

The Lack of Diversity in Healthcare: Causes, Consequences, and Solutions

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ABSTRACT

As the demographics of the country continue to rapidly change and as the increasing numbers of health disparities in underrepresented ethnic groups are identified, the future healthcare of the nation will become much more dependent upon a diverse healthcare workforce. The current numbers both in the health professional programs and in practice must be viewed as inadequate, despite efforts over many years designed to address this underrepresentation. To address this issue in a substantive way, commitments must be made at all stages of the “pipeline” for changes to occur. First, however, the reasons for the existing problem must be acknowledged so as to implement those changes. In this report, which focuses primarily on allopathic medicine, we have identified several major contributory factors leading to the lack of diversity, the impact and then offer solutions to correct, or at least minimize, the problem.

Keywords: ■ Disparities ■ Diversity ■ Healthcare Workforce ■ Minorities ■ Pipelines

INTRODUCTION

The underrepresentation of ethnic minorities as both healthcare professionals and the student populations of the health professional schools/programs has been a major problem for many years (Coffman, & Geyn, 2018; Smedley, Stith, & Nelson, 2003; Smedley, Stith, Colburn, & Evans, 2001) and, given the changing U.S. demographics, is actually getting worse. Recent census projections (U.S. Census Bureau, 2018) are that for youth under 18, minorities will outnumber Whites by 2020. Additionally, the U.S. Census Bureau (2017, 2018) using population estimates for July 2017 show that individuals reporting as other than White comprise nearly 25% of the U.S. population with Hispanics the largest group at 18%. However, the percentage of practicing health care professionals who are Hispanic is just over 8% and the percentage of those who are physicians is even lower at 6% (U.S. Bureau of Labor Statistics, 2017). The situation is even more dire for African Americans, who are currently over 13% of the U.S. population but represent less than 8% of the physicians. Indeed, the number of Black males currently entering medicine is lower than 35 years ago (AAMC, 2015; Cato Laurencin, 2018; Laurencin, & Murray, 2017). Similarly, the situation for American Indians (AI) and Alaska Natives (AN) in medicine has changed very little in the last decades with matriculants to medical school reporting as AI-AN alone decreasing from 0.39% in the academic year 2006–07 to 0.20%, which is just 42 individuals in 2017–18. Physicians reporting as AI-AN alone and in combination with other races represented only 0.56% of the active physicians in 2016 relative to an estimated 2% of the U.S. population (AAMC, 2018c). Reports on diversity in other healthcare fields, including dentistry (Mitchell, & Lassiter, 2005; Mitchell, & Lassiter, 2006); pharmacy (Hayes, 2008); optometry (Cole, 2007); and nursing (Adams, & Napper, 2009) drew similar conclusions.

In looking at the situation for an individual state, California is one of at least four states in which racial and ethnic minorities constitute a majority of the population with Hispanics as 39% of the total (U.S. Census Bureau, 2017). However, data show that the Latino physician shortage there has actually worsened over the last 30 years (Sanchez, Nevarez, Schink, & Hayes-Bautista, 2015) with current estimates that only 5% of the state's active physician population is Hispanic (Coffman, & Geyn, 2018). These disparities in the representation of ethnic minorities exist despite a history of various attempts by associated organizations over the years (see Figure 1). Efforts have included several initiatives by the American Association Medical Colleges (AAMC) dating back to the 1970's when they set population parity as a goal (Nelson, Bird, & Rogers, 1970). This was followed by the Robert Wood Johnson Foundation (RWJF) funding of the Minority Medical Education Program (MMEP) established in 1987 (Pechura, 2001) and then the AAMC Project 3000 by 2000 (Nickens, Ready, & Petersdorf, 1994). The MMEP was reauthorized and expanded in 1994 and again in 1998. Once again, the AAMC in 2006 got involved directly by calling for a 30% increase in enrollment from the 2002 level by 2015 and further noted efforts should be taken to increase enrollment

and graduation of racial and ethnic minorities from medical school. In 2007 the AAMC launched the Holistic Review Project that developed admissions tools and resources that medical schools could use to increase diversity (AAMC, 2010). This was followed in 2015 by a competency-based Medical College Admissions Test (MCAT), informed by reports from both AAMC and the Howard Hughes Medical Institute (AAMC-HHMI Committee, 2009). Although some of these efforts resulted in changes, the gains were limited and even reversed for a number of reasons including major national anti-affirmative action efforts, such as the University of California Regents decision to prohibit the use of race, religion, sex, color, ethnicity, or national origin as criteria for admission (decided in 1995, effective 1997); Prop 209 in California (1996); and Initiative 200 (1998) in Washington State. These efforts along with other similar ones in a number of states resulted in many legal challenges to considering race as an admission factor—including *Regents of the University of California v. Bakke* (1978), *Gratz v. Bollinger* (2003), *Grutter v. Bollinger* (2003), and *Fisher v. University of Texas* (2013 and 2016). In fact, at the time of writing, the Supreme Court is still hearing and ruling on these and newer challenges to affirmative action. Most recently, federal guidance from President Obama's administration on affirmative action that encouraged schools to embrace diversity was revoked in June 2018 by the Trump administration. As evidence of the deleterious effect of the legal uncertainty and removal of affirmative action, while Black students represented 6.4% of California high school seniors who graduated in 2013, they made up less than 4% of new enrollees at University of California (UC) Berkeley, which is bound by Proposition 209 (Chinoy, 2016). The situation is even worse for Latino students who represented 47% of California high school graduates in 2013, but only 17% of UC Berkeley enrollees.

Considerable evidence has now been published that increasing the number of healthcare providers from diverse backgrounds, including those from underrepresented racial and ethnic groups, rural communities, and low socioeconomic status (SES), is a vital step in tackling both the projected primary-care physician shortage and healthcare disparities, as well as providing more patient-centered and patient-concordant care (AAMC, 2018a; Jackson, & Gracia, 2014; Marrast, Zallman, Woolhandler, Bor, & McCormick, 2014; Peek, Wilson, Bussey-Jones et al., 2012; Street, O'Malley, Cooper, & Haidet, 2008). Thus, it is more important than ever to tackle the underrepresentation of diverse students among health-care providers, and an obvious first place to start is to look at the matriculation of individuals who are considered underrepresented in medicine (AAMC, 2004). Unfortunately, data collection and transparency are mixed for professions other than allopathic, and more recently osteopathic, medicine—a problem that needs to be solved if we are truly looking for data-driven solutions. In addition, the nature of underrepresentation in other professions is also likely to be different—for example, in the nursing profession only 12% of the total registered nurse workforce in 2015 was male (Buerhaus, Skinner, Auerbach, & Staiger, 2017). However, we believe that trends seen in medicine are largely reflected in other health-care professional schools.

Tables 1 and 2 show trends in matriculation to both allopathic and osteopathic medical

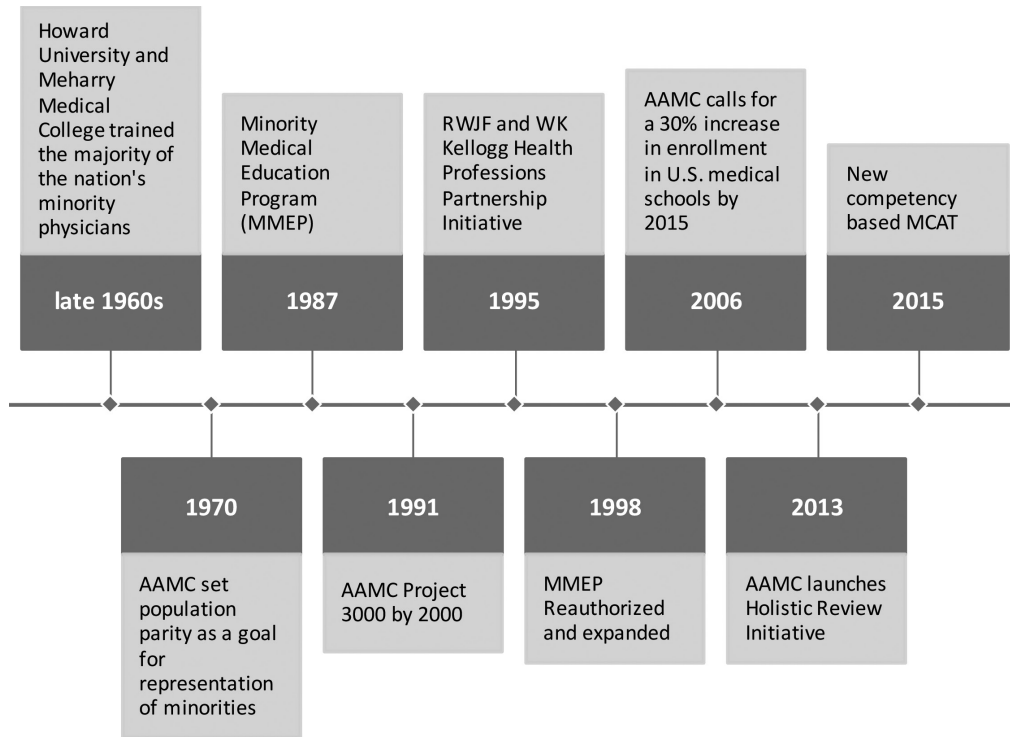


Figure 1. Timeline of Major Initiatives for Increasing Minority Participation in Medical School.

schools. Changes in data collection and race and ethnicity categorization makes comparisons over the years somewhat more difficult. In particular AAMC has allowed multiple designations since 2017 and as such the data in Table 1 do not show the most recent matriculant data but rather that from 2016 for a better comparison.

However, even with these considerations it is clear from Tables 1 and 2 diversity in both allopathic and osteopathic schools has not significantly improved and in the case of some groups has actually decreased. Indeed, when compared to the demographic data for the U.S. populations discussed above, all of the races and ethnicities with the exception of Whites and Asians are demonstrably underrepresented.

Other efforts to diversify the student population have included changes at the levels of the individual schools, including interpretation of MCAT scores, the holistic reviews of applicants, and changes in admissions committee members, among others. However, even holistic review is limited in that many health professions schools are using holistic review

Table 1. Number and Percentage of First-Year Matriculants to U.S. Allopathic Medical School in 1980 and 2016 by Race or Ethnicity Compared to U.S. Population Data

Race or Ethnicity	1980–1981			2016–2017		
	Number	US		Number	US	
		Matriculants	Population		Matriculants	Population
		Percent of Total	Percent of Total		Percent of Total	Percent of Total
American Indian or Alaska Native	63	0.4	0.6	54	0.3	1.3
Asian ^a	679	4.0	1.5	4,475	21.3	5.8
Black or African American	999	6.0	11.7	1,497	7.1	13.4
Hispanic or Latino	807	4.9	6.4	1,335	6.3	18.1
White	13,884	83.7	83.1	10,828	51.5	76.6
Native Hawaiian or other Pacific Islander, multiple-race, other, unknown, and non-U.S. citizens and nonpermanent residents ^b	155	0.9	3.0	2,841	13.5	0.2
Total	16,587			21,030		

Note. Modified from the following sources: (U.S. Census Bureau), American Medical College Application Service, archived January 2004; AAMC Data Warehouse: Applicant Matriculant File as of September 18, 2017.

^aAsian and Pacific Islander combined; ^bChanges in data collection and race/ethnicity categories are likely to be underestimating this number compared to 2016.

practices to varying degrees and often only after applicants have met minimum criteria for admission (Drees, Nairn, & Nivet, 2014). For the most part however, as already mentioned and seen in Tables 1 and 2, changes in matriculation of diverse applicants have been limited and in the case of American Indian or Alaska Native matriculants there has been an overall decrease in actual numbers. The situation for Black males in medicine is worth special attention and has resulted in a significant report and a recent workshop (AAMC, 2015; National Academies of Sciences Engineering and Medicine, 2018). The data in Table 3 clearly show that not only is the percentage of Black/African American matriculants stagnant, but also if one looks deeper at the number of U.S.-born African American males who will likely have the most concordance with the growing U.S. Black male population and serve as role models for Black youth these numbers are embarrassingly low.

Table 2. Number and Percentage of First-Year Matriculants to U.S. Osteopathic Medical School in 1996 and 2016 by Race or Ethnicity Compared to U.S. Population Data

Race or Ethnicity	1996–1997			2016–2017		
	Number	US		Number	Us	
		Matriculants	Population		Matriculants	Population
		Percent of Total	Percent of Total		Percent of Total	Percent of Total
American Indian or Alaska Native	17	0.7	0.9	9	<0.1	1.3
Native Hawaiian or other Pacific Islander (non-Hispanic)	-	-	-	3	<0.1	0.2
Asian	307 ^a	12.1	3.6 ^a	1,537	22.7	5.8
Black or African American	115	4.5	12.6	183	2.7	13.4
Hispanic or Latino	112	4.4	10.2	381	5.6	18.1
Two or More Races (non-Hispanic)				220	3.3	2.7
White	1,972	77.8	83.0	3,929	58.1	76.6
Total	2,535^b			6,763^b		

Note. Modified from the following sources: (Day, JC, 1996; U.S. Census Bureau); 2006 Annual Statistical AACOM Statistical Report on Osteopathic Medical Education; 2016 AACOMAS Applicant and Matriculant Profile Summary Report.

^aAsian and Pacific Islander combined; ^bUndisclosed and foreign are included in total.

A traditional review of the factors that contribute to the underrepresentation of minorities in the health field leads to an examination of the “pipeline” from college to professional school with some inclusion of K–12. Many contributory factors that are barriers/impediments to movement through the pipeline at the level of undergraduate education as well as the admissions level of the professional schools have been identified. These factors include poor academic preparation, lack of exposure, lack of training for standardized examinations, admissions committee compositions, racist attitudes, and such. Consequently, the emphasis in many of the programs designed to improve the pipeline have concentrated their efforts at those levels. However, even with considerable resources dedicated to these pipeline programs, the “leaks” have not been adequately fixed. At the same time, it is becoming clearer that many additional factors in the K–12 group as well as even the preschool populations have major contributory long-term effects, which have not been addressed very effectively. The goal of this report is two-fold: first, to identify and elaborate factors that are barriers to increasing

Table 3. Black/African American Male Matriculation to Allopathic Medical School 2015–2018

	2015–2016		2016–2017		2017–2018		2018–2019	
	<i>Matriculants</i>							
	<i>Number</i>	<i>Percent of Total</i>	<i>Number</i>	<i>Percent of Total</i>	<i>Number</i>	<i>Percent of Total</i>	<i>Number</i>	<i>Percent of Total</i>
All Black/ African American Males	556	5.2	581	5.5	572	5.4	604	5.8
US Born African American Males	271	2.5	273	2.6	257	2.4	284	2.7

Note. Source AAMC Applicant and Matriculant Data (AAMC, 2018b) Table A-12.

healthcare diversity including those that are only now beginning to be fully recognized; and second, to suggest some remedies to fix these as well as those further up the pipeline, perhaps using some innovative tools of intervention.

FACTORS NEGATIVELY AFFECTING DIVERSITY

Educational Barriers

Pre-K and K-12. A recent report from the National Women’s Law Center (Onyeka-Crawford, Patrick, & Chaudhry, 2017) highlights the implicit biases faced by girls of color starting as early as preschool. The “Let Her Learn” survey found that in the K–12 group Black girls are 5.5 times more likely and Native American girls 3 times more likely to be suspended than White girls. The report also noted that Black and Native American girls are disproportionately subject to discipline (suspension and expulsion) that leads to loss of class time. Of particular concern is that this trend is observed even in pre-K classes where although Black girls represent only 20% of the students enrolled, they are suspended one or more times at a rate of 54%! Black children in these programs are 3.6 times as likely to be suspended as their White classmates. These trends have been seen and reported previously (Losen, & Skiba, 2010; Wallace, Goodkind, Wallace, & Bachman, 2008) where it was documented that suspension and expulsion rates for Black, Hispanic, and American Indian youth are substantially (two to five times) greater than for White youth. Furthermore, it has been noted that

the transgressions that lead to these disciplinary actions are more often than not subjective rather than objective. For example, an extensive analysis (Annamma, Anyon, Joseph et al., 2016) using Critical Race Theory and Critical Race Feminism indicated that Black girls are most often being “subjected to discipline based on the judgment of school personnel, many of whom likely have limited understanding of ways race and racism affect Black girls’ lives.” Moreover, a recent study (Epstein, Blake, & Gonzalez, 2018) from the Georgetown Law Center on Poverty and Inequality determined that young Black girls, especially in the 5–14 age group are perceived as “less innocent,” “need to be supported less,” and are “more adult-like than their white peers.” This finding was based on a survey of a large group of adults from various backgrounds, although the participants were primarily White women. In addition, they viewed Black girls as needing less protection and nurturing and also as more knowledgeable about adult and sexual topics. As a result, the adults were less likely to believe or acknowledge accounts by Black girls of sexual assault; in fact, they often blamed how the girls dressed. These findings and conclusions can definitely impact a young girl’s perceptions of her future education goals since it was adults who were the source of the opinions.

Discipline problems are also likely exacerbated by the fact that children of color are more likely to attend underresourced schools with inexperienced and uncertified or unqualified teachers but with a higher presence of law enforcement. The U.S. Department of Education Office for Civil Rights measures student access to resources that impact education equity and opportunity for students and have reported (2014) that underrepresented minority (URM) students attend schools with a higher percentage of first-time teachers: 3–4% versus 1%. Similarly, the salary disparities also reflect the numbers of URM students enrolled in the school, with the largest gap between the schools with the highest numbers of enrolled Black and Hispanic students versus the lowest. Finally, nearly 7% of the nation’s Black students attend schools where 80% or fewer of the teachers meet all state certification and licensure requirements. Significantly, this group represents more than 500,000 students.

Again, the effects of these disparities on Pre-K and K–12 students has to represent a most meaningful negative experience educationally for these students leading to many of the “points of leakage” in the pipeline. A related number is that almost half of high schools with 90% or more students of color have at least one law enforcement officer whereas only 31.4% of high schools with 90% or more White students have a law enforcement officer (Onyeka-Crawford, Patrick, & Chaudhry, 2017). One can only imagine the long-term negative effects that these disciplinary measures have on these students relative to education.

As an objective measure of the problems that relate to the URM students due in part to some of the issues already raised, consider the NAEP National Reading Scores (Department of Education, 2017). Using a score of 238 for 4th-grade students and 281 for 8th-grade students as the “proficient” level, Black, Hispanic, and Native American students achieved scores significantly below those numbers (see Table 4). Note that the proficient numbers indicate abilities to integrate and interpret texts and apply their understanding. As it turns

Table 4. National Assessment of Educational Progress, National Reading Scores for 2017

	<i>White</i>	<i>Black</i>	<i>Hispanic</i>	<i>Asia/ Pacific Islander</i>	<i>Asian</i>	<i>Native Hawaiian/ PI</i>	<i>American Indian/ Alaska Native</i>	<i>Two or More Races</i>
Grade 4	231	205	208	238	241	210	203	226
Grade 8	275	249	255	282	284	255	253	272

Note. Source: The National Assessment of Educational Progress: Reading Assessment (Department of Education, 2017).

out similar disparities are seen in the 8th-grade reading level for low SES students, English Language Learners, and students with parents whose education levels are less than those who graduated from college.

Another factor that enters into any such discussions relating to a system not functioning optimally (or sometimes even minimally) are economic disparities, which again are increasingly contributing to the problem. The factors that relate directly to these types of disparities include inadequate transportation to better public schools, lack of school resources, lack of intellectual engagement, limited activities and opportunities, and lack of access to proven and tested mentors. A study by the Education Trust (Morgan, & Amerikaner, 2018) concluded that in the United States many school districts that serve large populations of students of color and students from low-income families receive far less funding than those serving White and more affluent students. The report showed that school districts serving the largest populations of Black, Latino, or American Indian students received roughly \$1,800—or 13% less per student in state and local funding than those serving the fewest students of color. A similar situation was reported for school districts serving largely students from low-income families where the gap is approximately 7%, or \$1,000 less per pupil on students compared to those school districts educating wealthier families. In a study of 38 elite colleges, Chetty and his colleagues (Chetty, Friedman, Saez, Turner, & Yagan, 2017), showed that more students came from the top 1% of the income scale than from the entire bottom 60%. Moreover, even among Pell Grant recipients who scored above the median of 1120 on the SAT there is no diversity in that 81% are White (Carnevale & Van Der Werf, 2017). A recent study (Carnevale, Werf, Quinn, Strohl, & Repnikov, 2018) extended this analysis and showed that at selective public colleges that typically spend nearly three times more on instructional and academic support as public open-access colleges, the enrollment of Whites has increased over the past decade more than the enrollment of Hispanics and African Americans combined.

Thus, it should be obvious that many factors contribute negatively to the preparation of URM students, even before they reach their college years, many of which relate directly to educational issues but also many related to other factors including social, cultural, and lifestyle.

College. Many factors enter into the student's successful progression through their undergraduate studies, particularly as they strive for postgraduate studies in the health professional schools/programs. Of course, these include performance in their classes, for example their GPA, but also their activities such as engagement in organizations and clubs; their experiences, such as shadowing and volunteering; their preparation for standardized tests; the availability of knowledgeable and experienced pre-health advisors; and, in general, a supportive climate. Indeed, effective advising can result in addressing the issues associated with underrepresentation, but only if both the numbers of advisors and the knowledge base of those advisors increase so as to "match" most effectively the deficiencies/weaknesses of an individual student with a program that identified those as its emphasis.

Regarding academic performance, the need for additional English and math courses serves as a fairly accurate barometer of success, particularly based on graduation rates. Using this as a parameter, of those groups defined as diverse, 55% of Blacks, 45% of Hispanics, and 55% of Pell Grant recipients (low SES) (Jimenez, Sargrad, Morales, & Thompson, 2016), need additional courses—as compared to 35% of Whites. Similarly, when time to graduate is assessed, both Blacks and Hispanics take longer than Whites, often due to the fact that remedial classes generally do not count toward graduation and often students may take up to three semesters of these courses. However, there is some good news (Smith, 2018) based on significant increases observed in graduation rates within the California State University (CSU) system, which is the largest and most diverse public university system in the nation. The data show that the graduation rate for first-time freshman increased six percentage points over three years (2015–2018), that is, 19.2% to 25.4 %, while the six-year graduation rate increased four percentage points (57% to 61%) during that same time period. These data were further broken down by the lessening of the gap in graduation rates between Whites and URM (i.e., Blacks, Native Americans, and Hispanics), going from 12.2% to 10.5%. Officials attribute these differences to the Graduation Initiative 2025, which called for major increases in the rates by 2025. Within the CSU system (which is made up of 23 campuses), individual campus saw varying degrees of success—for example, San Diego State University saw an increase in graduation rate of 71 % for their Pell Grant recipients! Officials indicated that it was just not a single change that resulted in these increases but rather a number of efforts, including opening more seats in classes, expanding living arrangements on campus, opening centers on campus for commuter students, and targeted advising /counseling.

The issue of racial and socioeconomic biases regarding standardized test taking has been an ongoing and long-term discussion, accentuated most recently by a number of four-year institutions eliminating SAT scores from their admissions decisions (Hoover, 2005; Jaschik, 2018a). As this movement continues, the role of these standardized tests should become clearer over time. This issue, of course, relates to many factors, including the type of schools the students attend, the financial ability to afford preparatory courses, the environment in the neighborhood as well as the household, qualified teachers, availability of role models, which

in themselves brings into question the term “standardized tests,” especially as a criterion for admissions.

Since it is a combination of all of these factors taken together that dictate acceptance to professional school programs, the undergraduate experiences represent a critically important factor in the successful progression through the pipeline, especially for the URM students. In fact in a recent report (Jaschik, 2018b) on college admissions criteria, many of the same factors in turn apply to professional school admissions with various priorities, such as previous schooling, race, first-generation status, financial status, gender, and legacy status, in addition to grades, test scores, writing sample, and letters of recommendation.

Professional School. Despite the hope that entry to professional school programs is an objective process, data show more and more subjectivity in admissions decisions. Over the years, much of this has centered around race (i.e., affirmative action), with little if any movement toward more objectivity, despite boasts of holistic admissions that indeed were designed to look at more than just numbers. Interestingly, more recently the affirmative action controversy has now centered on Asian American groups with the issue being perhaps that subjectivity and—in the words of the Department of Justice (2018) — “vague” metrics are playing too much of a role in admissions decisions. In fact, the other aspect of this specific controversy, which is that the prejudices are not necessarily solely around race but also socioeconomic issues (i.e., the richer and more privileged applicants), is nothing new. This issue is currently in the courts and could end up in the hands of the Supreme Court where a number of other affirmative action cases have been decided.

Along those same lines, much evidence has been presented that shows a parallelism between race/ethnicity and socioeconomic status when it comes to performance on standardized tests, for many of the same reasons. Additionally, if one looks at the most recent attempt to address underrepresentation, the adoption of MCAT2015, data are beginning to emerge that scores relative to URM students are still routinely below the 50th percentile (Table 5)—just as was seen with the “old MCAT” (Elks et al., 2018). A major component of these “unchanging” scores especially in the CARs section likely relates directly to the aforementioned factors, including reading ability and inadequately funded K–12 schools.

These “below the median” MCAT metrics will directly impact the effectiveness of holistic admissions, which has been promoted as an effective way to move away from the “numbers games.” In theory, the use of holistic admissions is exactly what many supporters and advocates of equity have advanced, especially those working with URM students. Realistically, however, considering the number of applicants to the current healthcare professional schools, logistics of support staff alone essentially prevents a true holistic review of all—or even most—of those applicants. This is especially relevant to reading personal statements, which for many of the URM students truly reflect the struggles and successes in getting to where they are. As such, strong URM students (as judged by factors other than MCAT and GPAs) are eliminated due to the numbers alone, severely hampering the movement toward diversity.

Table 5. MCAT Total Scores for Exams Administered From 2015–2017

	<i>Mean Score</i>	<i>Percentile</i>
White	502.3 (n = 105,696)	56th
Native Hawaiian or Other Pacific Islander	498.6 (n = 690)	46th
Hispanic	495.7 (n = 25,668)	35th
Black/African-American	493.5 (n = 24,559)	27th
Asian	502.0 (n = 63,201)	56th
American Indian or Alaska Native	496.9 (n = 2,452)	39th

Note. Source: “Using MCAT Data in 2019 Medical Student Selection” (AAMC, 2018e).

When considering this, it is not surprising that the underrepresentation of ethnic minorities is still such a daunting problem in the health professional programs and careers. With Blacks and Hispanics still represented in such low numbers (Table 1), and as one looks at the changing demographics of the nation, the appallingly low numbers of American Indians and Alaska Natives in medicine and academia (only 0.10 % of total full-time faculty at MD-granting institutions are reported as solely American Indian/Alaska Native) truly demonstrate how difficult the changes will be. Thus, based on at least two of the determinants for measuring success at the end of the pipeline, that is, professional school matriculants and members of the professional healthcare community for all URMs, a true realization of the underrepresentation of ethnic minorities is dramatic.

Psychological Barriers at All Levels

It has become increasingly evident—more so recently—that various social determinants are paramount to the problem of underrepresentation of ethnic minorities in the health professions since, as with the educational experiences in minority adolescents alluded to earlier, social factors have long-term effects. These include a number of aspects that are unique in certain ways, but all relate to the marginalization of minorities in society, such as stereotype threat, minority status stress, implicit bias, imposter syndrome, microaggressions, PTSD, and racial discrimination. Although in the United States these have always been a part of our society and have certainly contributed to the underrepresentation of minorities, especially in education and in particular in healthcare, the present environment in the United States has served to exacerbate these problems.

There are also psychosocial issues directly related to these social and behavior effects that have to be considered. A landmark study (Felitti et al., 1998) led to the concept of Adverse Childhood Experiences (ACEs) and their connection to adult health and morbidity. These experiences have now been expanded to include physical and emotional neglect, parental

separation and divorce (60 years ago 20% of children were born to parents who lived in a single-parent household; now that figure is nearly 70%), exposure to violence outside the home, living in unsafe neighborhoods, property crimes, homelessness, bullying, racial discrimination, and income insecurity. Not surprisingly, the prevalence of ACEs is lowest among Asian, non-Hispanic children, and in most regions is highest among Black, non-Hispanic children. As an example, 55% of Latina girls, 38% of Asian/Pacific Islander girls, and 30% of Black girls worry about a friend or family member being deported whereas 19% of Black girls ages 14–18 reported experiencing homelessness (Onyeka-Crawford, Patrick, & Chaudhry, 2017). Of all of these ACEs perhaps the most striking is that the suicide rate for Black children 5–12 years of age is nearly twice that of White children in the same age group (Bridge et al., 2018; Pechtel & Pizzagalli, 2011).

Substantial research has now documented that adverse childhood experiences can significantly contribute to negative adult physical, educational, and mental health outcomes (Gilbert et al., 2015; Hughes et al., 2017; Pechtel & Pizzagalli, 2011). A systematic study has provided compelling evidence that multiple ACEs had a strong correlation with increased risks of developing mental health issues, alcohol and drug abuse, and self-directed violence (Gilbert et al., 2015). Another recent study (Metzler, Merrick, Klevens, Ports, & Ford, 2017) using data from 10 states and the District of Columbia showed that participants with higher ACE scores are more likely to report noncompletion of high school, unemployment, and living in a household below the federal poverty level.

Importantly, as we examine the effects of ACEs, it is evident that early life experiences have the ability to trigger epigenetic modifications, effectively altering brain structure by changing gene transcription. Examples of such modifications include: (1) possibly permanently altering the stress-response system and affecting the glutamatergic system (Szyf, 2009); (2) chronic toxic stress resulting from ACEs impacting the neurological and immunological function (Bierhaus et al., 2003); (3) an actual structural variation in gray and white matter (McCrary, Brito, & Viding, 2011); (4) altered neurotransmitter levels and signaling involving molecules such as serotonin and GABA; and (5) enhanced ACTH and cortisol response to stress/stimulation (Doom & Gunnar, 2015). One does not have to be a neurobiologist to recognize the significance of these effects especially in URM and low SES individuals who are often most prone to the circumstances that cause ACEs.

An AAMC (2018d) examination of the data for medical school students relative to financial considerations shows the extreme socioeconomic disparities that currently exist in medical schools. In the 30-year span from 1988 through 2017, between 73% and 79% of medical students came from families earning above \$74,870 (the top two quintiles from the 2016 census), and in the last 11 years of the period the range was actually 76% to 79%. In 2017, nearly one-quarter of first-year U.S. medical students came from families where the parental income was above \$225,251. Additionally, but not surprisingly, using a SES-Education-Occupation (SES-EO) indicator, the correlation between income and parental education and occupation

was dramatic and for matriculating students from the lowest quintile of income (less than \$24,002 per year) 62% are first-generation college graduates or have parents with a degree but are in a service, clerical, skilled, or unskilled occupation. The situation is completely reversed for matriculants from the highest two-quintiles where greater than 64% of the parents have a bachelor's degree or higher and have an executive, managerial, or professional occupation. In examining what difference this might make in medical student success, a study at University of Central Florida, College of Medicine (Giordano, Hutchinson, & Pepler, 2016) showed that students with demonstrated financial need had a statistically lower score on the USMLE Step 1 exam as those who did not experience such needs, despite having access to the same tutoring resources, preparation tools, and curriculum. Possible explanations for this observation could be access to fewer additional resources such as supplemental books, and also the lack of exam-taking preparatory courses prior to medical school, in addition to the long-term effects of some of the educational barriers already discussed above. Importantly, financial considerations such as these can result in lower Step 1 exam scores and will disproportionately affect diverse and first-generation students.

WHAT NEEDS TO BE DONE?

Now what? As we have identified the many obstacles and stumbling blocks faced by students of color whose goals are to succeed in health professional schools and the lack of significant progress that has been made despite many initiatives, it is clear that diversity numbers are not going to change if radical changes do not happen and soon! Unfortunately, this will not be easy and, as such, will take a long time. However as discussed, there have been some moderate successes that can possibly be built upon to make such changes. Plus, with some of the newer developments, it is hoped that the system will be more responsive to making such necessary adjustments. Notably these changes have to be made at all levels throughout the pipeline while at the same time taking into account the academic, personal, sociological, and psychological factors. Furthermore, although some of these might appear mundane, it is truly necessary to “pull out all stops” in making substantive changes to address the problem.

First, changes have to be recognized as being needed and then must be executed at the top levels, as true leadership must be both committed to making the changes and willing to do so even in the face of resistance. This includes leaders both within and outside the basic academic institutions, for example, university presidents, deans, accrediting bodies, funding agencies, and such. When one does only what one is allowed to do, only minimal changes can result, a concept referred to in a recent paper (Emery, Boatright, & Culbreath, 2018) based on a quote by Audre Lorde (2007), who stated, “For the master's tools will never dismantle the master's house.” As an example, changing the MCAT has so far been largely a disappointment to many since the changes really did not address some of those issues that have contributed

in a major way to the underrepresentation of ethnic minorities over the years; the disparity in scores, especially for URM students, is still observed (Elks et al., 2018). The issue then is that the changes need to be made across all of the existing systems and not just within one program or institution. This in itself unquestionably represents a major problem as systems change inordinately slowly.

Second, changes at the level of admissions committees (both for medical school and for residency selection) must be made. For example, initiatives have been successfully undertaken at one major medical school that can address some of those factors that create minority underrepresentation (Capers, Mcdougle, & Clinchot, 2018), including crafting a vision statement that speaks directly to diversity and that is highly visible at all times. Granted, most institutions have diversity statements; however, when coupled with some of the other admissions committee initiatives, the statement is not just a “statement.” These other initiatives include: (a) anonymous voting by the committee members, (b) a sizable group of faculty screeners to minimize impact of individual biases, (c) requiring members to take unconscious bias training, (d) blinding interviewers to academic metrics; and (e) adopting a “true” holistic review process. Note here that, similar to a diversity statement, in a recent practice model study nearly half of 171 health professions schools indicated that they use some element of a holistic review process (Drees, Nairn, & Nivet, 2014). However, in the same report it was noted that the assessment of non-academic criteria in the initial review was “after applicants have met the minimum criteria for admission,” which are presumably GPAs and MCAT scores. Indeed only 4 of the 171 schools reported that “Non-academic criteria are the most important criteria during the initial screening process.” In addition, 57 schools reported that they were not using any form of holistic admissions. Clearly then in order to truly have a holistic review would require a significant expansion of the staff to evaluate the applicant pool, which of course in turn would require additional funds for training, both staff and faculty. However, if one truly wants to institute holistic reviews, this is a necessity. Finally, a major initiative is to ensure that more women, minorities, and younger people are appointed to the committees. This initiative requires specific attention and effort as most committee appointments are voluntary, and as such diversification of the committee presents a dilemma for many from those groups as they strive for promotion and tenure, especially considering the “minority tax” (Cyrus, 2017) and many other “needs” for them to serve in the ranks. However, if some incentives could be provided, this initiative would make a huge difference in committee considerations of the underrepresented group applications.

Third, an important component of the faculty involvement on committees at all levels in the pipeline would involve not just training but also a willingness to consider the need for advocacy and the advocate perspective based on various aspects of the levels of evaluation involved. Given the new evidence of ACE and the life-long consequences that result, this advocacy will be even more critical. In fact at the 2017 National Association for College Admission Counseling’s national conference, Dr. Shaun Harper from University of Southern

California (Harper, 2017), stated that more of the committee members and leaders need to be individuals of color along with others who can be sensitive to the needs and issues associated with diverse students.

Fourth, data need to be shown often and transparently, especially if changes are going to occur. Medicine, like science, must be evidence-based and relying on anecdotal or historical beliefs about medical school preparation and success can be deleterious. Even though it has previously been shown that among URM and low SES students coming from a rigorous special master's program, MCAT scores are not predictive of success in the preprofessional medical school curriculum and beyond, there has still been some resistance to policy change by some members of the admissions committee at some medical school programs (Goode & Talbot, 2016). As scientists, one only has to take one look at the paucity of URMs in the schools and professions, especially when compared to the demographics of the United States, to recognize the seriousness of this problem and then do something about it.

Fifth, also since many of the "leaks" in the pipeline are understood along with, in some cases, the possible fixes, accreditation boards, admissions officials, faculty, and committee members all have to work together to overcome some of the barriers faced by students from these underrepresented groups. As with any of the other possible solutions, financial considerations have to play into the "fix," in this case, for example, subsidization of the activities including, the training required, additional staff, and perhaps most important resources must be provided to implement such changes.

Limitations

Possible limitations of the study include the multiple changes in race and ethnicity classification by the U.S. Office of Management and Budget (OMB) that have occurred over the last four decades. During this time, census questions for U.S. population data have changed multiple times. In 2000, for example, the designation "Hispanic or Latino, or Spanish origins" was reclassified from racial to ethnic data. In addition, for the first time, respondents were allowed to select multiple boxes to reflect multiracial heritage. Data collection by AAMC and AACOMAS also uses the OMB race and ethnicity categories. Recently the Diversity 3.0 initiative of AAMC led to more changes in data collection strategies such that race and ethnicity data are now disaggregated by specific subpopulations. Finally, choice of race and ethnicity in both the decennial census and in data collection by medical schools is self-reported and as such may be subject to social and societal influences.

CONCLUSION

It should be obvious that a significant number of changes have to be made to address the underrepresentation problem and as such, the diversity in the health professions. Moreover, these changes have to occur at all stages of the pipeline, even including a recognition of the importance of early childhood experiences in preschool. Along with interventions at all stages, one also has to include biological issues associated with racism and discrimination as many of these social and behavior issues genuinely affect psychological well-being, particularly associated with educational success. As such, it will require not only the active involvement of counselors, teachers, advisors, and staff at all levels of the pipeline but also possibly training efforts for the interventions to be effective. The latter point is most critical as changing attitudes is often close to impossible. Unquestionably, these changes will take a long time to implement and at a significant cost. However, as mentioned earlier, some efforts on an institutional basis have begun that can be used as a template for others to follow. One such example includes the effects of using several of the aforementioned admissions efforts reported by Ohio State University COM (Capers, Mcdougle, & Clinchot, 2018) where the number of URM students rose from 19% in 2014 to 26% in 2016. Additionally, in a recent report (Levitan, 2018) Touro College of Osteopathic Medicine (TouroCOM), indicates that in this year's incoming class, approximately 27–28% are students of color. Although specific efforts in accomplishing this increase (from ~18%) were not elucidated, strategies included participation in a number of outreach and recruitment efforts, particularly at HBCUs and MSIs, while other efforts included a Masters Pipeline Program, a Med-Achieve Program (targeting high school students) and a COMPASS Welcoming event that matches current students with applicants. All of these activities are designed to pay individual attention to applicants as well as incoming and current students. Moreover, the Community Advisory Board, which is composed of Harlemites, such as former elected officials and doctors, commits to assisting students in attending, affording, and succeeding at TouroCOM. Finally, with the commitment of the institution devoted to the historical roots of the community, agencies such as the NAACP has also been involved. This type of overall academic and community involvement is necessary to address the many factors that contribute to the underrepresentation of minorities in healthcare. The bottom line—when considering the changing demographics of the country along with the increasing number of health disparities associated with the minority populations, dealing with this sooner rather than later is an absolute must.

REFERENCES

- AAMC. (2004). Underrepresented in medicine: Definition. Retrieved from <https://www.aamc.org/initiatives/urm>
- AAMC. (2006). AAMC statement on the physician workforce. Retrieved from <https://www.aamc.org/download/55458/data/workforceposition.pdf>
- AAMC. (2010). Roadmap to diversity: Integrating holistic review practices into medical school admission processes. Retrieved from <https://members.aamc.org/eweb/upload/Roadmap%20to%20Diversity%20Integrating%20Holistic%20Review.pdf>
- AAMC. (2015). Altering the course: Black males in medicine. Retrieved from https://members.aamc.org/eweb/upload/Black_Males_in_Medicine_Report_WEB.pdf
- AAMC. (2018a). The 2018 update: The complexities of physician supply and demand: Projections from 2016 to 2030. Retrieved from <https://www.aamc.org/data/workforce/>.
- AAMC. (2018b). Applicants and matriculants data. Retrieved from <https://www.aamc.org/data/facts/applicantmatriculant/>
- AAMC. (2018c). Reshaping the journey American: Indians and Alaska Natives in medicine. Retrieved from https://store.aamc.org/downloadable/download/sample/sample_id/243/
- AAMC. (2018d). An updated look at the economic diversity of U.S. medical students. Retrieved from <https://www.aamc.org/download/493046/data/october2018anupdatedlookattheeconomicdiversityofu.s.medicalstud.pdf>
- AAMC. (2018e). Using MCAT data in 2019 medical student selection. Retrieved from <https://www.aamc.org/download/462316/data/mcatguide.pdf>
- AAMC-HHMI Committee. (2009). Scientific foundations for future physicians. Retrieved from Washington, DC: <http://www.hhmi.org/sites/default/files/Programs/aamc-hhmi-2009-report.pdf>
- Adams, B., & Napper, B. (2009). Master plan for the California nursing workforce. Goal 2: Increasing diversity in California's nursing workforce. Retrieved from http://lahealthaction.org/library/CINHC-Goal_2_-_Increasing_Diversity_RN_Workforce_07-27-07__2_.pdf
- Annamma, S. A., Anyon, Y., Joseph, N. M., Farrar, J., Greer, E., Downing, B., & Simmons, J. (2016). Black girls and school discipline: The complexities of being overrepresented and understudied. *Urban Education*, 54(2), 211-242. doi:10.1177/0042085916646610
- Bierhaus, A., Wolf, J., Andrassy, M., Rohleder, N., Humpert, P. M., Petrov, D., . . . Nawroth, P. P. (2003). A mechanism converting psychosocial stress into mononuclear cell activation. *Proceedings of the National Academy of Sciences of the United States of America*, 100(4), 1920-1925. doi:10.1073/pnas.0438019100
- Bridge, J. A., Horowitz, L. M., Fontanella, C. A., Sheftall, A. H., Greenhouse, J., Kelleher, K. J., . . . Campo, J. V. (2018). Age-related racial disparity in suicide rates among U.S.

- youths from 2001 through 2015. *JAMA Pediatrics*, 172(7), 697–699. doi:10.1001/jamapediatrics.2018.0399
- Buerhaus, P. I., Skinner, L. E., Auerbach, D. I., & Staiger, D. O. (2017). State of the registered nurse workforce as a new era of health reform emerges. *Nursing Economics*, 35(5), 229–237.
- Capers, Q., Mcdougle, L., & Clinchot, D. M. (2018). Strategies for achieving diversity through medical school admissions. *Journal of Health Care for the Poor and Underserved*, 29(1), 9-18. doi:10.1353/hpu.2018.0002
- Carnevale, A. P., & Van Der Werf, M. (2017). Selective colleges can afford to admit more Pell Grant recipients. Retrieved from <https://cew.georgetown.edu/wp-content/uploads/The-20-Percent-Solution-web.pdf>
- Carnevale, A. P., Werf, M. V. D., Quinn, M. C., Strohl, J., & Repnikov, D. (2018). Our separate & unequal public colleges: How public colleges reinforce white racial privilege and marginalize Black and Latino students. Retrieved from <https://cew.georgetown.edu/cew-reports/sustates/>
- Cato Laurencin, M. M. (2018). An american crisis: The lack of black men in medicine. *National Academy of Medicine Perspectives*. doi:10.31478/201706a
- Chetty, R., Friedman, J., Saez, E., Turner, N., & Yagan, D. (2017). Mobility report cards: The role of colleges in intergenerational mobility. Retrieved from <http://www.equality-of-opportunity.org/college/>
- Chinoy, S. (2016). Breaking down the status of affirmative action at UC Berkeley. Retrieved from <http://projects.dailycal.org/affirmative-action/>
- Coffman, J., & Geyn, I. (2018). California physicians: Who they are, how they practice. Retrieved from <https://www.chcf.org/publication/california-physicians-who-they-are-how-they-practice/>
- Cole, J. (2007). How O.D.s are meeting the needs of underserved populations. Retrieved from <https://www.reviewofoptometry.com/article/how-ods-are-meeting-the-needs-of-underserved-populations>
- Cyrus, K. D. (2017). Medical education and the minority tax. *JAMA*, 317(18), 1833–1834. doi:10.1001/jama.2017.0196
- Day, J. C. (1996). Population projections of the United States by age, sex, race, and Hispanic origin: 1995 to 2050. Retrieved from <https://www.census.gov/content/dam/Census/library/publications/1996/demo/p25-1130.pdf>
- Department of Education. (2017). The national assessment of educational progress: Reading assessment. Retrieved from https://www.nationsreportcard.gov/reading_2017?grade=4
- Department of Justice. (2018). Statement of interest in Harvard discrimination case [Press release]. Retrieved from <https://www.justice.gov/opa/pr/justice-department-files-statement-interest-harvard-discrimination-case-defending-claim-0>

- Doom, J. R., & Gunnar, M. R. (2015). Stress in Infancy and Early Childhood: Effects on Development. In Wright, J. D. (Ed.), *International encyclopedia of the social and behavioral sciences* (2nd ed., Vol. 23, 577–582). Oxford: Elsevier.
- Drees, B., Nairn, R., & Nivet, M. D., J.C.A. (2014). Holistic admissions in the health professions: Findings from a National Study. Retrieved from http://urbanuniversitiesforhealth.org/media/documents/Holistic_Admissions_in_the_Health_Professions.pdf
- Elks, M. L., Herbert-Carter, J., Smith, M., Klement, B., Knight, B. B., & Anachebe, N. F. (2018). Shifting the curve: Fostering academic success in a diverse student body. *Academic Medicine*, 93(1), 66–70. doi:10.1097/acm.0000000000001783
- Emery, C. R., Boatright, D., & Culbreath, K. (2018). Stat! an action plan for replacing the broken system of recruitment and retention of underrepresented minorities in medicine. National Academy of Medicine Perspectives. doi:10.31478/201809a
- Epstein, R., Blake, J. J., & Gonzalez, T. (2018). Girlhood interrupted: The erasure of black girls' childhood. Retrieved from <https://www.law.georgetown.edu/poverty-inequality-center/wp-content/uploads/sites/14/2017/08/girlhood-interrupted.pdf>
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, 14(4), 245–258. doi:10.1016/S0749-3797(98)00017-8
- Gilbert, L. K., Breiding, M. J., Merrick, M. T., Thompson, W. W., Ford, D. C., Dhingra, S. S., & Parks, S. E. (2015). Childhood adversity and adult chronic disease: An update from ten states and the District of Columbia, 2010. *American Journal of Preventive Medicine*, 48(3), 345–349. doi:10.1016/j.amepre.2014.09.006
- Giordano, C., Hutchinson, D., & Peppler, R. (2016). A predictive model for USMLE step 1 scores. *Cureus*, 8(9). e769. doi:10.7759/cureus.769
- Goode, C. A., & Talbot, C. (2016). A special master's program as a pipeline to increase diversity at an osteopathic medical college. *Journal of Best Practices in Health Professions Diversity: Research, Education and Policy*, 9(2), 1198–1216.
- Harper, S. (2017). Stop sustaining white supremacy. *Inside Higher Ed*. Retrieved from <https://www.insidehighered.com/views/2017/08/21/what-charlottesville-says-about-white-supremacy-universities-essay>
- Hayes, B. (2008). Increasing the representation of underrepresented minority groups in US colleges and schools of pharmacy. *American Journal of Pharmaceutical Education*, 72(1), 1–4. doi:10.5688/aj720114
- Hoover, E. (2005). An analysis of the association of American medical colleges' review of minorities in medical education. *Journal of the National Medical Association*, 97(9), 1240–1242, 1244–1256.
- Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., . . .

- Dunne, M. P. (2017). The effect of multiple adverse childhood experiences on health: A systematic review and meta-analysis. *Lancet Public Health*, 2(8), e356-e366. doi:10.1016/s2468-2667(17)30118-4
- Jackson, C. S., & Gracia, J. N. (2014). Addressing health and health-care disparities: The role of a diverse workforce and the social determinants of health. *Public Health Reports*, 129(Suppl 2), 57-61. doi:10.1177/00333549141291S211
- Jaschik, S. (2018a). Chicago drops SAT/ACT requirement. Will others follow? *Inside Higher Ed* 6/19/2018. Retrieved from <https://www.insidehighered.com/admissions/article/2018/06/19/university-chicago-drops-satact-requirement>
- Jaschik, S. (2018b). New data on admissions: Criteria that matter, early decision and more. *Inside Higher Ed* 11/12/2018. Retrieved from <https://www.insidehighered.com/admissions/article/2018/11/12/new-data-admissions-including-application-trends-early-decision-and>
- Jimenez, L., Sargrad, S., Morales, J., & Thompson, M. (2016). Remedial education. The cost of catching up. Retrieved from <https://cdn.americanprogress.org/content/uploads/2016/09/29120402/CostOfCatchingUp2-report.pdf>
- Laurencin, C., & Murray, M. (2017). An american crisis: The lack of black men in medicine. *Journal of Racial and Ethnic Health Disparities*, 4(3), 317-321. doi:10.1007/s40615-017-0380-y
- Levitan, M. (2018). TouroCOM harlem makes underrepresented minorities in osteopathic medicine a priority. *Diverse Issues in Higher Education* 11/30/2018. Retrieved from <https://diverseeducation.com/article/132577/>
- Lorde, A. (2007). The master's tools will never dismantle the master's house. In A. Lorde (Ed.), *Sister outsider: Essays and speeches*, 110-114. Berkeley, CA: Crossing Press.
- Losen, D. J., & Skiba, R. (2010). Suspended education: Urban middle schools in crisis. Retrieved from https://civilrightsproject.ucla.edu/research/k-12-education/school-discipline/suspended-education-urban-middle-schools-in-crisis/Suspended-Education_FINAL-2.pdf
- Marrast, L. M., Zallman, L., Woolhandler, S., Bor, D. H., & McCormick, D. (2014). Minority physicians' role in the care of underserved patients: Diversifying the physician workforce may be key in addressing health disparities. *JAMA Internal Medicine*, 174(2), 289-291. doi:10.1001/jamainternmed.2013.12756
- McCrary, E., De Brito, S. A., & Viding, E. (2011). The impact of childhood maltreatment: A review of neurobiological and genetic factors. *Frontiers in Psychiatry*, 2(48). doi:10.3389/fpsy.2011.00048
- Metzler, M., Merrick, M. T., Klevens, J., Ports, K. A., & Ford, D. C. (2017). Adverse childhood experiences and life opportunities: Shifting the narrative. *Children and Youth Services Review*, 72, 141-149. doi:https://doi.org/10.1016/j.childyouth.2016.10.021
- Mitchell, D. A., & Lassiter, S. L. (2005). Addressing health care disparities and increasing

- workforce diversity: The next step for the dental, medical, and public health professions. *Journal of Dental Education*, 69, 817–825.
- Mitchell, D. A., & Lassiter, S. L. (2006). Addressing health care disparities and increasing workforce diversity: The next step for the dental, medical, and public health professions. *American Journal of Public Health*, 96(12), 2093–2097. doi:10.2105/AJPH.2005.082818
- Morgan, I., & Amerikaner, A. (2018). Funding gaps 2018: Too many students do not get their fair share of education funding. Retrieved from <https://edtrust.org/resource/funding-gaps-2018/>
- National Academies of Sciences Engineering and Medicine. (2018). *An American crisis: The growing absence of black men in medicine and science: Proceedings of a joint workshop*. Washington, DC: The National Academies Press.
- Nelson, B. W., Bird, R. A., & Rogers, G. M. (1970). Expanding educational opportunities in medicine for blacks and other minority students. *Journal of Medicine Education*, 45(10), 731–736.
- Nickens, H. W., Ready, T. P., & Petersdorf, R. G. (1994). Project 3000 by 2000. Racial and ethnic diversity in U.S. medical schools. *New England Journal of Medicine*, 331(7), 472–476. doi:10.1056/NEJM199408183310712
- Onyeka-Crawford, A., Patrick, K., & Chaudhry, N. (2017). Let her learn: Stopping school pushout for girls of color. Retrieved from https://nwlc.org/wp-content/uploads/2017/04/final_nwlc_Gates_GirlsofColor.pdf
- Pechtel, P., & Pizzagalli, D. A. (2011). Effects of early life stress on cognitive and affective function: An integrated review of human literature. *Psychopharmacology*, 214(1), 55–70. doi:10.1007/s00213-010-2009-2
- Pechura, C. M. (2001). Programs of the Robert Wood Johnson Foundation to develop minority medical careers. *American Journal of the Medical Sciences*, 322(5), 259–261. doi:10.1097/00000441-200111000-00005
- Peek, M. E., Wilson, S. C., Bussey-Jones, J., Lypson, M., Cordasco, K., Jacobs, E. A., . . . Brown, A. F. (2012). A study of national physician organizations' efforts to reduce racial and ethnic health disparities in the United States. *Academic Medicine*, 87(6), 694–700. doi:10.1097/ACM.0b013e318253b074
- Sanchez, G., Nevarez, T., Schink, W., & Hayes-Bautista, D. E. (2015). Latino physicians in the United States, 1980–2010: A thirty-year overview from the censuses. *Acad Med*, 90(7), 906–912. doi:10.1097/acm.0000000000000619
- Smedley, B. D., Stith, A. Y., Colburn, L., & Evans, C. H. (2001). *The right thing to do, the smart thing to do: Enhancing diversity in the health professions*. Washington, DC: National Academies Press (US).
- Smedley, B. D., Stith, A. Y., & Nelson, A. R. (2003). *Unequal treatment: Confronting racial and ethnic disparities in health care*. Washington, DC: National Academies Press.

- Smith, A. A. (2018). Cal State sees major gains in graduation rates. *Inside Higher Ed* 11/9/2018. Retrieved from <https://www.insidehighered.com/news/2018/11/09/cal-state-system-sees-record-increases-graduation-rates>
- Street, R. L. Jr., O'Malley, K. J., Cooper, L. A., & Haidet, P. (2008). Understanding concordance in patient-physician relationships: Personal and ethnic dimensions of shared identity. *Annals of Family Medicine*, 6(3), 198–205. doi:10.1370/afm.821
- Szyf, M. (2009). The early life environment and the epigenome. *Biochimica et Biophysica Acta*, 1790(9), 878–885. doi:10.1016/j.bbagen.2009.01.009
- U.S. Bureau of Labor Statistics. (2017). Labor force characteristics by race and ethnicity. Retrieved from <https://www.bls.gov/opub/reports/race-and-ethnicity/2017/home.htm>
- U.S. Census Bureau. (2017). Population estimates July 2017. Retrieved from <https://www.census.gov/>
- U.S. Census Bureau. (2018). Population projections. Retrieved from <https://www.census.gov/programs-surveys/popproj.html>
- U.S. Department of Education Office for Civil Rights. (2014). Data snapshot: Teacher equity. Retrieved from <https://www2.ed.gov/about/offices/list/ocr/docs/crdc-teacher-equity-snapshot.pdf>
- Wallace, J. M. Jr., Goodkind, S., Wallace, C. M., & Bachman, J. G. (2008). Racial, ethnic, and gender differences in school discipline among U.S. high school students: 1991–2005. *Negro Educational Review*, 59(1–2), 47–62.