

Gender of Award Recipients in Major Ophthalmology Societies



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- **PURPOSE:** To assess the gender distribution of major ophthalmology society award recipients
- **DESIGN:** Retrospective, observational study
- **METHODS:** The study population included award recipients from 9 ophthalmologic societies: American Academy of Ophthalmology, American Association for Pediatric Ophthalmology and Strabismus, American Glaucoma Society, American Society of Cataract and Refractive Surgery (ASCRS), American Society of Ophthalmic Plastic and Reconstructive Surgery, American Society of Retina Specialists, American Uveitis Society, Cornea Society, and North American Neuro-Ophthalmology Society. A gender-specific pronoun and a photograph of each award recipient were extracted from professional websites to assign their gender. Main outcome measures were gender distribution by award society, year (1970-2020), type (lectureship or not), category (achievement, education, research contribution, research item, international member achievement, public service–global health, service to society), and training level.
- **RESULTS:** Out of 2,150 recipients for 78 awards, 1,606 (74.7%) were men and 544 (25.3%) were women. The proportion of women recipients increased from 0% in 1970 to 33.2% in 2020 ($P < .001$). Women representation varied within each society ($P < .01$), with ASCRS having the highest percentage (40.8%). Women received 11.0% of awards accompanied by a lecture. Women received a significantly greater proportion of research-related awards than achievement or service awards. Awards for trainees and early-career ophthalmologists had a greater proportion of women (39.8%) than the rest of the awards (21.5%) ($P < .001$).
- **CONCLUSIONS:** Overall, women received awards (25.3%) at a higher rate than the average 1970-2020 American gender distributions of oph-

thalmologists. However, women are still under-represented in many award categories and subspecialties. (*Am J Ophthalmol* 2021;231: 120–133. © 2021 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>))

WITH WOMEN OUTNUMBERING MEN AMONG NEWLY admitted medical students,¹ the gender gap in ophthalmology has progressively diminished in the past decade. Women compose approximately a quarter of the ophthalmology workforce and nearly half of the ophthalmology residents.^{2,3} Prior research has shown an increase in the number of women presenting at conferences,⁴ publishing in ophthalmology journals,⁵ and working in academic centers.⁶ Despite these positive trends, women ophthalmologists are under-represented at senior academic ranks,⁷ editorial board positions,⁵ and compensation.⁸ Potential disparities in recipients of society awards have yet to be investigated in ophthalmology.

Awards given by medical societies may help increase the percentage of women in leadership and other senior academic positions.⁹ The gender disparity in award recipients highlight the need to narrow the widening gender gap in achievement recognition.¹⁰ In the ophthalmology literature, little is known about award recipient gender distribution beyond research grants. Chao and associates¹¹ report gender differences in National Institutes of Health (NIH) National Eye Institute (NEI) Career and Development Grant (K grant) awardees in ophthalmology that diminished with time. Another study by Svider and associates reported that men had higher mean NIH awards and total funding than their women counterparts in ophthalmology.¹²

Recent studies have assessed the gender disparity among award recipients in societies, such as anesthesiology,¹³ dermatology,¹⁴ neurology,¹⁵ otolaryngology,¹⁶ orthopedic surgery,¹⁷ psychiatry,¹⁸ radiology,¹⁹ urology,¹⁰ and 20 other surgical specialty societies.²⁰ Although some medical societies are more gender-balanced than others in their award distribution, they all highlight the necessity for greater efforts to achieve equal women representation. This would foster an inclusive environment for learning, teaching, and growth, continuing to bring attention to and action regard-

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ing women under-representation in awards and leadership roles. It is necessary to increase equity awareness, or lack thereof, among women and men. Advised actions such as promoting mentorship and removing bias can make it more fair for women to be represented equally compared with men.^{19,21}

This is the first study to assess the gender distribution of major ophthalmology and subspecialty societies over the past 50 years. We examine gender differences while accounting for award society and year and further investigate other variables at the award and award recipient level that may have an effect on the gender disparities in award recipients.

METHODS

This observational study was exempted by the Stanford University IRB/Ethics Committee (eProtocol: 57659-IRB 7: Registration 5136). The described research adhered to the tenets of the Declaration of Helsinki. We queried 15 major professional ophthalmology clinical and certifying societies, including the American Academy of Ophthalmology (AAO), American Association of Ophthalmic Oncologists and Pathologists (AAOOP), American Association for Pediatric Ophthalmology and Strabismus (AAPOS), American Board of Ophthalmology (ABOP), American Glaucoma Society (AGS), American Ophthalmological Society (AOS), American Society of Cataract and Refractive Surgery (ASCRS), American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS), American Society of Ophthalmic Trauma (ASOT), American Society of Retina Specialists (ASRS), American Uveitis Society (AUS), Cornea Society, North American Neuro-Ophthalmology Society (NANOS), Retina Society, and Women in Ophthalmology (WIO) (Figure 1).

This selection was guided by the AAO's roster of subspecialty and special interest societies directory.²² All societies are based in the United States except NANOS and the Cornea Society. Because there are no US neuro-ophthalmology or cornea societies, NANOS, a professional neuro-ophthalmology organization with American and Canadian members, and the Cornea Society, an international organization whose headquarters are in the United States, were included.

All societies typically give awards during their annual meetings. Awards are defined as the honors, prizes, grants, and named lectureships displayed on each society's website. Award data were compiled from annual meeting brochures or lists displayed on the official society websites. If award data were not accessible because they were not fully and publicly displayed on the society's website, we contacted the society's official administrator. If the administrator did not respond to the initial e-mail query, we further contacted an

executive committee member listed on the society's website to obtain award details (name, description, and years).

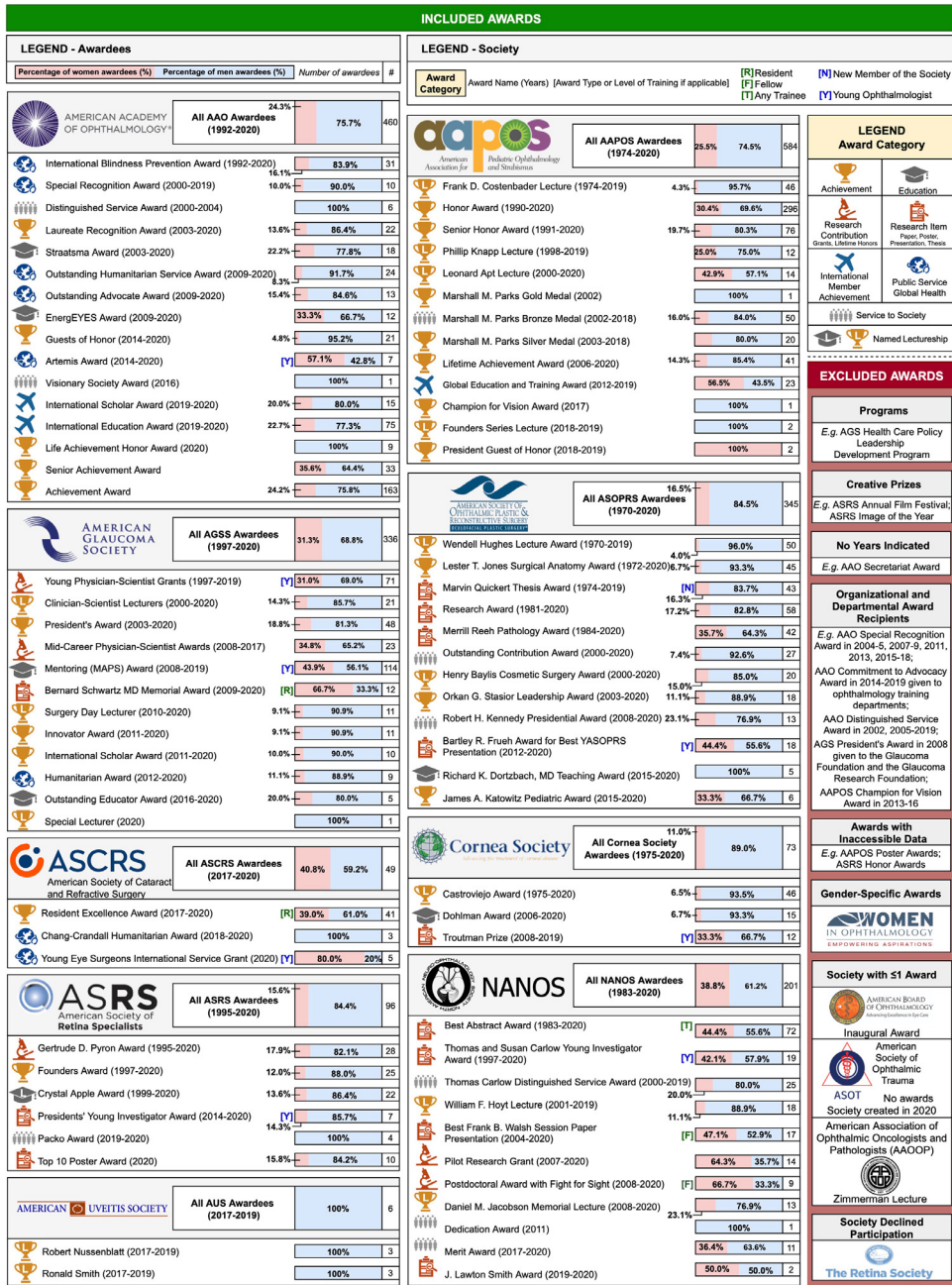
Societies that gave 1 award or none (AOS: no award, ASOT: no award, ABOP: Inaugural Award, AAOOP: Zimmerman lecture) and those that declined to provide their data concerning awards (Retina Society) were considered ineligible. Award exclusion criteria included programs, prizes related to creative pieces (photographs, films), awards given to organizations/groups, and gender-specific awards (WIO).

Professional websites (eg, LinkedIn, Twitter, ResearchGate, university pages, conference pages, private practice pages, newspapers) were searched to extract a gender-specific pronoun (eg, he, him, she, her, they, them) and a photograph of each award recipient. Award recipients' degrees and country of affiliated institutions were also collected. If a gender-specific pronoun or photograph was not available through Internet searches performed by A.X.N., S.R., and A.B., the award recipient's first name and country of affiliated institution were entered into Gender-API (<https://gender-api.com/>), the most accurate gender assignment application program interface with 98% accuracy.^{23,24}

Primary outcomes assessed were gender distributions by award classifications, which include award society (AAO, AAPOS, AGS, ASCRS, ASOPRS, ASRS, AUS, Cornea Society, NANOS), time period (award year), award type (award accompanied by a lecture or not), award category (achievement, education, research contribution, research item, international member achievement, public service–global health, service to society), and award level of training (trainee vs early-career ophthalmologists vs nonspecified). The award type, category, and level of training were determined based on the award name and its description on the society's official website and/or brochures.

A lectured award is typically a prestigious recognition accompanied by an educational talk given by the award recipient during the society's annual meeting. Awards in the achievement category recognize exceptional individuals who have greatly contributed to the society's respective field (ophthalmology, pediatric ophthalmology, glaucoma, oculoplastics, or neuro-ophthalmology). Awards in the education category recognize exceptional educators and mentors, as well as excellent mentees. The research contribution category includes awards related to lifetime honors in research and grants. The research item category highlights outstanding papers, theses, and research presentations (ie, poster or oral).

As defined in its name, the international member achievement category encompasses all awards exclusively reserved for international members, often created to support their attendance to societies' annual meetings. The awards in the public service–global health category typically highlight the work done by ophthalmologists in their community or around the world to improve eye care. The awards in the service to society category are given to individuals who have made significant contributions to the



EXCLUDED AWARDS

Programs	Creative Prizes	No Years Indicated	Organizational and Departmental Award Recipients	Awards with Inaccessible Data	Gender-Specific Awards	Society with ≤1 Award
E.g. AGS Health Care Policy Leadership Development Program	E.g. ASRS Annual Film Festival, ASRS Image of the Year	E.g. AAO Secretarial Award	E.g. AAO Special Recognition Award in 2004-5, 2007-9, 2011, 2013, 2015-18; AAO Commitment to Advocacy Award in 2014-2019 given to ophthalmology training departments; AAO Distinguished Service Award in 2002, 2005-2019; AGS President's Award in 2008 given to the Glaucoma Foundation and the Glaucoma Research Foundation; AAPOS Champion for Vision Award in 2013-16	E.g. AAPOS Poster Awards; ASRS Honor Awards	WOMEN IN OPHTHALMOLOGY EXPERIENCE AWARDS	AMERICAN BOARD OF OPHTHALMOLOGY Newly Elected to the Board Inaugural Award American Society of Ophthalmic Trauma ASOT No awards Society created in 2020 American Association of Ophthalmic Oncologists and Pathologists (AAOOP) Zimmerman Lecture Society Declined Participation The Retina Society

FIGURE 1. All awards (included and excluded) from major ophthalmology societies. Included awards are listed by society with details about gender, number of awards, and award category. The awards are labeled with their level of training and type (if applicable). Excluded awards are listed by award category (programs, creative prizes, organizations/groups, data not available) and by society category (gender-specific awards, ≤1 award given, participation declined). The logos are from the societies' websites: AAO (aao.org), AAPOS (aapos.org), AGS (americanglaucomasociety.net), ASCRS (ascrs.org), ASOPRS (asoprs.org), ASRS (asrs.org), AUS (uveitissociety.org), Cornea Society (corneasociety.org), NANOS (nanosweb.org), WIO (wioonline.org), ABOP (abop.org), ASOT (theasot.com), AAOOP (aaoop.org), and Retina Society (retinasociety.org). AAO = American Academy of Ophthalmology, AAOOP = American Association of Ophthalmic Oncologists and Pathologists, AAPOS = American Association for Pediatric Ophthalmology and Strabismus, ABOP = American Board of Ophthalmology, AGS = American Glaucoma Society, ASCRS = American Society of Cataract and Refractive Surgery, ASOPRS = American Society of Ophthalmic Plastic and Reconstructive Surgery, ASOT = American Society of Ophthalmic Trauma, ASRS = American Society of Retina Specialists, AUS = American Uveitis Society, NANOS = North American Neuro-Ophthalmology Society, WIO = Women in Ophthalmology.

ophthalmology society, such as filling the role of a past president. Awards for trainees include those specifically for residents, fellows, or both. Early-career ophthalmologists encompass young ophthalmologists typically aged <45 years and members recently admitted to the society. Secondary outcomes were analyses at the award recipient level, such as gender distribution based on the award recipients' country of affiliated institution and degrees.

Stata/IC, version 16.1 (Stata Corp, College Station, Texas, USA), was used to assess the most statistically significant factors influencing gender representation in major ophthalmology societies' award recipients. Cochran-Armitage trend tests were performed to assess the relationship between the years (1970-2020) and the proportions of women award recipients in all awards, in trainee and age-specific awards, and in nonspecified level of training awards.

An independent 2-sample *t* test was further used to compare the proportion of women award recipients in 2000-2009 to the proportion of women award recipients in 2010-2020. χ^2 tests of independence were performed to determine if there were significant relationships between gender and factors related to award classification (award society, award type, award category, award level of training) as well as award recipient characteristics (country of affiliated institution: domestic/US or international, degrees). These tests were followed by post hoc pairwise testing with Bonferroni adjustment for comparisons of multiple groups (7 options for award category, 9 for award society, and 3 for award level of training). *P* values less than .05 were considered statistically significant.

RESULTS

• **CHARACTERISTICS OF AWARDS GIVEN BY OPHTHALMOLOGIC SOCIETIES:** Nine societies gave 78 distinct awards to 2,150 recipients from 1970 to 2020 (Figure 1): 16 AAO awards from 1992 to 2020 (1-163 recipients per award), 13 AAPOS awards from 1974 to 2020 (1-296 recipients per award), 12 AGS awards from 1997 to 2020 (1-114 recipients per award), 12 ASOPRS awards from 1970 to 2020 (5-58 recipients per award), 3 ASCRS awards from 2017 to 2020 (3-41 recipients per award), 6 ASRS awards from 1995 to 2020 (4-28 recipients per award), 2 AUS awards from 2017 to 2019 (3 recipients per award), 3 Cornea Society awards from 1975 to 2020 (12-46 recipients per award), and 11 NANOS awards from 1983 to 2020 (1-72 recipients per award).

Of the 2,150 recipients, 1,606 award recipients (74.7%) were men, and 544 (25.3%) were women. Although most award recipients received 1 award (421 women and 1,133 men), women received up to 8 awards (*n* = 2) and men up to 7 awards (*n* = 2). When looking at unique award recipients, 1,133 (72.9%) were men, and 421 (27.1%) were women. A total of 2,006 award recipients' (93.3%) gen-

der was confirmed by a picture and a gender-specific pronoun. Forty-two award recipients' (2.0%) gender was determined using a gender-specific pronoun. Sixty award recipients' (2.8%) gender was determined using a picture, which was further confirmed with Gender-API's assignment (mean accuracy = 97.6% and standard deviation = 7.1%). Gender-API assigned the gender of the remaining 42 award recipients (2.0%; mean accuracy = 90.2% and standard deviation = 16.2%).

Most awards were given by AAPOS (*n* = 584; 27.2%), followed by AAO (*n* = 460; 21.4%), ASOPRS (*n* = 345; 16.0%), AGS (*n* = 336; 15.6%), NANOS (*n* = 201; 9.3%), ASRS (*n* = 96; 4.5%), Cornea Society (*n* = 73; 3.4%), ASCRS (*n* = 49; 2.3%), and AUS (*n* = 6; 0.3%).

Fourteen awards were accompanied by a lecture (*n* = 282 award recipients, 13.2%): 4 from AAPOS (Founders Series Lecture; Frank D. Costenbader Lecture; Leonard Apt Lecture; Phillip Knapp Lecture), 3 from AGS (Clinician-Scientist Lecturers; Special Lecturer; Surgery Day Lecturer), 2 from ASOPRS (Henry Baylis Cosmetic Surgery Award; Wendell Hughes Lecture Award), 1 from ASRS (Crystal Apple Award), 2 from AUS (Robert Nussenblatt Lecture, Ronald Smith Lecture), 1 from Cornea Society (Castroviejo Award), and 2 from NANOS (Daniel M. Jacobson Memorial Lecture; William F. Hoyt Lecture).

Thirty-four awards fell under the achievement category (*n* = 1,149 award recipients; 53.4%). Twelve awards were categorized as research item (*n* = 312; 14.5%), 9 as service to society (*n* = 138; 6.4%), 7 as education (*n* = 191; 8.9%), 8 as public service–global health (*n* = 102; 4.7%), 5 as research contribution (*n* = 145; 6.7%), and 3 as international member achievement (*n* = 113; 5.3%).

Seven of 9 societies (AAO, AGS, ASCRS, ASOPRS, ASRS, Cornea Society, and NANOS) had trainee or age-specific awards. Although 64 awards did not specify training level (*n* = 1,703 award recipients; 79.2%), 5 awards were dedicated to trainees (*n* = 151; 7.0%) and 9 awards to those in their early career (*n* = 296; 13.8%). Specifically, the AGS Bernard Schwartz (MD) Memorial Award was given to residents (*n* = 12; 0.6%), the ASCRS Resident Excellence Award to residents (*n* = 41; 1.9%), the NANOS Best Frank B. Walsh Session Paper Presentation to fellows (*n* = 17; 0.8%), the NANOS–Fight for Sight Postdoctoral fellowship award to fellows (*n* = 9; 0.4%), and the NANOS Best Abstract Award to residents or fellows (*n* = 72; 3.3%).

Eight awards were given to 253 (11.8%) young ophthalmologists: the AAO Artemis Award (*n* = 7; 0.3%), the AGS Young Physician-Scientist Grants (*n* = 71; 3.3%), the AGS Mentoring for Advancement of Physician-Scientist Award (*n* = 114; 5.3%), the ASOPRS Bartley R. Frueh Award for Best YASOPRS (*n* = 18; 0.8%), the ASCRS Young Eye Surgeons International Service Grant (*n* = 5; 0.2%), the ASRS President's Young Investigator Award (*n* = 7; 0.3%), the Cornea Society Troutman Prize (*n* = 12; 0.6%), and the NANOS Thomas and Susan Carlow Young

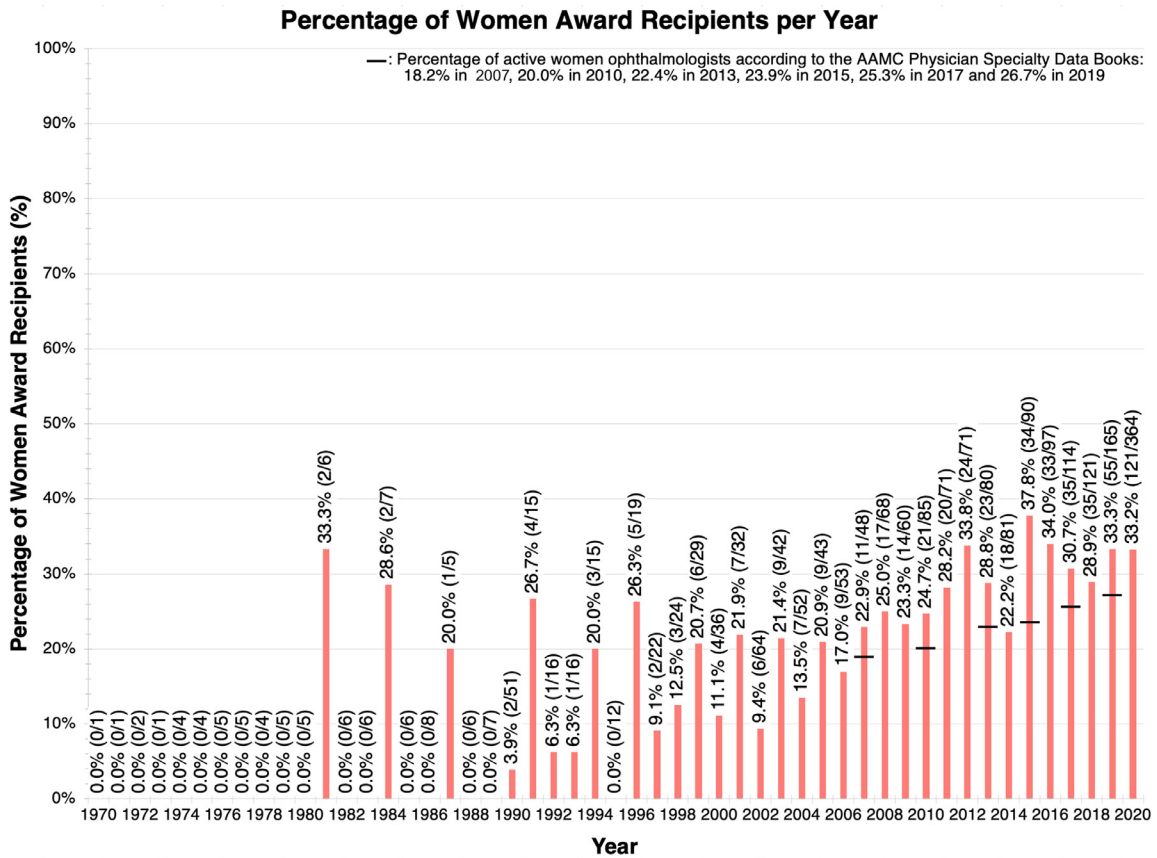


FIGURE 2. Distribution (percentage and number) of women award recipients from 1970 to 2020 compared with the annual percentages of active women ophthalmologists from the available AAMC Physician Specialty Data Books. AAMC = Association of American Medical Colleges.

Investigator Award (n = 19; 0.9%). The Marvin Quickert Thesis Award was given to 43 (2.0%) individuals seeking ASOPRS membership.

Seven awards were given to women more often than to men: the AAO Artemis Award with 57.1% women (4 women out of 7 award recipients), the AAPOS President Guest of Honor with 100% women (2 women out of 2 award recipients), the AAPOS Global Education and Training Award with 56.5% women (13 women out of 23 award recipients), the AAPOS Bernard Schwartz (MD) Memorial Award with 66.7% women (8 women out of 12 award recipients), the ASCRS Young Eye Surgeons International Service Grant with 80.0% women (4 women out of 5 award recipients), the NANOS Pilot Research Grant with 64.3% women (9 women out of 14 award recipients), and the NANOS–Fight for Sight Postdoctoral Award with 66.7% women (6 recipients out of 9 award recipients). One award was given to men and women equally: the NANOS J. Lawton Smith Award (1 woman out of 2 award recipients).

- OUTCOMES: GENDER DISTRIBUTION BY AWARD CLASSIFICATIONS:

Award year

Between 1970 and 2020, women award recipient proportions per year ranged from 0% (in these 18 years: 1970-1980, 1982-1983, 1985-1986, 1988-1989, 1995) to 37.8% (in 2015) (Figure 2). The number of women recipients per year varied from 0 (in the 18 years listed above) to 121 (in 2020). The proportion of women recipients was significantly associated with the year ($P < .001$). From 1970 to 1999, there were 10.2% women award recipients (32 of 313). Compared with 2000-2009 (18.7%, 93 of 498), women received a significantly greater proportion of awards (31.3%, 419 of 1,339) in the last decade, from 2010 to 2020 ($P < .001$). The proportion of women recipients by society increased in each time period, with the exception of the Cornea Society (4% women in 1970-1999 to 0% women in 2000-2009) and NANOS (30% women in 1970-1999 to 29.4% in 2000-2009) (Figure 3).

Award society

As shown in Figure 1, the mean proportion of women recipients per society were the following: 40.8% for ASCRS

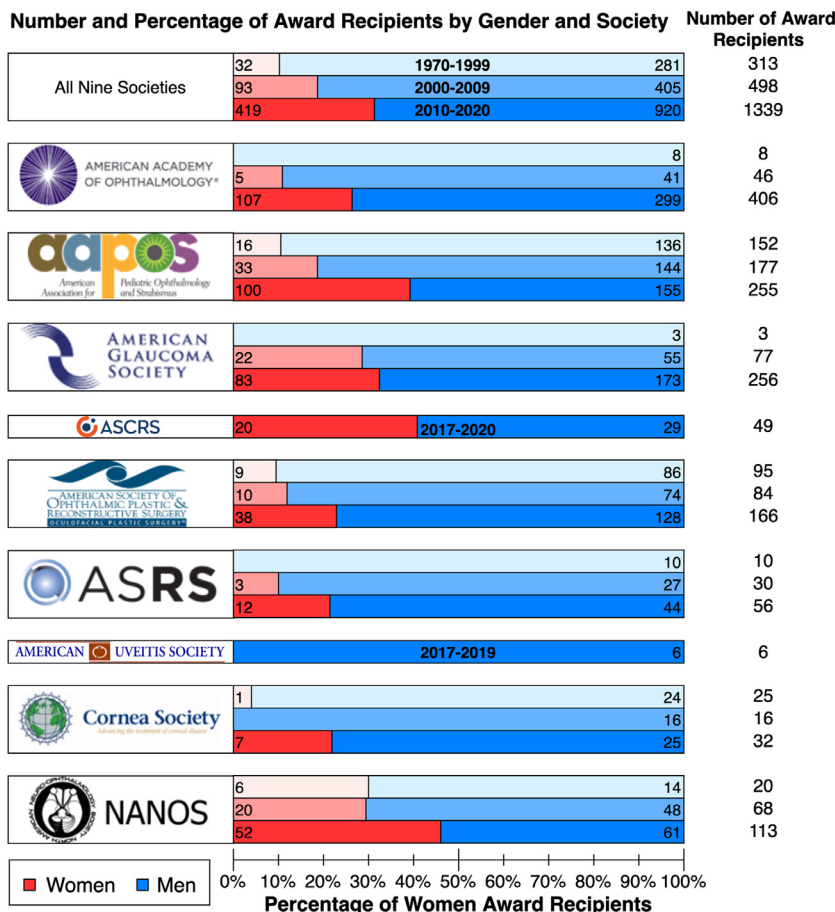


FIGURE 3. Gender distribution (percentage and number) of award recipients per award society (all societies, AAO, AAPOS, AGS, ASCRS, ASOPRS, ASRS, Cornea Society, NANOS, and AUS) per time period (1970-1999, 2000-2009, and 2010-2020). The logos are from the societies' websites: AAO (aao.org), AAPOS (aapos.org), AGS (americanglaucomasociety.net), ASCRS (ascrs.org), ASOPRS (asoprs.org), ASRS (asrs.org), AUS (uveitissociety.org), Cornea Society (corneasociety.org), and NANOS (nanosweb.org). AAO = American Academy of Ophthalmology, AAPOS = American Association for Pediatric Ophthalmology and Strabismus, AGS = American Glaucoma Society, ASCRS = American Society of Cataract and Refractive Surgery, ASOPRS = American Society of Ophthalmic Plastic and Reconstructive Surgery, ASRS = American Society of Retina Specialists, AUS = American Uveitis Society, NANOS = North American Neuro-Ophthalmology Society.

(range: 0%-80.0% women recipients per award), 38.8% for NANOS (range: 0%-66.7% women recipients per award), 31.3% for AGS (range: 0%-66.7% women recipients per award), 25.5% for AAPOS (range: 0%-100% women recipients per award), 24.3% for AAO (range: 0%-57.1% women recipients per award), 16.5% for ASOPRS (range: 0%-44.4% women recipients per award), 15.6% for ASRS (range: 0%-17.9% women recipients per award), 11.0% for Cornea Society (range: 6.5%-33.3% women recipients per award), and 0% for AUS. AAPOS gave the greatest number of awards to women ($n = 149$), followed by AAO ($n = 112$), AGS ($n = 105$), NANOS ($n = 78$), ASOPRS ($n = 57$), ASCRS ($n = 20$), ASRS ($n = 15$), Cornea Society ($n = 8$), and AUS ($n = 0$).

The proportion of women recipients was significantly different between the societies ($P < .001$). NANOS had a

significantly greater proportion of women recipients than AAO ($P = .003$), AAPOS ($P = .006$), ASOPRS ($P < .001$), Cornea Society ($P < .001$), and ASRS ($P = .001$). AGS was also significantly different from ASOPRS ($P < .001$) and Cornea Society ($P = .009$). The proportions of women recipients in ASCRS and in AUS were not significantly different from the other societies.

Award type

Among lecture award recipients, 11.0% ($n = 31$) were women and 89.0% ($n = 251$) were men. Among non-lecture award recipients, 27.5% ($n = 513$) were women and 72.5% ($n = 1,355$) were men. The proportion of women recipients was significantly lower in awards accompanied by a lecture than in those without ($P < .001$).

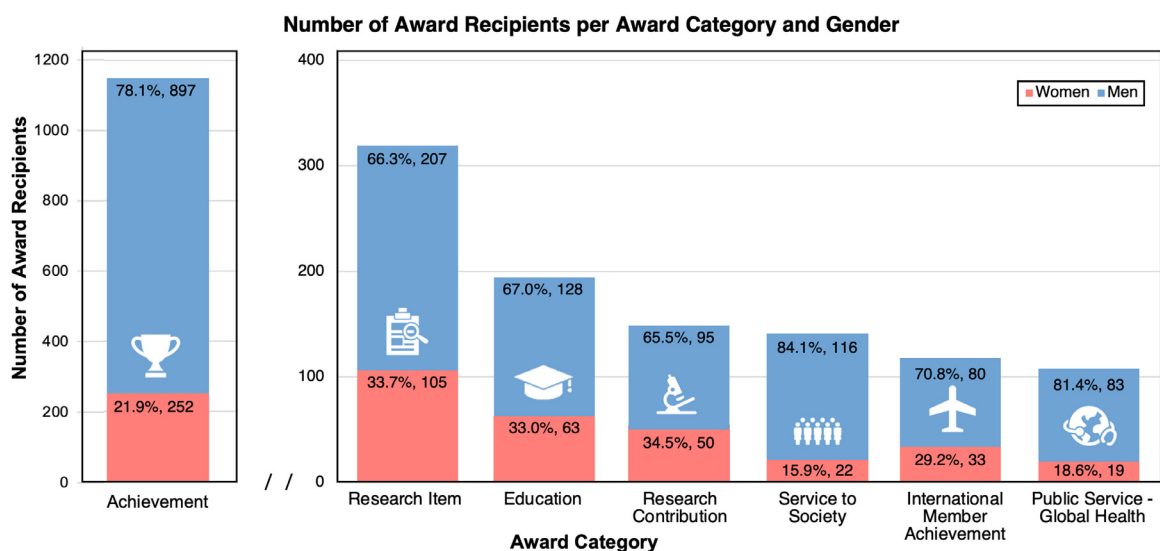


FIGURE 4. Gender distribution (percentage and number) of award recipients per award category (achievement, research item, education, research contribution, service to society, international member achievement, and public service–global health).

Award category

When examining all awards during the 5-decade study period, awards in the achievement category were given to the greatest number of women ($n = 252$), followed by research item ($n = 105$), education ($n = 63$), research contribution ($n = 50$), international member achievement ($n = 33$), service to society ($n = 22$), and public service–global health ($n = 19$) awards, as shown in Figure 4.

The proportion of women recipients was significantly different between the award categories ($P < .001$). The proportion of women in research-contribution awards (34.5%) was significantly higher than the proportion of women recipients in awards categorized as achievement (21.9%) ($P = .021$) and service to society (15.9%) ($P = .006$). The proportion of women in research item awards (33.7%) was also significantly different from awards categorized as achievement ($P < .001$), public service–global health (18.6%) ($P = .048$), and service to society ($P = .001$). The proportion of women in education awards (33.0%) was significantly greater than in achievement awards ($P = .022$) and service to society awards ($P = .007$). The proportion of women in awards for international members (29.2%) and those for public service–global health were not significantly different from the other categories, based on the Bonferroni test ($P > .05$).

Award level of training

The proportions of women in the trainee, early career, and nonspecified level of training were significantly different ($P < .01$). More specifically, the proportions of women trainees (46.4%) and early-career ophthalmologists (36.5%) were significantly higher than the proportion of women (21.5%)

in the awards with no specified level of training ($P < .001$). The proportion of women in the trainee category (46.4%) was higher than the proportion of women in the group of early-career ophthalmologists (36.5%), but this was not significant ($P = .064$). The proportion of women recipients of awards with no specified level of training was significantly associated with the year of award allocation ($P < .001$). When grouping the early-career ophthalmologists and the trainee-specific award recipients, the proportion of those women recipients was significantly associated with the years ($P < .001$).

When examining the last 2 decades, the proportion of women award recipients in 2010-2020 (27.4%) was significantly greater than that in 2000-2009 (14.2%) for awards with no specified level of training, which are typically awards for senior ophthalmologists ($P < .001$) (Figure 5, A). However, for early-career and trainee-specific awards, there were no significant differences between the proportions of women award recipients in 2000-2009 (35.6%) and 2010-2020 (45.0%) (Figure 5, B).

• SECONDARY OUTCOMES: GENDER DISTRIBUTION BY AWARD RECIPIENT CHARACTERISTICS:

Country of affiliated institution

The 2,150 award recipients were affiliated with institutions from 77 countries and territories, the top 3 being United States ($n = 1,855$; 86.3%) with 25.6% women, Canada ($n = 43$; 2.0%) with 18.6% women, and the United Kingdom ($n = 22$; 1.3%) with 21.4% women. There was no significant difference in the proportion of women between international (70 women out of 295 award recipients; 23.7%)

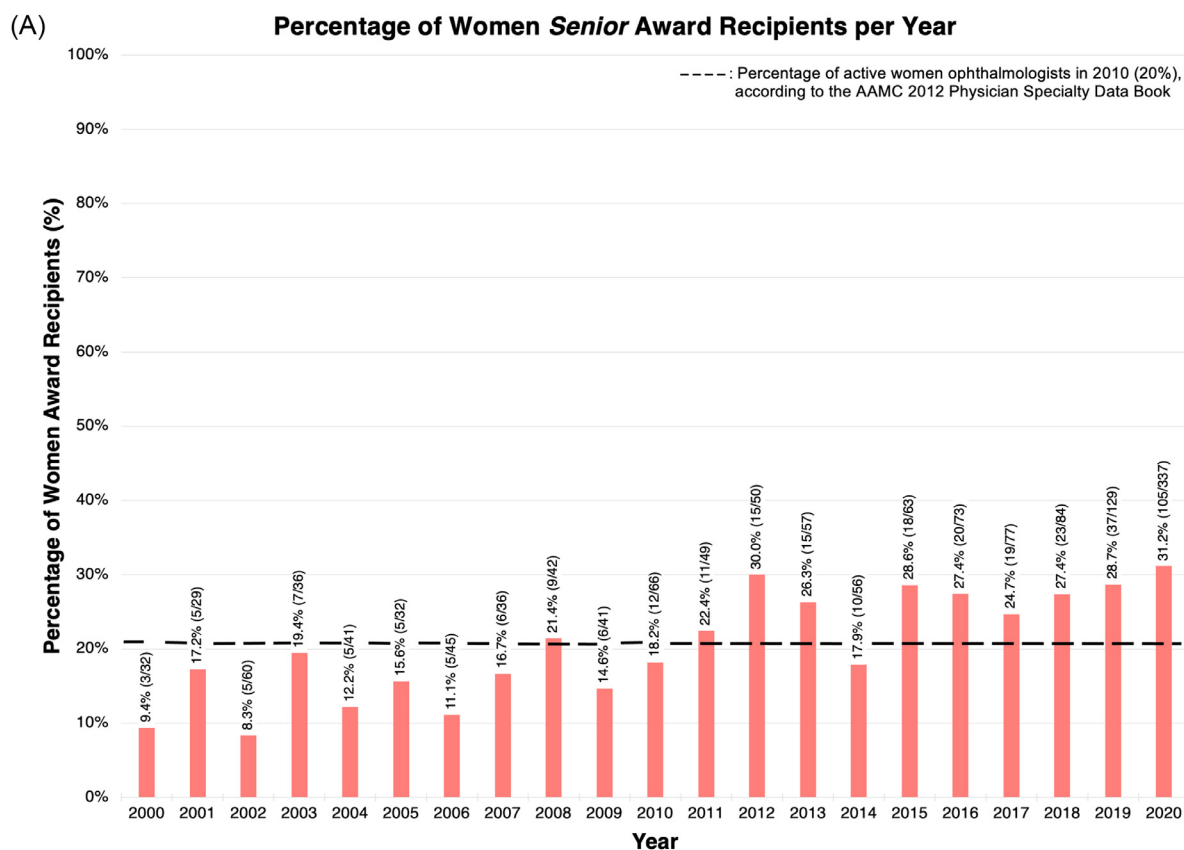


FIGURE 5. Distribution (percentage and number) of women award recipients from 2000 to 2009 and from 2010 to 2020 for the following awards: A. Awards that do not specify the age nor the level of training. These awards are typically given to senior ophthalmologists. B. Early-career and trainee-specific awards. The dotted lines in A and B, respectively, represented the percentage of active women ophthalmologists in 2010 (20.0%) and the percentage of ACGME residents/fellows in 2010 (41.4%) according to the AAMC 2012 Specialty Data Book (<https://www.aamc.org/media/33486/download>). 2010 marks the middle year of the data presented, 2000-2020. AAMC = Association of American Medical Colleges, ACGME = Accreditation Council for Graduate Medical Education.

and domestic award recipients (474 women out of 1,855 American award recipients; 25.6%) ($P = .503$).

Degree

Of 623 women award recipients with a completed graduate degree, 82.5% ($n = 514$) had an MD or equivalent degree (eg, MBBS, MBChB, DO), 10.6% ($n = 66$) had a PhD or equivalent degree (eg, DSc), and 6.9% ($n = 43$) had a master's or equivalent degree (eg, MPH) (Figure 6). Of 1,845 men award recipients, 85.3% ($n = 1,574$) had an MD or equivalent degree, 10.0% ($n = 184$) had a PhD or equivalent degree, and 4.7% ($n = 87$) had a master's or equivalent degree. Among recipients with a medical degree, a greater proportion of women (10.7%) than men (10.6%) had a master's or equivalent degree, and a greater proportion of women (6.8%) than men (5.0%) had a PhD or equivalent degree, but these differences were not significant ($P > .05$). Among the 15 award recipients (0.7%) with an allied health professional degree (optometry, orthoptics), 5 (33.3%) were women.

DISCUSSION

Although women now comprise 50% of medical school graduates and there has been in recent years increased recognition of women physicians and surgeons in academic medicine, gender disparity continues to be widespread in health care.²⁵ Specialty medical societies play an important role in supporting members' career development through the provision of leadership opportunities and recognition. Prestigious awards help boost the reputation and resume of members, who are then better poised to pursue leadership positions at their academic institutions.

Studies have shown that there is indeed a disparity among women and men award recipients in medicine. This is the first study to assess the gender of award recipients in major clinical ophthalmology societies over the past 50 years. Overall, 25.3% of the awards assessed in this study were given to women. The proportion of women recipients

(A) **Percentage of Women *Early-Career and Trainee-Specific* Award Recipients per Year**

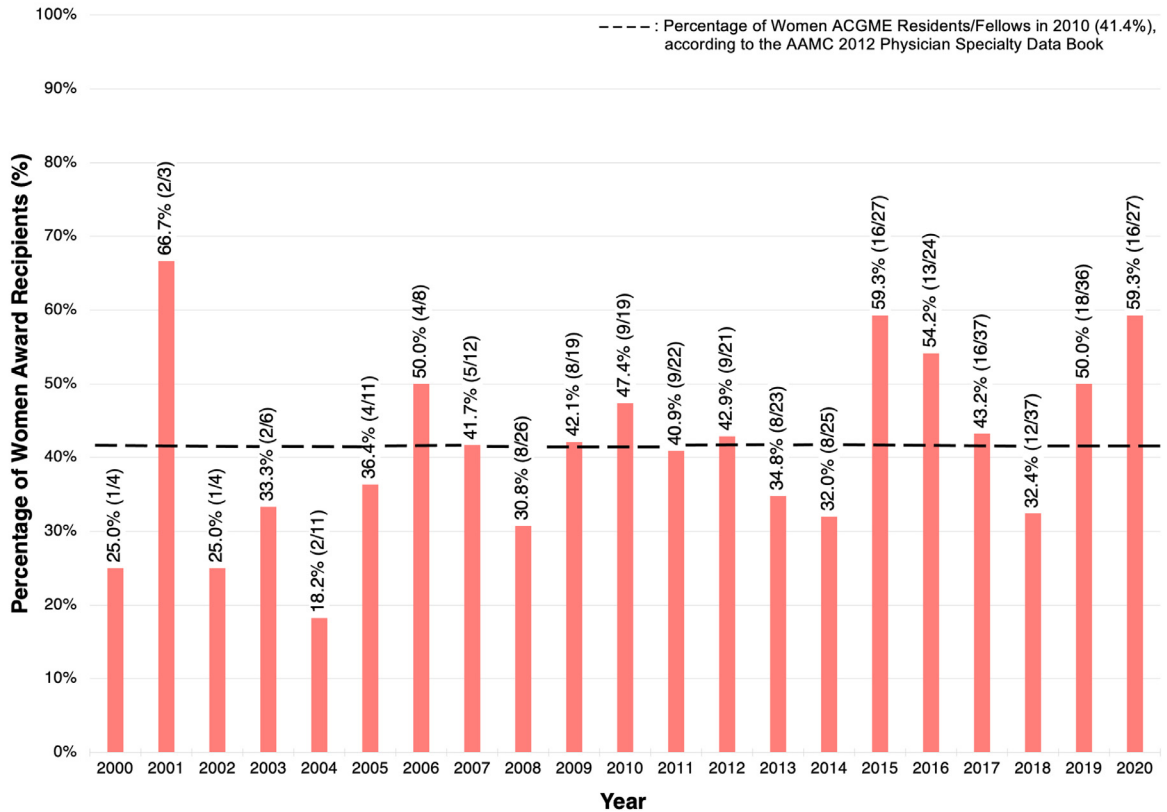


FIGURE 5. Continued

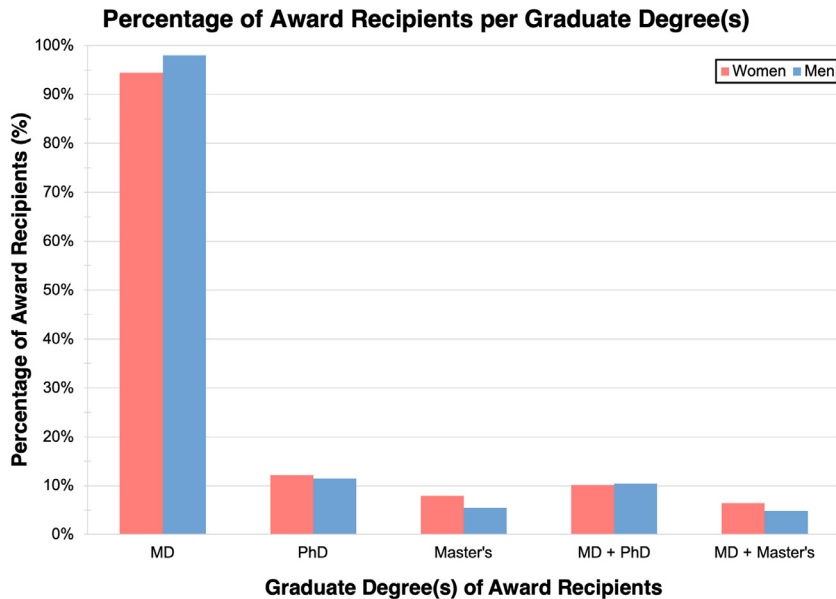


FIGURE 6.

increased from 0% in 1970 to 33.2% in 2020, demonstrating an increase in recognition of women in the academic space. These positive trends are encouraging, as women ophthalmologists are increasingly acknowledged and honored for their accomplishments. Despite this progress, a notable gender gap continues to exist among ophthalmology society award recipients.

Furthermore, representation varied greatly within these societies, from 0% women recipients in AUS (possibly owing to low sample size, with 6 award recipients), to 11.0% in Cornea Society, and up to 38.8% in NANOS and 40.8% in ASCRS. The proportion of women also fluctuated according to award category, with the lowest 2 being service to society (15.9%) and public service–global health (18.6%) and the top 2 being research item (33.7%) and research contribution (34.5%). In line with the increasing number of women ophthalmology residents, awards specifically for trainees and early-career ophthalmologists (39.8%) were given to a significantly greater proportion of women than the rest of the awards (21.5%) ($P < .001$).

Our findings are not consistent with the prior largest study²⁰ assessing award recipient gender disparities among 20 surgical societies over a 20-year period. In this study, Atkinson and associates²⁰ found that, overall, women surgeons (nonophthalmic) receive awards on par with men. However, the second largest study by Silver and associates reports an under-representation of women physicians in award recipients from 11 societies covering 7 medical specialties. Our findings complement these 2 investigations by contributing award recipient information in the field of ophthalmology, a specialty at the intersection of surgery and medicine not included in these previous studies.

Our study also explores additional facets of award recipients that were not examined in these 2 studies, namely, award recipients' country of affiliated institution and postgraduate degrees. More than 75 countries were represented among award recipients, but there was no significant difference between the proportion of women domestic and international award recipients ($P > .05$). Women physician award recipients were more likely to have a master's, PhD, or equivalent graduate degree than their male counterparts, but the differences were not statistically significant ($P > .05$).

Women received awards at a slightly higher rate with respect to the US ophthalmology workforce gender distribution in all the years during which the percentage of active women ophthalmologists were recorded in the Association of American Medical Colleges physician specialty data (ie, 2008, 2010, 2013, 2015, 2017, and 2019; Figure 2).²⁶ When examining awards typically given to senior ophthalmologists in the past 2 decades, we compared the gender distribution in 2000-2009 and 2010-2020 to the percentage of active women ophthalmologists in 2010. As shown in Figure 5, A, less than 20% of award recipients prior to 2010, except 2008, were women, whereas more than 20% of award recipients were women after 2010, with the excep-

tion of 2014. Furthermore, the proportion of those women award recipients from 2000 to 2009 differed significantly from the proportion of women award recipients in the last decade.

A comparison between awards given by ophthalmology subspecialty societies to those given by similar societies was undertaken: AAPOS with general pediatrics, pediatric otolaryngology–head and neck surgery (OHNS), ASOPRS with OHNS and plastic surgery, and NANOS with neurology. AAPOS, with 25.5% of women award recipients from 1974 to 2020, had a greater proportion of women award recipients compared with 2 major awards in pediatrics, the Federation of Pediatric Organizations Geme Award (1988-2015) and the American Pediatric Society Howland Award (1952-2015) with 15% and 12% women award recipients, respectively.²⁷

Examination of 2013-2019 data revealed that AAPOS also had a greater proportion of women recipients (37.9%) compared with Zambare and associates' data on American Society of Pediatric Otolaryngology (ASPO) Potts and Ferguson awards (26.7%).¹⁶ Possible explanations include the low sample size of the 2 general pediatrics awards ($n = 92$ recipients)²⁸ and the ASPO awards ($n = 15$ recipients)¹⁶ compared with the 13 AAPOS awards ($n = 584$ recipients from 1974 to 2020, $n = 177$ from 2013 to 2019), as well as AAPOS's use of point-based systems (Supplemental Table S1).

Instead of the traditional nomination-selection process, AAPOS rewards members who participate in AAPOS activities, committees, annual meeting presentations, and boards. Point-based systems are more objective measures to select recipients. For example, when comparing AAO awards based on a clear scoring system (International Education Award, International Scholar Award, Life Achievement Honor Award) to the other AAO awards, there was a greater proportion of women in the point-based awards (79.8% > 74.5%) although the difference was not significant ($P = .278$).

When comparing ASOPRS award recipients to OHNS societies during the same period (2009-2019), ASOPRS had 21.3% women, which is lower than the 28% OHNS award recipients reported by Zambare and associates.¹⁶ However, when comparing ASOPRS award recipients to plastic surgery societies during the same time period (1970-2019), ASOPRS had 15.5% women award recipients, which is almost twice as much the 8% women award recipients in plastic surgery according to Čebren and associates' study.²⁹ When comparing the study of American Academy of Neurology (AAN) awards by Silver and associates¹⁵ to NANOS award recipients during the same time period (2008-2017), NANOS had a greater proportion of women recipients (41.7%) than AAN (21.9%). The high proportion of NANOS women recipients is probably because NANOS has the most awards (4 of 11) specifically designated to young ophthalmologists and trainees (Figure 1).

When comparing education level, 5 of 7 awards with women award recipients representing more than half of total recipients were specifically designated for trainees and early-career ophthalmologists (Figure 1). These results are consistent with the overall trend that women are likely younger in societies, as the proportion of women medical students has surpassed 50% in recent years, and ophthalmology residents and fellows have almost reached parity (41.2% women as of 2019).^{30,31} From 1970 to 2020, women received 39.8% of awards specifically designated for trainees and early-career ophthalmologists. When compared to the percentage of women residents and fellows from the Accreditation Council for Graduate Medical Education (ACGME) in 2010 (41.4%), 2015 (42.7%), 2017 (41.2%), and 2019 (41.2%), the percentage of women award recipients for the trainees and early-career ophthalmologists awards in each of those four years was over 43%, which is higher than the percentage of women ACGME residents and fellows in those years.^{3,31,41,42} However, there was a slight underrepresentation of women award recipients for the trainees and early-career ophthalmologists awards in 2007 (41.7%) and 2013 (34.8%), compared to the ACGME percentage of women residents and fellows in ophthalmology in 2007 (41.8%) and 2013 (44.6%).^{43,44}

The highest proportions of women were in the education, research contribution, and research item categories, whereas the lowest were in the achievement and service awards. This variation could be due to the broad definitions of achievement and service awards, which introduce possible bias. These awards, often described as recognition for individual(s) who made significant contributions in their field or provided substantial service to their society, are left to the awarding committees' interpretation.

As highlighted in a study examining awards given to orthopedic surgeons, awards with no clear-cut or measurable criteria might have a negative bias toward women nominated for leadership awards.¹⁷ The low representation of women in achievement and service to society awards, as well as named lectures, could also be the result of the predominantly masculine leadership stereotype.³² Along with named lectures, achievement and service to society awards are likely the most significant awards in our data set: these awards represent the accomplishments to an entire field (ophthalmology or ophthalmology subspecialty) or the contributions to an entire organization (ophthalmology and ophthalmology subspecialty societies).

Gerull and associates hypothesized that underrepresentation in major leadership awards could be the consequence of barriers faced by women in the access of leadership opportunities and in fair recognition of leadership activities performed.¹⁷ The disparity of women in leadership has previously been suggested to be due to the "pipeline effect," the idea that it will take several years for the young women who now make up more than half of medical school classes to reach the highest levels of leadership and recognition.³³ That concept, however,

has been called into question.³⁴ Studies have shown that men advance to full professor more quickly than women faculty, and that at the present rate, it will take another 120 years for women to be equally represented at the full professorship rank.³⁵

In light of these findings, we recommend that mentorship and sponsorship be made more accessible to women to help them overcome the hurdles in accessing higher academic ranks, and in being properly recognized for their achievements.^{36,37} To ensure that women are acknowledged equitably, we further encourage societies to clarify and standardize award selection criteria to reduce ambiguity among reviewers. Both implicit and overt biases are likely contributing to the ongoing disparity faced by women in medicine. This spans both general inequity in society and institutional awards and recognition, and in advancement in faculty rank.³⁸ To address systemic and unconscious biases, implicit bias training should be provided within academic institutions and to all society award selection committee members.³⁹

To improve diversity, equity, and inclusion within award recipients, additional efforts must be made to diversify the composition of selection committees. Diverse committees, including women and minority groups, can advise wording that appeals to both male and female nominees. According to the Association for Women in Science's resource on Avoiding Implicit Bias: Best Practices for Award Selection Committees,⁴⁰ the words used in the description of awards are often terms that are in relation to men and not women. Societies should therefore re-evaluate the guidelines and descriptions for awards and ensure the use of epicene language.

To form a clear picture of disparity or parity in award recipients, we recommend that societies collect and publicly disclose gender membership data, similarly to the Association of American Medical Colleges reports on the sex of residents, fellows, and practicing ophthalmologists. With annual baseline data per society, progression or regression in gender equity can be comprehensively assessed.

There are several limitations of this study. Although we reported gender imbalances in award recipients, we were unable to directly compare the gender proportions between award recipients with each associated society membership. Societies who responded to our inquiries either were unable to share the gender distribution of members per year, as this information is not publicly available, or they do not systematically collect gender data. For example, AGS estimates their women membership to be around 30%, which is slightly lower than the 31.3% women AGS award recipients (personal communication).

When comparing AAO's baseline 2017 membership data (24% women) to 2017 AAO award recipients (27.3% women), there is an overrepresentation of women in award recipients.² Without this baseline data per year, it is not possible to confirm or reject the hypothesis that award demographics are proportional to society membership. The

ideal baselines would be membership gender data per society and per year, because membership fluctuates annually. We strongly recommend societies to monitor these statistics in the future to correlate award recipient and membership proportions.

Second, some awards and one society were excluded from the data set. Despite querying missing data directly from societies, some award recipient data could not be accessed (eg, AAOPOS Poster Awards and ASRS Honor Awards) or permission was not granted (Retina Society) (Figure 1).

Third, awardees were unable to self-report their gender. Therefore, we were limited by manual data extraction from publicly accessible websites to determine award recipients' gender, which may not consider nonbinary identities. We reported no award recipients as nonbinary. Moreover, bias can occur in gender determination solely by photograph. To address this issue, 1 female (A.B.) and 1 male (S.R.) author assigned genders, and a third author (A.X.N.) verified the data when there were uncertainties. Recipients whose gen-

der was solely determined based on photograph were also assessed by Gender-API for further confirmation. We reported no conflicts between manual gender assessment by photograph and Gender-API.

In conclusion, this is the first study to examine gender distribution of award recipients in major clinical ophthalmology societies. Overall, women received awards at a slightly higher prevalence to the national gender distribution of ophthalmologists. Positive trends are noted in awards specifically for trainees and early-career ophthalmologists, especially in recent years. Despite this advancement, women under-representation in award recipients remains when assessing individual societies, named lectures, and award categories during the past 50 years. This under-recognition impacts career development and may be contributing to the under-representation of women at senior academic ranks, underscoring the importance of ongoing gender disparity research in medicine. Further investigation into award selection processes and gender membership data is required to understand the inequality of women award recipients.

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