares JL, Tumin D. Projected Estimates of African American Medical Graduates of Closed Historically Black Medical Schools. *JAMA Netw open*. 2020;3(8):e2015220. <https://doi.org/10.1001/jamanetworkopen.2020.15220>
8. Saha S, Guiton G, Wimmers PF, Wilkerson LA. Student body racial and ethnic composition and diversity-related outcomes in US medical schools. *JAMA - J Am Med Assoc*. 2008;300(10):1135-1145. <https://doi.org/10.1001/jama.300.10.1135>
9. Stewart MD. Pushed or Pulled Out? The Racialization of School Choice in Black and White Mothers' (Home) Schooling Decisions for Their Children. *Sociol Race Ethn*. 2020;6(2):254-268. <https://doi.org/10.1177/2332649219901130>
10. Ray V. Why So Many Organizations Stay White. *Harv Bus Rev*. 2019.
11. Nguemni Tiako MJ, South EC, Ray V. Medical Schools as Racialized Organizations: A Primer. *Ann Intern Med*. June 2021:M21-0369. <https://doi.org/10.7326/M21-0369>
12. Girotti JA, Chanatry JA, Clinchot DM, et al. Investigating group differences in examinees' preparation for and performance on the new MCAT exam. *Acad Med*. 2020;95(3):365-374. <https://doi.org/10.1097/ACM.0000000000002940>
13. Genao I, Gelman J. The MCAT's restrictive effect on the minority physician pipeline: A legal perspective. *Ann Intern Med*. 2018;169(6):403-404. <https://doi.org/10.7326/M18-0545>
14. An Updated Look at the Economic Diversity of U.S. Medical Students. <https://www.aamc.org/>. Accessed November 24, 2020.
15. Grbic D, Jones DJ, Case ST. The Role of Socioeconomic Status in Medical School Admissions: Validation of a Socioeconomic Indicator for Use in Medical School Admissions. *Acad Med*. 2015;90(7):953-960. <https://doi.org/10.1097/ACM.0000000000000653>
16. Terregino CA, Saguil A, Price-Johnson T, Anachebe NF, Goodell K. The diversity and success of medical school applicants with scores in the middle third of the MCAT score scale. *Acad Med*. 2020;95(3):344-350. <https://doi.org/10.1097/ACM.0000000000002941>
17. Freeman BK, Landry A, Trevino R, Grande D, Shea JA. Understanding the leaky pipeline: Perceived barriers to pursuing a career in medicine or dentistry among underrepresented-in-medicine undergraduate students. *Acad Med*. 2016;91(7):987-993. <https://doi.org/10.1097/ACM.0000000000001020>
18. A C, C G, R W, L H, K G, MK P-O. US Medical School Applicant Experiences of Bias on the Interview Trail. *J Health Care Poor Underserved*. 2020;31(1):185-200. <https://doi.org/10.1353/HPU.2020.0017>
19. Orom H, Semalulu T, Underwood W. The social and learning environments experienced by underrepresented minority medical students: A narrative review. *Acad Med*. 2013;88(11):1765-1777. <https://doi.org/10.1097/ACM.0b013e3182a7a3af>
20. Odom KL, Roberts LM, Johnson RL, Cooper LA. Exploring obstacles to and opportunities for professional success among ethnic minority medical students. *Acad Med*. 2007;82(2):146-153. <https://doi.org/10.1097/ACM.0b013e31802d8f2c>
21. Choi KJ, Tak HJ, Bach C, et al. Characteristics of Medical Students with Physician Relatives: A National Study. *MedEdPublish*. 2018;7(1):1-7. <https://doi.org/10.15694/mep.2018.0000030.1>
22. Peel A. *Students Of Color And The "Doctor Dynasty": The Dual Realities Of Newly-Enrolled Medical Students' Socialization And Professional Identity Formation.*; 2019. <https://hdl.handle.net/10150/633065>.
23. Hafferty FW. Beyond curriculum reform: Confronting medicine's hidden curriculum. *Acad Med*. 1998. <https://doi.org/10.1097/00001888-199804000-00013>
24. Ackerman-Barger K, Boatright D, Gonzalez-Colaso R, Orozco R, Latimore D. Seeking Inclusion Excellence. *Acad Med*. 2019;1. <https://doi.org/10.1097/acm.0000000000003077>
25. Nguemni Tiako MJ. The Pictures on the Wall: Transitioning from a Historically Black College/University (HBCU) to an Ivy League Medical School. *Acad Med*. 2018;93(6). <https://doi.org/10.1097/ACM.0000000000002191>
26. Hardeman RR, Przedworski JM, Burke S, et al. Association Between Perceived Medical School Diversity Climate and Change in Depressive Symptoms Among Medical Students: A Report from the Medical Student CHANGE Study. *J Natl Med Assoc*. 2016;108(4):225-235. <https://doi.org/10.1016/j.jnma.2016.08.005>
27. Dupree CH, Torrez B, Obioha O, Fiske ST. Race-status associations: Distinct effects of three novel measures among White and Black perceivers. *J Pers Soc Psychol*. 2020. <https://doi.org/10.1037/0022-3514.86.1.95>
28. Rogers N. "Caution: The AMA May Be Dangerous to Your Health": The Student Health Organizations (SHO) and American Medicine, 1965-1970. *Radic Hist Rev*. 2001;(80):5-34. <https://doi.org/10.1215/01636545-2001-80-5>
29. More Than Just Hair: Combating Hair Discrimination in Medicine » in-Training, the online peer-reviewed publication for medical students. <https://in-training.org/more-than-just-hair-combating-hair-discrimination-in-medicine-18350>. Accessed June 1, 2021.
30. Richmond CL. H.R.5309 - 116th Congress (2019-2020): CROWN Act of 2020. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5309>. Accessed June 1, 2021.
31. Olsen LD. The Conscripted Curriculum and the Reproduction of Racial Inequalities in Contemporary U.S. Medical Education. *J Health Soc Behav*. 2019;60(1):55-68. <https://doi.org/10.1177/0022146518821388>
32. Burgess DJ, Warren J, Phelan S, Dovidio J, van Ryn M. Stereotype threat and health disparities: what medical educators and future physicians need to know. *J Gen Intern Med*. 2010. <https://doi.org/10.1007/s11606-009-1221-4>
33. Hardeman RR, Przedworski JM, Burke SE, et al. Mental Well-Being in First Year Medical Students: A Comparison by Race and Gender: A Report from the Medical Student CHANGE Study. *J racial Ethn Heal disparities*. 2015;2(3):403-413. <https://doi.org/10.1007/s40615-015-0087-x>
34. Walton GM, Spencer SJ. Latent ability: Grades and test scores systematically underestimate the intellectual ability of negatively stereotyped students. *Psychol Sci*. 2009;20(9):1132-1139. <https://doi.org/10.1111/j.1467-9280.2009.02417.x>
35. Green M, Angoff N, Encandela J. Test anxiety and United States Medical Licensing Examination scores. *Clin Teach*. 2016;12(2):142-146. <https://doi.org/10.1111/tct.12386>
36. Encandela J, Gibson C, Angoff N, Leydon G, Green M. Characteristics of test anxiety among medical students and congruence of strategies to address it. *Med Educ Online*. 2014;19(1):1-3. <https://doi.org/10.3402/meo.v19.25211>
37. Burgess DJ, Warren J, Phelan S, Dovidio J, Van Ryn M. Stereotype Threat and Health Disparities: What Medical Educators and Future Physicians Need to Know. *J Gen Intern Med*. 2010;25(2):169-177. <https://doi.org/10.1007/s11606-009-1221-4>
38. Andriole DA, Jeffe DB. Prematriculation Variables Associated With Suboptimal Outcomes for the 1994-1999 Cohort of US Medical School Matriculants. *JAMA*. 2010;304(11):1212-1219.

39. Figure 10. Amount of premedical education debt for U.S. medical school matriculants by race/ethnicity, academic year 2018-2019 | AAMC. <https://www.aamc.org/data-reports/workforce/interactive-data/figure-10-amount-premedical-education-debt-us-medical-school-matriculants-race/ethnicity-academic>. Accessed November 24, 2020.
40. Wheeler M, De Bourmont S, Paul-Emile K, et al. Physician and Trainee Experiences with Patient Bias. *JAMA Intern Med.* 2019;179(12):1678-1685. <https://doi.org/10.1001/jamainternmed.2019.4122>
41. Bullock JL, Lockspeiser T, Del Pino-Jones A, Richards R, Teherani A, Hauer KE. They Don't See a Lot of People of Color: A Mixed Methods Study of Racial/Ethnic Stereotype Threat Among Medical Students on Core Clerkships. *Acad Med.* 2020. <https://doi.org/10.1097/ACM.0000000000003628>
42. Low D, Pollack SW, Liao ZC, et al. Racial/Ethnic Disparities in Clinical Grading in Medical School. *Teach Learn Med.* 2019;31(5):487-496. <https://doi.org/10.1080/10401334.2019.1597724>
43. Ross DA, Boatright D, Nunez-Smith M, Jordan A, Chekroud A, Moore EZ. Differences in words used to describe racial and gender groups in Medical Student Performance Evaluations. *PLoS One.* 2017;12(8):e0181659. <https://doi.org/10.1371/journal.pone.0181659>
44. Teherani A, Hauer KE, Fernandez A, King TE, Lucey C. How small differences in assessed clinical performance amplify to large differences in grades and awards: A cascade with serious consequences for students underrepresented in medicine. *Acad Med.* 2018;93(9):1286-1292. <https://doi.org/10.1097/ACM.0000000000002323>
45. Williams M, Kim EJ, Pappas K, et al. The impact of United States Medical Licensing Exam (USMLE) step 1 cutoff scores on recruitment of underrepresented minorities in medicine: A retrospective cross-sectional study. *Heal Sci Reports.* 2020;3(2). <https://doi.org/10.1002/hsr.2.161>
46. Lee AH, Young P, Liao R, Yi PH, Reh D, Best SR. I dream of Gini: Quantifying inequality in otolaryngology residency interviews. *Laryngoscope.* 2019;129(3):627-633. <https://doi.org/10.1002/lary.27521>
47. Angus S V., Williams CM, Stewart EA, Sweet M, Kisielewski M, Willett LL. Internal medicine residency program directors' screening practices and perceptions about recruitment challenges. *Acad Med.* 2020;582-589. <https://doi.org/10.1097/ACM.0000000000003086>
48. Sondheimer HM, Xierali IM, Young GH, Nivet MA. Placement of US medical school graduates into graduate medical education, 2005 through 2015. *JAMA - J Am Med Assoc.* 2015;314(22):2409-2410. <https://doi.org/10.1001/jama.2015.15702>
49. Burkhardt JC, Parekh KP, Gallahue FE, et al. A Critical Disconnect: Residency Selection Factors Lack Correlation With Intern Performance. *J Grad Med Educ.* 2020;12(6):696-704. <https://doi.org/10.4300/JGME-D-20-00013.1>
50. Hartman ND, Lefebvre CW, Manthey DE. A Narrative Review of the Evidence Supporting Factors Used by Residency Program Directors to Select Applicants for Interviews. *J Grad Med Educ.* 2019;11(3):268-273. <https://doi.org/10.4300/JGME-D-18-00979.3>
51. Sharma A, Schauer DP, Kelleher M, Kinnear B, Sall D, Warm E. USMLE Step 2 CK: Best Predictor of Multimodal Performance in an Internal Medicine Residency. *J Grad Med Educ.* 2019;11(4):412-419. <https://doi.org/10.4300/JGME-D-19-00099.1>
52. Rayamajhi S, Dhakal P, Wang L, Rai MP, Shrotriya S. Do USMLE steps, and ITE score predict the American Board of Internal Medicine Certifying Exam results? *BMC Med Educ.* 2020;20(1):1-8. <https://doi.org/10.1186/s12909-020-1974-3>
53. McCaskill QE, Kirk JJ, Barata DM, Wludyka PS, Zenni EA, Chiu TT. USMLE Step 1 Scores as a Significant Predictor of Future Board Passage in Pediatrics. *Ambul Pediatr.* 2007;7(2):192-195. <https://doi.org/10.1016/j.ambp.2007.01.002>
54. Swanson DB, Sawhill A, Holtzman KZ, et al. Relationship between performance on part i of the American board of orthopaedic surgery certifying examination and scores on USMLE Steps 1 and 2. *Acad Med.* 2009;84(SUPPL. 10):21-24. <https://doi.org/10.1097/ACM.0b013e3181b37fd2>
55. *Results of the 2018 NRMP Program Director Survey*; 2018. www.nrmp.org. Accessed June 1, 2021.
56. Romero JM, Martinez CI, Sanchez AN, Frontera JE, Escalon MX, Verduzco-Gutierrez M. Reporting of USMLE Step 1 as Pass/Fail: A Benefit for Residency Programs and Those Underrepresented in Medicine? *J Grad Med Educ.* 2021;13(1):39-42. <https://doi.org/10.4300/JGME-D-20-00897.1>
57. Cohn MR, Bigach SD, Bernstein DN, et al. Resident Selection in the Wake of United States Medical Licensing Examination Step 1 Transition to Pass/Fail Scoring. *J Am Acad Orthop Surg.* 2020;28(21):865-873. <https://doi.org/10.5435/JAOS-D-20-00359>
58. King JT, Angoff NR, Forrest JN, Justice AC. Gender Disparities in Medical Student Research Awards: A 13-Year Study from the Yale School of Medicine. *Acad Med.* 2018;93(6):911-919. <https://doi.org/10.1097/ACM.0000000000002052>
59. Boatright D, Ross D, O'Connor P, Moore E, Nunez-Smith M. Racial disparities in medical student membership in the alpha omega alpha honor society. *JAMA Intern Med.* 2017;177(5):659-665. <https://doi.org/10.1001/jamainternmed.2016.9623>
60. Ulloa J, Viramontes O, Ryan G, Wells K, Maggard-Gibbons M, Moreno G. Perceptual and Structural Facilitators and Barriers to Becoming a Surgeon: A Qualitative Study of African-American and Latino Surgeons. *Acad Med.* 2018;93(9):1326-1334. <https://doi.org/10.1097/ACM.0000000000002282>
61. Lett LA, Orji WU, Sebro R. Declining racial and ethnic representation in clinical academic medicine: A longitudinal study of 16 US medical specialties. Koniaris LG, ed. *PLoS One.* 2018;13(11):e0207274. <https://doi.org/10.1371/journal.pone.0207274>
62. Yoon JD, Ham SA, Reddy ST, Curlin FA. Role Models' Influence on Specialty Choice for Residency Training: A National Longitudinal Study. *J Grad Med Educ.* 2018;10(2):149-154. <https://doi.org/10.4300/JGME-D-17-00063.1>
63. Okike K, Phillips DP, Johnson WA, O'Connor MI. Orthopaedic Faculty and Resident Racial/Ethnic Diversity is Associated With the Orthopaedic Application Rate Among Underrepresented Minority Medical Students. *J Am Acad Orthop Surg.* 2020;28(6):241-247. <https://doi.org/10.5435/JAOS-D-19-00076>
64. Puri P, Landman N, Smoldt RK, Cortese D. Quantifying the Financial Value of Clinical Specialty Choice and Its Association With Competitiveness of Admissions. *Cureus.* 2021;13(2). <https://doi.org/10.7759/cureus.13272>
65. Grischkan J, George BP, Chaiyachati K, Friedman AB, Dorsey ER, Asch DA. Distribution of Medical Education Debt by Specialty, 2010-2016. *JAMA Intern Med.* 2017;177(10):1531-1532. <https://doi.org/10.1001/jamainternmed.2017.4011>
66. Poon S, Nellans K, Rothman A, et al. Underrepresented Minority Applicants Are Competitive for Orthopaedic Surgery Residency Programs, but Enter Residency at Lower Rates. *J Am Acad Orthop Surg.* 2019;27(21):E957-E968. <https://doi.org/10.5435/JAOS-D-17-00811>
67. Osseo-Asare A, Balasuriya L, Huot SJ, et al. Minority Resident Physicians' Views on the Role of Race/Ethnicity in Their Training Experiences in the Workplace. *JAMA Netw open.* 2018;1(5):e182723. <https://doi.org/10.1001/jamanetworkopen.2018.2723>
68. Yuce TK, Turner PL, Glass C, et al. National Evaluation of Racial/Ethnic Discrimination in US Surgical Residency Programs. *JAMA Surg.* 2020. <https://doi.org/10.1001/JAMASURG.2020.0260>
69. Nunez-Smith M, Pilgrim N, Wynia M, et al. Race/ethnicity and workplace discrimination: Results of a national survey of physicians. *J Gen Intern Med.* 2009;24(11):1198-1204. <https://doi.org/10.1007/s11606-009-1103-9>
70. Wingfield AH, Chavez K. Getting In, Getting Hired, Getting Sideways Looks: Organizational Hierarchy and Perceptions of Racial Discrimination. *Am Sociol Rev.* 2020;85(1):31-57. <https://doi.org/10.1177/0003122419894335>
71. Nunez-Smith M, Pilgrim N, Wynia M, et al. Health care workplace discrimination and physician turnover. *J Natl Med Assoc.* 2009;101(12):1274-1282. [https://doi.org/10.1016/S0027-9684\(15\)31139-1](https://doi.org/10.1016/S0027-9684(15)31139-1)
72. Nunez-Smith M, Ciarleglio MM, Sandoval-Schaefer T, et al. Institutional variation in the promotion of racial/ethnic minority faculty at US medical schools. *Am J Public Health.* 2012;102(5):852-858. <https://doi.org/10.2105/AJPH.2011.300552>
73. Woalder. Prevalence and Predictors of U.S. Medical Graduates' Federal F32, Mentored-K, and R01 Awards: A National Cohort Study. *J Investig Med.* 2018;66(2):340-350. <https://doi.org/10.1016/j.physbeh.2017.03.040>
74. Hoppe TA, Litovitz A, Willis KA, et al. Topic choice contributes to the lower rate of NIH awards to African-American/black scientists. *Sci Adv.* 2019;5(10):1-13. <https://doi.org/10.1126/sciadv.aaw7238>
75. Phelan SM, Burke SE, Cunningham BA, et al. The Effects of Racism in Medical Education on Students' Decisions to Practice in Underserved or Minority Communities. *Acad Med.* 2019;94(8):1178-1189. <https://doi.org/10.1097/ACM.0000000000002719>
76. Laveist TA, Pierre G. Integrating the 3Ds-social determinants, health disparities, and health-care workforce diversity. *Public Health Rep.* 2014;129(SUPPL. 2):9-14. <https://doi.org/10.1177/00333549141291s204>

77. **Laurencin CT, Murray M.** An American crisis: The lack of black men in medicine. *J Racial Ethn Heal Disparities*. 2017;4(3):317-321. <https://doi.org/10.1007/s40615-017-0380-y>
78. **Hardeman R, Perry S, Phelan SM, Przedworski JM, Burgess DJ.** Racial identity and mental well-being: The experience of African American Medical Students: A Report from the Medical Student CHANGE Study HHS Public Access. *J Racial Ethn Heal Disparities*. 2016;3(2):250-258. <https://doi.org/10.1007/s40615-015-0136-5>
79. **Perry SP, Hardeman R, Burke SE, Cunningham B, Burgess DJ, van Ryn M.** The impact of everyday discrimination and racial identity centrality on African American medical student well-being: A report from the medical student CHANGE study. *J Racial Ethn Heal Disparities*. 2016;3(3):519-526. <https://doi.org/10.1007/s40615-015-0170-3>
80. **Anderson N, Lett E, Asabor EN, et al.** The Association of Microaggressions with Depressive Symptoms and Institutional Satisfaction Among a National Cohort of Medical Students. *J Gen Intern Med*. 2021. <https://doi.org/10.1007/s11606-021-06786-6>
81. **Yuce TK, Turner PL, Glass C, et al.** National evaluation of racial/ethnic discrimination in us surgical residency programs. *JAMA Surg*. 2020;155(6):526-528. <https://doi.org/10.1001/jamasurg.2020.0260>
82. **Elharake JA, Frank E, Kalmbach DA, Mata DA, Sen S.** Racial and Ethnic Diversity and Depression in Residency Programs: a Prospective Cohort Study. *J Gen Intern Med*. 2020;35(4):1325-1327. <https://doi.org/10.1007/s11606-019-05570-x>
83. **Mateo CM, Williams DR.** More Than Words: A Vision to Address Bias and Reduce Discrimination in the Health Professions Learning Environment. *Acad Med*. 2020;95(12 Addressing Harmful Bias and Eliminating Discrimination in Health Professions Learning Environments):S169-S177. <https://doi.org/10.1097/ACM.0000000000003684>

Publisher's Note: Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.