Gender Authorship Trends in the Ophthalmic Plastic and Reconstructive Surgery Literature

Kalla A. Gervasio, M.D., Bonnie A. Sklar, M.D.,* Anne X. Nguyen,† and Albert Y. Wu, M.D., PH.D., F.A.C.S.‡*

**Wills Eye Hospital, Philadelphia, Pennsylvania, U.S.A.; †Faculty of Medicine, McGill University, Montreal, Quebec, Canada; and ‡Department of Ophthalmology, Stanford University School of Medicine, Palo Alto, California, U.S.A.*

Purpose: Despite increasing numbers of women oculoplastic surgeons, they remain underrepresented within the subspecialty. The purpose of this study was to analyze trends in gender authorship within the field of ophthalmic plastic and reconstructive surgery.

Methods: This retrospective observational study sampled articles published in *Ophthalmic Plastic and Reconstructive Surgery (OPRS)* and *Orbit* during the years 1985, 1995, 2005, 2015, and 2020. Data reviewed included article type, total number of authors, and the gender of each article's first and senior author.

Results: Nine hundred ninety-nine articles were analyzed, including 701 in *OPRS* and 298 in *Orbit*. Of 3,716 total authors, 1,151 (31%) were women, including 297 (29.7%) first authors, and 191 (21.5%) senior authors. Women authorship in *OPRS* in 1985 (first, 3.9%; senior, 3.3%; all, 3.2%) significantly increased by 2020 (first, 44.6%; senior, 27.9%; all, 42%). Women authorship in *Orbit* in 1985 (first, 0%; senior, 4.5%; all, 7.4%) also significantly increased by 2020 (first, 43.3%; senior, 34%; all, 42.9%). In a subanalysis of *OPRS* original investigations alone, women first authorship increased from 3.1% in 1985 to 35.8% in 2020 ($p<0.001$) and women senior authorship increased from 4.3% in 1985 to 25% in 2020 ($p=0.001$). In a subanalysis of *Orbit* original investigations alone, women first authorship increased from 0% in 1985 to 65.4% in 2020 ($p<0.001$) and women senior authorship increased from 5.3% in 1985 to 42.3% in 2020 ($p<0.001$).

Conclusions: Despite a significant increase in women authorship over the past several decades, women remain underrepresented within the oculoplastic literature, particularly in regard to senior authorship. When considering original investigations alone, there has been a significant increase in women first and senior authorship in both *OPRS* and *Orbit*.

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The number of women practicing medicine and entering the field of ophthalmology has increased steadily over the past several decades.[1–3] In 2019, women represented the majority (50.5%) of US medical students for the first time in history.[2] Within ophthalmology, there has also been an increasing number of women residents, with 41% of ophthalmology residents being women compared with 25% of practicing ophthalmologists in 2017–2018.[3] Despite this progress, gender disparities persist in academic medicine with regard to research productivity and women representation in senior academic positions.[4,5] Prior studies have validated the use of authors' gender in academic medical literature as an indicator of gender disparities within medical research.[6,7]

Jagsi et al.[6] conducted one of the foundational studies on this topic in 2006, examining differences in gender authorship of original articles within prominent journals of 4 core medical specialties including internal medicine, surgery, pediatrics, and obstetrics and gynecology. The authors found that while the proportion of overall women authorship increased between 1970 and 2004, women lagged behind men in terms of senior authorship and solicited editorials.[6] Similar trends were found in subsequent studies on other medical and surgical subspecialties, including dermatology, plastic surgery, family medicine, otolaryngology, cardiology, orthopedic surgery, and emergency medicine.[7–13] In the general ophthalmology literature, studies of high-impact journals have demonstrated an overall increase in the volume of articles written by junior and senior women authors, yet women persistently lag behind their male colleagues, particularly in regard to senior authorship.[14–16]

Within the American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS), there has been an increase in the percentage of female members from 3.8% in the first decade of the organization (1969–1978) to 45.2% in the fifth decade (2009–2018).[5] Charlson et al.[4] also found that women ASOPRS members trended toward achieving full professor rank less often than their male counterparts, although this was not statistically significant. While the number of women ASOPRS members has been studied previously, there have been no studies examining authorship gender trends in oculoplastics journals. Given the influence of research productivity upon career advancement in academic medicine, gender disparities in academic publication warrant further investigation. The purpose of this study was to analyze authorship gender trends within theophthalmic plastic and reconstructive surgery literature.

METHODS

This was a retrospective observational study conducted from June 2018 through December 2020. This study was ruled exempt by the Stanford University IRB/Ethics Committee. This study was HIPAA-compliant and adhered to the tenets of the Declaration of Helsinki. Two prominent subspecialty journals in the oculoplastic literature were

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Address correspondence and reprint requests to Albert Y. Wu, M.D., Ph.D., F.A.C.S., Department of Ophthalmology, Stanford University School of Medicine, 2370 Watson Court, Suite 200, Palo Alto, CA 94303. E-mail: awu1@stanford.edu

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selected for review: *Ophthalmic Plastic and Reconstructive Surgery (OPRS)* and *Orbit*. All articles published in *OPRS* and *Orbit* during the years 1985, 1995, 2005, 2015, and 2020 were reviewed. The selection of decade-long intervals for data collection was chosen based on similar methodology in Jagsi et al.'s[6] prior study published in the *New England Journal of Medicine* on gender authorship trends within prominent journals in internal medicine, surgery, pediatrics, and obstetrics and gynecology. The year 2020 was additionally included given this was the most recent calendar year of publication for both journals. The selection of 1985 as the start year was chosen because this was the first year *OPRS* started publishing. Article types included for analysis from *OPRS* were Original Investigations, Case Reports, Letters to the Editor, Review Articles, and miscellaneous types such as Surgical Techniques and "OPRS Images." Article types included for analysis from *Orbit* were Original Investigations, Case Reports, Letters to the Editor, Major Reviews, and miscellaneous types such as Surgical Techniques and Photo Essays. Articles citing previously published work such as "Aesthetic Abstracts and Citations" and "Oculoplastics Abstracts" from *OPRS* and "Current Orbital Literature" from *Orbit* were excluded. Book review articles were also excluded from both *OPRS* and *Orbit.*

Data reviewed included the total number of authors, and the gender and continent of affiliation of each article's first and senior author. Articles with only a single author were assigned to the first author cohort and excluded from the senior author cohort. Gender was determined by initial inspection of the author's first name by 2 of the principal investigators (KG and BS). If uncertain by inspection alone, gender was verified through Google search engine to access institutional websites for author photographs and gender-related pronouns or related sites (genderchecker.com) as in similar studies.[1] Pearson's χ^2 test was used to compare proportions of authors by gender. The Cochrane-Armitage trend test was used to assess the change in proportion over time. *p* values less than 0.05 were considered statistically significant. Statistics were conducted using Stata, version 16.1 (StataCorp, College Station, TX).

RESULTS

A total of 1,057 articles were reviewed, of which 34 (3.2%) were excluded because they did not meet article type inclusion criteria and 24 (2.3%) were excluded because one or more authors' gender could not be reliably identified. In total, 26 articles were excluded from *OPRS* and 8 articles were excluded from *Orbit* for not meeting article inclusion criteria as described in the methods section. Six articles were excluded from *OPRS*, and 18 articles were excluded from *Orbit* in which one or more authors' gender could not be reliably determined.

After exclusion of the aforementioned articles, a total of 999 articles were analyzed, including 701 (70.2%) published in *OPRS* and 298 (29.8%) in *Orbit* from the years 1985, 1995, 2005, 2015, and 2020. Among articles included from *Orbit*, 33 (11.1%) were published in 1985, 29 (9.7%) in 1995, 57 (19.1%) in 2005, 75 (25.2%) in 2015, and 104 (34.9%) in 2020. Among articles included from *OPRS*, 51 (7.3%) were published in 1985, 57 (8.1%) in 1995, 151 (21.5%) in 2005, 211 (30.1%) in 2015, and 231 (33%) in 2020. Overall, article types included 451 (45.1%) original investigations, 259 (25.9%) case reports, 132 (13.2%) letters to the editor, 30 (3%) reviews, and 127 (12.7%) miscellaneous articles. From *OPRS*, 299 (42.7%) original investigations, 177 (25.2%) case reports, 115 (16.4%) letters to the editor, 23 (3.3%) reviews, and 87 (12.4%) miscellaneous articles were included. From *Orbit*, 152 (51%) original investigations, 82 (27.5%) case reports, 17 (5.7%) letters to the editor, 7 (2.3%) reviews, and 40 (13.4%) miscellaneous articles were included.

Of 3,716 total authors identified, 1,151 (31%) were women, including 297 of 999 (29.7%) first authors and 191 of 890 (21.5%) senior authors. Trends in women authorship in *OPRS* and *Orbit* between 1985 and 2020 are shown for all articles in Table 1 and for original articles alone in Table 2. Of 297 women first authors, 144 (48.5%) had an institutional affiliation from North America, 53 (17.8%) from Europe, 76 (25.6%) from Asia, 9 (3%) from South America, 14 (4.7%) from Australia, and 1 (0.3%) from Africa ($p=0.09$). Of 191 women senior authors, 80 (41.9%) had an institutional affiliation from North America, 42 (22%) from Europe, 54 (28.3%) from Asia, 8 (4.2%) from South America, 5 (2.6%) from Australia, and 2 (1%) from Africa ($p=0.001$). Trends in women authorship by continent in *OPRS* and *Orbit* combined between 1985 and 2020 are shown for all articles in Table 3. A subanalysis of women authorship by continent for all articles in *OPRS* alone over time is shown in Table 4. There were not enough female authors from several continents to conduct a statistical analysis on articles in *Orbit* over time.

The prevalence in women authorship for all article types in *OPRS* significantly increased from 1985 (first, 3.9%; senior, 3.3%; all, 3.2%) to 2020 (first, 44.6%; senior, 27.9%; all, 42%). *Orbit* similarly saw an increase in women authorship from 1985 (first, 0%; senior, 4.5%; all, 7.4%) to 2020 (first, 43.3%; senior, 34.0%; all, 42.9%). In a subanalysis of original articles alone from 1985 to 2020, women first authorship increased from 1.7% to 43% ($p<0.001$) and women senior authorship increased from 4.8% to 29.2% ($p<0.001$) for both *OPRS* and *Orbit* combined (Table 2). When analyzing original articles in *OPRS* alone, the percentage of women first authors increased from 3.1% in 1985 to 35.8% in 2020 ($p<0.001$), while the percentage of women senior authors increased from 4.3% in 1985 to 25.0% in 2020 ($p=0.001$). When analyzing original articles in *Orbit* alone, the percentage of women first authors increased from 0% in 1985 to 65.4% in 2020 ($p<0.001$), while the percentage of women senior authors increased from 5.3% in 1985 to 42.3% in 2020 ($p<0.001$).

In a subanalysis of case reports alone for both *OPRS* and *Orbit*, women first authorship significantly increased over time: 0/3 case reports (0%) in 1985, 15/77 (19.5%) in 2005, 31/83 (37.3%) in 2015, and 48/96 (50%) in 2020 ($p<0.001$). Similarly, women senior authorship for case reports also significantly increased over time: 0/1 (0%) in 1985, 13/76 (17.1%) in 2005, 21/83 (25.3%) in 2015, and 34/95 (35.8%) in 2020 ($p=0.005$). There were no case reports included from the year 1995. In a subanalysis of letters to the editor alone for both *OPRS* and *Orbit*, women first authorship significantly increased over time: 2/6 articles (33.3%) in 1995, 3/28 (10.7%) in 2005, 9/42 (21.4%) in 2015, and 21/56 (37.5%) in 2020 ($p=0.03$). Women senior authorship for letters to the editor increased but not significantly over time: 0/1 (0%) in 1995, 1/18 (5.6%) in 2005, 5/33 (15.2%) in 2015, and 7/42 (16.7%) in 2020 ($p=0.26$). There were no letters to the editor included from the year 1985.

In a subanalysis of review articles alone for both *OPRS* and *Orbit*, women first authorship significantly increased over time: 0/7 (0%) in 1985, 0/6 (0%) in 2015, and 9/17 (52.9%) in 2020 ($p=0.01$). Women senior authorship for review articles increased but not significantly over time: 0/4 (0%) in 1985, 2/4 (50%) in 2015, and 4/16 (25%) in 2020 ($p=0.33$). There were no review articles included from the years 1995 and 2005. In a subanalysis of miscellaneous articles alone for both *OPRS* and *Orbit*, women first authorship significantly increased over time: 1/14 (7.1%) in 1985, 0/5 (0%) in 1995, 2/9 (2.2%) in 2005, 7/40 (17.5%) in 2015, and 24/59 (40.7%) in 2020 ($p=0.003$). Women senior authorship for miscellaneous articles increased but not significantly over time: 0/5 (0%) in 1985, 1/4 (25%) in 2005, 10/38 (26.3%) in 2015, and 18/56 (32.1%) in 2020 ($p=0.13$).

Finally, an analysis of same-sex first and last authorship was performed to evaluate whether or not authors of the same sex were more likely to publish together. Of 890 total articles written by more than a single author, 566 (63.6%) articles were written by first and senior authors that shared the same sex (405 articles from *OPRS* and 161 articles from *Orbit*). More specifically, within *OPRS,* there were 353 (56.7%) articles written by both male first and senior authors, 52 (8.3%) articles written by both women first and senior authors, 152 (24.4%) articles written by a woman first author and a male senior author, and 66 (10.6%) articles written by a male first author and a woman senior author. Within *Orbit*, there were 136 (50.9%) articles written by both

TABLE 1. Proportion of women first and senior authors in ophthalmic plastic and reconstructive surgery literature by year

***OPRS* proportion of women authors (%)**						
Author	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
First	2/51 (3.9%)	10/57 (17.5%)	32/151 (21.2%)	64/211 (30.3%)	103/231 (44.6%)	<0.001
Senior	1/30 (3.3%)	2/45 (4.4%)	16/134 (11.9%)	39/199 (19.6%)	60/215 (27.9%)	<0.001
All	3/94 (3.2%)	21/162 (13%)	101/511 (19.8%)	239/810 (29.5%)	418/995 (42%)	<0.001
***Orbit* proportion of women authors (%)**						
Author	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
First	0/33 (0%)	5/29 (17.2%)	14/57 (24.6%)	22/75 (29.3%)	45/104 (43.3%)	<0.001
Senior	1/22 (4.5%)	3/19 (15.8%)	12/52 (23.1%)	23/74 (31.1%)	34/100 (34%)	0.002
All	6/81 (7.4%)	11/75 (14.7%)	52/207 (25.1%)	106/329 (32.2%)	194/452 (42.9%)	<0.001
***OPRS* and *Orbit* combined proportion of women authors (%)**						
Author	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
First	2/84 (2.4%)	15/86 (17.4%)	46/208 (22.1%)	86/286 (30.1%)	148/335 (44.2%)	<0.001
Senior	2/52 (3.8%)	5/64 (7.8%)	28/186 (15.1%)	62/273 (22.7%)	94/315 (29.8%)	<0.001
All	9/175 (5.1%)	32/237 (13.5%)	153/718 (21.3%)	345/1139 (30.3%)	612/1,447 (42.3%)	<0.001

OPRS, *Ophthalmic Plastic and Reconstructive Surgery*.

TABLE 2. Proportion of women first and senior authors in ophthalmic plastic and reconstructive surgery original articles by year

***OPRS* proportion of women authors (%)**						
Author	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
First	1/32 (3.1%)	9/50 (18%)	18/64 (28.1%)	23/72 (31.9%)	29/81 (35.8%)	<0.001
Senior	1/23 (4.3%)	2/44 (4.5%)	10/60 (16.7%)	11/72 (15.3%)	20/80 (25%)	0.001
All	2/67 (3%)	20/151 (13.2%)	53/246 (21.5%)	97/319 (30.4%)	171/457 (37.4%)	<0.001
***Orbit* proportion of women authors (%)**						
Author	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
First	0/28 (0%)	4/25 (16%)	8/30 (26.7%)	16/43 (37.2%)	17/26 (65.4%)	<0.001
Senior	1/19 (5.3%)	3/19 (15.8%)	3/28 (10.7%)	13/43 (30.2%)	11/26 (42.3%)	<0.001
All	6/71 (8.5%)	10.71 (14.1%)	25/114 (21.9%)	71/199 (35.7%)	74/148 (50%)	<0.001
***OPRS* and *Orbit* combined proportion of women authors (%)**						
Author	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
First	1/60 (1.7%)	13/75 (17.3%)	26/94 (27.7%)	39/115 (33.9%)	46/107 (43%)	<0.001
Senior	2/42 (4.8%)	5/63 (7.9%)	13/88 (14.8%)	24/115 (20.9%)	31/106 (29.2%)	<0.001
All	8/138 (5.8%)	30/222 (13.5%)	78/360 (21.7%)	168/531 (31.6%)	245/605 (40.5%)	<0.001

OPRS, *Ophthalmic Plastic and Reconstructive Surgery*.

TABLE 3. Proportion of women first and senior authors by continent in ophthalmic plastic and reconstructive surgery literature by year

***OPRS* and *Orbit* combined proportion of women first authors (%)**						
Institutional affiliation	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
North America	2/53 (3.8%)	8/51 (15.7%)	15/87 (17.2%)	48/150 (32%)	71/172 (41.3%)	<0.001
Europe	0/28 (0%)	4/25 (16%)	15/58 (25.9%)	12/36 (33.3%)	22/49 (44.9%)	<0.001
Asia	0/2 (0%)	2/5 (40%)	9/44 (20.5%)	22/79 (27.8%)	43/82 (52.4%)	<0.001
South America	0/1 (0%)	0/2 (0%)	3/5 (60%)	0/2 (0%)	6/10 (60%)	0.16
Australia	0/0 (0%)	1/2 (50%)	4/11 (36.4%)	4/16 (25%)	5/18 (27.8%)	0.49
Africa	0/0 (0%)	0/1 (0%)	0/3 (0%)	0/3 (0%)	1/4 (25%)	0.25
***OPRS* and *Orbit* combined proportion of women senior authors (%)**						
Institutional affiliation	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
North America	1/31 (3.2%)	1/37 (2.7%)	5/77 (6.5%)	25/148 (16.9%)	48/172 (27.9%)	<0.001
Europe	1/17 (5.9%)	3/18 (16.7%)	11/53 (20.8%)	10/34 (29.4%)	17/51 (33.3%)	0.001
Asia	0/3 (0%)	0/3 (0%)	11/36 (30.6%)	22/70 (31.4%)	21/64 (32.8%)	0.27
South America	0/1 (0%)	1/3 (33.3%)	0/7 (0%)	1/1 (100%)	6/10 (60%)	0.03
Australia	0/0 (0%)	0/2 (0%)	1/13 (7.7%)	3/18 (16.7%)	1/15 (6.7%)	0.91
Africa	0/0 (0%)	0/1 (0%)	0/0 (0%)	1/2 (50%)	1/3 (33.3%)	0.59

OPRS, *Ophthalmic Plastic and Reconstructive Surgery*.

TABLE 4. Proportion of women first and senior authors by continent in ophthalmic plastic and reconstructive surgery by Year

***OPRS* proportion of women first authors (%)**						
Institutional affiliation	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
North America	2/49 (4.1%)	6/43 (14%)	15/83 (18.1%)	43/125 (34.4%)	55/129 (42.6%)	<0.001
Europe	0/1 (0%)	1/6 (16.7%)	6/26 (23.1%)	4/19 (21.1%)	15/33 (45.5%)	0.03
Asia	0/0 (0%)	2/4 (50%)	6/30 (20%)	13/52 (25%)	25/49 (51%)	0.01
South America	0/1 (0%)	0/1 (0%)	1/3 (33.3%)	0/2 (0%)	5/9 (55.6%)	0.13
Australia	0/0 (0%)	1/2 (50%)	4/7 (57.1%)	4/10 (40%)	2/9 (22.2%)	0.18
Africa	0/0 (0%)	0/1 (0%)	0/2 (0%)	0/3 (0%)	1/2 (50%)	0.17
OPRS proportion of women senior authors (%)						
Institutional affiliation	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
North America	1/28 (3.6%)	1/32 (3.1%)	5/73 (6.8%)	25/122 (20.5%)	48/125 (38.4%)	<0.001
Europe	0/0 (0%)	3/6 (50%)	11/24 (45.8%)	10/17 (58.8%)	17/35 (48.6%)	0.41
Asia	0/1 (0%)	0/2 (0%)	11/23 (47.8%)	22/46 (47.8%)	21/37 (56.8%)	0.42
South America	0/1 (0%)	1/2 (50%)	0/5 (0%)	1/1 (100%)	6/8 (75%)	0.01
Australia	0/0 (0%)	0/2 (0%)	1/9 (11.1%)	3/11 (27.3%)	1/8 (12.5%)	0.31
Africa	0/0 (0%)	0/1 (0%)	0/0 (0%)	1/2 (50%)	1/2 (50%)	0.40

OPRS, *Ophthalmic Plastic and Reconstructive Surgery*.

male first and senior authors, 25 (9.4%) articles written by both women first and senior authors, 58 (21.7%) articles written by a woman first author and a male senior author, and 48 (18%) articles written by a male first author and a woman senior author. Trends in the number of articles written by first and senior authors of the same versus differing sex over time are shown in Table 5. Notably, the number of articles published by male first authors with female senior authors in both *OPRS* and *Orbit* increased over time but did not reach statistical significance. For *Orbit*, the number of articles published by both female first and senior authors increased over time but also did not reach statistical significance.

DISCUSSION

In recent decades, women have made significant progress toward reducing gender disparities within medicine.[17] For the first time in history, women accounted for the majority (50.5%) of U.S. medical students in 2019.[2] Forty-one percent of ophthalmology residents were women compared with 25% of practicing ophthalmologists in 2017–2018, highlighting an influx of younger women in the field.[3] Despite these shifting demographics, gender gaps persist within senior ranking positions in academic medicine.[17,18] The AAMC reported that women accounted for 16% of all medical school deans, 18% of department chairs, and 25% of full professors in 2018.[1] Ophthalmology is no exception to this trend, with women representing 22% of full professors, 39% of associate professors, 48% of assistant professors, and 63% of instructors in 2019.[19] Ophthalmology department chairs overwhelmingly tend to be male; as recently as 2017, 90% were male.[1–3,19]

Within oculoplastics, a growing number of women surgeons entering the field has narrowed what was once a considerable gap in representation.[5] A recent study examining ASOPRS found that general society membership among women rose from 3.8% to 45.2% between the first and fifth decades of the organization (1969–2018).[5] While these findings are encouraging,

TABLE 5. Proportion of articles with same-sex authorship in ophthalmic plastic and reconstructive surgery literature by year

***OPRS* proportion of articles (%)**						
First/senior author sex	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
Male/male	29 (96.7%)	36 (80%)	90 (67.2%)	111 (55.8%)	87 (40.5%)	<0.001
Female/female	0 (0%)	1 (2.2%)	3 (2.2%)	14 (7%)	34 (15.8%)	<0.001
Male/female	1 (3.3%)	1 (2.2%)	13 (9.7%)	25 (12.6%)	26 (12.1%)	0.05
Female/male	0 (0%)	7 (15.6%)	28 (20.9%)	49 (24.6%)	68 (31.6%)	<0.001
***Orbit* proportion of articles (%)**						
First/senior author sex	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
Male/male	21 (95.5%)	13 (68.4%)	31 (59.6%)	36 (48.6%)	35 (35%)	0.003
Female/female	0 (0%)	1 (5.3%)	4 (7.7%)	7 (9.5%)	13 (13%)	0.06
Male/female	1 (4.5%)	2 (10.5%)	8 (15.4%)	16 (21.6%)	21 (21%)	0.08
Female/male	0 (0%)	3 (15.8%)	9 (17.3%)	15 (20.3%)	31 (31%)	0.006
***OPRS* and *Orbit* combined proportion of articles (%)**						
First/senior author sex	**1985**	**1995**	**2005**	**2015**	**2020**	***p***
Male/male	50 (96.2%)	49 (76.6%)	121 (65.1%)	147 (53.8%)	122 (38.7%)	<0.001
Female/female	0 (0%)	2 (3.1%)	7 (3.8%)	21 (7.8%)	47 (14.9%)	<0.001
Male/female	2 (3.8%)	3 (4.7%)	21 (11.3%)	41 (15%)	47 (14.9%)	0.009
Female/male	0 (0%)	10 (15.6%)	37 (19.9%)	64 (23.4%)	99 (31.4%)	<0.001

OPRS, *Ophthalmic Plastic and Reconstructive Surgery*.

the authors also identified significant disparities among markers of late career advancement. Women ASOPRS members are currently underrepresented in terms of program directorship, executive committee membership, society presidencies, and late career awards. Furthermore, women achieve program directorship a median of 4 years after their male counterparts.[5]

Research productivity is one well-accepted measure of academic accomplishment, and gender inequities in academic publication may contribute to these observed disparities in career advancement. Jagsi et al.[6] identified a prominent gender gap in publication within academic medical journals across 4 specialties, including internal medicine, surgery, obstetrics & gynecology, and pediatrics. The authors found that while the proportion of overall women authorship increased between 1970 and 2004, women lagged behind men in terms of senior authorship and solicited editorials. An invitation to contribute an editorial is typically extended to those considered experts in the field. Additional studies have identified similar trends in plastic surgery, family medicine, dermatology, otolaryngology, cardiology, orthopedic surgery, and emergency medicine.[7–13] Another study examining editorial boards of 16 major biomedical journals found that only 16% of board members and 7% of editors-in-chief were women in 2005.[20]

Within the ophthalmology literature, gender disparities in publication rates have been well-documented. Mansour et al.[21] analyzed trends in gender authorship within 3 major ophthalmology journals (*American Journal of Ophthalmology [AJO]*, *Ophthalmology*, and *Archives of Ophthalmology*) over 5 decades; by 2009, women comprised 29.2% of first authors, 22.9% of senior authors, 18.9% of reviewers, and 12.5% of assistant editors. Remarkably, none of these high-impact journals had ever employed a women editor-in-chief as of 2009. An analysis of 3 high-impact ophthalmology journals (*Ophthalmology*, *AJO*, and *Journal of the American Medical Association [JAMA] Ophthalmology*) by Franco-Cardenas found that between 2000 and 2010, women first authorship increased by 40% and women senior authorship increased by 47%, while there was no significant increase in editorial authorship.[14] Mimouni et al.[16] similarly identified an increase in the percentage of women authors publishing original research in 6 leading ophthalmology journals between 2002 and 2014, with the increased rate of first authorship exceeding that of senior authorship. Additionally, the rate of publication by women was greater within general ophthalmology journals than subspecialty journals; in fact, the authors reported no significant increase in women senior authorship in *Retina* or the *Journal of Glaucoma*. A recent large bibliometric analysis of 87,640 original articles published across 248 ophthalmic journals discovered that women claimed 35% of all authorships, 37% of first authorships, and 27% of last authorships with a women-to-male odds ratio of 0.63 for senior authorships.[22] Interestingly, another study of top-tier ophthalmology journals between 2000 and 2009 showed that articles published by women first authors tended to have a greater number of collaborators compared with those written by male first authors.[15]

Oculoplastics journals were not considered in the abovementioned studies. Our study specifically evaluated women authorship within the subspecialty of ophthalmic plastic and reconstructive surgery. Despite increasing women first and senior authorship over the past several decades, women remain underrepresented compared with men in 2 prominent oculoplastics subspecialty journals, *OPRS* and *Orbit*. When considering original investigations alone, there was a significant increase in women first and senior authorship in both journals, although women were still underrepresented particularly in regard to senior authorship. Similarly, first and senior authorship for case reports by women significantly increased over time. Interestingly, while first authorship increased significantly for women writing letters to the editor and review articles, senior authorship did not increase significantly for these article types. These trends reflect those which have been reported for the general ophthalmology literature and are consistent with the fact that women hold fewer senior positions than men.

Bates et al.[23] propose that a lack of available mentorship and sponsorship (i.e., professional advocating) for women may contribute to gender disparities. In addition, Shah et al.[15] found a significant association between the gender of the first and last authors in the ophthalmology literature, suggesting that mentor-mentee relationships may be more likely to form between authors of the same gender. Therefore, limited numbers of senior women faculty members may perpetuate disparities in academic publishing.[2,15] Feramisco et al.[7] similarly observed that women senior authors were more likely than male counterparts to publish articles with women first authors in the field of dermatology. In addition to lack of mentorship, considerations such as unconscious bias, institutional culture, tenure policies, and work-life balance may further impede women's ability to progress to higher academic ranks.[15,17,18,23] Within our study, the most common co-authorship pairings by 2020 in both *OPRS* and *Orbit* combined were male first authors with male senior authors (38.7%) and women first authors with male senior authors (31.4%). Within *OPRS* alone, all co-authorship pairings increased significantly over time from 1985 to 2020 except for articles published by male first authors with women senior authors (12.1%). The prevalence of the latter co-authorship pairing approached but did not reach statistical significance. For *Orbit*, all co-authorship pairings increased significantly over time from 1985 to 2020 except for articles published by women first authors with women senior authors (13%) and male first authors with women senior authors (21%), both of which approached but did not reach statistical significance. Within ASOPRS, the majority of fellowship program directors have historically been male.[5] This may explain in part why women first authors more frequently copublished articles with male senior authors than women senior authors.

Finally, an analysis of the geographic location of authors' institutional affiliation revealed that for both *OPRS* and *Orbit* combined, there has been a significant increase in the number of women first authors from North America, Europe, and Asia over time. Women first authors from South America, Australia, and Africa were underrepresented in all years studied. In regard to senior authorship, there was a significant increase in the number of women senior authors from North America and Europe for both journals combined over time. Women senior authors from Asia, South America, Australia, and Africa were underrepresented in all years studied. When analyzing *OPRS* alone, first authorship increased significantly for women from North America, Europe, and Asia, but senior authorship only increased significantly for those from North America. One possibility for the latter finding is that there is a higher number of women oculoplastic surgeons concentrated in North America, although data on the number of male versus female oculoplastic surgeons worldwide and by continent was not available for review to verify this. Future studies cross-analyzing trends in women first and senior authorship by continent and trends in the number of oculoplastic surgeons across the world would help to elucidate this hypothesis further.

Several limitations were present in this study. We presumed the final listed author to be the senior ranking member and the first author to be the primary writer, as is the common convention in academic publication. However, this may not always be the case, and credit may have been misattributed accordingly. Furthermore, 24 cases in which one or more authors' names could not be definitively identified as male or women were excluded.

Given that author gender was determined by inspection of first names by 2 of the principal investigators, there is additionally a possibility that misidentification of author gender could have occurred. The primary investigators used Google search or gender checker websites only in cases in which author gender was uncertain by inspection alone, not for every author included. Finally, our study was limited to 2 prominent oculoplastic journals as a proxy for the subspecialty, and it is possible that other trends may have emerged if a wider array of journals was evaluated.

Gender parity is a goal worth striving for, as gender diversity has been shown to improve collective problem solving, broaden viewpoints, and benefit scientific discovery.[24] Despite significant progress in terms of representation and academic productivity over recent decades, women oculoplastic surgeons remain underrepresented particularly in terms of senior authorship within 2 prominent subspecialty journals. These findings are consistent with the overall paucity of women in senior ranking academic positions within oculoplastics and the medical field in general. Given the value of gender diversity in medicine, we must continue to work toward narrowing and ultimately closing these persistent gender gaps.

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