


Otolaryngology residency program factors associated with female resident representation

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Abstract

Objective: Female representation in the field of otolaryngology is lacking. Residency is the first point at which medical school graduates specialize in a chosen field and thus represents an opportunity to recruit and train more female otolaryngologists. This study sought to identify program factors associated with greater female representation among resident physicians.

Methods: Departmental websites of all 124 otolaryngology residency programs in the United States and Puerto Rico were examined for a list of residents. For programs with a resident roster available, the genders of residents, faculty, program directors, and chairpersons were recorded. Location and city population for each program was also recorded, as was female resident representation. Programs were compared using Pearson Chi-squared univariate tests.

Results: 1,632 residents and 2,605 faculty were included in the analysis of 109 programs. The median female resident representation was 40%. Programs with larger faculty sizes, more female faculty, and urban location were associated with an above-median female resident representation. Programs with a larger residency cohort approached significance regarding above-median female resident representation. Higher female faculty representation, program director gender, chairperson gender, and US region were not associated with variation in female resident representation.

Conclusions: Greater female otolaryngology residency representation was associated with programs having an urban location and greater numbers of female and total faculty. It was also likely that a larger resident cohort size may affect female resident representation. The proportions of female faculty, program director, and chairperson gender, as well as the US region, were not associated with variation in female resident gender representation.

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KEYWORDS

gender, program director, recruitment, residency training

Key points

- This study found that otolaryngology training programs in urban locations and with greater numbers of female and total faculty had higher female representation in their residency cohorts.
- Expanding the numbers of both faculty overall and faculty who are female, as well as focusing on serving urban, and often more diverse, populations might help attract female applicants to otolaryngology residency programs.

INTRODUCTION

Gender inclusion and equity in science and medicine have been shown to have numerous benefits¹; gender-diverse teams, in general, demonstrate improved productivity, innovation, and general performance,^{2,3} and a gender-diverse medical workforce can give rise to improved patient outcomes.⁴ Women have made several advances toward equal representation in medical schools over recent decades; in fact, the proportion of medical students in 2017 identifying as female was reported to be equal to that of medical students identifying as male.⁵ However, despite this progress, women in medicine still encounter bias and discrimination when compared to their male colleagues,⁶ and several healthcare specialties still struggle to recruit female residents.⁷

The field of otolaryngology is one such specialty: a recent analysis of gender trends in otolaryngology residency found only a 6.1% increase in female residents from 2008 to 2017, though there was an increase in the absolute number of female ENT residents in the United States.⁸ Otolaryngology has lagged behind other surgical subspecialties in terms of advances in gender representation: while otolaryngology saw a 36.2% increase in female residents from 2005 to 2017, neurosurgery had a 56.8% increase, plastic surgery had a 68.1% increase, and thoracic surgery had a 111.2% increase.⁹

Residency programs provide opportunities for new doctors to train, find mentors, and pursue leadership opportunities. Therefore, it is worth investigating whether certain residency programs possess qualities that are more or less attractive to specific applicants; an understanding of the characteristics of programs that are appealing to groups that are underrepresented in medicine can help shape a more equitable landscape of healthcare that is representative of the larger population. The present study sought to examine the gender distribution in otolaryngology residencies in the United States and to assess for any program factors that might be associated with the gender distribution.

METHODS

This project was granted IRB Exemption by the Duke University Health System Institutional Review Board (Protocol ID: Pro00110375). Departmental websites of all 124 otolaryngology residency programs

in the United States and Puerto Rico were searched in August 2021 for their list of current residents. Programs without publicly available lists of current residents were excluded from the analysis ($n = 15$). The gender of the residents, faculty as defined by designation on each program website, program director, and chairpersons were recorded from the departmental websites. Population estimates for 2019 from the United States Census Bureau¹⁰ were used to categorize the institution's location into urban (population $\geq 500,000$) and nonurban (population $< 500,000$). The geographic location of each residency program was categorized based on United States Census categories: West, Midwest, Northeast, and South.¹¹ A linear regression was performed to assess whether program size and program location population size were correlated, given that these variables sometimes covary.

The overall median percentage of female residents was calculated. To control for outliers, the overall median was calculated for factors with continuous variables. Statistical comparisons were done with categorization into above median and less than or equal to median groups. Comparisons were made between the residency program gender breakdown and the residency program size, the total faculty size, the total female faculty, the percentage of female faculty, the program director gender, the chairperson gender, the population category of the program's city, and the program's United States region using Pearson χ^2 univariate tests. A p -value of less than 0.05 was considered statistically significant, and analysis was performed in JMP Pro (version 15.0.0; SAS Institute Inc.).

RESULTS

Of the 124 otolaryngology residencies in the United States and Puerto Rico, 109 programs met the inclusion criteria. There were 1,632 total residents, including 636 females (39%) and 996 males (61%). There were 2,605 total faculty, including 675 females (26%) and 1,930 males (74%). There were nine female chairpersons (9%) and 94 male chairpersons (91%), as well as 34 female program directors (31%) and 75 male program directors (69%). 49 programs were in urban locations (45%), while 60 were nonurban (55%). This information is summarized in Table 1. The median resident female

TABLE 1 Residency program gender demographics from all programs with publicly available data.

Gender	Residents	Faculty	Chairpersons	Program directors
Female	636 (39%)	675 (26%)	9 (9%)	34 (31%)
Male	996 (61%)	1930 (74%)	94 (91%)	75 (69%)
Total	1632	2605	103	109

representation was 40%; this was the threshold for comparisons made between programs with above-median versus at- or below-median female resident representation.

Table 2 demonstrates the comparison of departmental factors between programs with above-median female resident representation and programs with at- or below-median female representation. Programs with a larger faculty size, larger numbers of female faculty members, and an urban location were significantly associated with higher female resident representation. Larger residency class size approached a statistically significant association with higher female resident representation ($P = 0.05$). Higher percent female faculty representation, program director gender, chairperson gender, and US region were not associated with female resident representation.

Linear regression showed that program size and program regional population was correlated ($P = 0.04$).

DISCUSSION

The present study evaluates the relationship between otolaryngology departmental factors and female otolaryngology resident populations. Of note, greater female residency representation was significantly associated with urban location, and greater numbers of female faculty and overall faculty; its association with larger residency program size approached significance (Table 2).

Programs in urban locations had higher female residency representation (Table 2). This is possibly due to several factors, including greater population diversity¹² and the perception of more opportunities for women.¹³ Similar to what might occur in larger programs, chances for women to excel might be more visible in urban programs with initiatives to aid more diverse patient populations. Several studies have shown that underrepresented minorities in medicine are more likely to treat underserved populations.^{14–16} While this relationship has not been observed as robustly for females as it has in racial and ethnic minorities, this finding still speaks to the notion of minority groups taking a special interest in helping other minority groups; that urban programs often pioneer strong initiatives to aid underserved populations^{17–19} might be particularly attractive to female applicants looking to aid groups that might need specialized care. Further, several studies have suggested that female residency applicants tend to value qualities that urban programs often emphasize²⁰; these values include diversity and equal representation in healthcare.²¹ In addition, other studies have suggested that female

TABLE 2 Female resident distribution by departmental variables.

Factor	Female resident representation—Median 40% female residents (n, %)		P-Value
	Above median	Below median	
All	46 (42%)	63 (58%)	
Program size—Median 15 residents			0.05
Above median (n = 43)	23 (53%)	20 (47%)	
Below median (n = 66)	23 (35%)	43 (65%)	
Total faculty—Median 18 faculty			<0.01
Above median (n = 53)	32 (60%)	21 (40%)	
Below median (n = 56)	14 (25%)	42 (75%)	
Total female faculty—Median 5 female faculty			<0.01
Above median (n = 48)	28 (58%)	20 (42%)	
Below median (n = 61)	18 (30%)	43 (70%)	
Female faculty representation—Median 24% female faculty			0.213
Above median (n = 54)	26 (48%)	28 (52%)	
Below median (n = 55)	20 (36%)	35 (64%)	
Program director gender			0.489
Female (n = 34)	16 (47%)	18 (53%)	
Male (n = 75)	30 (40%)	45 (60%)	
Chairperson gender			0.474
Female (n = 9)	3 (33%)	6 (67%)	
Male (n = 94)	43 (46%)	51 (54%)	
City population			<0.01
More than 500,000 (n = 49)	28 (57%)	21 (43%)	
Less than 500,000 (n = 60)	18 (30%)	42 (70%)	
US Region			0.507
Midwest (n = 32)	13 (41%)	19 (59%)	
Northeast (n = 28)	15 (54%)	13 (46%)	
South (n = 32)	11 (34%)	21 (66%)	
West (n = 17)	7 (41%)	10 (59%)	

applicants were more likely than male applicants to prioritize program culture, current resident composition, and program size,²² all of which are qualities that might be more prominent in larger programs in urban locations, with greater faculty size.

There was a positive association between female resident representation and a greater total number of female faculty members, but not the proportion of female faculty. This finding is consistent with studies in other specialties that have suggested that female applicants value female representation, but not necessarily higher proportions of females on faculty.^{23,24} This difference might suggest that larger programs with greater total numbers of female faculty—and larger faculty populations in general—are able to offer more immediate access to female mentorship, a quality that 20% of female medical students have reported would increase their interest in a surgical field.²⁵ In small residency programs, such as otolaryngology, this perceived accessibility might depend on the overall numbers of female faculty members, as opposed to percentages of faculty members that are female. For example, consider a theoretical department with three faculty members, all of whom are female. Though the entire faculty is composed of women, this generally small faculty size might feel inaccessible to female residents. Consider, instead, a department of 50 faculty members, 20 of whom are female. Compared to the first example, this department would have a lower proportion of female faculty members, but a much greater number of female faculty members (and total number of faculty members)—which could certainly be an alluring draw for applicants.

Above-median residency program size approached a significant association with higher female resident representation (Table 2). It is certainly possible that such programs would be more alluring to female applicants, who might seek the opportunity to interact with a broader range of residents during residency. Prior studies have found that women may pay more attention than do men to a program's gender mix.²⁶ Given that otolaryngology programs typically have only a few seats per year, higher absolute numbers of female residents might “feel” more gender-equitable than higher proportions might. It should also be noted that residency program size was correlated with the population size of the program location. This is unsurprising; larger patient populations provide more opportunities to train a larger resident class. Class size and population size both directly inform the residency experience for similar reasons, and are likely considered to similar degrees by residency applicants. Future studies might disentangle whether one of these variables carries more importance than another.

Greater female resident representation was not correlated with geographic region ($P = 0.507$), percentage of female faculty ($P = 0.213$), or gender of the program director ($P = 0.489$) or chair ($P = 0.474$). It is difficult to comment on the weight that a female program director or chair might bear on the residency application process, given how few females fill these already scarce roles; this pattern has been reported across several specialties and is not unique to otolaryngology.^{27,28} It is also possible that some females in leadership positions have not occupied such offices long enough for a difference in resident gender breakdown to have become apparent. The prevalence of more females in leadership positions in otolaryngology programs might, therefore, be a meaningful benchmark

to continue to monitor as the field aims for more equal gender representation.

There are several limitations to the present study. The study utilized only publicly available data, which was unavailable or outdated for some programs. Furthermore, the study accounted only for faculty listed on the residency program website; it is possible that some faculty not advertised on the residency page—perhaps at a satellite location—could be heavily involved in the interview and training process. Such faculty could bear weight on the resident selection process, but would not have been included in this study. Also, while the present study evaluated gender disparities from the perspective of what female applicants might be seeking in a residency program, it is also possible that variation in resident gender breakdown is largely due to how the programs rank applicants, which this study does not analyze. It should also be noted that program data were retrieved in 2021, while census data were from 2019; though it is unlikely that wholly disruptive shifts in the population occurred in the interim, it is true that the two data sets represent slightly different time frames. Finally, the data collected were from residency program websites that offered information about current residents and faculty members; this means that the names, images, and pronouns used by individuals on the websites were the best possible means for inferring gender. Future studies might investigate a different method, such as self-reported gender, for analysis of resident populations.

CONCLUSIONS

In conclusion, the field of otolaryngology is significantly lacking in female representation, both in leadership and in practicing providers. The first opportunity for advancing gender equality in the field is to encourage more women to pursue ENT residencies. The present study identified that greater female otolaryngology residency representation is associated with urban program location and greater numbers of female and total faculty and that a larger residency cohort size may also be an important factor. Further investigation is warranted to assess whether these factors and others have an influence on where women choose to pursue training and careers as otolaryngologists. Where such qualities are modifiable, deliberate adjustments could pave the way for programs striving to recruit a more diverse resident class.

AUTHOR CONTRIBUTIONS

Concept and design: All authors. *Acquisition, analysis, and interpretation of the data:* James C. Campbell, Julia E. Canick, Charles R. Woodard, Lars J. Grimm, Alissa M. Collins. *Drafting of the manuscript:* James C. Campbell, Julia E. Canick. *Critical revision of the manuscript for important intellectual content:* All authors. *Statistical analysis:* James C. Campbell, Lars J. Grimm. *Supervision:* Charles R. Woodard, Lars J. Grimm, Alissa M. Collins. James C. Campbell, Julia E. Canick, Charles R. Woodard, Lars J. Grimm, and Alissa M. Collins had full access to all

the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

None.

ETHICS STATEMENT

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REFERENCES

- Wallis CJ, Ravi B, Coburn N, Nam RK, Detsky AS, Satkunasivam R. Comparison of postoperative outcomes among patients treated by male and female surgeons: a population based matched cohort study. *BMJ*. 2017;359:j4366.
- Lauring J, Villesèche F. The performance of gender diverse teams: what is the relation between diversity attitudes and degree of diversity? *Eur Manag Rev*. 2019;16:243-254.
- Dawson J, Calvasina L, Kersley R, Natella S, Suisse C. *The CS Gender 3000: Women in Senior Management*. Credit Suisse AG, Research Institute; 2014.
- Shannon G, Jansen M, Williams K, et al. Gender equality in science, medicine, and global health: where are we at and why does it matter? *Lancet*. 2019;393:560-569.
- O'Connell Ferster AP, Hu A. Women in otolaryngology. *Otolaryngol Head Neck Surg*. 2017;157:173-174.
- Kang SK, Kaplan S. Working toward gender diversity and inclusion in medicine: myths and solutions. *Lancet*. 2019;393:579-586.
- de Costa J, Chen-Xu J, Bentounsi Z, Vervoort D. Women in surgery: challenges and opportunities. *Int J Surg Global Health*. 2018;1:e02.
- Lopez EM, Farzal Z, Ebert Jr. CS, Shah RN, Buckmire RA, Zanation AM. Recent trends in female and racial/ethnic minority groups in US otolaryngology residency programs. *Laryngoscope*. 2021;131:277-281.
- Chambers CC, Ihnow SB, Monroe EJ, Suleiman LI. Women in orthopaedic surgery: population trends in trainees and practicing surgeons. *J Bone Jt Surg*. 2018;100:e116.
- United States Census Bureau; 2021. Accessed July 31, 2021. <https://data.census.gov/cedsci/>
- Census Regions and Division of the United States. *United States Census Bureau*; 2021. Accessed July 31, 2021. https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf
- Nielsen RS, Winther AH. The complexity of diversity in reality: perceptions of urban diversity. *Urban Stud*. 2020;57:2817-2832.
- Chant S, Datu K. *Women in Cities: Prosperity or Poverty? A Need for Multi-dimensional and Multi-spatial Analysis*. Springer; 2015:39-63.
- Ngo NT, Aniagolu N, Lang J, Mcdougale A, Ekwenna O. Under-represented minority representation trends in gynecologic oncology fellowships in the United States. *Gynecol Oncol*. 2021;160:485-491.
- Komaromy M, Grumbach K, Drake M, et al. The role of Black and Hispanic physicians in providing health care for underserved populations. *N Engl J Med*. 1996;334:1305-1310.
- Bailey JA, Willies-Jacobo LJ. Are disadvantaged and underrepresented minority applicants more likely to apply to the program in medical education-health equity. *Acad Med*. 2012;87:1535-1539.
- Mongelli F, Georgakopoulos P, Pato MT. Challenges and opportunities to meet the mental health needs of underserved and disenfranchised populations in the United States. *Focus*. 2020;18:16-24.
- Oldfield BJ, Clark BW, Mix MC, et al. Two novel urban health primary care residency tracks that focus on community-level structural vulnerabilities. *J Gen Intern Med*. 2018;33:2250-2255.
- Alicea-Alvarez N, Reeves K, Rabelais E, et al. Impacting health disparities in urban communities: preparing future healthcare providers for "neighborhood-engaged care" through a community engagement course intervention. *J Urban Health*. 2016;93:732-743.
- Pretorius ES, Hrung J. Factors that affect national resident matching program rankings of medical students applying for radiology residency. *Acad Radiol*. 2002;9:75-81.
- Glazer G, Tobias B, Mentzel T. Increasing healthcare workforce diversity: urban universities as catalysts for change. *J Prof Nurs*. 2018;34:239-244.
- Madsen LB, Kalantarova S, Jindal R, Akerman M, Fefferman NR, Hoffmann JC. National survey to assess gender, racial, and ethnic differences among radiology residency applicants regarding factors impacting program selection. *Academic Radiol*. 2021;28:1410-1423.
- Goldstein T, Lessen S, Moon JY, Tsui I, Rosenberg JB. The significance of female faculty and department leadership to the gender balance of ophthalmology residents. *Am J Ophthalmol*. 2022;238:181-186.
- Yousuf SJ, Kwagyan J, Jones LS. Applicants' choice of an ophthalmology residency program. *Ophthalmology*. 2013;120:423-427.
- Snyder RA, Bills JL, Phillips SE, Tarpley MJ, Tarpley JL. Specific interventions to increase women's interest in surgery. *J Am Coll Surg*. 2008;207:942-947.
- Mayer KL, Perez RV, Ho HS. Factors affecting choice of surgical residency training program. *J Surg Res*. 2001;98:71-75.
- Nguyen L, Amin NH, Vail TP, Pietrobon R, Shah A. Editorial: a paucity of women among residents, faculty, and chairpersons in orthopaedic surgery. *Clin Orthop Rel Res*. 2010;468:1746-1748.
- Long TR, Elliott BA, Warner ME, Brown MJ, Rose SH. Resident and program director gender distribution by specialty. *J Women's Health*. 2011;20:1867-1870.

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