

The Social and Learning Environments Experienced by Underrepresented Minority Medical Students: A Narrative Review

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Abstract

Purpose

To review the literature on the social and learning environments experienced by underrepresented minority (URM) medical students to determine what type of interventions are needed to eliminate potential barriers to enrolling and retaining URM students.

Method

The authors searched MEDLINE, PubMed, Ovid HealthStar, and Web of Science, and the reference lists of included studies, published between January 1, 1980, and September 15, 2012. Studies of the learning and social environments and of students' satisfaction, experiences

with discrimination or unfair practices, and academic performance or progress, as well as assessments of programs or interventions to improve URM students' academic performance, were eligible for inclusion.

Results

The authors identified 28 studies (27 unique data sets) meeting the inclusion criteria. The results of the included studies indicated that URM students experienced less supportive social and less positive learning environments, were subjected to discrimination and racial harassment, and were more likely to see their race as having a negative impact on their medical school experiences

than non-URM students. Academic performance on standardized exams was worse, progress less timely, and attrition higher for URM students as well.

Conclusions

For URM students, an adverse climate may be decreasing the attractiveness of careers in medicine, impairing their academic performance, and increasing attrition. Improvements to the social and learning environments experienced by URM students are needed to make medicine a more inclusive profession. The current environment of health care reform creates an opportunity for institutions to implement strategies to achieve this goal.

Increasing minority representation in medicine has been identified as an opportunity to both improve clinical care and reduce health disparities.^{1,2} It also may improve medical training, including expanding classroom discussions,³ better preparing majority students to work in multicultural settings,^{3,4} engendering a stronger endorsement of equitable access to care from all students,⁴ and fostering students' cognitive skills.⁵ In addition, growing the ranks of underrepresented

minority (URM) physicians will improve our capacity to provide culturally and linguistically appropriate care and, in turn, will increase patient satisfaction.^{6,7} Likely, it also will increase the number of physicians who are willing to work in underserved areas and practice primary care.²

The Association of American Medical Colleges (AAMC) defined URM in 2004 as "racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population."⁸ This definition applies to African Americans, Mexican Americans, Puerto Ricans, American Indians/Alaska Natives, and Native Hawaiians and other Pacific Islanders, groups that make up more than a quarter of the U.S. population but less than 13% of students enrolled in U.S. MD degree-granting medical schools⁹ and less than 9% of practicing physicians in the United States.¹⁰⁻¹² Since the mid-1960s, when the remaining medical schools in the United States to do so were desegregated, several major national initiatives involving the AAMC, the National Institutes of Health, and other organizations have aimed to increase the enrollment and retention of URM students in medicine (e.g.,

Project 3000 by 2000).¹³ Strategies have included pipeline and academic readiness programs, associated infrastructure building, and considering race and ethnicity in admissions decisions.¹⁴ Hindered, in part, by anti-affirmative action ballot initiatives,^{1,13} the enrollment of URM students remains disproportionately low at most medical schools.¹⁵ Although current approaches are commendable, we need additional strategies to increase the enrollment and retention of URM medical students.

Few have documented attempts to improve the quality of the learning and social environments experienced by URM medical students. However, whether URM students are academically successful, find their medical school environment supportive and collegial, and experience racial discrimination may influence their attrition. These factors may also have downstream effects on recruitment if current and past URM medical students influence both the perceptions of younger students and their likelihood of applying to medical school. Finally, URM students' experiences during medical school may have an important influence on whether they

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decide to pursue a career in academic medicine—where URM physicians make up only 4% of medical school faculty.¹⁶

Leaders in academic medicine have shown a renewed interest in increasing URM enrollment in medical school and improving URM students' academic performance.¹⁷ A review of the existing research on the social and learning environments experienced by URM medical students will provide insight into whether social and academic outcomes for URM students have improved over time and what type of new interventions are needed to change the medical school environment. Reviewing a variety of outcomes, as we have done, may help to identify the most significant issues faced by URM medical students, as well as gaps in the extant literature.

Method

At this point in time, studies of the social and learning environments experienced by URM medical students are too limited and the outcomes assessed too heterogeneous to use a meta-analytic approach to summarizing the state of the research; therefore, we used a narrative approach and included studies on a variety of topics that shed light on the nature of the social and learning environments experienced by URM medical students.

Search strategy

We searched MEDLINE, PubMed, Ovid HealthStar, and Web of Science for English-language studies published in peer-reviewed journals between January 1, 1980, and August 31, 2012. We extended our search to 1980 to understand trends over time in the number of studies published on the social and learning environments and in the outcomes reported, as well as shifts in results over time.

Our final search terms were *underrepresented minorit**, *minorit**, *African-American*, *black*, *Mexican American*, *Mainland Puerto Rican*, *Native American*, *American Indians*, *Alaska Natives*, *Pacific Islanders*, *retention*, *satisfaction*, *depression*, *isolation*, *burnout*, *medical school*, *medical student*, *climate*, *prejudice*, *racism*, *medical education*, *discrimination*, *depression*, *anxiety and quality of life*, *support*, *interaction*, *learning*, *social*, *experience*,

*graduat**, *performance*, *intervention*, *program*, *United States Medical Licensing Examination (USMLE)*, *race*, *progress*, *grade*, *psychology*. We also searched the reference lists of the included studies and related reviews for potentially relevant studies.

Study selection criteria and process

We included empirical studies if (1) the data were collected in or after 1980 or, if the data collection dates were not provided, the study was published in or after 1980; (2) the study participants were current or past students in a U.S. MD or DO degree-granting undergraduate medical program; (3) observational studies were cross-sectional or longitudinal and intervention studies included comparison data (e.g., pre- and posttest or control or comparison group); (4) the sample included and identified at the time the data were collected URM participants as defined by the AAMC; and (5) quantitative results were relevant to the following topics: learning or

social environment, student satisfaction, discrimination or unfair practices, academic performance or progress, and programs or interventions to improve academic performance or the learning or social environment in medical school. In many instances, the authors identified Hispanics in their sample but did not differentiate between URM and non-URM Hispanics. In our review, we included results for Hispanics, as the vast majority of Hispanic medical students in the United States are classified as URM, and we believe that omitting these results would eliminate valuable information.

See Figure 1 for our article selection process. Our electronic database search yielded a total of 889 studies (including duplicates). On the basis of a review of the titles from the reference lists of the relevant articles, we selected an additional 48 articles to review. One author (T.S.) performed an initial review of the titles and abstracts for possible topic and study design relevance, yielding 248 potentially eligible articles. Two authors (H.O. and

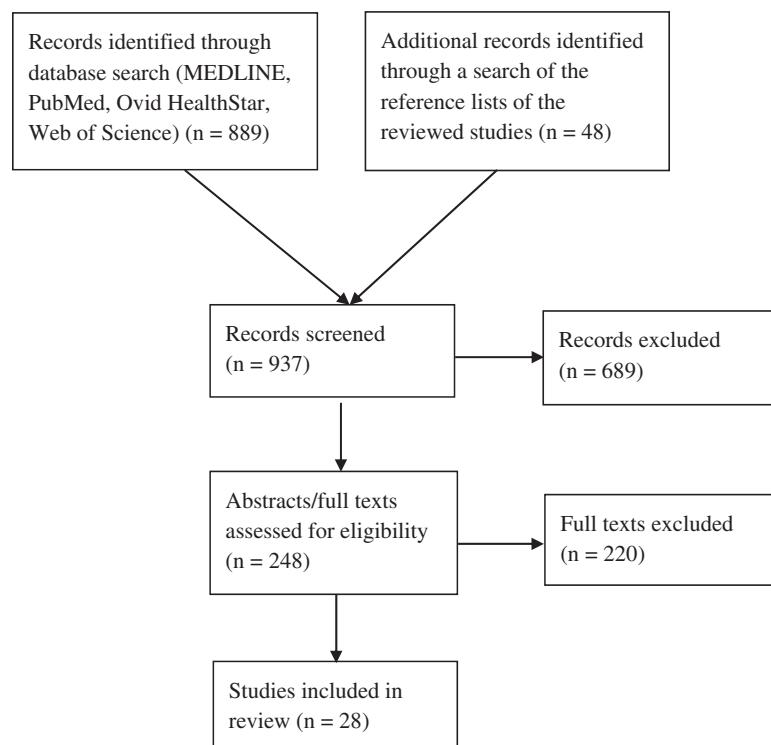


Figure 1 Flowchart of the literature search and study selection process in a review of the literature on the social and learning environments experienced by underrepresented minority medical students published between January 1, 1980, and September 15, 2012. We excluded studies (1) that were not empirical research, (2) that were not relevant to the preselected content areas of the review, (3) if the results were not stratified by underrepresented minority (URM) or by URM subgroup versus non-URM students, (4) with no basis for comparing outcomes for intervention participants, (5) if data were collected before 1980, or (6) if data were not collected in the United States.

T.S.) reviewed these titles and abstracts and, if necessary, the full-text articles to determine study eligibility. Interrater reliability was good ($\kappa = 0.73$). We resolved any discrepancies by consensus. This process yielded a total of 28 eligible articles.

Data extraction

Two authors (H.O. and T.S.) independently extracted the relevant data, including (1) the years during which the data were collected and the study design (cross-sectional versus longitudinal; observational versus intervention); (2) the type of data collected or, if an intervention, the content of the intervention; (3) the sample size, including the size of the URM subgroups; (4) the target topics addressed by the study; and (5) the results of all analyses conducted relevant to the target topics. To determine the quality of the study, we also extracted (6) whether the study incorporated data collected at a single or multiple institutions; (7) the response rate, if relevant and reported; and (8) whether tests of statistical significance were performed as part of the analyses. The same two authors (H.O. and T.S.) collected the data using a spreadsheet similar to Appendix 1 and resolved omissions and conflicts at joint meetings, during which they consulted the source articles and discussed the discrepancies. At a later date, the same two authors compared the data included in Appendix 1 against the source articles to ensure accuracy. They again discussed any inconsistencies and resolved them via consensus.

Results

See Appendix 1 for a summary of the 28 studies (27 unique data sets) that we included in our review. Of those data sets, 6 were collected from 1980 to 1989, 18 from 1990 to 1999, and 10 from 2000 to 2010 (some studies overlapped time periods). Of the included studies, 25 were observational studies and 3 were intervention studies; 14 were single-institution studies and 14 were multi-institution studies. Topics covered included the social environment (4), discrimination (4), other race-related experiences (5), the learning environment (3), academic performance (11), and academic progress (5).

Social environment

Perceptions of the social environment and social support. In three of the four studies^{18–21} that addressed differences between URM and non-URM students' perceptions of the medical school social environment and social support, African Americans reported more negative perceptions than whites. Among respondents to a 1996 national survey of fourth-year medical students, URM students were more likely than white students to report having trouble establishing both peer support networks (25.4% versus 14.5%) and good peer working relationships (12.9% versus 6.0%) ($P < .05$).¹⁸ In a survey of alumni from a single medical school, African Americans reported lower satisfaction than whites with the social environment (effect size = .89).¹⁹ In a third, single-institution, longitudinal study,²⁰ at the beginning of their first year, African Americans and Hispanics reported greater emotional and overall social support than whites ($P < .01$). However, by the beginning of their second year, African Americans reported declines in emotional, event-related, and overall support ($P < .05$); whites only experienced a drop in event-related support ($P < .005$), whereas Hispanics did not experience a significant drop in support. In the fourth study, however, Strayhorn and Frierson²¹ found that African American students enrolled at the University of North Carolina Medical School (1982–1985) reported greater overall social support than white students ($P = .0005$), including greater support from class advisors and administrators ($P < .01$).

Racial discrimination. Four studies^{22–25} reported students' experiences of racial discrimination in medical school or their perceptions of whether racial discrimination occurred at their medical school. These studies found that URM students more frequently than non-URM students experienced racial discrimination. The largest study examined responses to the 1996 AAMC Graduation Questionnaire.²² Graduates were asked whether they had experienced racial harassment, defined as being "subjected to racially/ethnically offensive remarks or names directed at the student personally." Racial harassment was reported by 1.8% of white male and 1.3% of white female respondents. In

contrast, greater percentages of African Americans (9.4% of males, 16.8% of females), Hispanics (9.6% of males, 8.0% of females), and American Indian/Alaska Natives (4.9% of males, 5.9% of females) reported racial harassment.²² In another multi-institution study from 1996, 3.0% of whites reported experiencing racial discrimination by instructors or supervisors, whereas 68.4% of African Americans and 40.0% of Hispanics reported experiencing such discrimination.²³ In a 2003 single-institution study, a greater percentage of URM students (46.7%) compared with non-URM students (21.0%) perceived that racism existed at their institution ($P < .05$). The study reported no significant differences between URM students' and non-URM students' ratings of perceiving themselves as "accepted and respected by their peers, faculty, and administration" and perceiving that the "university has achieved a positive and accepting climate for cultural differences."²⁴ However, more URM than non-URM students reported personally experiencing racial discrimination or observing racial discrimination ($P < .05$).²⁴ Students surveyed in 1998 were asked if they had encountered a "lack of sensitivity specifically related to race." The mean response for white and Hispanic students was "never" but for African American students was "rarely/sometimes."²⁵

Other race-related experiences. Five studies^{18,19,21,25,26} confirmed that URM students believed that their race had a detrimental impact on their medical school experiences. In Bright and colleagues'¹⁸ study of fourth-year students, a greater percentage of URM students (76%) than white students (30%) reported that race affected their educational experience ($P < .0001$). In the study conducted by Strayhorn and Frierson²¹, African American students reported greater stress than white students because of their minority status ($P = .001$). In a third study, African American students were the least likely to believe that the curriculum contained adequate information about diversity issues and that faculty were knowledgeable about diversity, and they were the most likely to feel that they needed to censor themselves on discussions about diversity to avoid accusations of racism.²⁵ Outcomes of indirect assessments of students' satisfaction followed a similar pattern.

African American alumni of Jefferson Medical College were less likely than white alumni to report recommending the school to African Americans, Hispanics, and American Indians ($P < .01$) and less willing to make donations to the school ($P < .05$).¹⁹ Finally, in a 1980 single-institution survey of African American medical students, respondents reported more negative perceptions of the behavior of and their interactions with white faculty and peers than with African American faculty and peers.²⁶

Learning environment

Students' satisfaction with the learning environment. In two of the three studies^{19,21,27} that evaluated students' satisfaction with their learning environment, being a URM student was associated with a lower level of satisfaction than being a white student. In a single-institution study of first-year medical students, URM students were less satisfied than white students with their overall learning environment, the timeliness of evaluations of their performances, and the responsiveness of faculty to students' concerns ($0.2 \leq d_s < 0.5$). They also were less likely to agree that students received the appropriate amount of constructive feedback and that the school was a comfortable place for men and women ($0.5 \leq d_s < 0.8$) and all races and ethnicities to learn ($d \geq 0.8$).²⁷ The study found no differences in perceptions that the school promoted critical thinking and that medical student education was a high priority for faculty.²⁷ In the study of Jefferson Medical College alumni, African Americans were less satisfied than white alumni with their time as medical students and with their interactions with faculty and administrators ($P < .01$), but they were not less satisfied with the academic environment, the preparation for their career, or their educational experiences ($P > .05$).¹⁹ In contrast, in Strayhorn and Frierson's²¹ study, African American and white students reported similar perceptions of the quality of the learning environment ($P > .08$).

Academic performance. Eleven studies^{28–38} compared the academic performance of URM and non-URM students. URM students consistently scored lower on, or were more likely to fail, standardized exams, such as the USMLE and its predecessor, the

National Board of Medical Examiners (NBME) exam.^{28,30–38} Specifically, in studies of national cohorts taking these exams in 1986–1988²⁸, 1992–1994³⁰, and 1991–1996,³¹ African American and Hispanic students scored lower than white students. Among students matriculating from 1994 to 1999, URM status was associated with 2.30 greater adjusted odds (95% confidence interval [CI] = 2.13–2.48) of not passing the USMLE Step 1 and/or Step 2 exam on the first attempt, compared with white status.³⁷ Among students matriculating from 1993 to 2000 who failed the USMLE Step 1 exam, being a URM student, compared with being a white student, was associated with lower odds of passing the Step 2 Clinical Knowledge section of the exam (odds ratio [OR] = 0.59, 95% CI = 0.51–0.70).²⁹ In two single-institution studies, URM students did not perform as well as white students on the NBME or USMLE exam.^{32,33} In the only study of Native Hawaiian and Pacific Islander students, members of this race/ethnicity graduating from 1996 to 2000 scored lower on the USMLE Step 1 exam than their classmates of other race/ethnicities, but their performance on the USMLE Step 2 exam was no different from that of several other groups, including whites.³²

Studies also showed that URM students had lower GPAs^{30,38} and scores on periodic assessments^{33–36} than non-URM students. In two of the three studies comparing clerkship performance, URM students did not perform as well as non-URM students. A 2006 study found that URM students were more likely to receive lower grades than white students in all six of the required clerkships ($P < .001$).³⁴ In the same sample, African American and Native American/Alaskan Native students reported receiving more negative comments, and African American students reported receiving fewer positive comments, than white students regarding their communication skills during clinical clerkships (no differences found between Hispanics and whites for either outcome).³⁵ In a single-institution study of third-year clerkship students between 1996 and 2000, compared with white students, African American students scored lower on both clinical evaluations and objective structured clinical examinations (OSCEs), and Hispanic students scored lower on OSCEs.³⁶ However, a study that compared the academic performance of white and

URM students who graduated between 1987 and 1991 found that although URM students had lower average scores on the family practice clerkship final exam ($P < .01$), they scored as well on the clinical and problem-solving components of the clerkship evaluation and only marginally lower on the OSCE ($P = .02$).³³

Academic progress. Five studies^{37–42} found that URM students were more likely than non-URM students to experience graduation delays and failure. According to AAMC data for medical students matriculating between 1980 and 1988, all URM groups had lower four-year graduation rates than whites.³⁹ In a 1992 study of matriculating students, URM status was associated with increased risk for experiencing withdrawal, leave of absence, dismissal, or delay of graduation, even after adjusting for MCAT score, science GPA, major, selectivity of undergraduate school, age, and gender.⁴⁰ The same study found that ultimately 18% of URM students experienced one or more of these events by the end of their fourth year, compared with 3% of non-URM students.⁴⁰ Among students matriculating between 1994 and 1999, URM students had increased odds of withdrawing or being dismissed because of both academic (OR = 2.96; 95% CI = 2.48–3.54) and nonacademic reasons (OR = 1.41; 95% CI = 1.22–1.64) compared with white students.³⁷ Following the same pattern, in the 1992 and 1993 matriculating classes at the University of Illinois at Chicago College of Medicine, URM students were more likely to withdraw before graduation than non-URM students (18.26% versus 3.25%).³⁸ Similarly, between 1993 and 1997, the attrition rate for URM students at the same institution was 16.2%, whereas the rate for non-URM students was 4.0%.⁴² Finally, URM students were disproportionately represented in decelerated programs; according to an early 2000s survey, 37.0% of students in decelerated programs were URM.⁴¹

Interventions to improve the environment experienced by URM medical students

All the studies that reported on interventions to the medical school environment to modify outcomes for URM students were aimed at improving the academic outcomes of

at-risk students; none were designed to improve the social environment or reduce racial discrimination in medical schools. Many have adopted prematriculation enrichment programs that are often required for URM students. These programs have been reviewed elsewhere,^{43,44} so we did not review them here. Three studies^{45–47} examined the impact of academic support interventions during medical school. In the first, 28 students (26 URM), who had either repeatedly failed academic course work or the USMLE Step 1 or Step 2 exam and were on academic probation, were referred to the University of Michigan Medical School's Academic Support Program between 1994 and 1998.⁴⁵ By 1998, 26 (93%) had either graduated or were progressing, and none were put on academic probation again. The intervention included support from "tutors, assistance with study skills, or accommodations in the classroom (e.g., extended time on examinations, assistance with note taking)."⁴⁵ A second study examined the impact of curriculum change on USMLE Step 1 scores.⁴⁶ In 1998, a new integrated medical curriculum was introduced at the University of Texas Medical Branch, which incorporated organ-system-based and problem-based learning, explicit preparation for the exam, and proactive remediation for at-risk students. Compared with students who matriculated between 1995 and 1997 and completed the traditional curriculum, students who matriculated between 2003 and 2005 and completed the integrated curriculum had lower failure rates and improved scores (difference of 9.7 points, $d = 0.48$). The largest difference was for URM students (difference of 11.9 points, $d = 0.64$), and, in particular, African American students (difference of 14.3 points, $d = 0.77$). In the traditional curriculum cohort, 12.9% of URM students failed Part 1, whereas in the integrated curriculum cohort, only 4.2% failed.⁴⁶ A study of a larger sample of an overlapping cohort reported similar findings.⁴⁷

Trends over time

Among the studies of the social and learning environments, discrimination, and students' satisfaction, three trends emerged. First, most studies were conducted in the 1990s. Although the most recent data were collected in 2003

at a single institution, the most recent national data were collected in 1996. Second, URM students reported negative race-related experiences regardless of the year the data were collected, including in the 2003 study (46.7% of URM versus 19.8% of non-URM students perceived racism at their institution). Although the most recent study comparing URM and non-URM students' academic achievement was conducted in 2006, most were conducted in the 1990s. All of these studies reveal a gap in achievement between URM and non-URM students. Finally, only three studies reported the results of interventions to improve the academic performance of at-risk students; the most recent data were collected in 2005.

Discussion

A limited number of studies conducted over the last three decades have examined URM students' medical school experiences. Almost unanimously, they revealed that URM students have experienced less supportive social and less positive learning environments, have been subjected to discrimination and racial harassment, and have been more likely to perceive that their race negatively affected their medical school experiences, compared with non-URM students. These findings are consistent with those of qualitative reports that deepened our understanding of ways in which students' medical school experiences are influenced by race or ethnicity. For example, in interviews conducted with URM medical students (88% black, 10% Hispanic, 2% Asian/Pacific Islander) in 2002–2003, interviewees reported being ignored by faculty, residents, and staff physicians, experiencing discrimination, being perceived as intellectually inferior, being socially isolated, and having difficulty forming study groups with non-URM students.⁴⁸ These themes of invisibility, discrimination, and being perceived as inferior echo the findings from earlier qualitative studies.^{49,50} Opportunities to address these issues may be limited by a reported lack of institutional support for diversity and barriers to reporting race-related issues.⁴⁸

Trends in studying the social and learning environments experienced by URM medical students indicate that empirical work in this area may have waned. Few data have been published on these topics

since 2000. Furthermore, after researchers identified gaps in achievement, they did not then conduct the necessary empirical work to develop evidence-based interventions and policy changes to eliminate URM students' experiences with discrimination or to close the URM/non-URM gap in academic achievement. However, within the current health care reform movement, increasing attention is being paid to the argument that a diverse medical workforce is essential for efficient, quality health care⁵¹ (by increasing access to care in underserved populations, reducing health disparities, and improving quality of care).⁵² We expect that this shift will prompt a renewed interest in institutional changes that could make medicine, and in particular, academic medicine, a more inclusive profession for minorities.

Today's adverse climate may affect URM medical students in a range of ways, including detracting from the attractiveness of medicine, and in particular, academic medicine, as a career choice, impairing academic performance, and increasing attrition. Numerous studies have shown that URM students have lower scores on standardized exams, progress more slowly, and have higher attrition rates than non-URM students. Without a doubt, these academic performance issues faced by URM medical students stem, in part, from racial/ethnic inequities in the quality of K–12 and undergraduate education; however, they also may be influenced by a negative medical school climate. For example, discrimination by instructors, supervisors, and peers^{22,23} and social isolation^{18,19} may reduce URM students' opportunities for forming study groups with classmates and finding mentors. Strong evidence shows that the salience of racial/ethnic identity in combination with concerns about being perceived as less competent because of one's race/ethnicity undermine performance, a phenomenon called stereotype threat.⁵³ In Steele and Aronson's⁵³ original study, they randomly assigned African American and white students to complete items similar to those on the Graduate Record Exam after being told that the test was either a diagnostic of their verbal abilities or a measure of their problem-solving strategies. Both groups performed equally when they were told that the task was a measure of their problem-solving strategies, but African

Americans performed worse when they were told that the task was a diagnostic of their verbal abilities.⁵³ Since then, over 300 hundred studies have demonstrated that when people are concerned about confirming a negative stereotype about a group with which they identify, their performance is impaired, not only on exams but also on tasks critical to the learning process, such as note taking.⁵⁴

Strengths

Given that our health care system is currently undergoing systemic change, our review of the research on the social and learning environments experienced by URM medical students is timely, and it provides a basis for planning future research and interventions. From our review, we learned three key things. First, the number of studies conducted on this and related topics has waned over the past 15 years; thus, the literature must be updated. We need additional research to identify the social and learning challenges faced by URM medical students today. Second, almost no research has been conducted on the program, curriculum, and policy changes that will help institutions reduce the negative race-related experiences of URM students and improve their academic outcomes. Although the descriptions of three single-institution diversity interventions^{55–57} included in the recent theme issue of *Academic Medicine* on diversity and inclusion¹⁷ help to close this gap, the need still exists to test programs and policies across multiple institutions. Third, the outcomes studied to date have been limited, for the most part, to single-item measures of discrimination, social support, or satisfaction, or to standardized test scores. Future efforts might explore the different ways that students experience unfair treatment and the conditions that make unfair treatment permissible, as well as adopt research questions that align with the ultimate goal of improving health care quality. As Niu and colleagues⁵⁸ asked in a recent study, these questions might include the following: Are medical students prepared to deliver culturally competent care? Do medical students intend to practice in underserved areas? Do URM students intend to enter academic medicine?

Limitations

An inherent limitation of any review is the difficulty associated with

summarizing studies that are diverse in their design and quality and that report a wide range of outcomes. As few studies have addressed the social and learning environments experienced by URM medical students, we could not focus only on the highest-quality, multi-institution studies or on the studies that reported a narrow range of outcomes. We attempted to provide enough information about each study in Appendix 1 (number of institutions and participants involved, response rate, whether tests of significance/effect size were performed) so that readers could evaluate it on their own. Given the heterogeneity of topics addressed by the studies, we did not perform a meta-analysis. A second limitation was our inability to draw conclusions based on the extant data about what processes contribute to URM students' experiences of discrimination or social and academic isolation and the consequences of these experiences for their retention and career choices. Much work is needed to develop an understanding of, and standard ways of assessing, the institutional, interpersonal, and psychological processes that underlie the outcomes reported in the literature. A third limitation was our inability to report on the very current experiences of URM medical students. The most recent studies of the social environment and the academic performance/progress of URM students were conducted in 2003 and 2006, respectively. Given the slow pace of cultural change in academic medicine,⁵⁹ we expect that the issues reported in the studies included in this review persist today; however, a large-scale study that includes a detailed analysis of students' experiences and beliefs, which underlie students' perceptions of discrimination or lower satisfaction, and their implications for students' academic performance, progress, and career choice is warranted. This important step could galvanize support for using resources and promoting policy initiatives to address any problems in the social and learning environments that contribute to URM students' academic failure, attrition, and reluctance to enter academic medicine. Another limitation is that we did not attempt to find and review unpublished studies, which, because of the bias toward publishing studies yielding statistically significant differences, would be more likely to have found small or null effects. Thus, if null effects have been reported in unpublished studies, we did not include

them in our analysis. Finally, we analyzed the outcomes of interventions to improve the social and learning environments experienced by URM medical students. The published literature includes few descriptions of attempts to improve the academic success of URM medical students and none, to our knowledge, to improve the social environment experienced by URM medical students. This dearth of studies may be due, in part, to researchers' concerns about the ethics of randomizing students to experimental conditions as well as to a lack of awareness of and funding directed toward, in particular, the problem of unfair treatment of medical students. Leaders at medical schools also may be wary of such initiatives because they may have experienced unexpected resistance and challenges to previous efforts to resolve racial dynamics.⁶⁰

Conclusions

The underrepresentation of some racial/ethnic groups in medicine is rooted in a history of segregated and unequal medical education as well as in the barriers to professional advancement, some of which continue in academic medicine today.⁶¹ A socioeconomic/political system in which racial/ethnic minorities receive lower-quality education at every level, and a culture in which institutional and interpersonal racial discrimination remains a reality. Yet, progress is not impossible, and medical schools can become better places for minorities to learn and work.^{62–64} In addition to the continued support for pipeline programs that increase the number of URM students entering medical school, our health care system would benefit from programs and policies that foster an institutional culture that is intolerant of the inequitable and disrespectful treatment of minorities, promotes an open dialogue about diversity and cultural sensitivity, and ensures support and mentoring to all students. The recent discussion in *Academic Medicine* about novel ways to increase diversity in medicine¹⁷ identified the need for a greater financial and administrative commitment from institutions to a strategic plan for recruiting and retaining minorities,⁵⁷ the incorporation of diversity into institutions' core missions, and the monitoring and self-evaluation of the current culture to promote change over

time.⁶⁵ Although our findings indicate that change is needed to make medicine an inclusive profession for minorities, the current environment of health care reform creates an opportunity for institutions to implement these strategies.

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Appendix 1

Characteristics of the 28 Studies of the Social and Learning Environments Experienced by Underrepresented Minority (URM) Medical Students, Identified in a Review of the Literature Published Between January 1, 1980, and September 15, 2012*

First author, year of publication	Year(s) of data	Study design	Study sample	Topics	Results	MI	IR	Sig test
Observational studies								
Bright, 1998 ¹⁸	1996	Cross-sectional self-report survey	564; analyses included 437 fourth-year students (366 white, 43 African American [AA], 26 Hispanic, 2 Native American) on the 1996 AMSA mailing list	<ul style="list-style-type: none"> Social environment Race-related experiences 	<ul style="list-style-type: none"> More URMs than whites reported trouble establishing peer support networks, good peer working relationships ($P < .05$) 76% of URMs versus 30% of whites reported that race affected their educational experience ($P < .0001$) 	Yes	28%	Yes
Gantland, 2003 ¹⁹	2003 [†]	Cross-sectional self-report survey	4 white, 87 AA graduates of Jefferson Medical College	<ul style="list-style-type: none"> Social environment Race-related experiences Learning environment 	<ul style="list-style-type: none"> AAs less satisfied than whites with social environment, time as medical student, interactions with faculty and administrators ($P < .01$) AAs less likely than whites to report recommending the school to AAs, Hispanics, and American Indians ($P < .01$) AAs less willing than whites to make donations to school ($P < .05$) No differences in satisfaction with academic environment, preparation for career, or regards for educational experiences in medical school ($P > .05$) 	No	61%	Yes
Pysko, 1990 ²⁰	1987–1988	Longitudinal self-report survey; assessments in the fall of first and second years	126 students (90 white, 19 AA, 17 Hispanic) at a state medical college	Social environment	<ul style="list-style-type: none"> AAs and Hispanics entered with higher emotional and overall social support than whites ($P < .01$); AAs experienced drop in emotional and event-related social support ($P < .05$) and whites in event-related support ($P < .005$) Hispanics did not experience a drop in any dimension of support (reciprocity, availability, instrumental, emotional, event-related, overall) 	No	78%	Yes
Strayhorn, 1989 ²¹	1982–1985	Cross-sectional data from a longitudinal self-report survey; assessments at the beginning and end of the first year	442 first-year students (392 white, 50 AA) at the University of North Carolina School of Medicine	<ul style="list-style-type: none"> Social environment Race-related experiences Learning environment 	<ul style="list-style-type: none"> AAs reported greater overall social support ($P = .0005$) and social support from class advisors and administrators ($P < .01$) than whites AAs reported greater stress due to their minority status than whites ($P = .0001$) AAs and whites had similar perceptions of learning environment ($P > .08$) 	No	69%	Yes
Kashebaum, 1996 ²²	1996	Cross-sectional analysis of items included in AAMC Medical School Graduation Questionnaire	13,168; analyses included 10,686 graduates (9,087 white, 783 AA, 741 Hispanic, 75 American Indian/Alaska Native) from the 125 medical schools affiliated with the AAMC	Discrimination	<ul style="list-style-type: none"> For whites, AAs, Hispanics, American Indian/Alaska Natives, respectively, the percentages of males reporting racial harassment were 1.8%, 9.4%, 9.6%, and 4.9%; percentages of females were 1.3%, 16.8%, 8.0%, and 5.9% 	Yes	83%	No

(Appendix continues)

Appendix 1, continued

First author, year of publication	Year(s) of data	Study design	Study sample	Topics	Results	MI	RR	Sig test
Mangus, 1998 ²³	1996	Cross-sectional self-report survey	548; analyses included 440 graduating students (401 white, 19 AA, 20 Hispanic) at 8 medical schools in four regions (according to AAMC's geographic categorization)	Discrimination	3.0% of whites, 68.4% of AAs, and 40.0% of Hispanics reported experiencing racial discrimination	Yes	55%	Yes
Hung, 2007 ²⁴	2003	Cross-sectional self-report survey	216 students (201 non-URM, 15 URM) attending a Pacific Northwest medical school	Discrimination	<ul style="list-style-type: none"> More URMs (46.7%) than non-URMs (19.8%) perceived racism at their university ($P < .05$) No significant differences with respect to beliefs that students are "accepted and respected by their peers, faculty, and administration," and "university has achieved a positive and accepting climate for cultural differences" between URMs and whites, although percentages were 10–16 points lower for URMs than non-URMs 	No	54%	Yes
Elam, 2001 ²⁵	1998	Cross-sectional self-report survey	349 ^a students attending 4 Southeastern medical schools	<ul style="list-style-type: none"> Discrimination Race-related experiences 	Whites and Hispanics, on average, responded that they "never" encountered lack of sensitivity related to race; AAs responded "rarely" sometimes	Yes	74%	No
Frierson, 1987 ²⁶	1980	Cross-sectional self-report survey	76 AA students attending 4 North Carolina medical schools	Race-related experiences	Respondents reported more negative interactions with white than AA faculty and peers	Yes	65%	No
Robins, 1997 ²⁷	1992–1995	Cross-sectional self-report survey	430; analyses included 313 first-year students (239 whites, 74 URM) at the University of Michigan	Learning environment	<ul style="list-style-type: none"> URMs less satisfied than whites with: overall learning environment, timely evaluations of students' performances, responsiveness of faculty to students' concerns, ($0.2 \leq ds < 0.5$) URMs less likely to agree that students received appropriate amount of constructive feedback and school is a comfortable place for both men and women to learn ($0.5 \leq ds < 0.8$) URMs less likely than whites to agree that school is comfortable place for all races and ethnicities to learn ($d \geq 0.8$) 	No	90%	Yes
Dawson, 1994 ²⁸	1986–1988	Cross-sectional analysis of records from NBME and AAMC	10,403; analyses included 9,433 students (8,517 white, 548 AA, 368 Hispanic) who took the June administration of Part I for the first time in 1988 and who were 2 years from graduation	Academic performance (NBME)	<ul style="list-style-type: none"> AAs (107 points lower, where $1 SD = 100$) and Hispanics (52 points lower) scored lower on NBME Part I than whites Pass rates for NBME Part 1 were 88%, 49%, and 66% for whites, AAs, and Hispanics respectively 	Yes	NA ^b	No

(Appendix continues)

Appendix 1, continued

First author, year of publication	Year(s) of data	Study design	Study sample	Topics	Results	MI	IR	Sig test
Andriole, 2012 ²⁹	1993–2001	Longitudinal analysis of records from students matriculating 1993–2000 at U.S. medical schools accredited by the LCME who failed the USMLE Step 1	6,594 students (2,444 white, 952 Asian/Pacific Islander, 3,198 URM) at U.S. medical schools accredited by the LCME who failed the USMLE Step 1	Academic performance (USMLE)	• URMs had lower odds than whites of passing USMLE Step 2 Clinical Knowledge (OR = 0.59; 95% CI = 0.51–0.70) • No difference in odds of attempting Step 2	Yes	NA	Yes
Koenig, 1998 ³⁰	1992–1994	Longitudinal analysis of exam scores	11,219; (8,142 white, 667 AA and 279 Hispanic) medical students who took Step 1 in June 1994	Academic performance (USMLE)	AAs and Hispanics had lower scores than whites on USMLE Step 1 and lower year 1 and 2 GPAs	Yes	NA	No
Case, 1996 ³¹	1991–1996	Longitudinal analysis of USMLE records	14,725; analyses included 11,710 students (10,290 white, 865 AA, 555 Hispanic)	Academic performance (USMLE)	• Step 1 pass rates by expected graduation date for whites, AAs, and Hispanics were 98.6%, 87.6%, and 92.3%, respectively • Step 2 pass rates by expected graduation date for whites, AAs, and Hispanics were 93.8%, 70.6%, and 82.5%, respectively	Yes	NA	No
Kasuya, 2003 ³²	1996–2000	Longitudinal analysis of student records from graduating classes 1996–2000	258 students (40 Hawaiian/Pacific Islander, 218 other) graduating from the University of Hawai'i School of Medicine	Academic performance (USMLE)	• Hawaiian/Pacific Islanders performed worse than other groups on USMLE Step 1 but not Step 2	No	NA	Yes
Campos- Outcalt, 1994 ³³	1987–1991	Longitudinal study of grade and exam records	410 graduates (368 non-URM, 8 AA, 28 Hispanic, 6 Native American) of the University of Arizona College of Medicine	Academic performance (clerkships, OSCE)	URMs had lower GPA, lower NBME Part I and II exam scores than non-URMs ($P < .01$) but family practice clerkship clinical evaluations and 7/12 OSCE scores were equivalent	No	NA	Yes
Lee, 2007 ³⁴	2006	Cross-sectional self-report survey; students were contacted through NMSA database and school deans of all US MD-degree granting medical schools	2,395; analyses included 1,633 students (1,368 white, 265 URM) attending 105 medical schools	Academic performance (clerkships)	URMs received lower grades in 6 required clerkships ($P < .001$)	Yes	— ¹	Yes
Lee, 2009 ³⁵	2006	Cross-sectional self-report survey; same dataset as Lee, 2007 ³⁴	2,395; analyses included 1,620 students (1,357 white, 115 AA, 116 Hispanic, 32 Native American/Alaska Native) who completed at least one required clinical clerkship	Academic performance	• AAs reported receiving fewer positive comments than whites regarding their communication skills during clinical clerkships	Yes	— ¹	Yes
Renequiz, 2002 ³⁶	1996–2000	Analysis of exam records and faculty clinical evaluations	650; analyses included 425 students (321 white, 45 AA and 59 Hispanic) at UMDNJ-New Jersey Medical School who rotated through a medicine clerkship	Academic performance (clerkships)	• AAs had lower mean test scores than whites on clinical evaluations, OSCE, and NBME • Hispanics had lower mean test scores than whites on NBME	No	NA	Yes

(Appendix continues)

Appendix 1, continued

First author, year of publication	Year(s) of data	Study design	Study sample	Topics	Results	MI	RR	Sig test
Andriole, 2010 ³⁷	1994–1999	Longitudinal analysis of AAMC Student Record System and Matriculating Student Questionnaire data	84,018 students (55,514 white, 12,505 URM) matriculating between 1994–1999 to US medical schools accredited by the LCME	• Academic performance (USMLE) • Academic progress	• Being a URM was associated with 2.30 (95% CI, 2.13–2.48) greater adjusted odds of not passing the USMLE Step 1 and/or Step 2 on the first attempt compared with whites • URMs had increased odds of withdrawing or being dismissed due to both academic (OR = 2.96; 95% CI, 2.48–3.54) and nonacademic reasons (OR = 1.41; 95% CI 1.22–1.64) compared with whites	Yes	NA	Yes
Tekian, 1998 ³⁸	1992–1993	Cross-sectional study of two cohorts	350; analyses included 350 first-year students (246 non-URM, 104 URM) at the University of Illinois at Chicago College of Medicine	• Academic performance (GPA) • Academic progress	• URMs had lower GPAs than non-URMs • Withdrawal rate for URMs was higher than non-URMs (18.26% versus 3.25%)	No	NA	No
Kasebaum, 1994 ³⁹	1980–1988	Cross-sectional study of multiple cohorts	All students matriculating between 1976–1988; only results for 1980 and after included here	Academic progress	URMs had lower four-year graduation rates than whites	Yes	NA	No
Huff, 1999 ⁴⁰	1992	Longitudinal study of exam and graduation records	13,118 [#] ; 81% of the entering class of 1992 at 126 MD degree-granting medical schools accredited by the LCME	Academic progress	18% of URMs experienced withdrawal, leave of absence, dismissal, or delay of graduation, compared with 3% of non-URMs	Yes	NA	No
McGrath, 2004 ⁴¹	2004 ^t	Cross-sectional self-report survey sent to the academic officers of all US MD-degree granting medical schools	77 medical schools	Academic progress	URMs disproportionately represented in decelerated programs (37% of students)	Yes	62%	No
Tekian, 1998 ⁴²	1993–1997	Cross-sectional study of multiple cohorts	957; 895 graduates (729 non-URM, 166 URM) and 62 withdrawals (30 non-URM, 32 URM) from the University of Illinois at Chicago College of Medicine	Academic progress	Attrition rate for URMs was 16.2% compared with 4.0% for non-URMs	No	NA	No
Interventions								
Segal, 1999 ⁴⁵	1994–1998	Intervention: academic support including tutors, accommodations, referrals to medical or psychiatric services if warranted	28 students (4 non-URM, 24 URM) who were referred to the University of Michigan Medical School's Academic Support Program due to failing USMLE Step 1 or 2 or academic probation	Academic progress	By 1998, 93% had either graduated or were continuing to progress; none were put on academic probation again	No	NA	No

(Appendix continues)

Appendix 1, continued

First author, year of publication	Year(s) of data	Study design	Study sample	Topics	Results	MI	RR	Sig test
Lieberman, 2008 ⁴⁶	1995–1997, 2003–2005	Intervention: switch from traditional to integrated curriculum that incorporated system- and problem-based learning, exam preparation, remediation for at-risk students	255 students (74 non-URM, 181 URM) at the University of Texas Medical Branch	Academic performance	<ul style="list-style-type: none"> • Improvement in Step 1 scores greatest among URMs (+ 11.9 points, $d = 0.64$), in particular AAs (+ 14.3 points, $d = 0.77$) • Decrease in Part I failure (12.9% to 4.2%) for URMs 	No	NA	Yes
Lieberman, 2010 ⁴⁷	1995–1997, 2003–2005	Intervention; same dataset as Lieberman, 2008 ⁴⁶	1,114 students (771 non-URM, 329 URM) at the University of Texas Medical Branch	Academic performance	<ul style="list-style-type: none"> • Improvement in Step 1 scores greatest among URMs (+ 14.6 points, $d = 0.74$), in particular AAs (+ 20.8 points, $d = 1.12$) • Decrease in Part I failure (16.6% to 3.9%) for URMs 	No	NA	Yes

* MI indicates multi-institution study; RR, response rate; sig test, all differences or effects were tested for statistical significance or effect size; AMSA, American Medical Student Association; AAMC, Association of American Medical Colleges; NBME, National Board of Medical Examiners; LCME, Liaison Committee on Medical Education; JSMLE, United States Medical Licensing Examination; OSCCE, objective structured clinical examination; NMSA, National Medical Student Association; SD, standard deviation; OR, odds ratio; CI, confidence interval.

[†]Data collection dates not provided, therefore, publication date included instead.

[§]Breakdown of number of respondents by race not provided.

[¶]Not applicable (NA) indicates that data were extracted from student records.

^{||}Response rate was not reported and could not be calculated.