

This Medical Education theme issue introduces a new collaboration between the *JAOA* and the American Association of Colleges of Osteopathic Medicine (AACOM) to recruit, peer review, edit, and distribute articles through the *JAOA* on osteopathic medical education research and other scholarly issues related to medical education.

## **JAOA and AACOM**

### Program Characteristics Influencing Allopathic Students' Residency Selection

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**Context:** Medical students must consider many overt variables when entering the National Resident Matching Program. However, changes with the single graduate medical education accreditation system have caused a gap in knowledge about more subtle considerations, including what, if any, influence the presence of osteopathic physician (ie, DO) and international medical graduate (IMG) house officers has on allopathic students' residency program preferences. Program directors and selection committee members may assume students' implicit bias without substantiating evidence.

**Objective:** To reexamine which program characteristics affect US-trained allopathic medical students' residency selection, and to determine whether the presence of DO and IMG house officers affects the program choices of allopathic medical students.

**Methods:** Fourth-year medical students from 4 allopathic medical schools completed an online survey. The Pearson  $\chi^2$  statistic was used to compare demographic and program-specific traits that influence ranking decisions and to determine whether school type (private vs public), valuing a residency program's prestige, or interest in a competitive specialty dictated results. Qualitative data were analyzed using the Pandit variation of the Glaser and Strauss constant comparison.

**Results:** Surveys were completed by 323 of 577 students (56%). Students from private vs public institutions were more likely to value a program's prestige (160 [93%] vs 99 [72%];  $P < .001$ ) and research opportunities (114 [66%] vs 57 [42%];  $P < .001$ ), and they were less likely to consider their prospects of being accepted (98 [57%] vs 111 [81%];  $P < .001$ ). A total of 33 (10%) and 52 (16%) students reported that the presence of DO or IMG trainees, respectively, would influence their final residency selection, and these percentages were largely unchanged among students interested in programs' prestige or in entering a competitive specialty. Open-ended comments were generally optimistic about diversification of the physician workforce, and 4 of the 709 student comments expressed cynicism or hostility to the presence of DOs or IMGs.

**Conclusion:** Both overt and subtle variables influence students' perceptions of residency programs in the United States, but the presence of DO and IMG house officers seems relevant to a small percentage of them.

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In the 1970s and 1980s, several authors<sup>1-5</sup> examined factors influencing medical students' residency selection in the United States and found that personal impressions of a program, geographic location, and educational opportunities held the greatest sway. A 1990 poll by Simmonds et al<sup>6</sup> yielded similar conclusions and was the first to describe statistically significant differences in responses from students entering surgical vs nonsurgical specialties. In 2004, Nuthalapaty et al<sup>7</sup> surveyed all fourth-year medical students in the United States and documented a clear prioritization of quality of life concerns over educational and instructional ones. In 2005, Aagaard et al<sup>8</sup> explored female and underrepresented minority applicants' interest in a diverse and inclusive training environment.

Although the literature<sup>1-8</sup> is relatively robust, several distinct limitations must be noted. First, all investigators but Nuthalapaty et al<sup>7</sup> surveyed narrow respondent pools by recruiting respondents enrolled at a single institution, entering a specific field, or applying to highly competitive training programs. Second, although each of these studies was questionnaire-based, none allowed for open-ended answers, so qualitative analyses of students' preferences were not performed.

Unique considerations have now arisen with the single graduate medical education accreditation system. As all medical school graduates will compete for the same residency training slots, we must understand allopathic medical (ie, MD) students' perceptions of the presence of osteopathic physician (ie, DO) and international medical graduate (IMG) house officers in prospective training programs and, in this way, better inform program directors on the selection of applicants for their programs. Program directors must consider that DOs have near-identical training to US-trained MDs with an additional focus on musculoskeletal pathology and that IMGs completed undergraduate medical education outside of the United States.

The National Resident Matching Program (NRMP) places fourth-year medical students with residency pro-

grams in the United States. Medical students apply to training programs, interview with schools, and submit their rank list of programs to the NRMP. Similarly, residency program selection committees review applications, conduct interviews, and send a rank list of candidates to the NRMP.

Our colleagues have expressed concerns that some residency programs may be reluctant to interview or rank DO and IMG applicants. An estimated 450 US medical school graduates will not find a residency position in 2015,<sup>9</sup> and we believe some program directors may be concerned that matching IMGs may lead to repercussions from residency review committees<sup>10,11</sup> or may feel obligated to rank MDs ahead of DO and IMG applicants. Additionally, we have found that a lingering yet less well substantiated concern exists that DO and IMG house officers may leave a negative impression on MD applicants. In 1996, Riley et al<sup>12</sup> published a study that addressed this issue. Allopathic medical students who were trained in the United States were asked to rate and rank profiles of 5 hypothetical residency programs.<sup>12</sup> Although very low (3%) and very high (90%) percentages of IMG trainees were associated with improvements and reductions, respectively, in ratings and rankings, mid-range percentages (26%, 35%, and 44%) had no statistical effect.<sup>12</sup> No such study of MD students' perceptions of DO house officers has been undertaken to date, to our knowledge.

In our experience, some program directors have been hesitant to match DO and IMG applicants, but several trends in graduate medical education may fuel their recruitment. First, MD and DO training programs will be held to the same core standards through the single graduate medical education accreditation system.<sup>13</sup> Further, both osteopathic and international medical schools tend to focus on generalist practice, so their graduates are more likely than US-trained MDs to enter primary care fields.<sup>14,15</sup> With a steady and widely embraced emphasis on training physicians to meet workforce shortages in primary care, applicants eager to

enter “first-line” specialties, such as family medicine, internal medicine, and pediatrics, may become more attractive to residency programs.

The present study had 2 main goals. The first was to offer an updated and inclusive understanding of factors influencing fourth-year medical students’ residency selection. The second was to determine whether the presence of DO and IMG house officers influenced MD applicants’ perceptions of prospective programs.

## Methods

In this nonexperimental study, we used a cross-sectional design and a convenience sampling of fourth-year medical students at 4 MD schools. After obtaining institutional review board approval from each participating institution, we surveyed all fourth-year medical students from 2 higher-ranked private institutions (Boston University School of Medicine in Massachusetts and Northwestern University Feinberg School of Medicine in Chicago, Illinois) and 2 mid-ranked public institutions (University of Nevada School of Medicine in Reno and University of Louisville School of Medicine in Kentucky). These 4 schools were selected to maximize geographic diversity among students and to represent a spectrum of academic competitiveness. After e-mailing each institution’s fourth-year class an initial invitation to participate, we used the Dillman approach and sent 2 reminder e-mails to increase the response rate.<sup>16</sup>

The online survey was an original instrument and comprised 12 questions on a 5-point Likert scale with 1 indicating strongly disagree and 5 indicating strongly agree; 1 multiple choice question on factors influencing match selection; 9 demographic questions; and 2 open-ended (qualitative) questions. The face validity of the instrument relied on existing knowledge based on the literature and expert observation and comments from the research team, several of whom authored a recent study about the concerns and attitudes of senior medical students.<sup>17</sup> For example, the team anticipated differ-

ences in future residents’ interest in research, in clinical opportunity, and in lifestyles associated with geographic locations.

Descriptive statistics included demographics, Likert scale, and program-specific traits that influence match selection. Data examination of the 4 schools on match selection factors showed similarities between the higher-ranked private institutions and the mid-ranked public institutions; therefore, we categorized the schools into 2 groups. We used the Pearson  $\chi^2$  statistic and the independent samples *t* test to assess the association of demographics and the program-specific traits that influence match selection with school category. Then we used the  $\chi^2$  test of linear trend to assess whether a linear association existed between the program-specific traits that influence match selection and students’ self-reported class rank. Next, we used the Pearson  $\chi^2$  to assess the association of responses of students who expressed agreement that the prestige of a residency program would influence its position on their final rank list (+PRESTIGE) with those who expressed disagreement or a neutral response (–PRESTIGE), and of students attempting to enter competitive vs noncompetitive specialties. Competitive specialties were considered those without enough available positions to accommodate all graduating US medical students who would like to match into them, and noncompetitive specialties were considered those with an excess of available positions.<sup>18</sup> Similarly, we grouped the other Likert scale items into agreement or disagreement categories and used the  $\chi^2$  test for trend to assess for associations between these responses and the estimated percentage of DO and internationally trained physician faculty provided by students. The data are expressed as frequencies and percentages for all analyses. SPSS version 22 (IBM) was used to analyze the quantitative data, and all *P* values were 2-tailed, with statistical significance set at *P*<.05.

We analyzed qualitative data using the Pandit variation of the Glaser and Strauss constant comparison, and

3 of the researchers (K.H.M., A.U., and C.K.M.) independently read and coded, collaborated on preliminary coding, then independently recoded each entry using Microsoft Excel 2013 (Microsoft Corporation) before coming to consensus on the common themes.<sup>19</sup> We then calculated the frequency of themes by linguistic position (ie, mentioned first [A list] or second [B list] in the comment). The frequency of themes was then compared with quantitative outcomes to support conclusions.

## Results

A total of 323 of 577 fourth-year students at participating institutions completed the survey, and the response rate was similar across all schools (49%, 64%, 43%, and 56%), with an overall response rate of 56%. No notable difference in sex was identified between private and public institutions. Of 323 students from private and public institutions, 213 (69.0%) self-identified as white non-Hispanic, and 180 students (58.2%) reported they were ranked in the top halves of their graduating classes (*Table 1*). Surveyed students had widely varying educational debt burdens. Students from public institutions were significantly more likely than those from private institutions to be white (108 students [81%] vs 105 students [63%], respectively;  $P=.015$ ). Further, students from public institutions had lower mean (SD) debt (\$141,512 [\$115,508]) than those from private institutions (\$171,839 [\$74,998];  $t_{281}=2.71$ ;  $P=.007$ ). Likewise, those from public institutions reported that lower percentages of their medical school faculty were DOs or internationally trained physicians.

Fourteen of 172 students in private institutions (8%) and 29 of 137 students in public institutions (21%) did not agree that DOs or IMGs are as capable in clinical teaching as US-trained MDs, but 96 (30%) viewed their training as being as rigorous as MD training in the United States. A total of 296 students (92%) had not considered applying to non-US schools. In addition, 199 students (59%) characterized their medical schools

as ethnically diverse, and 180 (56%) indicated that a residency program's diversity positively influences its prestige (*Table 2*).

When asked to rate program-specific traits that would influence their residency selection, 297 students (92%) were most interested in geographic location; 269 (83%), academic prestige and reputation; 264 (82%), proximity to family; and 255 (79%), clinical training offerings (*Table 3*). Thirty-three students (10%) were concerned with the presence of DOs, and 52 students (16%) were concerned with the presence of IMGs. No notable association was found between self-reported class rank and program-specific traits that influence match selection; however, students from private institutions were significantly more likely than those from public institutions to value a program's prestige and reputation (160 [93%] vs 99 [72%];  $P<.001$ ) and research opportunities (114 [66%] vs 57 [42%];  $P<.001$ ), and they were less likely to consider their prospects of being accepted (98 [57%] vs 111 [81%];  $P<.001$ ) (*Table 3*). Those who were specifically interested in programs' prestige were significantly more concerned with potential research opportunities than those specifically interested in programs' prestige (141 [65%] vs 35 [33%];  $P<.001$ ) (*Table 3*).

Class rank did not substantially alter these percentages, but having received a public education and focusing on a residency program's prestige did. Students from private institutions were significantly less likely than those from public institutions to be swayed by the presence of IMG house officers (20 [12%] vs 29 [21%];  $P=.02$ ) (*Table 3*), and those interested in a program's prestige and reputation were significantly influenced by the presence of DO house officers (28 [13%] vs 5 [5%];  $P=.02$ ) (*Table 3*). Of 52 students, 39 (75%) intending to apply to competitive specialties expressed particular interest in research opportunities but were neither more nor less likely than those entering noncompetitive fields to be dissuaded by the presence of DO or IMG house officers (*Table 4*).

**Table 1.**  
**Demographic Information and Perceptions of Surveyed Students by Institution Type (N=323)<sup>a</sup>**

Characteristic	No. (%)		P Value <sup>b</sup>
	Private Institution	Public Institution	
<b>Sex</b>	<b>(n=170)</b>	<b>(n=134)</b>	
Female	82 (48)	67 (50)	.760
<b>Race or Ethnicity</b>	<b>(n=168)</b>	<b>(n=133)</b>	
Black	7 (4)	4 (3)	
White (non-Hispanic)	105 (63)	108 (81)	
Hispanic	7 (4)	2 (2)	.015
Asian	19 (11)	8 (6)	
Middle Eastern or Indian subcontinent	16 (10)	8 (6)	
Mixed ethnicity	14 (8)	3 (2)	
<b>Did you receive your bachelor's degree in the United States?</b>	<b>(n=172)</b>	<b>(n=137)</b>	
Yes	168 (98)	137 (100)	.132
<b>Class Rank</b>	<b>(n=133)</b>	<b>(n=101)</b>	
Top quartile	61 (46)	52 (51)	
Second quartile	37 (28)	30 (30)	.347
Third quartile	24 (18)	16 (16)	
Fourth quartile	11 (8)	3 (3)	
<b>Approximately what percentage of clinical instructors (ie, residents, fellows, faculty) at your medical school are international medical graduates?</b>	<b>(n=145)</b>	<b>(n=110)</b>	
≤5%	61 (42)	17 (15)	
6%-10%	47 (32)	33 (30)	
11%-15%	26 (18)	31 (28)	<.001
16%-20%	9 (6)	13 (12)	
>20%	2 (1)	16 (15)	
<b>Approximately what percentage of clinical instructors (ie, residents, fellows, faculty) at your medical school are osteopathic physicians?</b>	<b>(n=144)</b>	<b>(n=114)</b>	
≤5%	93 (65)	39 (34)	
6%-10%	40 (28)	43 (38)	
11%-15%	10 (7)	24 (21)	<.001
16%-20%	0	7 (6)	
>20%	1 (1)	1 (1)	

<sup>a</sup> Fourteen students did not identify which institution they attended and thus were omitted from this table. Not all respondents completed each survey item.

<sup>b</sup> P value reflects Pearson  $\chi^2$ .

**Table 2.**  
**Descriptive Statistics of Likert Scale Questions and Factors That Influence Match Selection (N=323)**

Statements	n <sup>b</sup>	Survey Responses, No. (%) <sup>a</sup>			Score, Mean (SD)
		Strongly Disagree/ Disagree	Neutral	Agree/ Strongly Agree	
Osteopathic physicians are as capable at clinical teaching as allopathic physicians.	322	23 (7)	67 (21)	232 (72)	3.84 (0.85)
I understand the differences between the allopathic and osteopathic approaches to medicine.	323	42 (13)	51 (16)	230 (71)	3.71 (0.90)
I believe there are major differences between the US approach to medicine and the international approach.	321	23 (7)	93 (29)	205 (64)	3.70 (0.79)
The diversity of a residency program has a positive impact on its prestige.	322	48 (15)	94 (29)	180 (56)	3.53 (0.95)
The prestige of a residency program will impact its position on my final rank list.	322	61 (19)	45 (14)	216 (67)	3.53 (1.00)
I consider my medical school to be ethnically diverse.	322	70 (22)	62 (19)	190 (59)	3.53 (1.06)
International medical graduate physicians are as capable at clinical teaching as US-trained physicians.	322	67 (21)	105 (32)	150 (47)	3.31 (0.97)
Rural residency programs are as rigorous as urban programs.	322	112 (35)	120 (37)	90 (28)	2.92 (0.96)
Osteopathic training is as rigorous as allopathic training.	322	126 (39)	100 (31)	96 (30)	2.88 (1.01)
Training at foreign medical schools is as rigorous as in the United States.	320	121 (38)	128 (40)	71 (22)	2.82 (0.90)
When applying to medical school, I considered both allopathic and osteopathic programs.	323	280 (87)	6 (2)	37 (11)	1.75 (1.02)
When applying to medical school, I considered both foreign and US medical programs.	322	296 (92)	9 (3)	17 (5)	1.48 (0.84)

<sup>a</sup> The survey comprised 12 questions on a 5-point Likert scale with scores defined by responses as follows: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; and 5, strongly agree.

<sup>b</sup> Fourteen students did not provide the institution they attended; thus frequency and percentages of program-specific traits with type of school are based on n=309. Moreover, 1 student did not respond to the question related to prestige of residency programs.

The  $\chi^2$  test of linear trend assessed the association between the Likert scale items (dichotomized into agreement or disagreement categories) with student estimates of the percentage of DO clinical instructors at their medical school. Students from medical schools with larger estimated percentages of DO faculty were more likely to believe that DOs are as capable at clinical teaching as are MDs ( $\leq 5\%$  of instructors, 69%; 6%-10% of instructors, 68%; 11%-15% of instructors, 91%;  $\geq 16\%$  of instructors, 89%;  $P=.025$ ) and that DO training is as rigorous as MD training ( $\leq 5\%$  of instructors, 22%; 6%-10% of instructors, 37%; 11%-15% of instructors, 47%;  $\geq 16\%$  of instructors, 33%;  $P<.005$ ).

Qualitative results confirmed our quantitative data, revealed evidence of sophisticated decision-making by students, and offered several insights into students' opinions about physician workforce diversification. When students were asked which characteristics were most important about the residency programs into which they hoped to match, 71 of 246 comments (28.8%) on the A list (ie, mentioned first) focused on location, 34 (13.8%) stressed quality of training, and 23 (10%) emphasized the importance of collegiality, prestige, clinical volume and case mix, and issues related to personal relationships. Four B-list responses appeared with near-equal frequency (between 13% and 14%),

**Table 3.**  
**Program-Specific Traits That Influence Match Selection by Institution Type and Prestige of Residency Program<sup>a</sup>**

Characteristics	School			P Value <sup>c</sup>	The prestige and reputation of a residency program will affect its position on my final rank list		
	Overall (N=323) <sup>b</sup>	Public (n=137)	Private (n=172)		-Prestige (n=106)	+Prestige (n=216)	P Value <sup>c</sup>
Geographic location (ie, lifestyle choices)	297 (92)	130 (95)	153 (89)	.062	101 (95)	196 (91)	.152
Residency program's prestige and reputation	269 (83)	99 (72)	160 (93)	<.001	58 (55)	210 (97)	<.001
Geographic location (near family or significant other)	264 (82)	111 (81)	140 (81)	.933	92 (87)	171 (79)	.096
Unique clinical experience	255 (79)	102 (74)	141 (82)	.109	87 (82)	167 (77)	.325
Likelihood of being accepted	219 (68)	111 (81)	98 (57)	<.001	81 (76)	137 (63)	.019
Research opportunities	176 (54)	57 (42)	114 (66)	<.001	35 (33)	141 (65)	<.001
Affiliated medical school's prestige and reputation	148 (46)	53 (39)	91 (53)	.013	21 (20)	127 (59)	<.001
Annual stipend	70 (22)	37 (27)	31 (18)	.058	23 (22)	47 (22)	.990
Presence of IMGs in a given program	52 (16)	29 (21)	20 (12)	.023	13 (12)	39 (18)	.184
Presence of DOs in a given program	33 (10)	18 (13)	14 (8)	.152	5 (5)	28 (13)	.022

<sup>a</sup> Data are given as No. (%) unless otherwise indicated.

<sup>b</sup> Fourteen students did not respond to what institution they attended, hence the sample size of students for private and public schools is n=309. Frequency and percentages of program specific traits with type of school are based on n=309. Moreover, 1 student did not respond to the question related to prestige and reputation of residency programs.

<sup>c</sup> P value reflects Pearson  $\chi^2$ .

**Abbreviations:** DOs, osteopathic physicians; IMGs, international medical graduates.

including location, quality of training, prestige and reputation, and presence of a collegial atmosphere. Fifteen comments (7%) focused on long-term career planning and preparation for fellowship training, but students also offered less prevalent but well-articulated comments about the availability of research opportunities and the importance of teaching and mentoring (*Figure 1*).

When questioned about the potential impact of physician workforce diversification, students re-

vealed an awareness of increased potential for communication and empathy (95 [51.3%] on the A list vs 23 [29.4%] on the B list) and an enrichment of health care teams (13 [16.6%] of B-list responses) but also the prospect of cultural conflicts (14 [29%] on the B list), diminution of physicians' skills, and increased competition for training spots. Not all categories of responses appeared on both the A and B lists (*Figure 2*).



**Table 4.**  
**Factors of Finalizing Residency Rank by Residency Program Competitiveness<sup>a</sup>**

Factors	Residency Program		P Value
	Competitive (n=52)	Noncompetitive (n=252)	
Geographic location (ie, lifestyle choices)	47 (90)	231 (92)	.786
Residency program's prestige and reputation	44 (85)	209 (83)	.768
Geographic location (near family or significant other)	40 (77)	207 (82)	.380
Unique clinical experience	41 (79)	201 (80)	.881
Likelihood of being accepted	32 (62)	175 (69)	.265
Research opportunities	39 (75)	124 (49)	.001
Affiliated medical school's prestige and reputation	23 (44)	117 (46)	.772
Annual stipend	8 (15)	60 (24)	.184
Presence of IMGs in a given program	4 (8)	44 (17)	.079
Presence of DOs in a given program	5 (10)	26 (10)	.879

<sup>a</sup> Data are given as No. (%) unless otherwise indicated.

**Abbreviations:** DOs, osteopathic physicians; IMGs, international medical graduates.

## Discussion

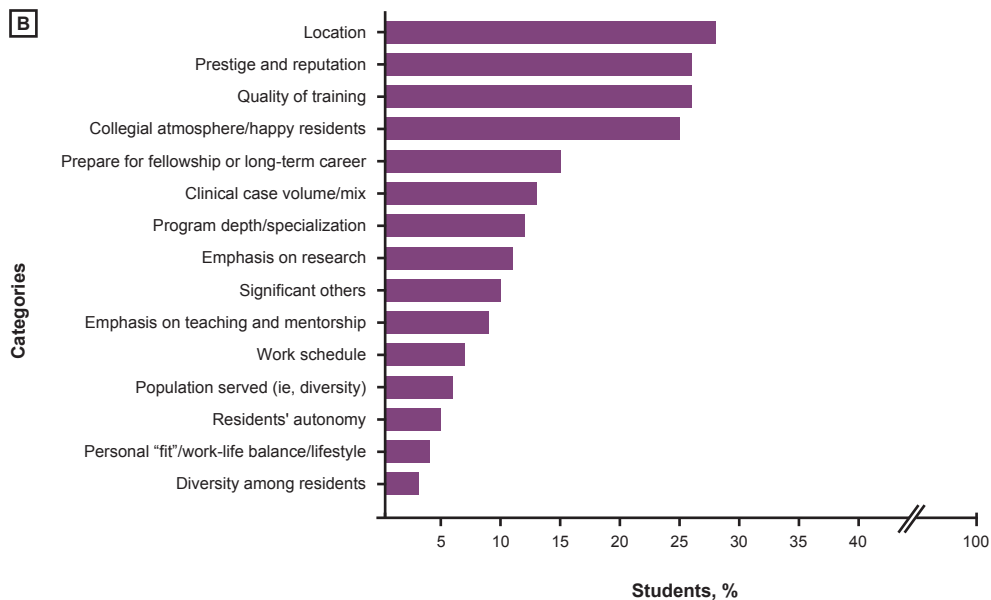
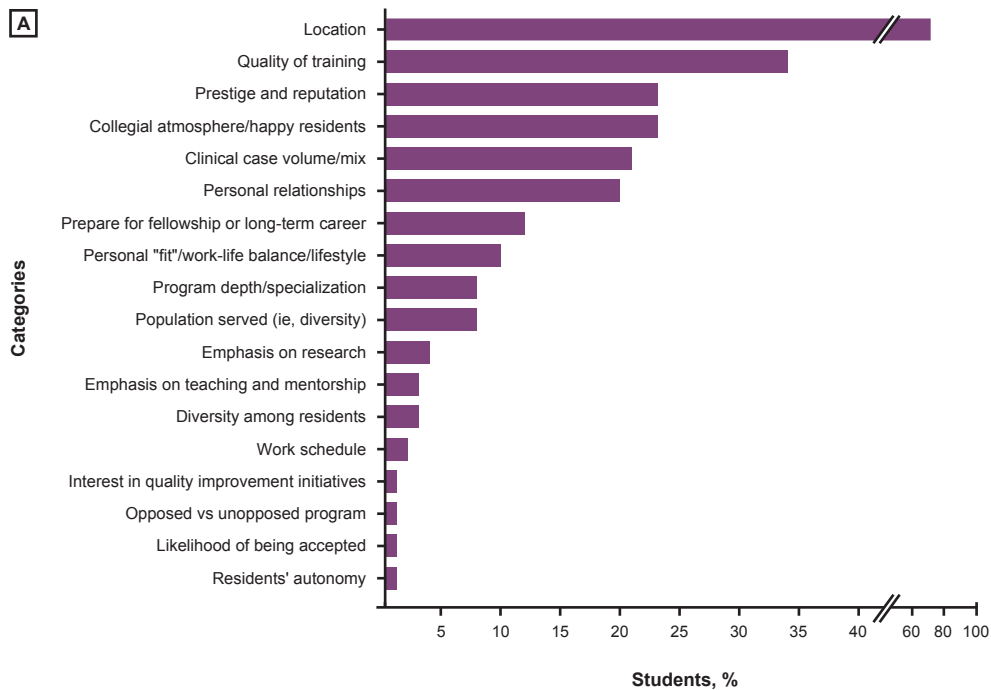
In the present study, we sought to reexamine which factors influence MD students' selection of residency program and to determine whether that selection was in any way affected by the presence of DO or IMG house officers. Although our data indicated that students are most interested in geographic location, prestige, proximity to family, and availability of unique clinical experiences—outcomes similar to those from other investigations of medical student match preferences<sup>8,20</sup>—they also yielded several novel insights.

Students from private institutions had accumulated less debt, possibly because private schools can generally offer higher scholarships, and were more interested in research possibilities during their residency. These issues were not the focus of the present study, but they do highlight some essential differences between private and public student populations.

First, our most notable finding is that fourth-year MD students are largely uninfluenced by the presence of DO and IMG physicians in evaluating prospective residency programs. In our entire pool, comparatively few students reported that the presence of DOs would influence their residency selection and that they would be influenced by the presence of IMGs. These low percentages were maintained across all subgroup analyses.

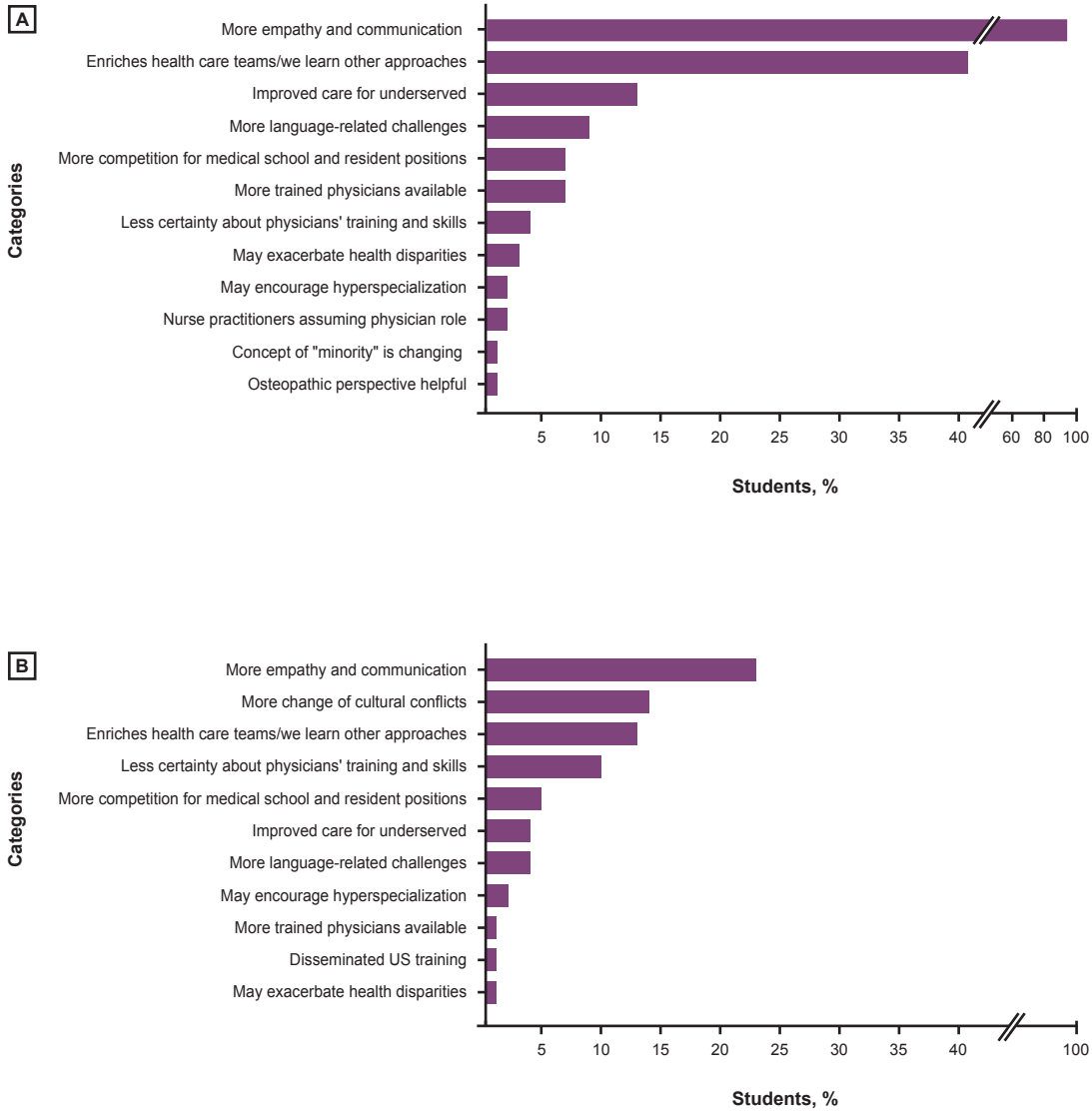
Some literature<sup>10,11</sup> has suggested that program directors and selection committees at many US academic institutions and more prestigious training programs have historically been concerned that accepting DOs and IMGs would lead to reputational decline and decreased applicant interest. Our data, however, show that students are far more interested in geographic and family considerations and in training and academic opportunities than with their prospective peers' educational roots. Leaders in graduate medical education are called to adopt a more





**Figure 1.**

Students were asked which characteristics were most important about the residency programs into which they hoped to match. Their answers were categorized into the A list (ie, mentioned first) or the B list (ie, mentioned second). In total, 246 students responses were in the A list, and 200 in the B list.



**Figure 2.**

Students were asked about the potential impact of physician workforce diversification. Their answers were categorized into the A list (ie, mentioned first) or the B list (ie, mentioned second). In total, 185 student responses were in the A list, and 78 in the B list.

inclusive stance during the resident selection process and to reconsider how they review and rank applications from DO and IMG students.

A second important insight is that although most of our students perceived DO and international medical training as less rigorous than MD training in the United States, fewer respondents believed that DOs and IMGs are less capable at clinical teaching than their US-trained MD colleagues. These perceptions held for students from all 4 participating medical schools and during all subgroup analyses, including when interest in a residency program's prestige and competitiveness was examined. Although fourth-year medical students may believe that osteopathic and international medical training are less complete than MD training in the United States, they respect the contributions of DOs and IMGs to academic medical practice and value their instruction. Calabrese et al<sup>21</sup> found that DO students retain empathy skills longer into the education process than MD students, and perhaps this humanistic quality in this population is modeled from their osteopathic medical school instructors.

A third finding is that individual student characteristics may lead applicants to view residency selection and medical practice in subtly different ways. Students from the 2 private and more highly ranked medical schools were substantially more likely to consider a program's prestige and availability of research opportunities compared with students from the less highly-ranked public institutions. They were also less concerned with their expected annual stipends and whether or not prospective programs had IMG house officers. It is not clear whether students with certain values are attracted to more prestigious medical schools, or whether having been educated at such institutions instills in them more traditional "academic" principles such as interest in scientific investigation. Perhaps mere exposure to DO faculty dispels students' potential concerns over differences in clinical training and leads them to view DO and IMG colleagues in a

more welcoming light. Students who agreed that a prospective residency program's prestige will influence their selection were less likely to have considered applying to osteopathic or international medical schools, to believe that rural residency programs are as rigorous as urban programs, and to deem DO training as rigorous as MD training. Our analyses indicated that fourth-year medical students hold a diversity of beliefs and that single priorities or concerns may indicate and help shape deeper philosophical differences.

Our qualitative data revealed evidence regarding students' efforts to balance academic opportunities with family and lifestyle considerations and also a posture that is largely welcoming to diversity in the physician workforce. The majority of students viewed health care professional diversity in a positive light and believed that it enhances empathy, communication, and the ability to care for underserved populations. Smaller percentages viewed diversity negatively and worried that it would lead to conflict, diminution of physicians' skills, and less availability of training positions. Of the 709 student comments we analyzed, 4 expressed overt cynicism or hostility to the presence of DOs or IMGs in the physician workforce. Perhaps an undergraduate emphasis on team-based practice and culturally responsive health care is beginning to pay dividends.

The current study has several important limitations. First, the survey instrument was original and was not validated with a large population. Second, this survey included students from the graduating class of 2015, and results may vary with each class of students. Third, we did not interrogate whether the proportion of DOs and IMGs in a given program influences residency selection. Finally, although we intentionally polled students before the Match—in this way attempting to describe their "native" feelings and attitudes—we do not know if their stated preferences were reflected in their actual rank lists. This being said, this study documents graduating US medical students' priorities in seeking residency programs and confirms that they are

largely unconcerned with the presence of DO and IMG house staff in those programs.

## Conclusion

As the health care workforce in the United States becomes more diverse and our nation's medical needs increase, residency programs will be required to recruit and produce the best physicians possible, regardless of training background. Previous literature<sup>10,11</sup> documents concerns by program directors that accepting DO or IMG applicants might invoke negative perceptions from graduate medical education governing bodies or reputational decline. Graduating MD students, however, have broader, more subtle, and more inclusive priorities regarding residency selection and do not demonstrate any uniform biases against DO and IMG house officers. This may be a reflection of generational differences between faculty and students. As we move to the single graduate medical education accreditation system, in which all medical school graduates will train together, faculty must be aware of their own unconscious biases and not project them onto the next generation of practitioners. We must articulate these biases and provide education and training opportunities to dispel them. A responsible and ethical approach to training must include a healthy regard for diversity among our future physicians, who will be providing health care in a more inclusive environment than the one in which the older generation was trained.

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## Author Contributions

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content; all authors gave final approval of the version of the article to be published; and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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