

AAIM Perspectives

AAIM is the largest academically focused specialty organization representing departments of internal medicine at medical schools and teaching hospitals in the United States and Canada. As a consortium of five organizations, AAIM represents department chairs and chiefs; clerkship, residency, and fellowship program directors; division chiefs; and academic and business administrators as well as other faculty and staff in departments of internal medicine and their divisions.

Investigating Gender Disparities in Internal Medicine Residency Awards



Michelle Hannon, MD,^a Katherine Duffey, MD,^a Sonia Bharel, MD,^a Rachel Redfield, MD,^a
Alison Greidinger, MD,^a Emily Stewart, MD,^b Gretchen Diemer, MD^b

^aInternal Medicine Residency, Department of Medicine, Thomas Jefferson University Hospital, Philadelphia; ^bDivision of Hospital Medicine, Department of Medicine, Thomas Jefferson University Hospital, Philadelphia, Penn.

KEYWORDS: Awards; Gender bias; Implicit bias; Residency; Women in medicine

INTRODUCTION

In 2017, for the first time in history women made up the majority of matriculating medical students.¹ Despite the improvements in representation that women have seen in academic medicine, the field remains rife with gender disparities: Female faculty members receive lower salaries,² hold fewer full professor and department chair positions,^{3,4} and are less frequently awarded research grants than their male counterparts.⁵ In addition, recent studies have highlighted the lack of female representation in awards from medical professional societies.⁶⁻⁸ These awards bolster reputations and play a key role in promotions, making them an important stepping stone to career advancement.

The challenges of academic advancement as a woman physician apply across specialties and pertain to residents as much as to faculty: Female residents receive lower scores on “objective” evaluations, are more strongly criticized by faculty physicians in “subjective” feedback, and receive shorter and less descriptive letters of recommendation as compared to

their male coresidents. These disparities persist regardless of the gender of the faculty member providing the evaluation, feedback, or letter of recommendation.⁹⁻¹¹ These early factors can stunt the career growth of young female physicians and can compound to create further gender disparity as time advances.

Despite the research that has been done about disparities in residency training, gender trends in awards conferred by residency programs are not well understood. Because gender bias permeates medicine in various fields of specialization via multiple mechanisms, it is likely that it also affects these awards. It is also likely that residency awards play an important role in career advancement and acquisition of faculty positions just as those from professional societies do. We aim to determine whether there is a gender disparity among annual residency award recipients and investigate factors that may mitigate gender bias in award selection.

METHODS

This is a retrospective multicenter study based on survey data from academic internal medicine residency programs across the country spanning from 2009 to 2019. This study was deemed exempt from review by the institutional review board at our institution.

The authors generated a survey to collect data using the Research Electronic Data Capture application (REDCap). This survey contained variables including program location, gender breakdown of residents and residency program leadership by year, a description of

Funding: None.

Conflicts of Interest: None.

Authorship: All authors had access to the data and a role in writing this manuscript.

Requests for reprints should be addressed to Michelle Hannon MD, Thomas Jefferson University Hospital, 833 Chestnut Street, Suite 220, Philadelphia, PA, 19107.

E-mail address: Michelle.Hannon@jefferson.edu

annual awards given to residents, gender of resident award recipients by award and by year, and details about how awards are selected. The survey was disseminated via e-mail to a convenience sample of medium-to-large-size academic internal medicine residency programs by program leaders at our institution. All programs that completed the survey, and all awards from each program that responded, were included in the study. Data were summarized and subsequently analyzed using χ^2 tests.

RESULTS

Eight academic internal medicine residency programs from 6 different states in various geographic regions of the United States completed the survey (33.3% survey yield). With this sample size, this study was statistically powered to detect a difference between percentage of females in the overall study population and percentage of female award winners of about 7.5% with a beta of 0.8 and an alpha of 0.05.

Of programs included in the study, the average program size was 106 residents and overall 43.9% of residents in the study population were female. Across all residency programs and years, there were 51 different resident awards with 290 (39.7%) female winners, for a gender disparity from the overall population of 4.2%, which was not statistically significant (Table 1).

Overall, males were overrepresented in residency awards by 16% relative to their proportion in the study population. There was no correlation between the gender of awardees with the historical gender breakdown of the program director, department chair, or chief resident positions, or with the number of hours of implicit bias training provided by the program. Each program had a variety of award selection mechanisms that varied based on the nature of the individual awards.

Two programs had slight (but not statistically significant) skew in awards favoring females (G and H). Program G had 4 awards: 2 compassion-centered awards given to females 68.8% of the time and 2 awards focused on research and clinical excellence given to females only 32.8% of the time. Program H had minimal data available regarding their awards selection processes. As described in Program G, most programs had a wide range in the degree of gender disparity for individual awards within a single program, with the overall percentage of female awardees representing an average

between some female-skewed awards and some male-skewed awards.

For further analysis, all awards were grouped into categories based on wording of the award title and description. Two categories of awards (ambulatory/community and compassion/humanism) were awarded to females at a significantly higher proportion than their prevalence in the study population of 43.9%, at rates of 75.0% ($P=0.012$) and 65.1% ($P < 0.001$), respectively (Table 2). Conversely, teaching awards were disproportionately awarded to males ($P < 0.001$). Notably, the words that were differentially associated with female award-winners (ambulatory, community, compassion, and humanism) were mentioned in 6 of the 10 awards that were received by women at a rate higher than their prevalence in the population; conversely there is only 1 mention of any of these words in the 41 equitable or male-skewed awards.

Awards were then broken down by the mechanism by which they were selected. Of the 31 awards with selection mechanisms reported, the majority (19 awards, 61.3%) were selected by resident voting (Table 2). Awards chosen by selection committees were heavily skewed favoring females (awarded to females 70.6% of the time compared to the overall prevalence of females in the study population of 43.9%; $P=0.027$), whereas awards chosen by resident voting were slightly skewed favoring males (awarded to females 37.7% of the time compared to the overall prevalence of females in the study population of 43.9%; $P < 0.001$).

Finally, data were analyzed to determine whether any changes have occurred over the course of the time studied. From 2009 to 2014, 36.0% of award winners were female, and from 2015 to 2019, 43.3% of winners were female, a 7.3% improvement in female representation. There was no difference in gender breakdown of the overall residency classes between these 2 periods. This analysis excluded several recently established awards with minimal to no data for the period of 2009-2014.

DISCUSSION

These data show a concerning gender bias in residency awards and highlight several factors that may contribute to this bias. Although the residency programs surveyed indicated that they were largely in the precontemplative or contemplative stages of making improvements to reduce bias, the trend of improved female

PERSPECTIVES VIEWPOINTS

- Males have historically received residency awards at a disproportionately higher rate compared with their representation in the resident population. Several factors, including award wording and selection mechanism, seem to contribute to this bias.
- This study prompted several proposed strategies to mitigate gender bias in awards selection including award allocation by a diverse selection committee; elimination of bias in awards will contribute to further professional advancement of women in medicine.

Table 1 Summary of Program Awards and Leadership Data

Program	Male residents (%)	Male awardees (%)	Male chiefs (%)	Years male program director (%)	Years male chair (%)	Male awardees (%)	Male residents (%)	Male chiefs (%)	Hours of implicit bias training
A	54.2	85	58.3	36.4	100	1.57	1.08	1.08	5
B	48	65	38.8	100	100	1.35	0.81	0.81	4
C	46.6	60	57.1	18.2	100	1.29	1.23	1.23	0
D	63.7	68.6	64.3	90.9	0	1.08	1.01	1.01	4
E	65.3	67.5	67.5	20	100	1.03	1.03	1.03	2
F	59.3	61.7	50	36.4	72.7	1.04	0.84	0.84	2
G	49.8	48.4	44.2	9.1	63.6	0.97	0.89	0.89	4
H	68.5	63.8	73.3	100	100	0.93	1.07	1.07	Unknown
Average	56.9	65	56.7	51.4	79.5	1.16	0.99	0.99	3

*Overall residency class population was 43.9% female.

representation over the past 5 years does show improvement. Two analyses highlight significant gender disparities and, therefore, provide opportunities for improvement. First, there is a statistically significant effect of award wording on selection, with females more frequently receiving awards whose descriptions include “compassion,” “humanism,” “ambulatory,” and “community,” a trend that has been shown consistently in medicine and other professional settings.⁹⁻¹¹ Interestingly, in this study the award category with the strongest gender bias toward males was that of teaching awards, contrary to the historic bias toward females as teachers and nurturers. This bias is possibly rooted in voter perception of these awards as broader resident excellence awards; for example, at our institution 1 “teaching award” is advertised to medical student voters with the instructions to “vote for your favorite resident!”

Second, our data underscore the effect that award selection mechanisms can have on mitigating bias. Awards that were chosen by selection committees were more likely to be awarded to women; comparatively, when selected by resident vote, awards were received by men at almost 1.5 times the rate of women. Diverse selection committees, particularly those aware of the impact of implicit bias, have been called for by multiple professional societies to mitigate bias.¹²

Our study may serve as further support for programs to shift to this model of award selection. We had hypothesized that based on age residents might hold less intrinsic gender bias than senior faculty and that therefore awards voted on by residents might have less gender disparity; however, our data show that gender bias in voting appears to be deeply rooted among residents studied. The categories of medical student and faculty voting were underpowered to detect statistical significance, so more data would need to be collected to determine whether there is a true difference based on the voting population or whether the apparent difference in this study is due to a confounding variable.

Acknowledging and understanding the many contributors to bias is essential in developing award selection processes that minimize this bias. In our survey, we provided the opportunity for residency program leadership to suggest opportunities for improvement of the award selection process. Proposed solutions included creating a gender-balanced selection committee for awards and including a statement about awareness of implicit bias in voting materials if awards are to be chosen by vote. Several studies have shown that implicit bias training alone is not a clear answer to the issues posed in this study; implicit bias training has been shown in meta-analyses to be ineffective in reducing institutional inequities and, in fact, has the potential to reinforce or normalize biases depending on the language used.^{13,14}

This study is inherently limited in its status as a retrospective survey and as a convenience sample. It is

Table 2 Gender of Award Winners by Award Category and Selection Mechanism

Award category	Male winners	Female winners	Female winners (%)*	P Value [†]
Ambulatory/Community	4	12	75.0	0.012
Compassion/Humanism	53	98	64.9	<0.001
Excellence	35	31	47.0	0.255
Research	14	10	41.7	0.828
Resident of the Year	32	19	37.3	0.342
Teaching	166	56	25.2	<0.001

Selection mechanism	Male winners	Female winners	Female winners (%)*	P Value [†]
Selection committee	5	12	70.6	0.027
Medical student vote	10	9	47.4	0.759
PD selection	42	36	46.2	0.686
Chief selection	24	20	45.5	0.833
Faculty vote	8	5	38.5	0.694
Resident vote	276	167	37.7	0.011

*Overall residency class population was 43.9% female.

[†]P values represent Chi-squared tests comparing percent females in the overall study population to percent female awardees in each category or mechanism.

PD = program director.

not statistically powered to detect significance to the level of the overall gender disparity in residency awards. There is likely an element of selection bias due to the nature of participant recruiting in addition to self-selection given the poor survey yield. The gender of award recipients were reported by the program rather than by the individuals, and all reporting as well as all available literature reviewed was gender binary. Additionally, data collection was halted when the burden of the coronavirus disease 2019 (COVID-19) pandemic shifted program focus away from survey completion, lowering our response yield. A larger sample size might be able to better characterize program characteristics that might predict more bias (as are suggested in the noticeable differences among programs).

This pilot analysis provides a framework for future change. We plan to continue multi-institutional data collection in addition to studying implementation of the proposed strategies to reduce gender bias in residency awards. For programs looking to rapidly improve on gender disparities in awards, we recommend implementing either a gender-balanced selection committee to choose winners for awards or, if a voting system is to be used, a statement on the ballot reminding voters to be aware of their implicit bias when selecting award winners. We also recommend using gender-balanced language in award selection, while acknowledging that this can be difficult as there exists inherent gender bias in some areas of medicine (eg, women are thought to be more likely to choose specialties that include more outpatient or ambulatory time). Offering a balance of various types of awards may help remediate wording-specific bias.

Further research should continue with the goal of identifying additional targetable areas for improving

female representation in program and institutional leadership. Additionally, further research done on a larger scale could detect other biases including those against gender-nonbinary physicians and those based on race.

ACKNOWLEDGMENTS

The authors would like to thank Deborah Richards, Kim Roesch, Danielle Weber, MD, Jori May, MD, Dominique Cosco, MD, Todd Barton, MD, Susan Lane, MD, and Sima Desai, MD, for their efforts in collecting program data.

References

1. Association of American Medical Colleges. Applicant and matriculant data tables. Available at: https://www.aamc.org/system/files/d/1/5-2017_applicant_and_matriculant_data_tables.pdf. Accessed September 28, 2020.
2. Jena AB, Olenski AR, Blumenthal DM. Sex differences in physician salary in US public medical schools. *JAMA Intern Med* 2016;176:1294–304.
3. Tesch BJ, Wood HM, Helwig AL, Nattinger AB. Promotion of women physicians in academic medicine: glass ceiling or sticky floor? *JAMA* 1995;273:1022–5.
4. Nonnemaker L. Women physicians in academic medicine—new insights from cohort studies. *N Engl J Med* 2000;342:399–405.
5. Bornmann L, Mutz R, Daniel H. Gender differences in grant peer review: a meta-analysis. *J Informetrics* 2007;1:226–38.
6. Silver JK, Blauwet CA, Bhatnagar S, et al. Women physicians are underrepresented in recognition awards from the Association of Academic Physiatrists. *Am J Phys Med Rehabil* 2018;97:34–40.
7. Silver JK, Bank AM, Slocum CS, et al. Women physicians underrepresented in American Academy of Neurology recognition awards. *Neurology* 2018;91:e603–14.

8. Silver JK, Slocum CS, Bank AM, et al. Where are the women? The underrepresentation of women physicians among recognition award recipients from medical specialty societies. *PM R* 2017;9:804–15.
9. Mueller AS, Jenkins TM, Osborne M, Dayal A, O'Connor DM, Arora VM. Gender differences in attending physicians' feedback to residents: a qualitative analysis. *J Grad Med Educ* 2017;9:577–85.
10. Rand VE, Hudes ES, Browner WS, Wachter RM, Avins AL. Effect of evaluator and resident gender on the American Board of Internal Medicine evaluation scores. *J Gen Intern Med* 1998;13:670–4.
11. Turrentine FE, Dreisbach CN, St Ivany AR, Hanks JB, Schroen AT. Influence of gender on surgical residency applicants' recommendation letters. *J Am Coll Surg* 2019;228(4):356–365.e3.
12. Burden M, del Pino-Jones A, Shafer M, Sheth S, Rexrode K. GWIMS equity recruitment toolkit. Assoc Am Med Coll. 1-34. Available at: <https://jcesom.marshall.edu/media/57839/gwims-toolkit-volume-3.pdf>. Accessed November 30, 2020.
13. Bezrukova K, Spell CS, Perry JL, Jehn KA. A meta-analytical integration of over 40 years of research on diversity training evaluation. *Psychol Bull* 2016;142:1227.
14. Dobbin F, Kalev A. Why diversity programs fail and what works better. *Harvard Bus Rev* 2016;94:52–60.