Medical Education Original Article

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The relationship between required physician letters of recommendation and decreasing diversity in osteopathic medical school admissions

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Abstract

Context: Some racial and ethnic groups are underrepresented in the medical field because they face unique barriers to admission to medical school. One admission requirement that can present a barrier for applicants is the physician letter of recommendation (PLOR). Undergraduate students report confusion with the application process and lack of mentorship to be two of their biggest challenges to becoming a doctor. It is especially challenging to those who already have limited access to practicing physicians. Therefore, we hypothesized that in the presence of a PLOR requirement, the diversity of students who apply and matriculate into medical school will be decreased.

Objectives: This study aims to determine if a relationship exists between a PLOR requirement for the medical school application and the proportion of underrepresented in medicine (URM) students applying and matriculating to that school.

Methods: A retrospective study was conducted utilizing data published by the American Association of Colleges of Osteopathic Medicine Application Services (AACOMAS) on the race and ethnicity of applicants and matriculants to osteopathic medical schools during the years 2009–2019. In total, 35 osteopathic schools with 44 campuses were included in the study. Schools were grouped based on whether they required a PLOR. For each group of schools, descriptive statistics were performed for the following variables: number of total applicants, class size, application rate per ethnicity, matriculation rate per ethnicity, number of applicants per ethnicity, number of matriculants per ethnicity, and percentage of student body per ethnicity. The Wilcoxon rank-sum test was utilized to detect differences between the two groups. Statistical significance was assessed at the α=0.05 level.

Results: Schools that required a PLOR showed decreases in the number of applicants across all races and ethnicities. Black students showed the greatest difference between groups and were the only ethnicity to show significant reductions across all outcomes in the presence of a PLOR requirement. On average, schools that required a PLOR have 37.3% (185 vs. 295; $p<0.0001$) fewer Black applicants and 51.2% (4 vs. 8.2; $p<0.0001$) fewer Black matriculants.

Conclusions: This study strongly suggests a relationship between requiring a PLOR's and decreasing racial and ethnic diversity in medical school matriculants, specifically the Black applicants. Based on this result, it is recommended that the requirement of a PLOR be discontinued for osteopathic medical schools.

Keyword: diversity; letter of recommendation; medical education; medical school admissions.

Underrepresented in medicine (URM) are those ethnic groups that are underrepresented in the medical field relative to their numbers in the entire population [1]. Despite efforts by medical schools and government agencies to increase the number of URM students entering the medical profession, the percentage of medical students who belong to a URM group has not improved significantly in nearly a half century [2]. According to the US Census, individuals who are URM make up 34.1% of the country's population [3]. However, if we look at colleges of osteopathic medicine (COMs), URM students comprised only 11.1% of matriculants in 2020 [4]. The number of self-identifying Black students

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enrolling that same year was 3.3% [4] compared to 13.6% of the US population that is Black [3]. Similarly, the percentage of self-identifying Hispanic medical students, 7.6% [4], does not approximate their population percentage of 18.9% [3].

Equity in medical school admission is important because a racially and ethnically diverse student body is a critical element in educating physicians to meet the needs of a diverse society [5]. One study showed that White students who attended schools that are within the highest quintile for student body racial and ethnic diversity, measured by the proportion of URM students, were more likely to rate themselves as highly prepared to care for minority populations than those in the lowest diversity quintile (61.1% vs. 53.9%, respectively; $p<0.001$; adjusted odds ratio [OR], 1.33; 95% confidence interval [CI], 1.13–1.57) [6]. The same study also showed that URM students were substantially more likely than white or nonwhite/non-URM students to plan to serve the underserved (48.7% vs. 18.8% vs. 16.2%, respectively; $p<0.001$) [6].

URM students face unique barriers to admission to medical school due to social determinants: lack of financial resources [7–9], educational disparities [8, 10], and lack of mentorship [10–13]. In addition, many more are excluded by the application process itself: implicit bias [14], emphasis of Medical College Admission Test (MCAT) scores [10, 12, 15, 16], lack of URM faculty [12, 13], and extensive application requirements [10, 12]. Similar to the barriers presented in the literature, one requirement that may present a barrier for applicants, therefore warranting further study, is the physician letter of recommendation (PLOR). In general, letters of recommendation (LORs) are written to communicate information about an individual to an institution [17]. They communicate an applicant's potential for success and emphasize qualities not highlighted elsewhere in an application [17]. Medical schools utilize shadowing experience and PLORs to gauge an applicant's interest in medicine and to be sure that an applicant understands the career path on which they are about to embark [18]. PLOR requirements became common practice for osteopathic medical schools because they wanted to ensure that their applicants understood the principals of their profession and how their profession differs from allopathic medicine [18]. However, there is a growing body of evidence to support the idea that LORs have limited value to admission committees [19]. One study that retrospectively analyzed three consecutive graduating classes (2007–2009) of the Uniformed Services University of the Health Sciences (USU) in Bethesda, Maryland analyzed 437 letters based on 76 LOR characteristics and found that very few LOR characteristics predict how students perform during medical school [20].

A review of the literature suggests that subjective narrative LORs can act as a conduit of racism, sexism, and bias into the admissions process [19, 21, 22], and many studies have concluded that traditional narrative LORs are written in prose utilizing highly subjective terminology with poor inter-rater reliability when interpreted [23, 24]. Furthermore, opportunities to receive PLORs are not equal because opportunities to shadow are not ubiquitous [25]. Many hospital systems do not allow premedical student shadowing because HIPAA restricts access to protected health information to only those directly involved in healthcare operations activities [26]. According to a survey sent to all matriculated medical students at the Philadelphia College of Osteopathic Medicine (PCOM) and PCOM-Georgia for the 2017/2018 school year, a small number of students, 12.7% (43 out of 339) reported challenges with meeting this requirement, reporting that they had difficulty finding Doctor of Osteopathic Medicine (DO) physicians to shadow [25]. "The requirement to shadow and obtain a letter from a DO physician is a well-intended mechanism to expose premedical students to osteopathic medicine, but the requirement may be a barrier to some students who are unable to find shadowing experiences before medical school" [25].

Students who may not have a personal relationship with a physician as a part of their family, faith community, neighborhood association, or school parent-teacher organization, for example, have little choice but to rely on shadowing to secure a PLOR. URM applicants especially will have less access to a PLOR because the fewer number of practicing URM physicians means that there are fewer physicians who are connected to this population of people outside of work. Literature is currently lacking on the impact of the PLOR on a student's ability to apply to medical school and its outcome on medical school admission demographics. The authors hypothesized that students from rural, low-income, or minority backgrounds will apply and matriculate in fewer numbers to schools that require a PLOR.

Methods

This research was determined exempt by the Edward Via College of Osteopathic Medicine Institutional Review Board.

A retrospective study was conducted utilizing data published by the American Association of Colleges of Osteopathic Medicine Application Service (AACOMAS) on the race and ethnicity of applicants and matriculants to COMs during the years 2009–2019. The study date range was May 2009 to August 2019. The AACOMAS survey allowed students to self-identify in predefined racial categories. URM students were sorted into the following four racial/ethnic groups by the AACOMAS: (1) Hispanic (Hispanic/Latino); (2) Black or African American;

(3) Indigenous (American Indian or Alaskan Native); and (4) Islander (Native Hawaiian or Other Pacific Islander). Non-URM students refers to those who selected either White, Asian, Unknown, or more than one race/ethnicity. Students self-selected their race/ethnicity utilizing the following method: "The race and ethnicity questions on the AACOMAS application ask applicants to mark all that apply. For this report, race/ethnicity was examined utilizing both: (1) single-category response, where a single race/ethnicity is counted for each applicant, applicants listing more than one race are reported as Multiple Races, and any applicant who marked Hispanic/Latino is counted as being of Hispanic/Latino ethnicity, effectively superseding any other race selection(s) s/he may have made; and (2) multiple-category response, where each applicant is counted for every race/ethnicity the applicant reported, which may result in the applicant being counted multiple times" [4].

In total, 35 osteopathic schools with 44 campuses were included in the study. There are 37 COMs total; however, two schools were not included in this analysis because they are not included in the AACOMAS database. Based on the application requirements stated on each school's unique website, schools were grouped based on whether they required a PLOR or not. Twenty-nine schools with 36 campuses required a PLOR, whereas only six schools with eight campuses did not.

Descriptive statistics were performed on the group means for the following outcomes: number of total applicants, number of matriculants, application rate per ethnicity (defined as number of applicants of an race or ethnicity/total number of applicants), matriculation rate per rate or ethnicity (defined as number matriculants of a race or ethnicity/number of applicants of that race or ethnicity), number of applicants per race or ethnicity, number of matriculants per race or ethnicity, and percentage of matriculants per race or ethnicity (defined as number of matriculants of a race or ethnicity/total matriculants). Ultimately, the racial/ethnic diversity of a medical school's admissions process was measured by the percentage of applicants and the percentage of matriculants to that program. The best way to conceptualize a difference in diversity between groups separated by PLOR requirement is by observing changes in percentage of applicants and matriculants.

Comparative analysis was utilized to assess differences between the two groups of institutions. To account for the uneven group size, the Wilcoxon rank-sum test was utilized to determine the significance of the differences between the group means. This test is utilized to compare two nonparametric and independent sample populations. A p value of less than 0.05 was considered significant, 95% CIs were calculated, and overlapping intervals were considered insignificant values.

Results

On average, schools that require a PLOR have 22.1% fewer total applicants (4,164 vs. 5,345; p<0.0001) and have 15.8% smaller class sizes (176 vs. 209; p<0.0001) (Table 1). When considering only the group of URM students, all means trended toward decreased diversity in the presence of a PLOR requirement. However, the p values only indicate statistically significant decreases in total number of applicants (24.6%, 528.6 vs. 701.5, p<0.0001) and matriculants (17.6%, 15.4 vs. 18.7, p<0.0001) of URM students to schools that require PLORs (Table 1). The group of non-URM students showed similarly significant decreases only in total number of applicants (21.7%, 3635.8 vs. 4643.8, p<0.0001) and matriculants (17.3%, 160.4 vs. 193.9, p<0.001) in the presence of a PLOR requirement (Table 1).

Looking at each race individually, the group of Islander students did not have a large enough sample size to produce a statically significant difference in their prevalence between the groups of schools (Table 1). As a result, no conclusions were drawn about this group.

Indigenous students made up a greater percentage of the total applicants to schools that require a PLOR (0.4 vs. 0.3%; p<0.027). No other results for this group were significant.

Black students were the only ethnicity to show a significant decrease across all measured outcomes: application percentage (4.4 vs. 5.5%; p<0.0001), matriculation rate (2.2 vs. 2.8%; p=0.002), number of applicants (37.3%, 185 vs. 295; p<0.0001), number of matriculants (51.2%, 4 vs. 8.2; p<0.0001), and most notably a 47.7% decrease in the percentage of the class comprised by Black students was observed in schools that require a PLOR (2.3 vs. 4.4%; p<0.0001). These numbers are graphically displayed in Figure 1.

In contrast to Black students, when focusing on the Hispanic students, they represented a greater percentage of applicants and greater matriculant rate to schools that do require a PLOR (Table 1). In each case, there is less than a 1% difference between the groups, and although p values indicated statistical significance, the 95% CIs overlap by a very slim margin.

Discussion

The results of this study indicate that a relationship exists between a medical school requiring a PLOR and the percentage of URMs matriculating. It also provides evidence to suggest that obtaining a PLOR is a barrier for medical school applicants of any background. This study adds to the literature by illustrating an association between PLORs and decreasing diversity in medical school matriculants.

While we did see a large impact on Black applicants, the results indicate that the Hispanic population was not as impacted by the PLOR requirement. The term "Hispanic" includes both those of European descent and those of South American descent. Because it is an ethnicity and not a race [27], it could not accurately be compared to the other populations of students in this study. The authors recommend that organizations make more of an effort to distinguish South American Hispanic from European Hispanic to more intentionally target the community of people who are most disenfranchised.

Table 1: This table contains averages of matriculation, application, and rates of acceptance of various demographic groups at osteopathic medical schools. The averages are separated by schools that require a PLOR and schools that do not require one.

Variable	Does not require PLOR		Requires PLOR		p-Value
	Mean	(95% CI)	Mean	(95% CI)	
Number of matriculants					
Total	**208.7**	(194.3–227.0)	**175.8**	(168.0–183.5)	**<0.0001**
Hispanic	10.0	(8.9–11.1)	10.5	(9.5–11.5)	0.175
Black	**8.2**	(6.8–9.5)	**4.0**	(3.6–4.5)	**<0.0001**
Indigenous	0.47	(0.30–0.64)	0.75	(0.58–0.92)	0.216
Islander	0.12	(0.06–0.19)	0.17	(0.11–0.19)	0.642
URM	**18.7**	(16.8–20.7)	**15.4**	(14.1–16.7)	**<0.0001**
Non-URM	**193.9**	(175.8–208.1)	**160.4**	(153.1–167.6)	**0.001**
Percentage of matriculants					
Hispanic	5.3%	(4.60–6.00)	6.0%	(5.51–6.52	0.249
Black	**4.4%**	(3.32–4.41)	**2.3%**	(2.05–2.55)	**<0.0001**
Indigenous	0.2%	(0.14–0.27)	0.6%	(0.41–0.76)	0.077
Islander	0.1%	(0.02–0.08)	0.1%	(0.07–0.12)	0.486
URM	9.9%	(8.75–11.13)	9.0%	(7.34–9.65)	0.101
Non-URM	90.1%	(88.9–87.8)	91.0%	(90.3–91.7)	0.101
Number of applicants					
Total	**5,345.3**	(4,960.0–5,730.7)	**4,164.5**	(4,012.5–4,316.4)	**<0.0001**
Hispanic	**384.4**	(344.7–424.1)	**321.7**	(305–338.4)	**0.021**
Black	**295.1**	(265–325.3)	**185.5**	(174.8–196.2)	**<0.0001**
Indigenous	15.7	(13.7–17.7)	15.9	(14.6–17.1)	0.760
Islander	6.2	(5.5–6.9)	5.5	(5.1–5.8)	0.082
URM	**701.5**	(634.2–768.9)	**528.6**	(502.8–554.4)	**<0.0001**
Non-URM	**4,643.8**	(4,246.0–4,932.7)	**3,635.8**	(3,504.6–3,767)	**<0.0001**
Percentage of applicants					
Hispanic	**7.0%**	**(6.6–7.4)**	**7.6%**	**(7.3–7.8)**	**0.006**
Black	**5.5%**	(5.1–6.0)	**4.4%**	(4.3–4.6)	**<0.0001**
Indigenous	**0.3%**	(0.28–0.37)	**0.4%**	(0.40–0.49)	**0.027**
Islander	0.1%	(0.11–0.13)	0.1%	(0.13–0.14)	0.075
URM	13.0%	(12.2–13.7)	12.5%	(12.2–12.9)	0.575
Non-URM	87.0%	(86.3–87.8)	87.4%	(87.1–87.8)	0.575
Matriculation rate					
Total	**4.1%**	(3.8–4.4)	**4.4%**	(4.2–4.6)	**0.028**
Hispanic	**2.8%**	**(2.5–3.1)**	**3.3%**	**(3.1–3.5)**	**0.029**
Black	**2.8%**	(2.4–3.4)	**2.2%**	(1.9–2.4)	**0.002**
Indigenous	3.2%	(1.9–4.6)	3.7%	(3.0–4.4)	0.232
Islander	2.0%	(0.8–3.2)	2.6%	(1.8–3.5)	0.624
URM	2.8%	(2.6–3.1)	3.0%	(2.8–3.2)	0.816
Non-URM	**4.2%**	(3.9–4.6)	**4.6%**	(4.4–4.8)	**0.023**

CI, confidence interval; PLOR, physician letter of recommendation; URM, underrepresented in medicine. The values that are bolded are those that represent statistically significant results.

Although requiring a PLOR is very common practice among osteopathic medical schools, with 81.8% (36 out of 44) requiring it, it is rare among allopathic schools, with 3.9% (6 out of 154) requiring a PLOR. Allopathic medical schools only require LORs from a student's undergraduate institution and strongly recommend a clinical letter but do not require it. According to the Association of American Medical Colleges (AAMC), allopathic schools matriculated 14.6% URM students in the year 2020 [28], compared to 11.1% URM students at osteopathic schools [4]. They also

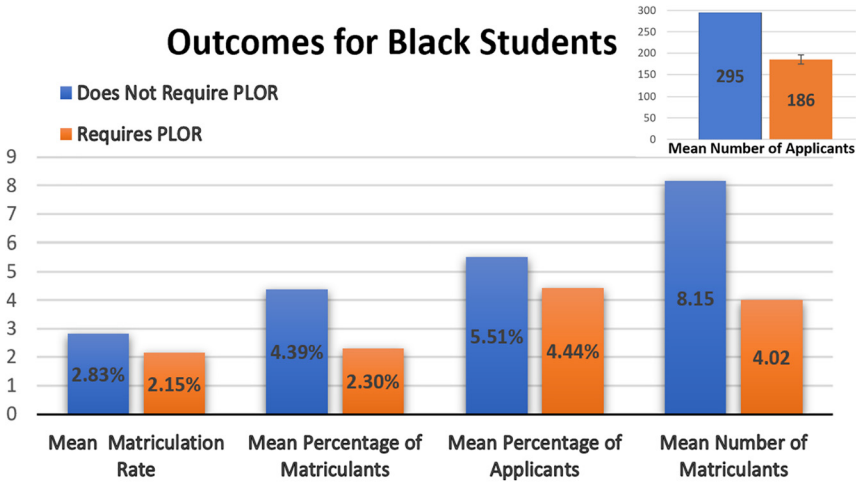

Figure 1: This figure displays all of the measured outcomes of this study for Black students. It shows a decrease in matriculation rate, the percent of matriculants, the percent of applicants, the number of matriculants, and the number of applicants of Black students at schools requiring a PLOR. A p value <0.05 for all outcomes.

had more than double the percentage of Black matriculants (7.6 vs. 3.3%) [4, 28].

Difficulty getting a PLOR can be a consequence of or reflective of the already-recognized barriers that URM students confront. An effort to increase racial/ethnic diversity in medical students requires us to make changes to some of the current processes and procedures to ensure equitable opportunity for all students. Current interventions have focused on unconscious bias training for interviewers [14, 29], holistic review of applicants [12, 15, 29], peer-to-peer mentoring [22], creating pipeline/enrichment programs [10–12], and increasing minority faculty [12, 29]. The results of our study indicate that reconsidering a required PLOR may add additional benefit to this effort.

Removal of a PLOR requirement would come at little cost to the quality of the osteopathic admissions process and could help to further diversify their applicant pool. Increasing diversity among the medical student population is essential to building a physician population that is more representative of the population of the United States [3]. Furthermore, evidence has indicated that diversity improves the accuracy of clinical decision making, leading to higher patient satisfaction and resulting in improved health outcomes [30].

An important limitation is that the data did not include the number of students that were accepted to a given school but did not matriculate to that school because they were also accepted to another school. This gap in knowledge can easily be overcome in the future collaboration and input from each COM. Additional confounding factors that were not controlled for and should also be considered when interpreting the results of this study include school location, location demographics, scholarship awards, and mission statement that might influence a student's decision to attend.

Location of a school and the demographics of that area is of interest because all six of the schools that did not require a PLOR are located on the eastern half of the United States [31]. They are located in the top eight states when ranked by percentage of practicing DO physicians [32]. Given the results of our study, this correlates to schools in states with more DOs having a higher percentage of URM applicants. This can be interpreted as supporting our hypothesis that access to physicians encourages more applications to medical school but could also be seen as a confounding factor. Future research is needed to assess the effects of geography on URM applications to a medical school with respect to PLOR requirements.

For a further example of the effects of location, there is a much higher population density of Native Americans in the Western and Midwestern states than in the eastern half of the United States (Arizona, Oklahoma, New Mexico) [33]. If one assumes that indigenous students applied to schools in their region more so than those further away, then it is possible that this would inadvertently increase the percentage of Indigenous applicants to schools that require PLORs. A future study could take a closer look at this phenomenon.

Furthermore, state-funded osteopathic medical schools often must meet quotas that require a certain percentage of their class size to be filled by students who reside in that state. Schools often have a mission to increase the number of physicians who practice in their state. Therefore, the demographics of a state may impact the demographics of their matriculants.

Finally, another important confounding factor that was not controlled for and should be considered when interpreting the results of this study is that some schools are more attractive to URM students because they offer scholarship awards specifically for them.

Conclusions

To the best of our knowledge, this is the first study to explore the impact of the required PLOR on diversity in medical schools. Future research should continue to explore this topic through the assessment of accepted and recently graduated students' application experiences, specifically how students obtain their PLOR, barriers if any to obtaining the letter, the duration of shadowing experiences, and more individual demographic data. A study of this methodology will help us to evaluate PLORs as a barrier for students grouped by factors such as socioeconomic status and the location of their hometown, not just their URM status.

Additionally, examining the diversity of osteopathic medical school applicants following the COVID-19 pandemic will help us understand the influence of the required PLOR. Due to the pandemic, some medical schools waived the requirement of a PLOR because shadowing opportunities were severely limited due to many hospitals not allowing shadowing as a measure to slow the spread of the virus.

The data from this research is a crucial first step in helping to guide medical school admissions departments regarding the impact of the PLOR. It suggests that the PLOR requirement is an additional barrier for students entering medical school, one that disproportionally affects Black students. Based on this result, it is recommended that the PLOR requirement for application to osteopathic medical schools be discontinued, pending research that shows otherwise or until access to physicians is equally ubiquitous

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