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# Enhancing Mentorship Networks through the Experiences of Women Professors of Ophthalmology

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## Abstract

**Purpose** The aim of this study is to identify and characterize women professors in ophthalmology to enhance professional development and equity of women in academic ophthalmology.

**Design** Cross-sectional descriptive survey study.

**Participants** Participants in the survey were women in ophthalmology departments who have obtained full professor rank at their respective institutions.

**Methods** A cross-sectional study was conducted using data from an electronic survey of women ophthalmologists and researchers who had obtained full professorship rank in ophthalmology. The survey included questions about degree obtained, training path, fellowship, length and trajectory of academic career, family or medical leave participation, previous positions, and mentorship involvement. Statistical comparisons were made based on response.

**Main Outcome Measures** Survey responses to questions pertaining to three domains: education and training, academic career, and mentorship.

**Results** Women that obtained the professor title within ophthalmology largely held Doctor of Medicine/Doctor of Osteopathic Medicine degrees, were more likely to have completed fellowship training, and on average took 11 to 15 years to obtain the full professor title. The participants held a variety of other positions and titles throughout their academic careers. The vast majority of women reported having between 1 and 3 mentors during their careers with the majority also noting they currently participate in mentoring programs. Surveys were completed by 62 (30% response rate) women full professors of ophthalmology.

**Conclusion** The experiences women have along the academic path to professorship are described in this survey and can help to inform junior faculty. Literature review highlights the importance of mentorship for work productivity, retention, and promotion within academic medicine which is an element seen in the vast majority

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- women
- professors
- academic ophthalmology
- mentorship

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of our participants' career paths. Guided by the identification of women professors within departments of ophthalmology and characterization of their experiences, a new initiative called Women Professors of Ophthalmology was formed under the Association of University Professors of Ophthalmology's organizational structure in 2021. This group that is tailored for women professors of ophthalmology to foster peer mentorship and guidance is poised to increase the retention and promotion of women in academic ophthalmology.

Gender inequities in ophthalmology persist despite modest gains over approximately the past decade. Inequities are apparent in salaries, publications, positions of leadership, and challenges faced in the workplace.[1–5] Evidence indicates there is more gender bias and discrimination in ophthalmology than other surgical specialties as evident by a wider gender-pay gap and different training experiences.[4,5] Differences start in residency with a study finding that woman residents in ophthalmology perform fewer cataract surgeries than male residents regardless of factors such as parental leave.[6] Discrepancies continue throughout the academic trajectory with fewer women attaining leadership roles. Additionally, there is still a lack of female representation among journal editorial and society boards despite more women going into ophthalmology over the years.[7] Differences extend even further with a recent study highlighting the disparity in the number of podium presentations by women at scientific meetings.[8]

Regarding gender representation across all medical specialties, 2020 Association of American Medical Colleges (AAMC) data noted that 73% of professors among U.S. medical schools were male.[9] The percentage of women with full professor titles has increased over time; however, men are promoted to full professor more often and more quickly than women. In fact, from 2016 to 2020, only 27% of the promotions to full professor were women.[9,10] Data suggests academic medicine is falling behind the science, technology, engineering, and mathematic (STEM) fields when it comes to eliminating gender differences in promotion.[11] Within ophthalmology, women were approximately 34% of assistant professors in 2003 and increased to 44% of assistant professors in 2017; however, this has not led to a similar increase in the percentage of women attaining the rank of professor. In fact, research shows that the ratio of men and women with professor ranks has not changed from 2003 to 2017.[12]

The same study found that academic ophthalmology departments have a larger discrepancy in the percentage of women with professor ranks compared with other clinical specialties.[5,12] This may be due to the finding that ophthalmology's rate of promotion lags behind the rate of promotion for women in other specialties; therefore, interventions specifically tailored toward women in academic ophthalmology are needed to improve the number of women attaining full professor rank. The goal of this study was to identify and survey women full professors in ophthalmology to uncover trends among these women and factors that were key in getting promoted. Gathering a consensus on how women can best gain professorship in ophthalmology from current women full professors can help other women gain promotion within the field. This survey was a critical step that led to a new initiative called Women Professors of Ophthalmology (WPO) formed under the Association of University Professors of Ophthalmology (AUPO) structure in 2021. This new organization for women professors of ophthalmology is designed to establish mentoring networks and create peer support for women in academic ophthalmology at all phases of career development.

## Methods

A 20-question survey was developed after literature review regarding the state of women in academic ophthalmology. The survey was divided into three broad categories: education and training path, academic career, and mentorship. Participants were given multiple-choice answers to record their response. When appropriate, respondents were prompted to fill out a free response answer in addition to multiple choice. The survey was distributed by email to 154 U.S. medical schools accredited by the Liaison Committee on Medical Education. A list of full professors in ophthalmology identifying as women were initially gathered through the AAMC database and by reviewing institutional Web sites. A total of 220 professors were identified as of August 2021. Email invitations to complete the survey were delivered via the AUPO. The survey was hosted and distributed via the online third party, Alcheimer. Professors had 2weeks to complete the survey. Institutional Review Board/Ethics Committee approval was obtained from both Northwestern University and The University of Texas Medical Branch at Galveston. The study adhered to the tenets of the Declaration of Helsinki.

## Results

Sixty-two women full professors completed the survey, yielding a response rate of 30%.

1. Education and training

Participants were queried about the types of degrees they hold (►**Fig. 1**). The majority of the respondents (69.4%; 43) held a Doctor of Medicine (MD) or Doctor of Osteopathy (DO) degree. A Doctor of Philosophy (PhD) was held by 35.5% (22) of respondents and a Master of Business Administration

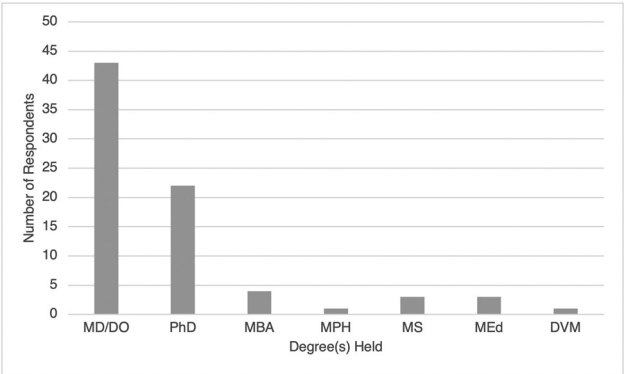


**Fig. 1** Degrees held by women professors in ophthalmology. Participants were asked to check all that applied ($N = 62$).

by 6.5% (4). Master of Science and Master of Education degrees were held by 4.8% (3) of responders. One respondent held a Master of Public Health degree and one a Doctor of Veterinary Medicine degree.

Of 62 participants, 74.2% (46) completed a fellowship. Choice of fellowships spanned a wide range of fields including 24.1% (14) in retina, 19% (11) in glaucoma, 17.2% (10) in pediatrics, 10.3% (6) in research domains, 6.9% (4) in neuro-ophthalmology, 6.9% (4) in pathology, and 5.2% (3) each in uveitis, cornea/refractive, and in oculoplastics (►**Fig. 2**). Of the 74.2% (46) of respondents who completed a fellowship, 43 have MD/DO degrees. There were three respondents who did not indicate they had an MD/DO, yet indicated that they had completed a fellowship. We believe this discrepancy came from respondents who completed fellowship and did not have an MD/DO degree. Other types of fellowships not included in the survey, yet specified by respondents include but are not limited to: post-doc fellowship, post-doc in cellular or molecular biology, research, retinal research, and pathology/genetics. From these results it seems that many respondents completed more than one fellowship and non-MD/DO respondents completed fellowships as well (►**Table 1**).

2. Academic career

Timelines and trajectories of each professor varied, with different starting points and length of time to reach their current positions. It took the majority of women, 46% (28), 11 to 15 years to obtain a full professor title. Note that 23.6% (15) took 16 to 20 years, 20.6% (13) took $\leq$ 10 years, and 9.5% (6) took 21+ years to reach full professor status (►**Fig. 3**). Most of the respondents reported progress on a traditional tenure track 44.3% (27) or a clinical educator track 36.1% (22).

Looking further into the total amount of years each participant has worked within academic ophthalmology, 66.1% (41)

**Table 1** Education and training

| | Respondents ($N = 62$) |
|---|---|
| Degree(s), *n* (%) | |
| MD/DO | 43 (60.4) |
| PhD | 22 (35.5) |
| MBA | 4 (6.5) |
| MS | 3 (4.8) |
| MEd | 3 (4.8) |
| MPH | 1 (1.6) |
| Other: DVM | 1 (1.6) |
| Fellowship(s) completion, *n* (%) | |
| Yes | 46 (74.2) |
| No | 16 (25.8) |
| Type of fellowship if completed, *n* (%) | |
| Retina (medical or surgical) | 14 (24.1) |
| Glaucoma | 11 (19.0) |
| Pediatric | 10 (17.2) |
| Research | 6 (10.3) |
| Neuro-ophthalmology | 4 (6.9) |
| Pathology | 4 (6.9) |
| Uveitis | 3 (5.2) |
| Cornea/Refractive | 3 (5.2) |
| Oculoplastics | 3 (5.2) |

Abbreviations: DO, Doctor of Osteopathic Medicine; DVM, Doctor of Veterinary Medicine; MBA, Master of Business Administration; MD, Doctor of Medicine; MEd, Master of Education; MPH, Master of Public Health; MS, Master of Science; PhD, Doctor of Philosophy.

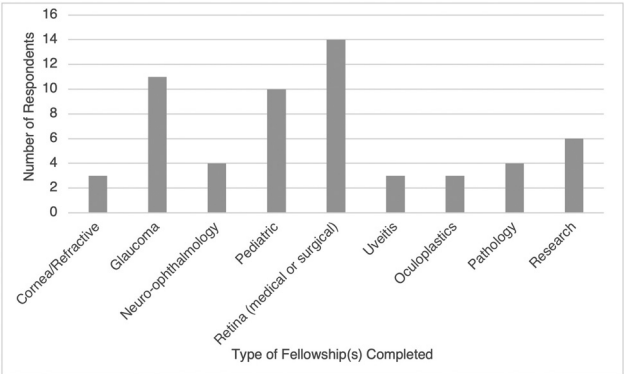


**Fig. 2** Type of fellowship completed by women who indicated having completed a fellowship during their training ($N = 46$).

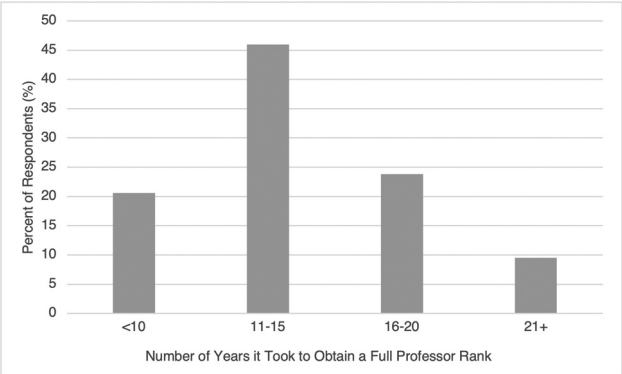


**Fig. 3** The number of years it took the respondents to reach the rank of full professor after their initial appointment in academic ophthalmology ($N = 63$).

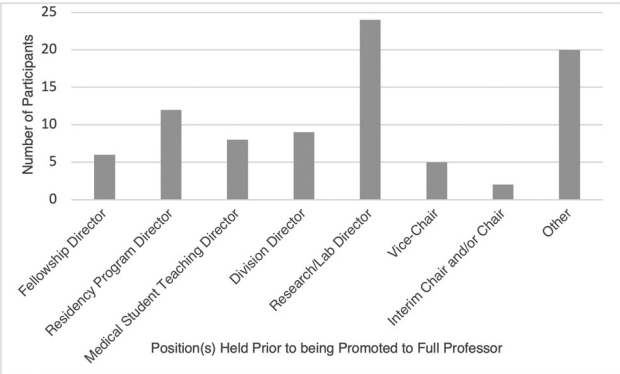


**Fig. 4** Positions held prior to being promoted to full professors ($N = 62$). Participants were asked to check all that applied. Notable answers within the "other" category included: chiefs, residency committee members, and medical directors of various hospital centers.

of the women have been an academic faculty member for over 21 years, 22.5% (14) have worked between 16 and 20 years, 8.1% (5) between 11 and 15 years, and 3.2% (2) for under 10 years. Fifty percent (31) of the respondents began their faculty track as an assistant professor. The next most common starting position was an instructor at 29% (18). Of the remaining respondents, 11.3% (7) stated that their starting rank was as professor, 4.8% (3) as associate professors, 3.2% (2) as lecturers, and 2% (1) as a clinical instructor.

Note that 35.5% of full professors (22) reported no connections to their institution prior to their current appointment, whereas 29.0% (18) reported having a faculty position at that location beforehand. Most other respondents completed a level of education at the same institution including 22.6% (14) fellowships, 30.6% (19) residencies, 1.6% (1) internship, 1.6% (1) PhD program, 9.7% (16) medical school programs, and 1.6% (1) other graduate program.

Note that 51.6% (32) of respondents held a secondary appointment in a different department. Respondents were free to name their second department if applicable. The most common other department named was pediatrics with neurology, neuroscience, and neurobiology being some of the next most common responses. Less frequent answers included pharmacology, pathology, and molecular/cell/microbiology.

Full professors held a variety of positions in academia before their current one (►**Fig. 4**). The most common position was a research or laboratory director, held by 36.1% (24) of responders. Note that 19.7% (12) were residency program directors, 14.8% (9) were division directors, 13.1% (8) were medical student teaching directors, 9.8% (6) were fellowship directors, 8.2% (5) were vice-chairs, and 3.3% (2) were chairs or interim chairs. An additional 49.2% (30) "other" positions of leadership were specified by free text ranging from service chiefs to medical directors of various hospital centers.

An overwhelming majority of respondents, 90.2% (55), indicated they had full-time positions while the remaining 9.8% (6) reported working part-time. Only 3.3% (2) claimed emeritus professorship status. Additionally, 21.3% (13) of

**Table 2** Academic career

| | **Respondents ($N = 62$)** |
|---|---|
| Number of years to reach the full professor rank after initial appointment in academic ophthalmology, *n* (%) | |
| ≤ 10 y | 13 (20.6) |
| 11–15 y | 29 (46.0) |
| 16–20 y | 15 (23.8) |
| 21+ y | 6 (9.5) |
| Years in academia in total, *n* (%) | |
| 6–10 y | 2 (3.2) |
| 11–15 y | 5 (8.1) |
| 16–20 y | 14 (22.6) |
| 21+ y | 41 (66.1) |
| Rank at start of academic career, *n* (%) | |
| Lecturer | 2 (3.2) |
| Instructor | 18 (29.0) |
| Assistant professor | 31 (50.0) |
| Associate professor | 3 (4.8) |
| Professor | 7 (11.3) |
| Other | 1 (1.6) |
| Prior connection to institution in which you hold full professorship, *n* (%) | |
| Completed undergraduate degree | 3 (4.8) |
| Completed medical school training | 6 (9.7) |
| Completed residency training | 19 (30.6) |
| Completed fellowship | 14 (22.6) |
| Held faculty position | 18 (29.0) |
| Interim Chair/ (and/or) Chair | 1 (1.6) |
| Other | 6 (9.7) |
| None | 22 (35.5) |
| Professor appointment in academic department other than ophthalmology, *n* (%) | |
| Yes | 32 (51.6) |
| No | 30 (48.4) |
| Current Emeritus Professor, *n* (%) | |
| Yes | 2 (3.3) |
| No | 59 (96.7) |
| Currently part-time or full-time, *n* (%) | |
| Part-time | 6 (9.8) |
| Full-time | 55 (90.22) |
| Switches between full and part-time status during career, *n* (%) | |
| Yes | 13 (21.3) |
| No | 48 (78.7) |
| Family or medical leave as faculty member, *n* (%) | |
| Yes | 23 (37.7) |
| No | 38 (62.3) |

**Table 2** (*Continued*)

| | Respondents ($N = 62$) |
|---|---|
| Approximate length of family or medical leave. Respondents, $N = 23$ | |
| 1–4 wk | 2 (8.7) |
| 5–8 wk | 7 (30.4) |
| 9–12 wk | 6 (26.1) |
| Greater than 12 wk | 8 (34.8) |

**Table 3** Mentorship

| | Respondents |
|---|---|
| Formal or informal mentor during career, *n* (%) | |
| Yes | 45 (73.8) |
| No | 16 (26.2) |
| Number of mentors during career, *n* (%). Respondents, $N = 45$ | |
| 1–3 | 33 (73.3) |
| $> 3$ | 12 (26.7) |
| Current participation in a formal or informal mentoring program, *n* (%) | |
| Yes | 44 (72.1) |
| No | 17 (27.8) |
| Role in mentoring program, *n* (%). Respondents, $N = 44$ | |
| As a mentor | 39 (88.6) |
| As both a mentor and mentee | 5 (11.4) |

respondents reported making a switch between part- and full-time status during some point in their career. Of 61 respondents, 37.7% (23) reported taking leave for medical or family reasons. Of these, 34.8% (8) estimated their leave was longer than 12 weeks, 26.1% (6) between 9 and 12 weeks, 30.4% (7) between 5 and 8 weeks, and 8.7% (2) between 1 and 4 weeks (►**Table 2**).

3. Mentorship

Participants were queried about their experience with mentorship, both past and present. A majority, 73.8% (45), reported having had mentorship, either formal or informal, during their career. Of these, 73.3% (33) reported between 1 and 3 mentors, with the remaining 26.7% (12) respondents indicating they had more than 3 mentors during their career. Additionally, 72.1% (44) respondents indicated they are currently participating in a mentoring program in which 88.6% (39) are solely a mentor and 11.4% (5) are acting as both a mentor and mentee (►**Table 3**).

## Discussion

The goal of our survey was to characterize experiences that current women professors in academic ophthalmology share. These common experiences can help identify a pathway that may guide women working toward academic promotion in ophthalmology. Most women professors in departments of ophthalmology hold MD or DO degrees and have subspecialty fellowship training. The trajectories of each woman's academic career varied with the majority starting out as an assistant professor and taking over 11 to 15 years to get promoted to full professor status according to the survey responses. An overwhelming majority hold full-time positions; however, 37.7% note having taken a leave for medical or family reasons at some point during their academic career. The fact that only a minority of the respondents took a leave at some point during their academic career could reflect similar attitudes to other studies' findings that taking a parental leave during residency is associated with a negative perception of that individual by their peers and even program director.[13–15] However, contrary to that belief, taking a parental leave during an ophthalmology residency is not correlated with a lower residency performance as measured by Ophthalmic Knowledge Assessment Program score, number of publications, milestone scores, or surgical volume.[16]

Mentorship played a role in most of our respondents' lives as the vast majority reported having had mentorship, either informal or formal at some point throughout their career. The majority of respondents reported having 1 to 3 mentors.

The "pipeline theory" is based on the premise that increasing the number of women in academic medicine will decrease the gender discrepancy within leadership positions. This, however, has not been the case thus far.[17] Women continue to be less likely to remain in academic medicine than men even when the ratio is equal during training.[17] Furthermore, women that remain in academic ophthalmology are not getting promoted to the full professor rank at the same rate as men. Academic ophthalmology gained more women overall than men from 2003 to 2017 (~450 vs. ~350 person increase). Yet, women professors increased by only approximately 90 individuals compared with male professors, which increased by nearly 200 individuals during this same 15-year interval.[11]

A literature review looking into factors that influence female medical students' decision to pursue a surgical specialty found that mentorship, specialty exposure, and the nature of the surgical field (intellectually challenging, prestige, etc.) positively affected their decision toward surgery. In contrast, gender discrimination, cultural or societal barriers, and surgical lifestyle negatively affected their decision against a surgical field.[18]

Further data continues to suggest that mentorship positively influences personal development, research productivity, satisfaction, faculty retention, and promotion within academic medicine. Mentors can pass down valuable tips and skills that helped them along their track. For example, a recent study found that the pay gap between men and women in their first year of clinical practice can be narrowed through successful negotiation, a skill that could be emphasized and taught through mentorship.[19] Unfortunately, in the literature, females note having a harder time finding mentors than males.[20] This may be reflected

in our results as the majority of respondents noted having only 1 to 3 mentors throughout their career, while only 26% women reported having more than that. Another study focusing on mentorship of women in academic medicine found that mentorship programs increase the promotion and retention of women faculty and that a lack of mentorship for females impairs their career development.[21] A survey of institutions across the U.S. with and without programs designed to recruit, promote, or retain female faculty found that a common rationale for institutions without such programs was that they did not believe there was a problem with gender equity at their institution.[22] This finding highlights how a national program designed to support gender equity may positively impact women's academic career development, because individuals can go beyond their own institutions which may not have the resources and needed programs that focus on promoting and retaining women faculty.

While there are national organizations in place designed to help promote a woman's career development within ophthalmology, there is a gap in one tailored to help women specifically navigate the academic world including successful promotion. Many subspecialty organizations focus on guiding and supporting women in the training stage; however, there is not an organization focused on the mentorship of women in academia across the stages of their career with the goal of advancing the trajectory toward promotion and leadership positions. The WPO initiative under the guidance of the AUPO is working to create a national group for women professors in ophthalmology focused on mentorship, guidance, and networking with an aim to increase the number of women attaining full professorship in ophthalmology. Such an organization is poised to work collaboratively with existing organizations to advance diversity and equity within academic ophthalmology.

Limitations of this study include those related to survey design and participation. The 30% response rate, by definition, does not include the experience of the majority of the women who hold the rank of full professor in departments of ophthalmology. A systematic review of neurosurgery research noted there have been significantly lower response rates to surveys as survey distribution has increased during the coronavirus disease 2019 pandemic.[23] While survey fatigue may have played a factor in our low response rate, the results we obtained from women who did respond are still valuable experiences for academic ophthalmologists to learn from to understand challenges women face in promotion to full professor. In addition, the inflexibility of survey design and wording of questions created some confusion for respondents that could not be followed up on. This is likely the case explaining the result 11.3% (7) of respondents began their academic rank as professors, as well as the *N* of 63 for our data in graph 3 when there were only 62 total respondents for the survey indicating someone likely selected two answers. Furthermore, the depth of information and details obtained was limited to avoid a lengthier survey which could lower the participation rate. Despite these limitations, the survey itself is a critical step in the identification of individuals and demonstrates the need for development of the WPO initiative.

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**Conflict of Interest**
None declared.

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