Analysis of Sex Diversity Trends Among Ophthalmology Match Applicants, Residents, and Clinical Faculty

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IMPORTANCE The proportion of women in the field of ophthalmology in the US trails the proportion of women in the general population. Sex diversity trends have been studied in other specialties, but there is a dearth of such literature in ophthalmology.

OBJECTIVE To investigate trends in the proportion of female ophthalmology match applicants, residents, and clinical faculty.

DESIGN, SETTING, AND PARTICIPANTS This cross-sectional study examined data from the San Francisco Match, the Association of University Professors of Ophthalmology, Accreditation Council for Graduate Medical Education, Association of American Medical Colleges, and American Academy of Ophthalmology (AAO) from January 1, 2011, to December 31, 2019. Data from ophthalmology match applicants, residents, clinical faculty at US medical schools, and AAO members were collected.

MAIN OUTCOMES AND MEASURES The proportion of female applicants, residents, and medical school clinical faculty in ophthalmology.

RESULTS Data were obtained from a total of 2807 ophthalmology applicants (35.3% female), 1,004,563 residents (43.8% female), 463,079 clinical faculty members (42.5% female), and 78,968 AAO members (26.1% female). Male ophthalmology residency applicants outnumbered female applicants by a ratio of 1.6:1 from 2016 to 2019. The percentage of female matched applicants in 2016 (41% [168/406]) and 2019 (42% [184/436]) differed by 1% (percent change, 0.99; 95% CI, −1.12 to 3.1; P = .36). There was a 2.3% increase (percent change, 0.34; 95% CI, 0.24-0.43; P < .001) in the percentage of female residents across all surgical specialties from 2011 (39.7% [8710/21,985]) to 2019 (42% [10,951/26,082]) but a 2.5% decrease (percent change, −0.45; 95% CI, −0.84 to −0.06; P = .02) in the percentage of female residents in ophthalmology from 2011 (41.5% [589/1419]) to 2019 (39% [575/1473]). The percentage of female ophthalmology clinical faculty differed by 2% (percent change, 1.02; 95% CI, −0.21 to 2.24; P = .10) from 2017 (38% [1179/3102]) to 2019 (40% [1225/3060]). From 2016 to 2019, male practicing ophthalmologists in the AAO outnumbered female practicing ophthalmologists by a ratio of 3:1.

CONCLUSIONS AND RELEVANCE This study found that the percentage of women in the field of ophthalmology remains lower than percentages in other specialties, and the percentage of female ophthalmology residents has decreased in recent years. More efforts are needed to improve female representation in ophthalmology.

Published online September 23, 2021.
he medical workforce needs to reflect the diversity of the US population. Patient outcomes and satisfaction are improved through provision of care by individuals who reflect the population being served. Unfortunately, however, the medical workforce has historically demonstrated unequal female representation. The proportion of women in medicine is discordant with the number of women in the US population (50%); instead, male physicians (64%) outnumber female physicians (36%) by a ratio of 1.8:1.2 For ophthalmology in particular, there is a stark disparity, with only approximately 23% of all practicing ophthalmologists being female according to recent literature; male ophthalmologists outnumber female ophthalmologists by a ratio of 3.3:1.3

Sex demographic characteristics in ophthalmology have been seldom studied, and to our knowledge this is the first study to examine trends in ophthalmology throughout each transitional stage from medical school to faculty appointment. We specifically examined trends in the sex demographic characteristics of applicants in the ophthalmology match, ophthalmology residents, and ophthalmology clinical faculty at medical schools over time. We also compared trends in ophthalmology with those of surgical and nonsurgical specialties. Findings from this study may offer valuable insight into the state of diversity of the ophthalmology workforce, highlighting areas where improvements can be made.

Methods

Data Collection

The Johns Hopkins Medicine Institutional Review Board deemed this research exempt because of its retrospective design; therefore, informed consent was not required. Our study adheres to the tenets of the Declaration of Helsinki.6 This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

To examine trends among ophthalmology match applicants, we extracted data on the ophthalmology San Francisco (SF) match applicants from the 2020 Ophthalmology Residency Match Summary Report and the 2020 Association of University Professors of Ophthalmology Residency Gender and Ethnicity Summary.4,5 Data from January 1, 2016, to December 31, 2019, were included in this study because these were the only years of Association of University Professors of Ophthalmology data that were publicly available. To calculate the number of total applicants, matched applicants, and match rates by sex each year, the number of Central Application System participants was extracted from the Ophthalmology Residency Match Summary Report and multiplied by the percentage of each sex who applied each year, provided by the Association of University Professors of Ophthalmology Residency Gender and Ethnicity Summary.

To study trends among ophthalmology residents, we collected data for the sex demographic characteristics from all US residency programs from the Accreditation Council for Graduate Medical Education Data Resource Books from 2011 to 2019.4,5 To analyze trends among ophthalmology clinical faculty, we collected data from the Association of American Medical Colleges yearly faculty rosters from 2017 (the earliest year available) to 2019.16 Lastly, we investigated trends in the sex demographic characteristics of the American Academy of Ophthalmology (AAO) membership from 2016 to 2019. These were the only years of data provided to us for analysis by the AAO.

All specialties included in our study were those listed in the Accreditation Council for Graduate Medical Education Data Resource Books.7–15 Specialties were then divided into 2 categories: surgical and nonsurgical. Surgical specialties in addition to ophthalmology included in this study were neurologic surgery, obstetrics and gynecology, orthopedic surgery, otolaryngology, plastic surgery, integrated plastic surgery, surgery, integrated vascular surgery, integrated thoracic surgery, and urology. Nonsurgical specialties were anesthesiology, dermatology, emergency medicine, family medicine, internal medicine, medical genetics and genomics, neurology, nuclear medicine, pathology, pediatrics, preventive medicine, physical medicine and rehabilitation, psychiatry, radiation oncology, radiology, and internal medicine and pediatrics.

Statistical Analysis

We used Stata/MP software, version 14.2 (StataCorp LLC) to analyze our data with the Cochran-Armitage trend test. Each trend analysis for the proportions was performed using the regression of female divided by female plus male; percent change was calculated by multiplying the slope of the regression by 100. People whose sex was categorized as decline to state or unknown were excluded from our analysis. P values were not adjusted for multiple analyses. A 2-sided P < .05 was considered to be statistically significant.

Results

Data were obtained from a total of 2807 ophthalmology applicants (35.3% female), 1,004,563 residents (43.8% female), 463,079 clinical faculty members (42.5% female), and 78,968 AAO members (26.1% female).

Ophthalmology Match Applicants: Analysis From 2016 to 2019

As indicated in Table 1, more men applied to ophthalmology programs compared with women in all match cycles from 2016
to 2019. Male ophthalmology residency applicants outnumbered female applicants by a ratio of 1.6:1 from 2016 to 2019. The percentage of women who applied to ophthalmology programs differed by 1% from 2016 (40% [232/580]) to 2019 (39% [259/666]) (percent change, 0.03; 95% CI, −1.69 to 1.76; \(P = .97\)).

The percentage of female applicants who successfully matched in ophthalmology differed by 1% from 2016 (41% [168/406]) to 2019 (42% [184/436]) (percent change, 0.99; 95% CI, −1.12 to 3.1; \(P = .36\)).

**Ophthalmology Residents: Analysis From 2011 to 2019**

As seen in **Figure 1**, the percentage of female ophthalmology residents decreased by 2.5% (percent change, −0.45; 95% CI, −1.69 to 1.76; \(P = .02\)) from 2011 to 2019 (41.5% [589/1419] to 39% [575/1473]), whereas the percentage of female residents across all specialties increased by 0.6% (percent change, 0.043; 95% CI, −0.004 to −0.09; \(P = .07\)) from 43.2% (40 535/93 776) to 43.8% (49 606/113 160). This finding was largely attributable to a 2.3% increase in the percentage of female residents in surgical specialties from 39.7% (8710/21 985) to 42% (10 951/26 082) because the percentage of female residents in nonsurgical specialties changed by only 0.1% from 44.3% (31 825/71 791) to 44.4% (38 655/87 078) (percent change, −0.049; 95% CI, −0.1 to 0.01; \(P = .08\)).

**Ophthalmology Medical School Clinical Faculty: Analysis From 2017 to 2019**

As shown in **Figure 2**, the mean percentage of female clinical faculty in ophthalmology from 2017 to 2019 was 39%. The percentage of female medical school clinical faculty in ophthalmology differed by 2% (percent change, 1.02; 95% CI, −0.21 to 2.24; \(P = .10\)) from 2017 (38% [1179/3102]) to 2019 (40% [1225/3060]) (Table 2). When compared with all other clinical specialties, the percentage of female clinical faculty in ophthalmology increased by 2% (percent change, 0.34; 95% CI, 0.24 to 0.43; \(P < .001\)).

**Table 1. Sex Diversity Trend Analysis for San Francisco Match Ophthalmology Applicants**

<table>
<thead>
<tr>
<th>Category</th>
<th>Study year</th>
<th>Percent change (95% CI)</th>
<th>(P) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All applicants, No. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2016</td>
<td>232 (40)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2016</td>
<td>348 (60)</td>
<td></td>
</tr>
<tr>
<td>Matched applicants, No. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2016</td>
<td>168 (41)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2016</td>
<td>238 (59)</td>
<td></td>
</tr>
<tr>
<td>Match rate, %c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2016</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2016</td>
<td>68</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: NA, not applicable.

\(a\) Association of University Professors of Ophthalmology Gender and Ethnicity Data for Ophthalmology Residency 2020 and San Francisco Match Ophthalmology Residency Match Summary Report 2020. Information for men was included in the table for completeness, but no analysis was performed because the \(P\) values would be the same as for women.

\(b\) Trend analysis for proportions regression was calculated as follows: female/(female + male). Percent change was calculated by multiplying the slope of the regression by 100.

\(c\) Match rate was calculated as matched applicants divided by all applicants. No \(P\) value was calculated because these are percentages and not exact numbers.
cal departments, ophthalmology falls in the bottom half. Our results indicate that the specialty with the most women was obstetrics and gynecology (64%), whereas the specialty with the least women was orthopedic surgery (20%). Furthermore, the mean proportion of female clinical faculty in surgical specialties in the study period was 34%, lower than the mean proportion of female clinical faculty in ophthalmology (39%) and nonsurgical specialties (45%).

AAO Membership: Analysis From 2016 to 2019
As indicated in Table 3, the percentage of male AAO members in training is greater than the percentage of female members in training by a ratio of 1.6:1. In addition, there was a 2% difference in the percentage of AAO female members in training from 2016 (41% [775/1877]) to 2019 (39% [703/1789]) (percent change, −0.70; 95% CI, −1.72 to 0.31; P = .17). Moreover, the percentage of male practicing ophthalmologists in the AAO is greater than the percentage of female practicing ophthalmologists in the AAO by a ratio of 3:1. The proportion of female practicing ophthalmologists who are AAO members increased by 2% from 2016 (24% [4198/17490]) to 2019 (26% [4695/18341]) (percent change, 0.54; 95% CI, 0.26-0.83; P < .001).

Discussion
The findings of this cross-sectional study suggest that increased efforts are needed to promote representation and inclusion of women in the workforce and in ophthalmology leadership. Female representation is extremely important in health care, yet a glaring imbalance persists across several fields of medicine. Drawing attention to this disparity may generate awareness and promote subsequent recruitment strategies to attract women into fields, such as ophthalmology, where they remain underrepresented.

In 2019, more women were matriculated into medical school than men for the first time ever (50.5% vs 49.4%). Although improvements have been made in some specialties, others, such as ophthalmology, may need additional strategies that might mitigate these imbalances. The sex disparity in certain fields, such as ophthalmology, does not appear to be a medical school pipeline issue but primarily a residency recruitment issue. Our results also support this notion. We found that male ophthalmology applicants consistently outnumber female ophthalmology applicants by a ratio of 1.6:1. In addition, we observed no substantial change in both the percentage of females who applied to ophthalmology programs and who matched to ophthalmology programs from 2016 to 2019. Our results also indicate a decrease in the percentage of female residents in ophthalmology from 2011 to 2019 and no substantial change in the percentage of female ophthalmology clinical faculty in medical schools from 2017 to 2019. Our findings about the membership of the AAO indicate that the percentage of AAO practicing ophthalmologist members who are female was a mean of 25%, whereas the percentage of AAO trainee members who are female was a mean of 40%. Although this finding suggests that we may approach parity over time as the increasing cohort of female trainees become practicing ophthalmologists in the field, the decreasing number of female residents is a concerning trend.

To achieve equity among the sexes in the field of ophthalmology at both the residency and faculty levels, increased efforts would seem to be needed to increase the number of female medical students applying to ophthalmology programs. We observed that disproportionately fewer women are applying to ophthalmology residency programs than men. The fact that the match rate of women in ophthalmology programs from 2016 to 2019 was higher than the match rate of men further emphasizes that fewer women applying to ophthalmology programs may be a key driver of the present disparity. One possible barrier for women applying to ophthalmology programs may be the lack of ability to couples match in ophthalmology and the perceived difficulty of coordinating a competitive match. The SF Match has no provision for couples matching and no means by which a couple can, with certainty, coordinate the outcome of matching in the SF Match and any other matching service. Furthermore, concerns with parental leave policies in ophthalmology programs may contribute to the sex disparity in the field of ophthalmology. Wang et al found that residents in ophthalmology take less parental...
leaving one-third than permitted and that more male program directors compared with female program directors believed that childbearing during residency negatively impacts resident dedication to patient care. Other specialties, such as pediatrics, have potentially more generous parental leave policies and for this reason may be viewed as more parent friendly. Barriers should be further explored and understood because implementing improved policies to enhance the recruitment of women into ophthalmology may be key to increasing female representation in the field.

Our findings point to a sex disparity among ophthalmology medical school clinical faculty, specifically showing no considerable change in the percentage of female ophthalmology clinical faculty in medical schools from the years 2017 to 2019. In addition, ophthalmology falls in the bottom half of specialties when ranked according to the percentage of female medical school clinical faculty in the field (Figure 2). The low number of female medical school clinical faculty coupled with the decreasing percentage of female ophthalmology residents and practitioners is concerning. Program directors are responsible for ensuring resident satisfaction, which includes understanding and implementing policies that support work-life balance for all residents. More generous parental leave policies are believed to be more parent friendly.19 Barriers should be further explored and understood because implementing improved policies to enhance the recruitment of women into ophthalmology may be key to increasing female representation in the field.

Table 2. Trend Analysis of Female Physicians Across Medical School Departments*

<table>
<thead>
<tr>
<th>Department</th>
<th>2017 No. (%) of female physicians</th>
<th>2018 No. (%) of female physicians</th>
<th>2019 No. (%) of female physicians</th>
<th>Percent change (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetrics and gynecology</td>
<td>3998/6369 (63)</td>
<td>4136/6432 (64)</td>
<td>4185/6468 (65)</td>
<td>0.96 (0.13 to 1.80)</td>
<td>.02</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>13 155/22 906 (57)</td>
<td>13 708/23 406 (59)</td>
<td>13 882/23 588 (59)</td>
<td>0.71 (0.26 to 1.16)</td>
<td>.002</td>
</tr>
<tr>
<td>Preventive medicine</td>
<td>483/872 (55)</td>
<td>456/833 (55)</td>
<td>455/832 (55)</td>
<td>-0.35 (-2.72 to 2.01)</td>
<td>.74</td>
</tr>
<tr>
<td>Psychiatry</td>
<td>5837/11 192 (52)</td>
<td>5991/11 239 (53)</td>
<td>6011/11 183 (54)</td>
<td>0.79 (0.14 to 1.45)</td>
<td>.02</td>
</tr>
<tr>
<td>Family medicine</td>
<td>2919/5753 (51)</td>
<td>2942/5653 (52)</td>
<td>2994/5669 (53)</td>
<td>1.04 (0.12 to 1.96)</td>
<td>.02</td>
</tr>
<tr>
<td>Dermatology</td>
<td>735/1475 (50)</td>
<td>776/1508 (51)</td>
<td>789/1519 (52)</td>
<td>1.05 (-0.74 to 2.84)</td>
<td>.27</td>
</tr>
<tr>
<td>Physical medicine and rehabilitation</td>
<td>775/1702 (46)</td>
<td>817/1724 (47)</td>
<td>847/1752 (48)</td>
<td>1.40 (-0.26 to 3.06)</td>
<td>.10</td>
</tr>
<tr>
<td>Pathology</td>
<td>1876/4468 (42)</td>
<td>1904/4496 (42)</td>
<td>1940/4536 (43)</td>
<td>0.39 (-0.63 to 1.41)</td>
<td>.45</td>
</tr>
<tr>
<td>Internal medicine</td>
<td>17 137/42 960 (40)</td>
<td>17 504/43 129 (41)</td>
<td>17 616/43 219 (41)</td>
<td>0.43 (0.11 to 0.76)</td>
<td>.01</td>
</tr>
<tr>
<td>Neurology</td>
<td>2430/6069 (40)</td>
<td>2510/6161 (41)</td>
<td>2521/6192 (41)</td>
<td>0.34 (-0.51 to 1.2)</td>
<td>.45</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>1179/3102 (38)</td>
<td>1245/3088 (40)</td>
<td>1225/3060 (40)</td>
<td>1.02 (-0.21 to 2.24)</td>
<td>.10</td>
</tr>
<tr>
<td>Emergency medicine</td>
<td>1863/5148 (36)</td>
<td>2035/5478 (37)</td>
<td>2093/5572 (38)</td>
<td>0.68 (-0.23 to 1.6)</td>
<td>.13</td>
</tr>
<tr>
<td>Anesthesiology</td>
<td>3275/9044 (36)</td>
<td>3338/9024 (37)</td>
<td>3339/9056 (37)</td>
<td>0.33 (-0.37 to 1.03)</td>
<td>.37</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>769/2238 (34)</td>
<td>792/2257 (35)</td>
<td>773/2234 (35)</td>
<td>0.12 (-1.28 to 1.52)</td>
<td>.86</td>
</tr>
<tr>
<td>Radiology</td>
<td>2942/9997 (29)</td>
<td>2905/9838 (30)</td>
<td>2933/9895 (30)</td>
<td>0.11 (-0.53 to 0.74)</td>
<td>.73</td>
</tr>
<tr>
<td>Surgery</td>
<td>4001/15 962 (25)</td>
<td>4196/16 160 (26)</td>
<td>4251/16 221 (26)</td>
<td>0.57 (0.09 to 1.05)</td>
<td>.01</td>
</tr>
<tr>
<td>Orthopedic surgery</td>
<td>790/4139 (19)</td>
<td>815/4134 (20)</td>
<td>822/4127 (20)</td>
<td>0.42 (-0.43 to 1.27)</td>
<td>.35</td>
</tr>
</tbody>
</table>

* The Association of American Medical Colleges Faculty Roster, which groups together differently named but similar departments across medical schools, was used. For example, the departments of neurosurgery and cardiothoracic surgery are reported in the surgery department classification.

Table 3. Sex Diversity Trends Among Ophthalmology Match Applicants, Residents, and Clinical Faculty

<table>
<thead>
<tr>
<th>Category</th>
<th>No. (%) of members</th>
<th>Percent change (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Members in training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1877</td>
<td>1834</td>
<td>1705</td>
</tr>
<tr>
<td>Female</td>
<td>775 (41)</td>
<td>726 (40)</td>
<td>567 (37)</td>
</tr>
<tr>
<td>Male</td>
<td>1089 (58)</td>
<td>1084 (59)</td>
<td>1002 (56)</td>
</tr>
<tr>
<td>Practicing ophthalmologists</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>17 490</td>
<td>17 888</td>
<td>18 044</td>
</tr>
<tr>
<td>Female</td>
<td>4198 (24)</td>
<td>440 (25)</td>
<td>4529 (25)</td>
</tr>
<tr>
<td>Male</td>
<td>13 292 (76)</td>
<td>13 470 (75)</td>
<td>13 497 (75)</td>
</tr>
</tbody>
</table>

* Data were obtained from the American Academy of Ophthalmology. Information for men was included in the table for completeness, but no analysis was performed because the P values would be the same as for women. Totals for each year include individuals who were male, female, and declined to state sex. However, data for individuals who declined to state sex were excluded from the analysis.

b Trend analysis for proportions regression was calculated as follows: female / (female + male). Percent change was calculated by multiplying the slope of the regression by 100.

c Members in training are physicians who matched into or are currently enrolled in a full-time accredited ophthalmology residency or fellowship training program lasting for 1 or more years. Data include international ophthalmologists who may be in the US to complete a 1-year fellowship.
increasing percentage of female residents in other surgical specialties may suggest that the position of ophthalmology clinical faculty compared with other specialties has the potential to decrease in the coming years.

Similar to the lack of female ophthalmology medical school clinical faculty, a disparity is also apparent among ophthalmology program directors, with only 28% of current ophthalmology residency program directors being female. In addition, chairs of ophthalmology departments are predominantly men. Dotan et al found that of the 111 chairs reviewed in their study, 90% are men. They further elaborate that the percentage of women in leadership roles in ophthalmology is much lower than the percentages of female ophthalmologists, female residents, and female ophthalmology clinical faculty. This disparity in leadership suggests a serious problem and further implies institutional biases are likely at play that are preventing women in ophthalmology from occupying positions of leadership. In addition, this lack of female visibility may contribute to fewer women entering the field.

We suggest that moving forward ophthalmology programs and other surgical specialties should prioritize strategic interventions to address the underrepresentation of women. Such initiatives are in place to address disparities in racial/ethnic diversity. For example, the National Medical Association’s Rabb-Venable Excellence in Research Program has supported underrepresented minority medical students and trainees for more than 20 years, offering opportunities for research and mentorship. Similarly, more formal mentorship initiatives for medical students through Women in Ophthalmology or other groups could facilitate recruitment of women into the field.

Yousuf et al highlighted diversity of residency programs as being among the most important factors that influence the rank lists of applicants. In their study, they used a survey tool and asked respondents to report the importance of select factors on their rankings of residency programs using an 11-point Likert scale (with 0 indicating not important and 10 indicating most important). They found that female applicants weighed the diversity of the programs by sex or ethnicity more heavily compared with male applicants. In addition, they found that underrepresented minority applicants also weighted the diversity of programs more heavily compared with White applicants. This finding not only implies that individual residency programs should prioritize the diversity of their residency classes to enhance recruitment but further suggests that increased diversity in ophthalmology as a whole may fuel a more diverse applicant pool. A recent study by Fearless et al reached a similar conclusion, reporting a serious lack of racial diversity among ophthalmology faculty at US medical schools. When compared with 17 other specialties using Accreditation Council for Graduate Medical Education demographic data, ophthalmology ranked third lowest in the number of underrepresented minority faculty in the department. This lack of diversity and parity with other departments likely has adverse effects on the recruitment of underrepresented minority medical students into the field. Similar conclusions can be deduced about the recruitment of women. Specialties that have fewer women in their departments likely inadvertently deter women from pursuing the field, as explained in a previous study in orthopedic surgery. In combination, these studies underscore the importance of intersectionality among faculty members, which has been documented to be lacking in surgical specialties. In particular, decreasing rates of women entering ophthalmology alongside the paucity of women in leadership in the field is cause for concern. Although clearly not limited to ophthalmology, the Association of American Medical Colleges has recently launched a bold initiative to achieve equity among sexes throughout academic medicine.

Limitations
Our study has several limitations. First, our study uses demographic characteristics of men vs women to examine parity among sexes in ophthalmology. It is critical to acknowledge, however, the importance of representation of nonbinary identities in medicine. In addition, although our study of residents examines the entire resident workforce, our study of clinical faculty does not include the entire workforce but only clinical professionals affiliated with medical schools. This approach discounts the medical professionals across all specialties who do not work in academia and may affect the generalizability of our results. Furthermore, this study did not directly examine and compare match rates of female applicants to all other applicants. Analysis of match data from the National Resident Matching Program, for example, would have provided a more direct means to examine how match rates for women have changed over time in ophthalmology compared with other specialties. By current policy, National Resident Matching Program diversity data are unable to be obtained for study. Permitting access to these data in the future would offer great benefit and progress research in this topic. Lastly, another limitation of this study concerns the fact that our data included persons who declined to state their sex or whose sex was unknown. Some women may have fallen into these categories, affecting the accuracy of our results.

Conclusions
The percentage of women in ophthalmology remains lower than that of the general population, and the percentage of female residents in ophthalmology has decreased in recent years. These findings suggest that future studies should examine obstacles that women may face when pursuing ophthalmology and determine sustainable initiatives to attract more women to the field.

ARTICLE INFORMATION
Accepted for Publication: July 29, 2021.


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Conflict of Interest Disclosures: None reported.

Additional Contributions: The San Francisco Match Residency and Fellowship Matching Services, the Association of University Professors of Ophthalmology, the Association of American Medical Colleges, the Accreditation Council for Graduate Medical Education, and the American Academy of Ophthalmology provided the data used in the analysis.

REFERENCES


