AMERICAN ACADEMY OF OPHTHALMOLOGY®

Evaluation of Publications from the American Academy of Ophthalmology

A 5-Year Analysis of Ophthalmology Literature

Fritz Gerald P. Kalaw, MD,[1,2] Kiana Tavakoli, MD,[1,2] Sally L. Baxter, MD, MSc[1,2]

Objective: To analyze recent publications in *Ophthalmology*, the journal of the American Academy of Ophthalmology.

Design: Retrospective review of published articles.

Participants: No human participants were involved in the study.

Methods: Articles published in *Ophthalmology* from January 2018 to December 2022 were reviewed and analyzed.

Main Outcome Measures: Research and review articles were included and analyzed per the following: total number of published articles based on related subspecialty area, level of evidence using the modified Oxford level of evidence, number of citations, number of listed authors, gender of the corresponding author, country of affiliation of the corresponding and contributing author(s), and involvement of consortium(s), group(s), or committee(s).

Results: A total of 965 articles were included. The mean (standard deviation) number of authors per article was 8.6 (5.7) and the majority of corresponding authors were male (665, 70.7%). The greatest number of published articles were related to retina (296, 30.7%) followed by glaucoma (172, 17.8%). The greatest number of Preferred Practice Pattern guidelines were also related to retina (7/24, 29.1%), followed by cornea/dry eye syndrome/external disease (6/24, 25%). Retina (77) had the most level 1 evidence, glaucoma (30) for level 2 evidence, and retina for levels 3 (69) and 4 (65). There were 223 articles contributed by consortia/groups/committees, with most from retina (73, 32.7%) followed by glaucoma (40, 17.9%). The mean number of citations per subspecialty article was highest in retina (45.8/article), followed by uveitis (31.7/article). The United States had the greatest number of affiliated corresponding authors (544, 56.4%), followed by the United Kingdom (68, 7.0%). There were 357 (37.0%) articles with coauthors affiliated outside the corresponding author's country of affiliation, although with a downward trend over the most recent 5-year period. There has been an increasing trend in the number of authors and consortia/group/committee involvement in publications.

Conclusions: Although team science and collaborations have increased recently, ongoing efforts to diversify individuals, groups, and subspecialties may be needed.

Financial Disclosure(s): Proprietary or commercial disclosure may be found in the Footnotes and Disclosures at the end of this article.

Supplemental material available at www.ophthalmologyscience.org.

Evidence-based health care, previously evidence-based medicine, is considered to have modernized health care.[1] It integrates the best available evidence, the health care professional's expertise, and the patient's values to provide optimum care for a particular individual.[2,3] Incorporating the best scientific evidence from high-quality research is as important as the other components, although this should be conceptualized as a situated practice in treating the patient rather than research-based judgment.[1]

Research has been an integral part of decision-making in medicine. High-quality research should be objective with rigorous scientific methodology.[4] One potential indicator of the quality of research is the number of times the paper has been cited.[5] The number of citations gives the journal a metric on how well a fellow researcher or investigator influences their research. Certain metrics include Impact Factor and CiteScore—defined as the number of citations received in 2 and 3 years by papers published in a given period, divided by the number of papers published in a certain period.[6] Another metric of quality is the level of evidence generated, and several frameworks have been developed to measure the level of evidence. Originally described in

https://doi.org/10.1016/j.xops.2023.100395
ISSN 2666-9145/23

1979, its purpose was to develop recommendations on health exams and base the recommendations on evidence in the medical literature. The levels of evidence offer a guide and are considered an important component of evidence-based health care.[7]

Since the late 1800s, the availability of ophthalmology journals have arisen; to date, there are > 130 comprehensive and subspecialty ophthalmology journals worldwide.[8] One of the highest-impact journals in the field of ophthalmology is the American Academy of Ophthalmology journal, *Ophthalmology*, which has been publishing articles since 1978. *Ophthalmology* publishes articles from all ophthalmology subspecialties and other relevant articles relating to the sense of sight. Its 2021 Impact Factor was 14.277, with a CiteScore of 17.9. Its acceptance rate is 14%.[9] It is widely considered a reputable source of ophthalmology literature and high-quality research. *Ophthalmology* introduced extension journals for retina and glaucoma in response to its growing research within the 2 subspecialties. *Ophthalmology Retina* and *Ophthalmology Glaucoma* started publishing articles in 2017 and 2018, respectively.

Publication trends can be analyzed to better understand the overall direction of scientific inquiry and the nature of scientific collaboration in various fields. For example, reviews in top general clinical ophthalmic journals have been previously performed.[10–12] These prior studies focused on identifying specific disparities and noted specific gaps in representation among gender and subspecialty collectively. In addition, a prior study has examined gender disparities in publications and research output.[13] This was another dimension we were interested in including in this analysis, particularly given the increasing awareness of gender disparities in ophthalmology as a field overall in recent years.[14–16] Although the reviews provided insights regarding particular gaps, a more comprehensive analysis of the available data of each article, along with analyses of levels of evidence, has not been investigated. In addition, with the availability of extension journals *Ophthalmology Retina* and *Ophthalmology Glaucoma* that were initiated within the last 6 years due to the abundance of their respective studies, one of the goals of this 5-year evaluation of articles is to better characterize the most recent publications and examine the representation of all subspecialties in the *Ophthalmology* journal. The purpose of this study was to review and evaluate publications in *Ophthalmology* across a 5-year period (2018–2022). Our group aimed to divulge different characteristics of published articles to help understand the current state of ophthalmic research and identify gaps to potentially improve the representation of different areas in the field of vision science.

Methods

No human participants were directly involved in this study, as the data were obtained from previously published articles from *Ophthalmology*. Therefore, this study did not require institutional review board approval. This study adhered to the Declaration of Helsinki.

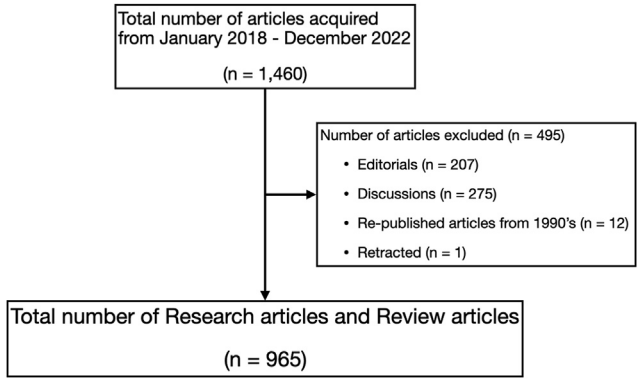

Figure 1. Diagram for acquiring all *Ophthalmology* articles from January 2018 to December 2022.

Literature Review

Elsevier-published journals from *Ophthalmology* were acquired using the ScienceDirect online platform.[17] The University of California San Diego Library provided access to full-text articles. Research articles and review articles published electronically and as print versions from January 1, 2018 to December 31, 2022 (Volumes 125–129, Issues 1–12) were identified and included in the analysis. Research articles and review articles were categorized in the ScienceDirect platform. Editorials, discussions (including pictures and perspectives and pictures and phylogeny), errata, correspondence, and short communications were excluded.

Parsing and Analysis of Articles

A careful and thorough manual review of the title, authors, affiliations, abstract, and full text of each article was performed. Each article was parsed into the following data elements: primary related ophthalmology subspecialty, study design, involvement of consortium/group/committee, number of listed authors, gender of the corresponding author, primary country of affiliation of the corresponding author, primary country of affiliation of the contributing authors (coauthors), and number of citations.

In cases of overlapping subspecialties (e.g., retinoblastoma can be categorized under pediatric ophthalmology, ocular oncology, or retina [pediatric]), the primary ophthalmology subspecialty considered was the corresponding author's subspecialty based on manual online search from publicly available websites. Conversely, in cases where ophthalmology subspecialty was not clearly defined (e.g., Medicare reimbursement, professional liability claims), the articles were considered under the category "others."

The gender of the corresponding author was derived based on pronouns used on publicly available sources such as hospital, clinic, or institutional affiliation websites. The list of authors from articles that were published by a consortium/group/committee was not included in calculating the number of listed authors. Contributors from the Preferred Practice Pattern (PPP) guidelines were not included in calculating the number of listed authors, country of the corresponding author, and number of citations.

The number of citations for all articles was obtained on the same day (4 April 2023), indexed from Scopus Preview, referenced in the ScienceDirect platform.

Additionally, clinical research study designs were aggregated and classified using the modified Oxford level of evidence framework.[18] This modified quality rating scheme was chosen for

Table 1. Characteristics of Articles per Related Subspecialty

	Cataract/ Refractive	Cornea/ DES/ED	Glaucoma	Low Vision	Neuro-Ophthalmology	Ocular Oncology	Oculofacial Plastic	Others	Pediatric	Retina	Uveitis	Total
Articles (%)	57 (5.9)	79 (8.2)	172 (17.8)	9 (0.9)	26 (2.7)	49 (5.1)	30 (3.1)	124 (12.9)	77 (8.0)	296 (30.7)	46 (4.7)	965 (100)
Authors (mean [SD])	215 (5.9 [2.8])	434 (7.9 [3.9])	1145 (8.8 [5.2])	43 (7.2 [2.3])	179 (8.1 [4.8])	372 (9.1 [4.2])	172 (8.6 [10.3])	852 (7.5 [5.2])	420 (9.1 [5.6])	2151 (9.9 [5.9])	294 (10.1 [9.5])	6277 (8.6 [5.7])
Corresponding author's gender* (%)												
Male	41 (74.5)	46 (63.0)	137 (81.0)	6 (75.0)	19 (73.1)	26 (53.1)	24 (80.0)	76 (61.8)	55 (75.3)	208 (72.0)	27 (58.7)	665 (70.7)
Female	14 (25.5)	27 (37.0)	32 (19.0)	2 (25.0)	7 (26.9)	23 (46.9)	6 (20.0)	47 (38.2)	18 (24.7)	81 (28.0)	19 (41.3)	276 (29.3)
Consortia/group/ committee articles (%)	10 (4.5)	19 (8.5)	40 (17.9)	2 (0.9)	4 (1.8)	9 (4.0)	11 (4.9)	9 (4.0)	28 (12.6)	73 (32.7)	18 (8.1)	223 (100)
PPP guidelines (%)	2 (8.3)	6 (25.0)	3 (12.5)	1 (4.2)	N/A	N/A	N/A	1† (4.2)	4 (16.7)	7 (29.2)	N/A	24 (100)
Total citations (mean citations)	1191 (21.7)	2242 (30.7)	4648 (27.5)	99 (12.4)	669 (25.7)	800 (16.3)	273 (9.1)	1949 (15.9)	2064 (28.3)	13 222 (45.8)	1458 (31.7)	28 615 (30.4)

DES = dry eye syndrome; ED = external disease; N/A = not applicable; PPP = Preferred Practice Pattern; SD = standard deviation.
*The corresponding authors from the PPP guidelines (24) were not included in calculating the total number of corresponding author's gender.
†PPP guidelines related to comprehensive adult medical eye evaluation.

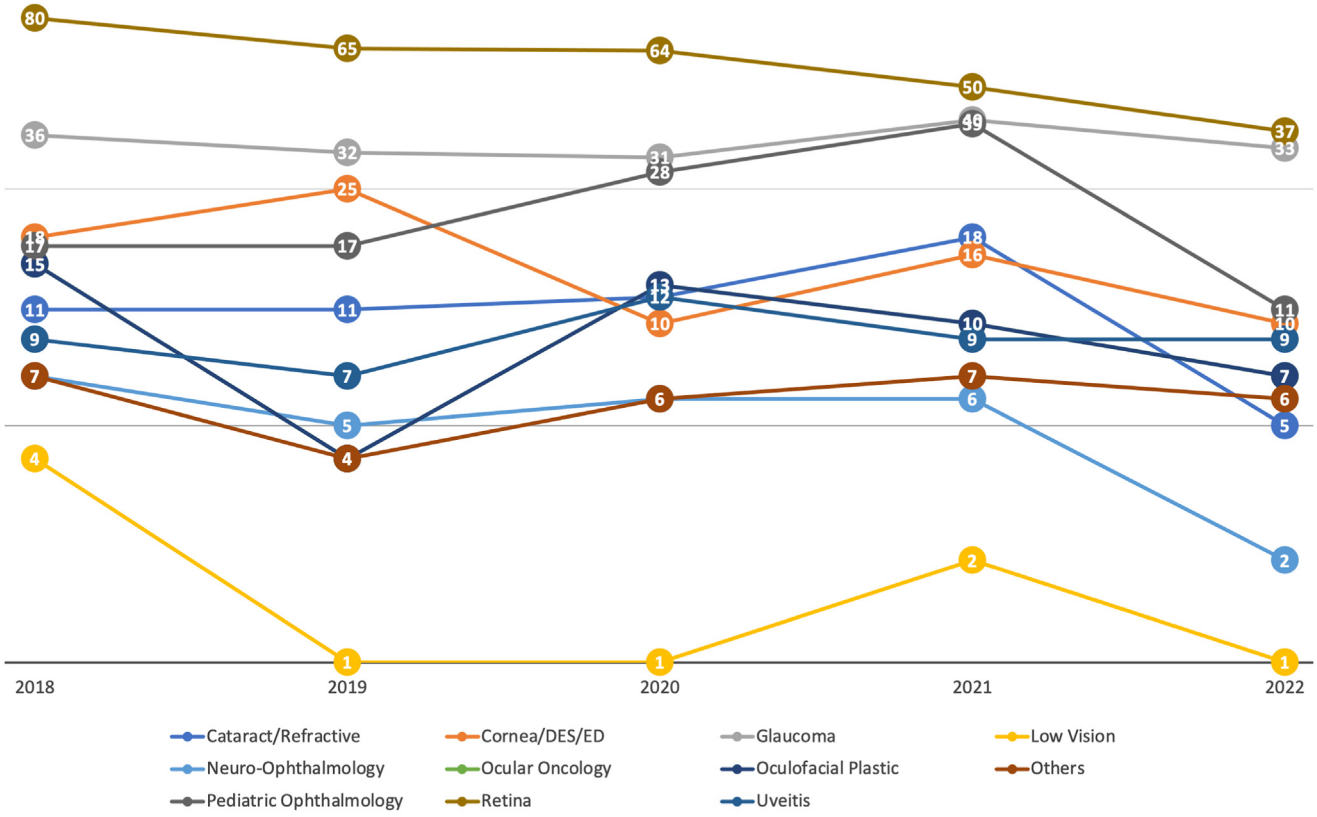

Figure 2. Annual trend of subspecialty articles. DES = dry eye syndrome; ED = external disease.

its straightforward approach to classifying levels of evidence from 1 to 5, with minimal subjective interpretation required. Briefly, level 5 evidence pertains to case report studies or opinions, level 4 evidence from case series or cross-sectional studies, level 3 evidence from case-control or retrospective cohort studies, level 2 evidence from nonrandomized controlled trials or prospective cohort studies, and level 1 for randomized controlled trials or systematic review with meta-analysis.[18] Articles that involved nonhuman subjects or were classified as basic research (e.g., deep learning algorithm, histology) that were deemed not to fit in any of the study designs for the level of evidence rating were not included in the rating scheme. Two analyses were done from the aggregated levels of evidence. First, we tabulated the overall counts of specific levels of evidence from all articles. Second, we calculated the proportion of articles within each level of evidence among each subspecialty using the following formula: the number of subspecialty articles with that specific level of evidence/total number of the same subspecialty articles. Longitudinal article trends were additionally analyzed in terms of collaboration, i.e., international coauthor, consortia/groups/committees, and the mean number of authors tracked over time by year of publication.

To validate the study design classification, an initial interobserver validation of 40 articles was performed. Discrepancies between classifications were discussed with the principal author (S.B.). A repeat interobserver validation of 200 articles using Cohen's Kappa coefficient was performed to quantify the level of agreement between 2 observers (F.K. and K.T.). The result from the interobserver validation provided an agreement of 80.2%, and a Kappa score of 0.76 ($P = 0.001$), indicating substantial agreement.

All data elements were tabulated and analyzed in a spreadsheet using Microsoft Excel version 16.58 (Microsoft Corporation) and presented as tables and figures. Figures were created using Microsoft PowerPoint version 16.58 (Microsoft Corporation). Linear trend lines for the mean number of authors, total number of consortia/group/committees, and total number of international coauthors per year were generated using embedded functionality in Microsoft Excel, accompanied by linear equations to quantify the rate of change over time and R-squared values."

Results

A total of 1460 published articles from *Ophthalmology* were acquired from the ScienceDirect platform from January 2018 to December 2022. Out of these articles, 965 met eligibility criteria and were included in the analysis (Fig 1). Table 1 shows the characteristics of articles per related subspecialty. Two hundred ninety-six (30.7%) articles were related to retina followed by glaucoma (172, 17.8%) and others (124, 12.9%; Fig 2). The mean (standard deviation) number of authors per article was 8.6 (5.7). The proportion of corresponding authors was 665/941 (70.7%) for males and 276/941 (29.3%) for females, with all related subspecialty articles, including the subcategory "others," dominated by male corresponding authors. Two hundred twenty-three articles were contributed by consortia/groups/committees, with 73 (32.7%) of articles related to

Table 2. Preferred Practice Pattern Guidelines Topics Provided per Subspecialty

Subspecialty	Topic
Cataract/refractive	1. Refractive Errors & Refractive Surgery[19] 2. Cataract in the Adult Eye[20]
Comprehensive ophthalmology	1. Comprehensive Adult Medical Eye Evaluation[21]
Cornea	1. Bacterial Keratitis[22] 2. Corneal Ectasia[23] 3. Corneal Edema and Opacification[24]
Dry eye syndrome	1. Dry Eye Syndrome[25]
External disease	1. Blepharitis[26] 2. Conjunctivitis[27]
Glaucoma	1. Primary Angle-Closure Disease[28] 2. Primary Open-Angle Glaucoma[29] 3. Primary Open-Angle Glaucoma Suspect[30]
Low vision	1. Vision Rehabilitation[31]
Pediatric ophthalmology and strabismus	1. Pediatric Eye Evaluations[32] a. Vision Screening in the Primary Care and Community Setting b. Comprehensive Ophthalmic Examination 2. Esotropia and Exotropia[33] 3. Amblyopia[34] 4. Adult Strabismus[35]
Retina	1. Idiopathic Epiretinal Membrane and Vitreomacular Traction[36] 2. Age-Related Macular Degeneration[37] 3. Diabetic Retinopathy[38] 4. Idiopathic Macular Hole[39] 5. Posterior Vitreous Detachment, Retinal Breaks, and Lattice Degeneration[40] 6. Retinal and Ophthalmic Artery Occlusions[41] 7. Retinal Vein Occlusions[42]

retina followed by glaucoma (40, 17.9%) and pediatric ophthalmology (28, 12.6%). A total of 24 PPP guidelines were published, 7 (29.2%) of which emerged from the retina subspecialty committees, followed by cornea/dry eye syndrome/external disease (6, 25%) and pediatric ophthalmology (4, 16.7%; Table 2). The average number of citations was highest in retina-related articles (45.6/article) followed by uveitis (31.7/article) and cornea/dry eye syndrome/external disease (30.7/article).

The United States had the greatest number of affiliated corresponding authors (544, 56.4%), followed by the United Kingdom (68, 7.0%) and Australia (46, 4.8%; Fig 3, Table S3). The articles with coauthors affiliated outside the corresponding author's country of affiliation were 357 (37.0%).

Overall, retina had the greatest number of articles (n = 77) corresponding to modified Oxford criteria level 1 evidence (the highest level of evidence consisting of randomized controlled trials or systematic reviews with meta-analysis), followed by glaucoma (n = 42) and pediatric ophthalmology (n = 35). Glaucoma had the most articles classified as level 2 evidence (n = 30), and retina for levels 3 (n = 69) and 4 (n = 65). Only retina had published level 5 evidence articles. In terms of proportions of level of evidence per subspecialty group, pediatric ophthalmology articles had the highest proportion of level 1 evidence studies (35/68, 51.5%), followed by cornea/dry eye syndrome/external disease (31/62, 50.0%) and oculofacial plastic and reconstructive surgery (13/27, 48.1%). Glaucoma (32/144, 20.8%) had the most proportion of level 2 evidence, cataract/refractive (15/41, 36.6%) for level 3 evidence, and neuro-ophthalmology (14/22, 63.6%) for level 4 evidence (Fig 4).

Further analysis of publication trends in terms of collaboration showed a slightly decreasing trend of international coauthorship collaboration, an increasing trend of publication from consortia/group/committees, and an increasing trend in the mean number of coauthors per published article (Fig 5).

Discussion

This study analyzed 965 research and review articles published by *Ophthalmology* over the last 5 years. Our key findings were: (1) there was a disproportionately higher proportion of male corresponding authors across all areas, (2) there was uneven representation of subspecialties, with retina and glaucoma comprising the majority of articles, and (3) trends suggest increasing team science and collaboration, including internationally.

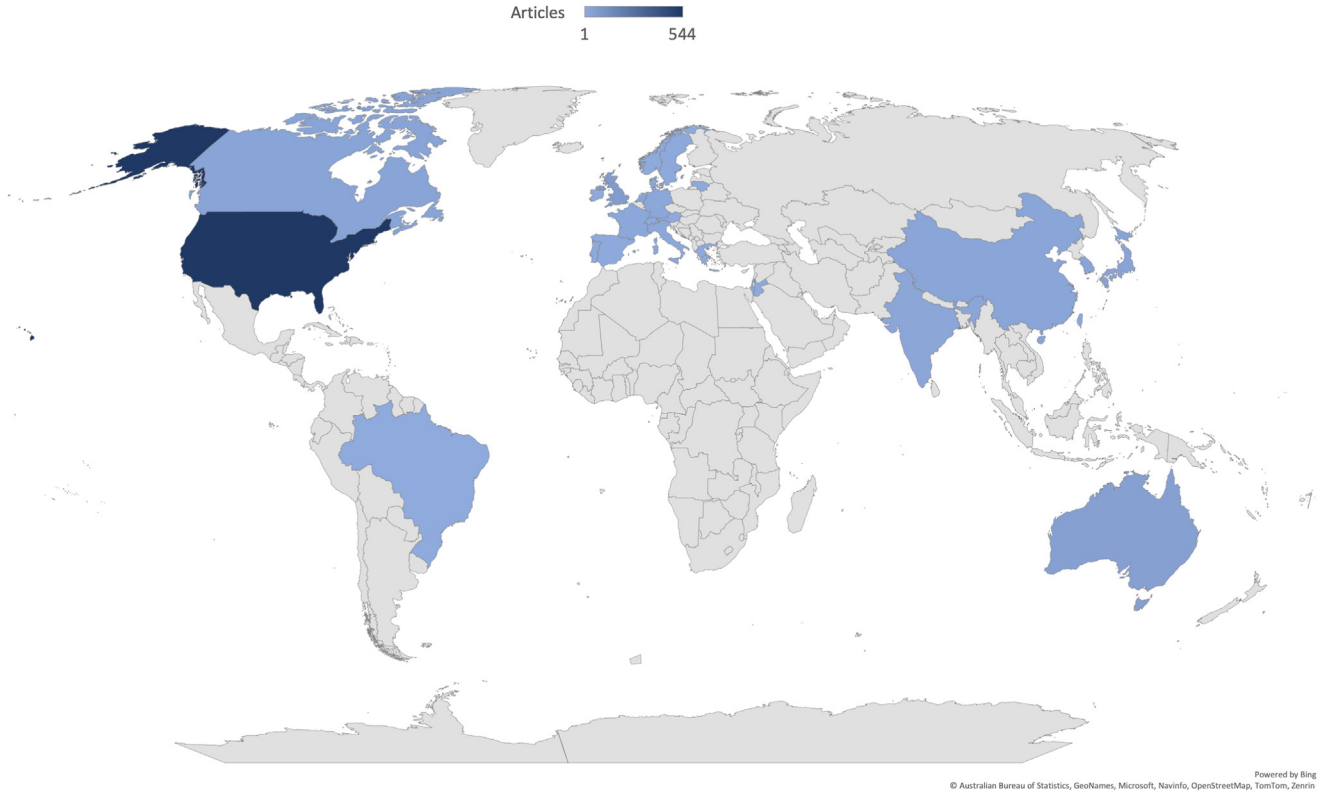

Figure 3. Heat map of affiliation of corresponding author based on country. All research and review articles from *Ophthalmology* obtained from January 2018 to December 2022. The top 5 countries with corresponding article contributions include the United States: 544, United Kingdom: 68, Australia: 46, Singapore: 31, and Japan: 29. Some countries (e.g., Singapore) with article contributions may not appear visible in the figure due to small geographic area. Table S1 provides the full list of countries with article contributions.

The first salient finding from our analysis was that the majority of articles had male corresponding authors (70.7%). This finding is consistent with a prior study by Kalavar et al,[43] which investigated the gender composition of authors from 2015 to 2019 from 4 comprehensive journals and 5 subspecialty journals in ophthalmology, and found that most corresponding authors (labeled in their study as "last authors") were males, and the average percentage of female corresponding authors was 27% across all journals (26% in *Ophthalmology*). The lowest was in *Retina* (22%), and the highest was in *Journal of American Association of Pediatric Ophthalmology and Strabismus* (47%). One possible reason for *Journal of American Association of Pediatric Ophthalmology and Strabismus* to have an approximate corresponding author proportion is that the total membership parity for the American Association of Pediatric Ophthalmology and Strabismus from 2000 to 2020 was 53% females and 47% males. Other subspecialties have greater gender proportion disparities, with underrepresentation of females (American Society of Ophthalmic Plastic and Reconstructive Surgeons, 21.6%; American Society of Cataract and Refractive Surgery, 24.8%; North American Neuro-Ophthalmology Society, 36.8%). The American Glaucoma Society and the American Society of Retina Specialists' gender representation was not obtained in the prior study. Related to this, the proportions of society leadership and award winners were noticeably lower in females.[44] These role model issues, combined with personal considerations like childbearing or child-rearing, lack of sufficient leave, and lack of flexibility in academic environments to allow women to stay on the academic career path, may represent some of the reasons for underrepresentation. Gender inequality is not only apparent in the research and leadership field. A study by Felfeli et al[45] reported differences in remuneration among female ophthalmologists, which was lower than male counterparts. This gender inequity is apparent not only in the field of ophthalmology but also in other specialty academic careers, which suggests a common set of barriers to academic career advancement for women.[46] Although the proportion of female members in the field of ophthalmology is gradually increasing,[14,44] consideration of other means of productivity, such as research leadership and pay gaps, should also be recognized and improved.

Another key finding from our study was the lopsided distribution of published articles by primary subspecialty, with the greatest representation from retina and glaucoma and relatively fewer articles published from other ophthalmic subspecialties. Since the start of the extension

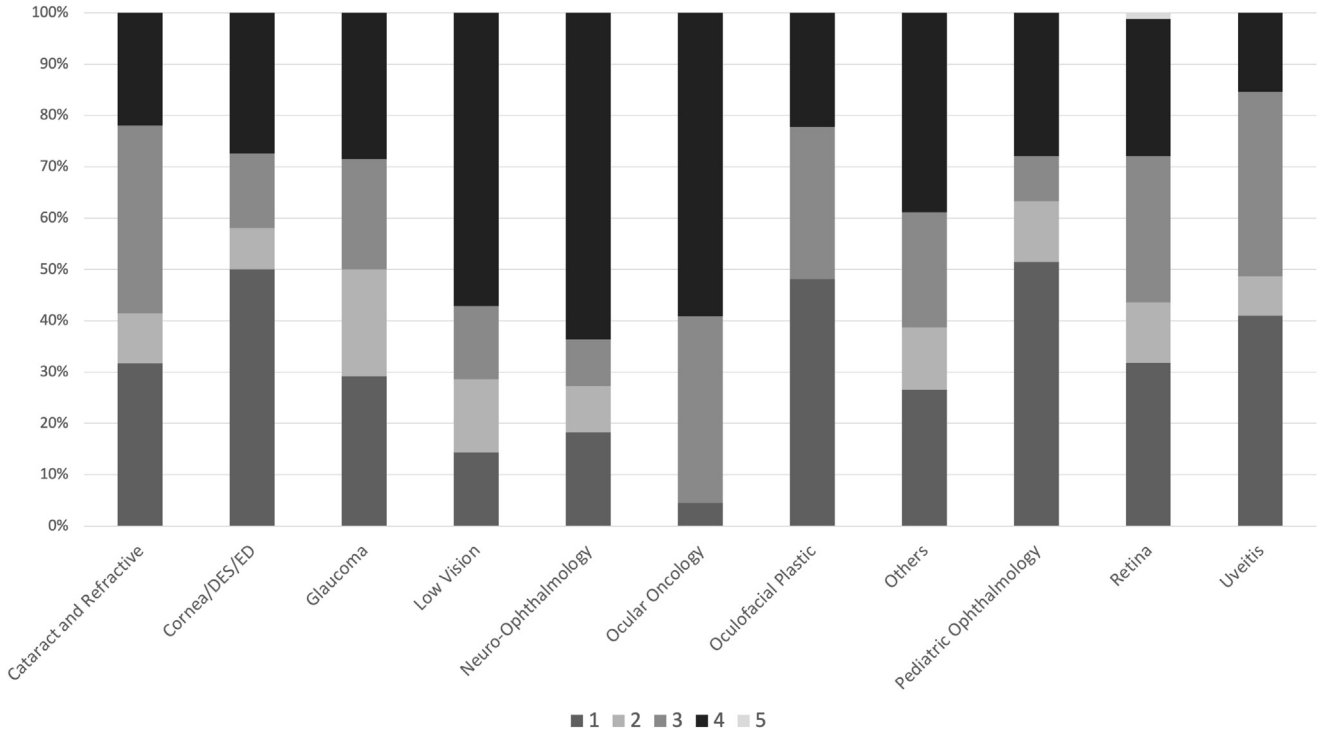

Figure 4. Stacked histogram of proportion of level of evidence among the group of articles in a particular subspecialty. DES = dry eye syndrome; ED = external disease.

journals in 2017 and 2018 to 2022, *Ophthalmology Retina* and *Ophthalmology Glaucoma* have published 715 and 285 articles (research and review combined). However, despite the creation of these 2 subspecialty journals during the same time period, nearly half (48%, 468/965) of articles within the main journal *Ophthalmology* were still related to retina and glaucoma. Upon analysis of the annual trend of publications per subspecialty, retina had a gradual decline in publishing *Ophthalmology* articles and a gradual increase in publishing in *Ophthalmology Retina*. Meanwhile, glaucoma had a stable publication rate in *Ophthalmology*, averaging 34.4 articles per year, with a progressive increase in publishing in *Ophthalmology Glaucoma*. Retina and glaucoma consortia also provided a high proportion of articles (51.8% combined), and retina led the average number of citations per subspecialty article (45.6) in this 5-year period. Perhaps one reason for having a high number of retina-related articles is the greater proportion of retina specialists. A 2015 survey from the American Academy of Ophthalmology showed that most subspecialists are retina specialists (22.3%) followed by cataract/intraocular lens specialists (14.4%) and glaucoma specialists (9.0%).[47] Another probable reason is the vast number of clinical trials related to retina.[48] Preferred Practice Pattern guidelines are based on the best available scientific evidence, such as clinical trials. Since retina has substantiated high levels of evidence in research, it can be reflected in the amount of PPP guidelines published over the past 5 years. It may be worth examining disciplinary or subspecialty diversity in the journal periodically to ensure exposure to a wide range of subspecialty topics for the broad, general ophthalmology readership.

The contribution of lead specialists and investigators from countries other than the United States was also remarkable (43.6%). In addition, collaboration with co-authors from other countries has been documented in 37% of all articles, making the journal's authors likely diverse in race and ethnicity, although this was not directly analyzed given the lack of consistent race/ethnicity information regarding authors. An article by Forrester about diversity in science states that shifting from diversity to inclusion and equity should be focused on to break down the barriers in academia.[49] This is important as data, expertise, and opinions from different races and ethnicities can provide more generalizable information. Collaboration and team science are seen in published *Ophthalmology* articles, also seen from the average number of authors per article of 8.65, with a gradually increasing trend annually. These coauthor collaborations seen either from the international representation or from the mean number of authors may have been possible due to engagement in international conferences, international groups, international observerships, fellowships or postdoctoral training, or even by the plain interest of an investigator to reach out to fellow investigators. Providing mentoring opportunities and continued support is essential in diversifying the ophthalmology workforce in the younger population and even for experienced specialists to broaden their knowledge in the field.[50]

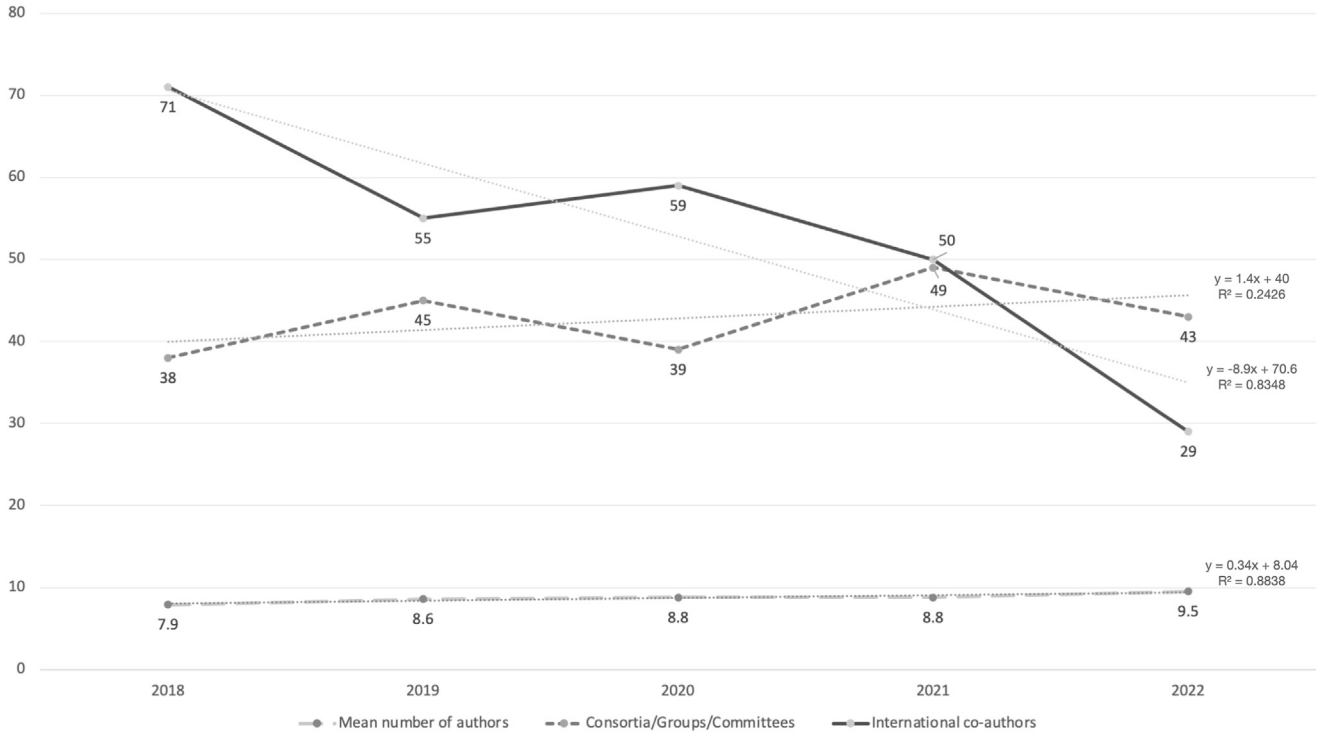

Figure 5. Annual team science publication trends representing the mean number of authors (bottom), consortia/groups/committees (middle) article publications, and international coauthors (top) line graphs. Trend lines are also shown with corresponding y and r-squared values.

There are a few limitations in this study. First, we only analyzed 1 journal and examined a 5-year period. The manual review required to assess the level of evidence among the studies made it difficult to analyze a broader cohort of articles from multiple journals or a longer period of time in detail. The study included only research articles and review articles. Including all published articles (e.g., pictures and perspectives, pictures and phylogeny, and editorials) may uncover more subspecialty contributions. Additionally, only the corresponding author's gender was recorded. Including the gender of all contributing authors may reflect the overall diversity of authorship. Another limitation is that the citation metrics for the latest years were included in computing the average number of citations. Citations from the 2022 published articles ranged from 0 to 52 and because recent articles may have ongoing citations in the coming years, this may have led to a slight underestimation of citations from articles published more recently. The precise level of evidence may be different if a different rating scale was used, such as the Scottish Intercollegiate Guideline Network used in the PPP guidelines. Further, any evidence framework requires some level of subjective evaluation, although our interobserver agreement was fairly high in this analysis. Although there was a relatively high level of agreement regarding level of evidence, this process still has some subjectivity, which may impact the results of variations of levels of evidence by subspecialty. The assignment of gender was based on derivation from pronouns provided on publicly available sources and may not reflect authors' self-report. Also, the author's self-reported race and ethnicity were not available; hence, we analyzed the author's country of affiliation to examine geographic diversity. This does not reflect the author's race and ethnicity. Lastly, some articles may be categorized into multiple subspecialties. This study categorized only 1 subspecialty per article, and when multiple specialties could be labeled, we used the corresponding author's primary subspecialty based on institutional websites, and this approach may not reflect the totality of subspecialties related to the article.

In conclusion, the retina and glaucoma subspecialties provided nearly half (48%) of the publications in *Ophthalmology* despite the availability of extension journals. In addition, there were variations in levels of evidence across all subspecialties. Over the last 5 years, there has been a trend of increasing numbers of coauthors and consortia/group/committee involvement in publications. A substantial proportion of publications (37%) that have included international coauthors have also been noted, although in a downward trend over the most recent 5-year period. Gender analysis of corresponding authors appeared unbalanced, with males contributing the majority of publications. Efforts to expand the diversity of subspecialties and authors may broaden research in the field of eye care.

Footnotes and Disclosures

Originally received: June 5, 2023.
Final revision: August 21, 2023.
Accepted: September 5, 2023.
Available online: September 11, 2023. Manuscript no. XOPS-D-23-00121.

[1] Division of Ophthalmology Informatics and Data Science, Viterbi Family Department of Ophthalmology and Shiley Eye Institute, University of California San Diego, La Jolla, California.

[2] Division of Biomedical Informatics, Department of Medicine, University of California San Diego, La Jolla, California.

Disclosure(s):

All authors have completed and submitted the ICMJE disclosures form.

The author(s) have made the following disclosure(s): S.L.B.: Receipt of equipment, materials, drugs, medical writing, gifts, or other services—Optomed and Topcon; Consulting fees— voxelcloud.io; Speaking fees—iVista Medical Education.

This study was supported by the National Institutes of Health (Grants OT2OD032644 [F.G.P.K.], DP5OD29610 and P30EY022589 [S.L.B.]) Bethesda, MD, USA and by an unrestricted departmental grant from Research to Prevent Blindness (New York, NY, USA) (S.L.B.). The funding organizations had no role in the design or conduct of this research.

HUMAN SUBJECTS: No human participants were directly involved in this study, as the data were obtained from previously published articles from Ophthalmology. Therefore, this study did not require institutional review board approval. This study adhered to the Declaration of Helsinki.

Author Contributions:

Conception and design: Kalaw, Tavakoli, Baxter

Data Collection: Kalaw, Tavakoli, Baxter

Analysis and interpretation: Kalaw, Tavakoli, Baxter; Obtained funding: The study was supported by National Institutes of Health (NIH, Bethesda, Maryland) awards DP5OD029610, P30EY022589, and OT2OD032644.

Overall responsibility: Kalaw, Tavakoli, Baxter

An abstract describing the study findings has been submitted for presentation at the American Academy of Ophthalmology Annual Meeting 2023.

Abbreviations and Acronyms:
PPP = Preferred Practice Pattern.

Keywords:
Evidence-based medicine, Health-care disparities, Journal article, *Ophthalmology*, Literature.

Correspondence:
Sally L. Baxter, MD, MSc, 9415 Campus Point Drive MC 0946, La Jolla, CA 92093. E-mail: s1baxter@health.ucsd.edu.

References

1. Wieringa S, Engebretsen E, Heggen K, Greenhalgh T. Has evidence-based medicine ever been modern? A latour-inspired understanding of a changing EBM. *J Eval Clin Pract*. 2017;23:964−970.
2. Masic I, Miokovic M, Muhamedagic B. Evidence based medicine - new approaches and challenges. *Acta Inform Med*. 2008;16:219.
3. Sackett DL. Finding and applying evidence during clinical rounds the "evidence cart." *JAMA*. 1998;280:1336.
4. Groves T. What makes a high quality clinical research paper? *Oral Dis*. 2010;16:313−315.
5. Caon M, Trapp J, Baldock C. Citations are a good way to determine the quality of research. *Phys Eng Sci Med*. 2020;43:1145−1148.
6. Fernandez-Llimos F. Differences and similarities between journal impact factor and CiteScore. *Pharm Pract*. 2018;16:1282.
7. Burns PB, Rohrich RJ, Chung KC. The levels of evidence and their role in evidence-based medicine. *Plast Reconstr Surg*. 2011;128:305−310.
8. Scimago Journal & country rank. https://www.scimagojr.com/journalrank.php?category=2731. Accessed May 30, 2023.
9. Ophthalmology by American Academy of Ophthalmology. https://www.aaojournal.org/. Accessed May 30, 2023.
10. Kumar A, Cheeseman R, Durnian JM. Subspecialization of the ophthalmic literature. *Ophthalmology*. 2011;118:1211−1214.
11. Zloto O, Souied E, Saeed P, et al. Publication trends in clinical ophthalmology journals in the last decade. *Eur J Ophthalmol*. 2022;32:1406−1410.
12. Mimouni M, Zayit-Soudry S, Segal O, et al. Trends in authorship of articles in major ophthalmology journals by gender, 2002−2014. *Ophthalmology*. 2016;123:1824−1828.
13. Patel SH, Truong T, Tsui I, et al. Gender of presenters at ophthalmology conferences between 2015 and 2017. *Am J Ophthalmol*. 2020;213:120−124.
14. Steren BJ, Yee P, Rivera PA, et al. Gender distribution and trends of ophthalmology subspecialties, 1992-2020. *Am J Ophthalmol*. 2023. https://doi.org/10.1016/j.ajo.2023.04.012.
15. Shah DN, Volpe NJ, Abbuhl SB, et al. Gender characteristics among academic ophthalmology leadership, faculty, and residents: results from a cross-sectional survey. *Ophthalmic Epidemiol*. 2010;17:1−6.
16. Gong D, Winn BJ, Beal CJ, et al. Gender differences in case volume among ophthalmology residents. *JAMA Ophthalmol*. 2019;137:1015.
17. Ophthalmology by ScienceDirect. https://www.sciencedirect.com/journal/ophthalmology. Accessed May 30, 2023.
18. JAMA Network. https://jamanetwork.com/journals/jamaophthalmology/pages/instructions-for-authors. Accessed May 30, 2023.
19. Chuck RS, Jacobs DS, Lee JK, et al. Refractive errors & refractive surgery preferred practice pattern®. *Ophthalmology*. 2018;125:P1−P104.
20. Miller KM, Oetting TA, Tweeten JP, et al. Cataract in the adult eye preferred practice pattern. *Ophthalmology*. 2022;129:P1−P126.
21. Chuck RS, Dunn SP, Flaxel CJ, et al. Comprehensive adult medical eye evaluation preferred practice pattern®. *Ophthalmology*. 2021;128:P1−P29.
22. Lin A, Rhee MK, Akpek EK, et al. Bacterial keratitis preferred practice pattern®. *Ophthalmology*. 2019;126:P1−P55.
23. Garcia-Ferrer FJ, Akpek EK, Amescua G, et al. Corneal ectasia preferred practice pattern®. *Ophthalmology*. 2019;126:P170−P215.
24. Farid M, Rhee MK, Akpek EK, et al. Corneal edema and opacification preferred practice pattern®. *Ophthalmology*. 2019;126:P216−P285.
25. Akpek EK, Amescua G, Farid M, et al. Dry eye syndrome preferred practice pattern®. *Ophthalmology*. 2019;126:P286−P334.

26. Amescua G, Akpek EK, Farid M, et al. Blepharitis preferred practice pattern®. *Ophthalmology*. 2019;126:P56–P93.
27. Varu DM, Rhee MK, Akpek EK, et al. Conjunctivitis preferred practice pattern®. *Ophthalmology*. 2019;126:P94–P169.
28. Gedde SJ, Chen PP, Muir KW, et al. Primary angle-closure disease preferred practice pattern®. *Ophthalmology*. 2021;128:P30–P70.
29. Gedde SJ, Vinod K, Wright MM, et al. Primary open-angle glaucoma preferred practice pattern®. *Ophthalmology*. 2021;128:P71–P150.
30. Gedde SJ, Lind JT, Wright MM, et al. Primary open-angle glaucoma suspect preferred practice pattern®. *Ophthalmology*. 2021;128:P151–P192.
31. Fontenot JL, Bona MD, Kaleem MA, et al. Vision rehabilitation preferred practice pattern®. *Ophthalmology*. 2018;125:P228–P278.
32. Wallace DK, Morse CL, Melia M, et al. Pediatric eye evaluations preferred practice pattern®. *Ophthalmology*. 2018;125:P184–P227.
33. Wallace DK, Christiansen SP, Sprunger DT, et al. Esotropia and exotropia preferred practice pattern®. *Ophthalmology*. 2018;125:P143–P183.
34. Wallace DK, Repka MX, Lee KA, et al. Amblyopia preferred practice pattern®. *Ophthalmology*. 2018;125:P105–P142.
35. Dagi LR, Velez FG, Archer SM, et al. Adult Strabismus preferred practice pattern®. *Ophthalmology*. 2020;127:P182–P298.
36. Flaxel CJ, Adelman RA, Bailey ST, et al. Idiopathic epiretinal membrane and vitreomacular traction preferred practice pattern®. *Ophthalmology*. 2020;127:P145–P183.
37. Flaxel CJ, Adelman RA, Bailey ST, et al. Age-related macular degeneration preferred practice pattern®. *Ophthalmology*. 2020;127:P1–P65.
38. Flaxel CJ, Adelman RA, Bailey ST, et al. Diabetic retinopathy preferred practice pattern®. *Ophthalmology*. 2020;127:P66–P145.
39. Flaxel CJ, Adelman RA, Bailey ST, et al. Idiopathic macular hole preferred practice pattern®. *Ophthalmology*. 2020;127:P184–P222.
40. Flaxel CJ, Adelman RA, Bailey ST, et al. Posterior vitreous detachment, retinal breaks, and lattice degeneration preferred practice pattern®. *Ophthalmology*. 2020;127:P146–P181.
41. Flaxel CJ, Adelman RA, Bailey ST, et al. Retinal and ophthalmic artery occlusions preferred practice pattern®. *Ophthalmology*. 2020;127:P259–P287.
42. Flaxel CJ, Adelman RA, Bailey ST, et al. Retinal vein occlusions preferred practice pattern®. *Ophthalmology*. 2020;127:P288–P320.
43. Kalavar M, Watane A, Balaji N, et al. Authorship gender composition in the ophthalmology literature from 2015 to 2019. *Ophthalmology*. 2021;128:617–619.
44. Azad AD, Chandramohan A, Li AS, et al. Representation of women in ophthalmology subspecialty societies over 20 years. *Ophthalmology*. 2022;129:587–590.
45. Felfeli T, Canizares M, Jin YP, Buys YM. Pay gap among female and male ophthalmologists compared with other specialties. *Ophthalmology*. 2022;129:111–113.
46. Lee MO, Flores B, Fassiotto M, Hobgood C. Career advancement among women physicians in nine academic medicine specialties. *J Womens Health*. 2023. https://doi.org/10.1089/jwh.2022.0464.
47. AAO 2016 exhibit prospectus. https://www.aao.org/assets/146026ad-18d8-48b7-acba-8305682a6b9b/636072258132130000/aao-2016-. Accessed May 30, 2023.
48. CenterWatch. https://www.centerwatch.com/clinical-trials/listings/therapeutic-area/13/ophthalmology/. Accessed May 30, 2023.
49. Forrester N. Diversity in science: next steps for research group leaders. *Nature*. 2020;585:S65–S67.
50. Woreta FA, Gordon LK, Knight OJ, et al. Enhancing diversity in the ophthalmology workforce. *Ophthalmology*. 2022;129:e127–e136.