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### **Recent Trends in Faculty Promotion in U.S. Medical Schools: Implications for Recruitment, Retention, and Diversity and Inclusion**

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## **Abstract**

### **Purpose**

Faculty promotion is important for retention and has implications for diversity. This study provides an update on recent trends in faculty promotion in U.S. medical schools.

### **Method**

Using data from the Association of American Medical Colleges Faculty Roster, the authors examined trends in faculty promotion over ten years. Promotion status for full-time assistant and full-time associate professors who started between 2000 and 2009 inclusive was followed from January 1, 2010 to January 1, 2019. The authors used bivariate analyses to assess associations and promotion rates by sex, race/ethnicity, department, tenure status, and degree type.

### **Results**

The promotion rate for assistant professors was 44.3% (2,330/5,263) in basic science departments, 37.1% (17,232/46,473) in clinical science departments, and 33.6% (131/390) in other departments. Among clinical departments, family medicine had the lowest rate of promoting assistant professors (24.4%; 484/1,982) and otolaryngology the highest rate (51.2%; 282/551). Faculty members who were male (38.9%; 11,687/30,017), White (40.0%; 12,635/31,596), tenured (58.7%; 98/167) or tenure-eligible (55.6%; 6,653/11,976), and holding MDs/PhDs (48.7%; 1,968/4,038) had higher promotion rates than, respectively, faculty who were female (36.3%; 7,975/21,998), minorities underrepresented in medicine (URM; 31.0%; 1,716/5,539), nontenured (32.5%; 12,174/37,433), and holding other/unknown degrees (20.6%; 195/948; all  $P < .001$ ). These differences were less pronounced among associate professors; however, URM and nontenured faculty continued to have lower promotion rates compared to White, Asian, or tenured faculty at the associate professor level.

## **Conclusions**

Promotion rates varied not only by faculty rank, but also by faculty sex, race/ethnicity, department, tenure status, and degree type. The differences were more pronounced for assistant professors than associate professors. URM faculty members, particularly assistant professors, were promoted at lower rates than their White and Asian peers. More research to understand the drivers of disparities in faculty promotion seems warranted.

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Historically diversity among medical school faculty has been lacking, and significant racial and ethnic disparities are apparent in faculty promotion rates.<sup>1-3</sup> In particular, those who identify as Black, Hispanic, and Native American not only remain underrepresented in medicine (URM), but are promoted at lower rates.<sup>4-7</sup> More women have entered academic medicine, and they are now the majority among several clinical departments<sup>3,8,9</sup>; nonetheless, previous reports have shown a lower promotion rate and a higher attrition rate among female faculty.<sup>10,11</sup> In the last two decades, many interventions and pipeline programs have been put in place in U.S. medical schools to address these issues, but with only varying effects.<sup>12</sup> As the sex, race, and ethnicity demographics among academic medicine faculty have changed, the number and proportion of nontenured faculty have risen significantly in the last three decades.<sup>13-16</sup> Furthermore, the proportion of physician faculty (those holding MD/DOs) has generally increased among clinical departments and decreased among basic science departments over the years.<sup>3</sup> Given this shift to an expanded, largely nontenured workforce with increasing numbers of women and URM faculty, previous investigations have called for more studies regarding faculty recruitment and retention, faculty development and promotion, and faculty contributions to the academic missions of medical schools.<sup>15, 16</sup>

Whether the patterns of faculty promotion have changed for academic medicine in recent years remains unknown. Likewise, an understanding of differences in promotion rate by academic departments is lacking. As academic medicine has largely shifted to nontenured faculty positions, understanding the association between tenure status and faculty promotion and retention seems necessary. This study describes promotion patterns for the most recent ten years of full-time faculty in U.S. medical schools both by faculty member characteristics and by department.

## Method

We used data from the Association of American Medical Colleges (AAMC) Faculty Roster, a comprehensive national database of information on full-time faculty at U.S. medical schools accredited by the Liaison Committee on Medical Education (LCME). We examined faculty promotion rate by department classification and individual faculty member characteristics. Department classification is a way to group disparately named (but similar) departments across medical schools. As an example, a medical school could have separate departments of neurosurgery and cardiothoracic surgery. These departments would appear in the Faculty Roster under their official names, but both would be reported in the surgery department classification. We obtained the department and faculty member data through the Faculty Administrative Management Online User System (FAMOUS).<sup>17</sup> FAMOUS is a web-based tool designed for individual medical school faculty members, administrators, and researchers to access Faculty Roster data. The AAMC initiated the Faculty Roster in 1966 and collects comprehensive information on the characteristics of full-time faculty members at LCME-accredited medical schools. We calculated faculty promotion rates by sex, race/ethnicity, department, tenure status, and degree type. We examined the promotion status of all full-time assistant and full-time associate professors who were appointed from January 1, 2000 to December 31, 2009. The snapshot date for the initial cohort was January 1, 2010. Primary endpoints were the percent promoted by faculty member characteristics and by department classification until January 1, 2019. We extracted data on October 10, 2019. The University of Texas Southwestern Medical Center Institutional Review Board exempted this research from human subject review.

For this study, we deemed racial and ethnic groups as mutually exclusive:

- Hispanic or Latino (of any race),

- non-Hispanic White,
- non-Hispanic Black or African American,
- non-Hispanic Asian or Asian American,
- non-Hispanic American Indian, Alaska Native, Native Hawaiian, and Pacific Islander,  
and
- other/unknown.

The concept of URM minority groups was first addressed by the AAMC in 1970 and then modified in 2004 to describe minority groups that are underrepresented relative to their numbers in the general population.<sup>18</sup> These groups currently include individuals who are Black, individuals who are Hispanic, and individuals who are Native American (including American Indian, Alaska Native, Native Hawaiian, and Pacific Islander).<sup>18</sup>

We studied all clinical and basic science departments. We combined the small number of departments that were classified as neither clinical nor basic science departments into a single group: “other departments.” We included both physician and non-physician faculty in our analysis.

To examine tenure status, we divided faculty into three groups as previously reported: nontenured, tenured, and tenure-eligible.<sup>15,16</sup> We combined faculty members not on a tenure track with faculty members working in medical schools where tenure is unavailable to form the nontenured faculty group.

Our statistical analyses included, where appropriate, the two-independent-sample t test, analysis of variance, and the  $\chi^2$  test to investigate differences in promotion rates by sex, race/ethnicity, department, tenure status, and degree type. We excluded faculty members with missing tenure information from our analysis of promotion rate by tenure status. We also excluded a small



number of faculty whose sex information was missing from our analysis of promotion by sex. All  $P$  values were 2-sided, and we considered  $P < .05$  to be statistically significant. We conducted statistical analyses with SAS version 9.4 (SAS Institute, Cary North Carolina).

## **Results**

Our analysis included 52,126 assistant professors and 23,103 associate professors who met inclusion criteria (Table 1). Overall, the majority of faculty members included in this study were associated with clinical departments. They were mostly White, male, and nontenured physicians. The assistant professors included in this study were significantly different from the associate professors. Compared with associate professors, higher proportions of assistant professors were associated with clinical departments, were nontenured, and held only an MD ( $P < .001$ ).

Compared with assistant professors, higher proportions of associate professors were male, White, and tenured ( $P < .001$ ).

### **Rate of promotion from assistant to associate professor by department**

The promotion rate from assistant to associate professor was generally higher in basic science departments (44.3%; 2,330/5,263) than in either clinical departments (37.1%; 17,232/46,473) or other departments (33.6%; 131/390) (Figure 1). Significant interdepartmental variations in faculty promotion rates occurred in both clinical and basic science departments; however, the differences in promotion rates were wider within clinical departments (standard deviation [SD] = 8.0%; range = 26.8%) versus basic science departments (SD = 5.3%; range = 15.8%). Among clinical departments, family medicine had the lowest promotion rate at 24.4% (484/1,982), whereas otolaryngology had the highest promotion rate at 51.2% (282/551). Among basic science departments, pathology had the lowest promotion rate (33.2%; 256/771) and biochemistry the highest promotion rate (49.0%;  $n = 362/739$ ).

### **Rate of promotion from assistant to associate professor by sex, by race/ethnicity, and by tenure status**

Among assistant professors, females had lower promotion rate ( $P < .001$ ) than males (Figure 2). While White and Asian faculty had similar promotion rates, their promotion rates (respectively, 40.0% [12,635/31,596]; and 38.6%; [4,278/11,082]) were significantly higher than those of URM faculty (31.0%; 1,716/5,539). Nontenured faculty had significantly lower promotion rates than those tenured or tenure-eligible faculty ( $P < .001$ ). In our sample, only 0.3% (167/52,126) of assistant professors were tenured, while 71.8% (37,433/52,126) were nontenured, 23.0% (11,976/52,126) were tenure-eligible, and 4.9% (2,550/52,126) were missing tenure information. However, just 32.5% (12,174/37,433) of the nontenured assistant professors received a promotion, compared to 58.7% (98/167) of tenured faculty and 55.6% (6,653/11,976) of tenure-eligible faculty.

### **Rate of promotion by degree type**

In 2018, physician faculty included 81.0% (126,027/155,677) full-time faculty in clinical departments and 18.9% (3,707/19,649) full-time faculty in basic science departments. By academic degree, our sample of assistant professors was similar to our sample of associate professors; the majority of full-time faculty (whether assistant or associate professors) held an MD, and 7.7-10.3% held an MD/PhD or an MD and other health degree (OHD). However, the proportion of faculty with only an MD was lower and the proportion of faculty with PhD or OHD was higher among associate professors than assistant professors. The promotion rates varied significantly by faculty degree types. Among assistant professors, faculty with an MD/PhD or MD/OHD had a higher promotion rate (48.7%; 1,968/4,038) than either faculty with only a PhD or OHD (42.5%; 4,804/11,297) or faculty with only an MD (35.5%; 12,726/35,843).

By degree types, assistant professors with other or unknown degrees had the lowest promotion rate (20.6%; 195/948). Similar to assistant professors, associate professors with an MD/PhD or MD/OHD had higher promotion rates (52.7%; 1,257/2,386) than either faculty with only an MD (43.7%; 6,327/14,478) or faculty with only a PhD or OHD (41.7%; 2,495/5,990). Among associate professors, faculty with other/unknown degrees had the lowest promotion rate (22.9%; 57/249).

### **Rate of promotion from associate to full professor by department**

We detected significant interdepartmental variations in associate professor promotion rates in both clinical and basic science departments. The promotion rate from associate to full professor was slightly lower among basic science departments (42.8%; 1,380/3,224) than among clinical departments (44.2%; 8,691/19,663) (Figure 3). Within clinical departments, public health and preventive medicine had the lowest promotion rate (33.5%; 60/179), whereas emergency medicine had the highest promotion rate (58.1%; 252/434). Among basic science departments, pathology had the lowest promotion rate (32.7%; 133/407) and physiology the highest (49.0%; 153/312).

### **Rate of promotion from associate to full professor by sex and by race/ethnicity**

While a significantly ( $P < .001$ ) higher proportion of men were promoted (38.9%; 11,687/30,017) compared to women (36.3%; 7,975/21,998) among assistant professors, women had a slightly higher but statistically similar promotion rate (44.3%; 3,363/7,583) to men (43.7%; 6,757/15,470) among associate professors (Figure 4). The differences in promotion rates from associate to full professor by race/ethnicity were less than those from assistant to associate professor. The promotion rate was 43.8% (7,371/16,846) for White faculty members, 48.5% (1,622/3,345) for Asian faculty members, 37.2% (231/621) for Black faculty members, and

43.6% (456/1,046) for Hispanic faculty members. URM faculty, as a whole, had a significantly ( $P < .001$ ) lower promotion rate (40.8%; 697/1,709) than their White and Asian peers (44.5%; 8,993/20,191).

### **Rate of promotion by tenure status**

A higher proportion of associate professors was tenured (20.6%; 4,766/23,103) and a smaller proportion was nontenured (60.6%; 13,998/23,103) compared to assistant professors (0.3% [167/52,126] and 71.8% [37,433/52,126], respectively). The promotion rates by tenure status were similar for assistant professors and associate professors. Among associate professors, tenured faculty had higher promotion rates (55.1%; 2,625/4,766) and nontenured faculty had lower promotion rates (39.1%; 5,478/13,998).

### **Discussion**

To our knowledge, this is the first national study comparing promotion rates among different disciplines in academic medicine in the United States. Although what constitutes reasonable promotion rates may depend on the context of a given medical school and department, our study shows that promotion rates not only varied by faculty members' ranks, but also by their sex, race/ethnicity, department, tenure status, and degree type. The drivers of these differences are important to understand. We speculate that the differences among specialties (departments) which we observed are driven by a host of factors including departmental research capacity, faculty members' tenure status, and local clinical competition for patients. Although Fang and colleagues have addressed the differences in promotion rates among department *types* (i.e., clinical vs basic sciences), the differences among *specific* departments in academic medicine remain unexamined.<sup>1</sup> Our findings were similar to those reported by Fang and colleagues in that clinical departments promoted assistant professors at a lower rate than basic science departments.

This difference disappeared for associate professors. Our study confirmed that tenure status still positively correlates with faculty promotion. Lower promotion rates for family medicine departments, for instance, may be related to family medicine departments having the highest proportion of faculty in nontenured positions.<sup>14</sup> Since most U.S. academic medical centers are hiring for nontenured positions, specific promotion assistance and mentoring for nontenured faculty (who tend to be clinician-educators) seem necessary. For example, protected time for research and more robust faculty development may be needed.

Our findings, similar to those of earlier studies,<sup>1,6</sup> show that URM faculty, particularly assistant professors, were promoted at lower rates than their White and Asian peers. Lower promotion rates increase faculty attrition and negate the limited gains made in faculty diversity. Increasing promotion rates for URM faculty may help improve faculty diversity, particularly at higher ranks. Diversity varies significantly by department; for example, URM physicians are more likely to practice primary care.<sup>19,20</sup> Future studies should elucidate the relationship between faculty promotion rate and department diversity.<sup>21,22</sup>

We also found that, overall, basic science departments had a higher assistant to associate professor promotion rate than clinical departments. This difference might be related to the proportion of faculty who are physicians. The majority of basic science department faculty members are non-physicians (who hold a PhD), and the majority of clinical department faculty are physicians (who hold an MD). The difference in pay scale may also drive this difference. Promotion brings a relatively higher pay increase for basic science department faculty than for clinical department faculty. To illustrate, in basic science departments, a promotion from assistant to associate professor could result in 27.2% pay increase and a promotion from

associate to full professor could come with a 46.0% pay increase.<sup>23</sup> In clinical departments, these numbers are much lower at, respectively, 8.4% and 11.3%.

We found that tenure status was significantly associated with faculty promotion. Tenured and tenure-eligible faculty were promoted at higher rates than nontenured faculty regardless of their rank. The rise of nontenured positions in higher education raises concerns about educational quality, academic freedom, and the career satisfaction of nontenured faculty.<sup>24</sup> Our findings align with those of previous studies, which also showed that tenured or tenure-eligible faculty had a higher promotion rate and lower attrition rate than nontenured faculty in U.S. medical schools.<sup>6,25,26</sup> The continual rise in the number and proportion of nontenured faculty in academic medicine has substantial implications for medical schools. Academic medicine, as a whole, may need to design better ways to provide resources regarding promotion and other assistance to nontenured faculty (who tend to be clinician-educators). As academic medicine is facing many challenges (e.g., the pressure to increase clinical revenues due to the changing health care environment and the fierce competition for research dollars), it is relying more and more on nontenured faculty who are primarily focused on seeing patients rather than teaching or research.<sup>14</sup> This shift in tenure landscape in academic medicine is accompanied by a growing number of medical schools that have focused on and prioritized protecting and growing the clinical enterprise; these trends are pushing academic institutions toward clinical enterprises.<sup>27</sup> We observed an interesting pattern by faculty degree type. Regardless of their rank, faculty with an MD/PhD or an MD/OHD had a higher promotion rate than faculty with only an MD or only a PhD. This difference in rate of promotion may be related to better academic preparation among MD/PhD faculty who tend to be translational scientists. Although MD/PhD faculty typically take

longer to train, their work is important for bringing scientific discovery and new technology from bench to bedside.<sup>28,29</sup>

We also observed that promotion rates tend to be lower among faculty moving from assistant to associate professor than among those moving from associate to full professor. Additionally, the differences in promotion rates by department were more pronounced for assistant professors than associate professors. Therefore, programs designed particularly to help assistant professors gain promotion should be developed.

Several limitations deserve discussion. First, Faculty Roster data were reported by medical schools. We could not confirm if faculty sex, race, and ethnicity were self-reported. Second, our analysis is descriptive in nature and precludes causal inferences. Due to external limitations put on our ability to access data, we were unable to control for confounding factors that might affect faculty promotion rates. For instance, we were unable to differentiate faculty by medical school types (private vs public), by faculty research productivity (grants and publications), by training pathways (international medical graduates vs U.S. medical graduates), or by service or clinical activities. We reported promotion rates by department classification, not by faculty specialty. For instance, a physician faculty member who specializes in family medicine could be serving in emergency medicine department. Moreover, we acknowledge that not all faculty are necessarily physicians; however, the majority of faculty members were physicians. Finally, a small number of faculty members were missing data regarding their sex and/or tenure status, but the proportion of faculty with missing data was very small compared with faculty with complete data.

We acknowledge that the variations in faculty promotion rates likely represent differences as well as disparities. Since characterizations of disparities fall along a continuum from simple differences with little connotation of injustice to differences that result from (and result in) overt

discrimination,<sup>30, 31</sup> where along this continuum a difference in promotion rate becomes a disparity remains subjective. That being said, the magnitude of injustice should be generally viewed as proportional to how much control a person is perceived to have over the cause of the difference.<sup>30</sup> This study uncovered a number of important differences in faculty promotion rates, ranging from those related to race/ethnicity to those associated with departmental affiliation. Some differences, for instance, lower promotion rates for women and faculty of certain racial ethnic background, are generally regarded as disparities that need eliminations.<sup>1,2,6,11</sup> Other differences, such as differences in promotion rates between faculty in clinical and basic science departments, might be viewed as differences between physician faculty and basic science researchers that do not have unjust causes. Given the limitations of our study, we could not conduct causal inferences and were, therefore, unable to determine which differences stem from or create outright disparities. Future studies should elucidate this uncertainty.

## **Conclusions**

In conclusion, we detected significant interdepartmental differences in promotion rates among U.S. medical schools. Clinical departments had lower promotion rates than basic science departments among assistant professors; however, differences in promotion rates generally shrank among associate professors. Nontenured faculty have become the majority in academic medicine; however, these faculty tend to have lower promotion rates compared to tenured or tenure-eligible faculty. While more studies are needed to explain the interdepartmental differences in promotion rates, academic medicine must find better ways to help nontenured faculty who largely serve as clinician-educators to gain promotions. Among assistant professors, women were promoted at lower rates than men, but among associate professors, their promotion rate was similar to that of men. URM faculty, however, had lower promotion rates among both



assistant and associate professors. As the nation swiftly marches toward racial and ethnic diversity in the general population, medical school faculty are also diversifying albeit at a slower pace.<sup>3,19-22</sup> The disparities in faculty promotion could lead to lower faculty retention, in particular for URM faculty. Developing institutional programs in academic medicine to better support the promotion of nontenured faculty and URM faculty seems warranted.

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## **Figures Legends**

### **Figure 1**

Assistant professor to associate professor promotion rate by department among full-time faculty members at LCME-accredited U.S. medical schools who were appointed from January 1, 2000 to December 31, 2009. The authors extracted data on October 10, 2019. Error bar represents 95% confidence interval. Data source: AAMC Faculty Roster. Abbreviations: LCME, Liaison Committee on Medical Education; AAMC, Association of American Medical Colleges.

### **Figure 2**

Assistant professor to associate professor promotion rate by faculty member demographic characteristics among full-time faculty members at LCME-accredited U.S. medical schools who were appointed from January 1, 2000 to December 31, 2009. The authors extracted data on October 10, 2019. Error bar represents 95% confidence interval. \* indicates records with missing data (records missing data were excluded). Data source: AAMC Faculty Roster. Abbreviations: LCME, Liaison Committee on Medical Education; AAMC, Association of American Medical Colleges; OHD, other health degree.

### **Figure 3**

Associate professor to full professor promotion rate by department among full-time faculty members at LCME-accredited U.S. medical schools who were appointed from January 1, 2000 to December 31, 2009. The authors extracted data on October 10, 2019. Error bar represents 95% confidence interval. Data source: AAMC Faculty Roster. Abbreviations: LCME, Liaison Committee on Medical Education; AAMC, Association of American Medical Colleges.

#### **Figure 4**

Associate professor to professor promotion rate by faculty member demographic characteristics among full-time faculty members at LCME-accredited U.S. medical schools who were appointed from January 1, 2000 to December 31, 2009. The authors extracted data on October 10, 2019. Error bar represents 95% confidence interval. \* indicates records with missing data (records missing data were excluded). Data source: AAMC Faculty Roster. Abbreviations: LCME, Liaison Committee on Medical Education; AAMC, Association of American Medical Colleges; OHD, other health degree.

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Table 1

**Description, by Rank, of Full-Time Assistant and Associate Professors at LCME-accredited U.S. Medical Schools Who Were Appointed from January 1, 2000 to December 31, 2009<sup>a</sup>**

Characteristic	Assistant professor, No. (% of 52,126)	Associate professor, No. (% of 23,103)
<b>Department type (<i>P</i> &lt; .001)</b>		
Clinical departments	46,473 (89.2)	19,663 (85.1)
Basic science departments	5,263 (10.1)	3,224 (14.0)
Other departments	390 (0.7)	216 (0.9)
<b>Sex (<i>P</i> &lt; .001)</b>		
Male	30,017 (57.6)	15,470 (67.0)
Female	21,998 (42.2)	7,583 (32.8)
Unknown	111 (0.2)	50 (0.2)
<b>Race/ethnicity (<i>P</i> &lt; .001)</b>		
White	31,596 (60.6)	16,846 (72.9)
Asian	11,082 (21.3)	3,345 (14.5)
URM	5,539 (10.6)	1,709 (7.4)
Black	2,297 (4.4)	621 (2.7)
Hispanic	2,993 (5.7)	1,046 (4.5)
Native	249 (0.5)	42 (0.2)
Others/unknown	3,909 (7.5)	1,203 (5.2)
<b>Tenure status (<i>P</i> &lt; .001)</b>		
Nontenured	37,433 (71.8)	13,998 (60.6)
Tenure-eligible	11,976 (23.0)	3,657 (15.8)
Tenured	167 (0.3)	4,766 (20.6)
Unknown	2,550 (4.9)	682 (3.0)
<b>Degree (<i>P</i> &lt; .001)</b>		
MD	35,843 (68.8)	14,478 (62.7)
MD/PhD or MD/OHD	4,038 (7.7)	2,386 (10.3)
PhD or OHD	11,297 (21.7)	5,990 (25.9)
Other degree/unknown	948 (1.8)	249 (1.1)

Abbreviations: AAMC, Association of American Medical Colleges; URM, minority underrepresented in medicine; OHD, other health degree.

<sup>a</sup>The snapshot date for the initial cohort was January 1, 2010. Primary endpoints were the percent promoted by faculty member characteristics and by department classification until January 1, 2019. We extracted data on October 10, 2019.

Figure 1

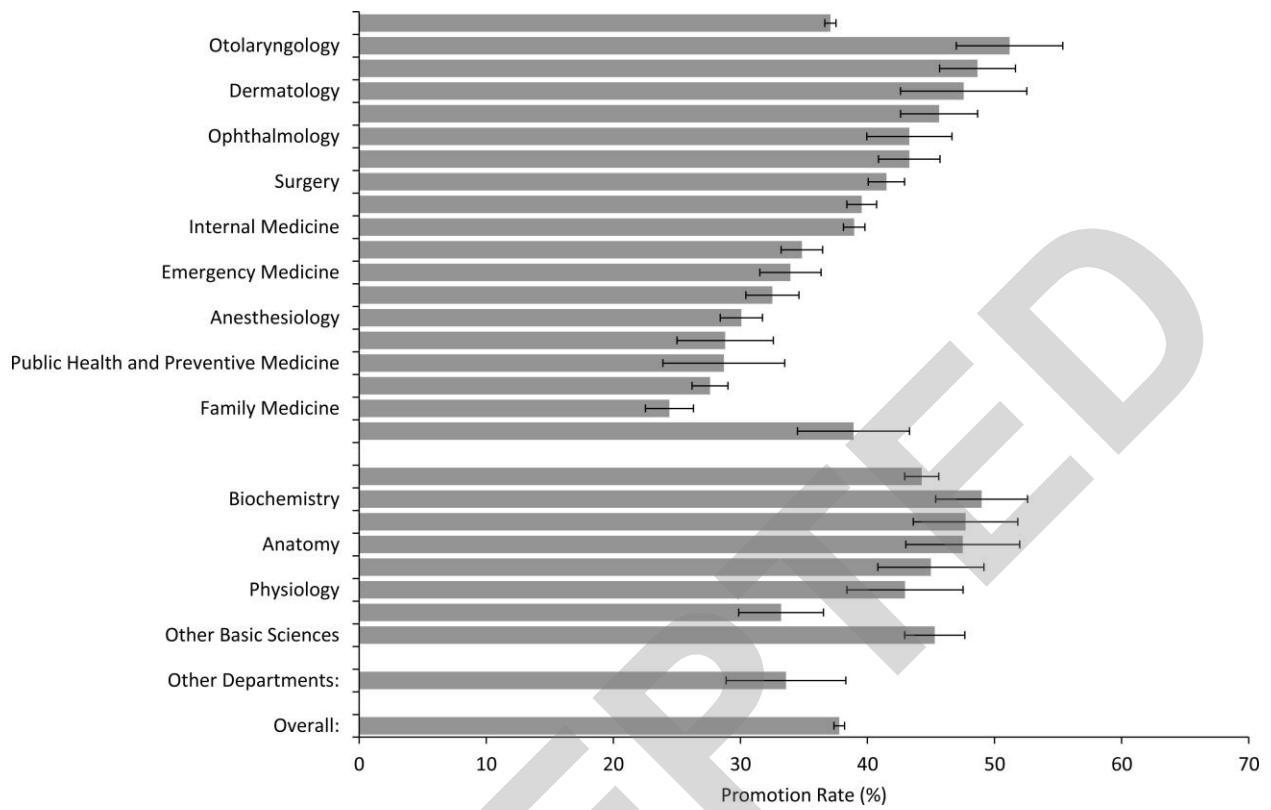


Figure 2

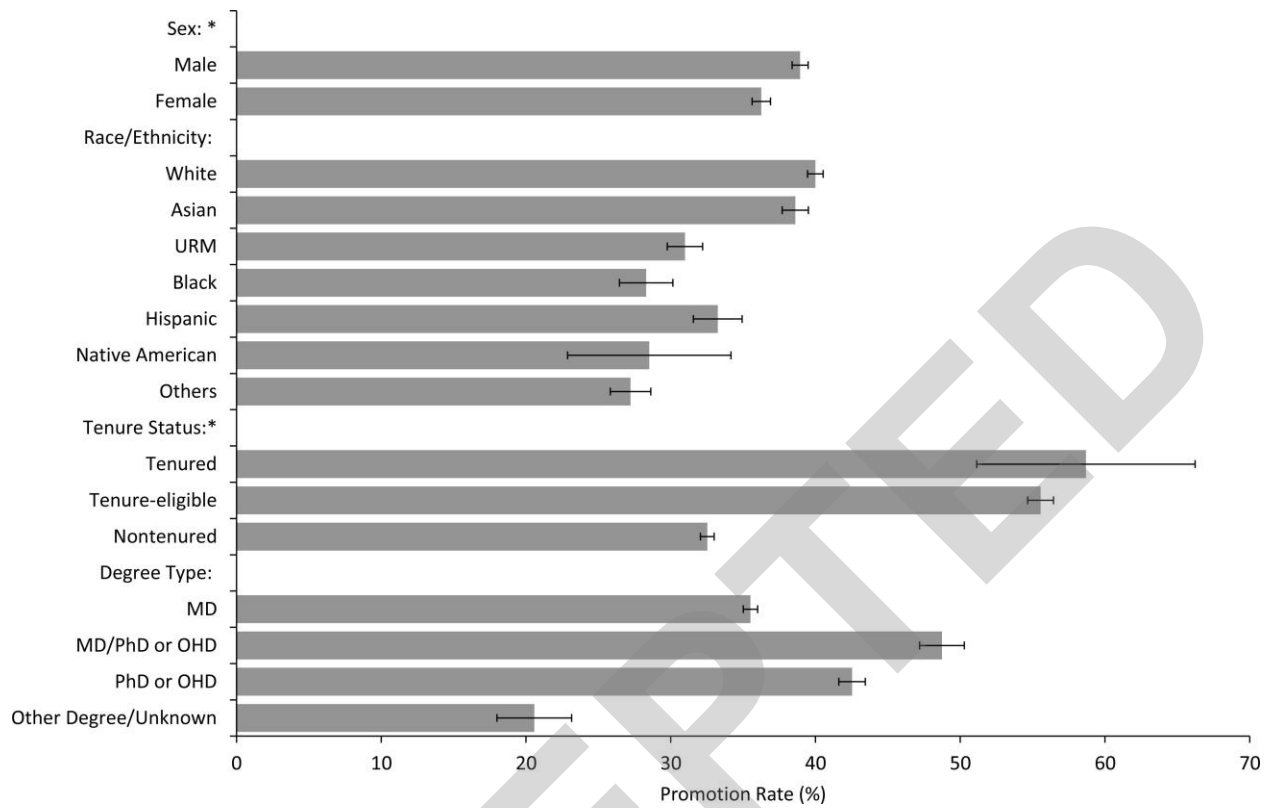


Figure 3

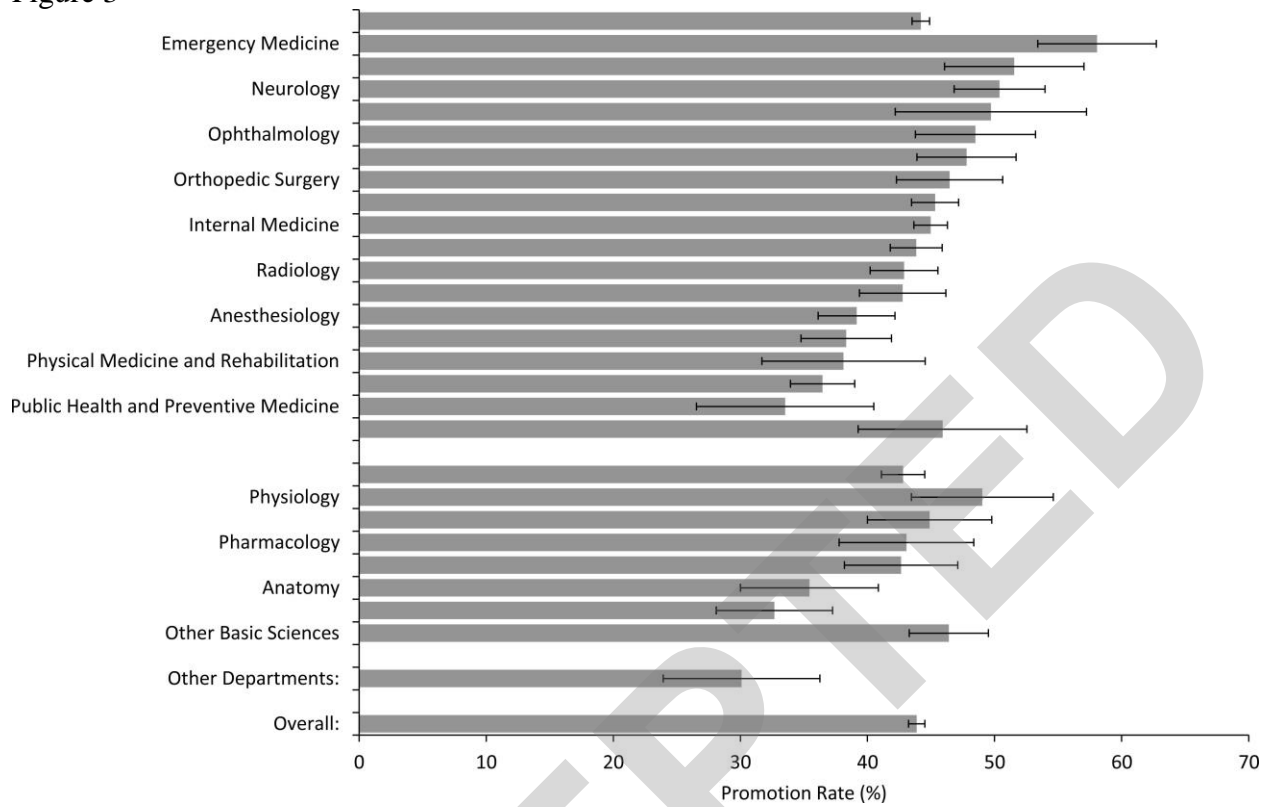


Figure 4

