

# Gender representation among leadership at national and regional cardiothoracic surgery organizational annual meetings



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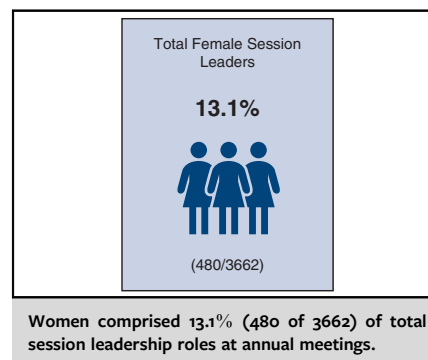
## ABSTRACT

**Background:** Increased attention has been dedicated to gender inequity at scientific meetings. This study evaluated the gender distribution of session leaders at cardiothoracic surgery national and regional meetings.

**Methods:** This is a descriptive study of the gender of peer-selected session leaders at 4 cardiothoracic surgery organizations' annual meetings from 2015 to 2019. Session leaders included moderators, panelists, and invited discussants. Data from publicly available programs were used to generate a list of session leaders and organization leaders. The primary outcome measure was the proportion of female session leaders at annual meetings. Descriptive analyses were performed, including the Cochran–Armitage trend test for linear trends of proportions.

**Results:** A total of 679 sessions over 20 meetings were examined. Of the 3662 session leaders, 480 (13.1%) were women. The proportion of total female session leaders trended positively over time from 9.6% (56 of 581) in 2015 to 15.9% (169 of 1060) in 2019 ( $P = .001$ ). Among specialty topic sessions, female session leaders were distributed as follows: adult cardiac, 6.9% (81 of 1172); congenital cardiac, 10.8% (47 of 437); and thoracic, 23.2% (155 of 668). The proportion of female session leaders trended significantly only for thoracic sessions (20.6% [21 of 102] in 2015 to 29.2% [58 of 199] in 2019;  $P = .02$ ). More than one-half of the sessions (57.4%; 390 of 679) featured all-male session leadership.

**Conclusions:** Women remain underrepresented in leadership roles at cardiothoracic surgery organizational meetings. This may deter female applicants and has implications for female surgeons' career trajectories; therefore, attention must be given to the potential for unconscious bias in leadership in cardiothoracic surgery. (*J Thorac Cardiovasc Surg* 2021;161:733-44)



## CENTRAL MESSAGE

Women are underrepresented in leadership roles at academic cardiothoracic surgery meetings, which impacts the recruitment of new female surgeons and the career trajectories of current female surgeons.

## PERSPECTIVE

Medical school enrollment has reached gender parity, but surgery has lagged behind, implying a hesitancy of women to pursue surgery. Studies in other fields suggest that underrepresentation in visible roles influences female applicants' career decisions. Merely identifying inequity has increased inclusion elsewhere, making this study an instrumental step in closing cardiothoracic surgery's gender gap.

See Commentaries on pages 745 and 746.

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Funding for this work was provided by Grants UL1TR001855 and UL1TR000130 from the National Center for Advancing Translational Sciences of the National Institutes of Health (to Dr Ding).

Read at the 100th Annual Meeting of The American Association for Thoracic Surgery: A Virtual Learning Experience, May 22-23, 2020.

Received for publication May 20, 2020; revisions received Nov 16, 2020; accepted for publication Nov 17, 2020; available ahead of print Dec 11, 2020.

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0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2020.11.157>

### Abbreviations and Acronyms

|      |   |
|------|---|
| AAMC | = American Association of Medical Colleges        |
| AATS | = American Association for Thoracic Surgery       |
| ABTS | = American Board of Thoracic Surgery              |
| ACS  | = American College of Surgery                     |
| ASC  | = American Surgical Congress                      |
| AWS  | = Association of Women Surgeons                   |
| CC   | = American College of Surgeons' Clinical Congress |
| JACS | = Journal of the American College of Surgeons     |
| STS  | = Society of Thoracic Surgeons                    |
| STSA | = Southern Thoracic Surgical Association          |
| WTSA | = Western Thoracic Surgical Association           |

To view the AATS Annual Meeting Webcast, see the URL next to the webcast thumbnail.

Increased attention is being given to gender representation at organizational meetings across many fields. These studies have unanimously reported significantly fewer women than men in leadership roles at scientific meetings.<sup>1,2</sup> An 2019 article published in *Nature* investigated the gender distribution of invited speakers at key meetings in neuroscience, artificial intelligence, chemistry, geology, and microbiology over the past decade and found that in 2011, <30% of speakers in these fields were women.<sup>1</sup> Furthermore, at the study's onset, the percentage of female speakers was lower than the percentage of female research authors in each field, which serves as a theoretical pool of potential speakers.<sup>1</sup>

Recent studies examining general surgery meetings echoed this disparity trend. Wilcox and colleagues<sup>2</sup> investigated the proportion of female panelists and moderators at the American Surgical Congress (ASC) from 2014 to 2019 and the American College of Surgeons' (ACS) Clinical Congress (CC) from 2013 to 2018. They reported that 35% (116 of 329) and 28% (952 of 3363) of panelists and 30% (305 of 1004) and 32% (202 of 626) of moderators were women at the ASC and at the CC, respectively. Significant positive trends were identified for female panelists at the CC (23% [112 of 481] in 2013 to 34% [187 of 553] in 2018;  $P = .007$ ) and female moderators at the ASC (31% [40 of 130] in 2014 to 43% [89 of 207] in 2019;  $P = .01$ ).<sup>2</sup> Our present analysis expands on the existing gender representation literature by examining session leadership roles at cardiothoracic surgical meetings.

When considering residency programs accredited by the Accreditation Council for Graduate Medical Education

(ACGME), women accounted for 45.6% (61,596 of 134,951) of all residents and 40.1% (3487 of 8697) of general surgery residents in 2019, but only 24.3% (110 of 453) of cardiothoracic surgery integrated residents and traditional fellows.<sup>3</sup> Furthermore, women accounted for only 3.6% (309 of 8617) of surgeons certified by the American Board of Thoracic Surgery (ABTS) as of 2018, regardless of current practice status.<sup>4</sup> The percentage improved only slightly when excluding retired physicians, with the American Association of Medical Colleges (AAMC) reporting that women composed 35.2% (313,808 of 891,770) of all active physicians but only 6.6% (172 of 2612) of actively practicing cardiothoracic surgeons in 2017. Orthopedic surgery was the only specialty with a lower proportion of practicing female surgeons.<sup>5</sup> When this disparity manifests itself as significantly fewer leadership roles than men at organizational meetings there can be major repercussions, including hindering female surgeons' career trajectories and dissuading trainees from entering the field.<sup>1,2,6,7</sup>

Given the major career implications of a lack of visibility for female surgeons and trainees, it is important to examine this data. Awareness of a gender discrepancy has been found to evoke improvement in other fields in conjunction with firm policies that compel diversity and planning programs that repeat the effort consistently.<sup>1</sup> In this study, we evaluated the gender distribution of peer-selected session leaders at cardiothoracic surgery organizational annual meetings over time to identify areas for improvement. Major findings are summarized in the graphical abstract (Figure 1).

## METHODS

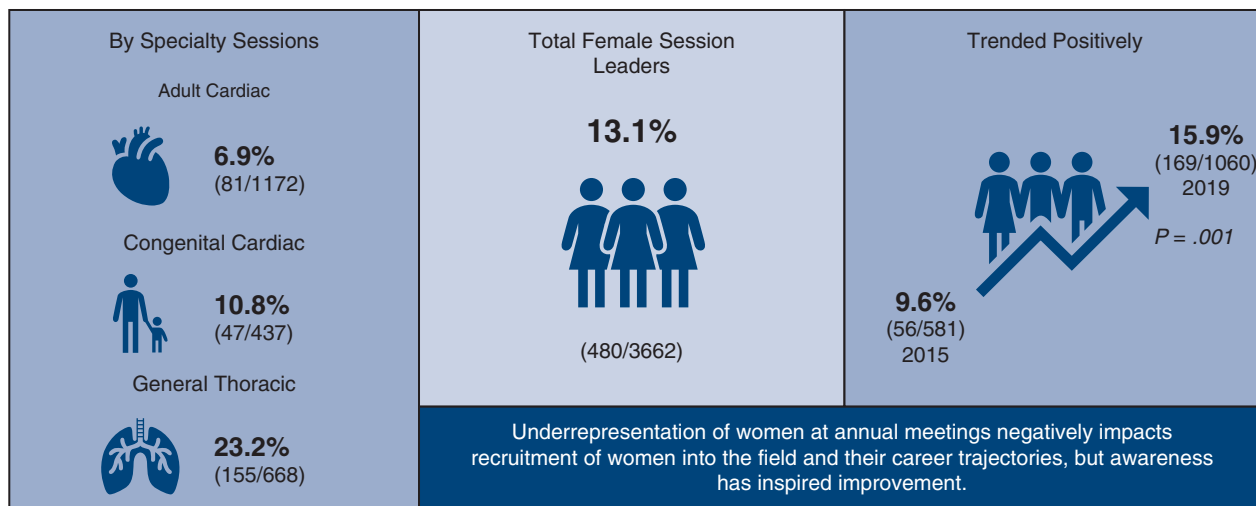
### Study Population

This is a descriptive study of the gender of peer-selected session leaders at annual meetings held by the American Association for Thoracic Surgery (AATS), Society of Thoracic Surgeons (STS), Western Thoracic Surgical Association (WTSA), and Southern Thoracic Surgical Association (STSA) from 2015 to 2019. Data from archived programs were used to generate a list of session leaders, which were defined as moderators, panelists, and invited discussants selected by peers during program planning. Moderators and invited discussants included those specifically designated to those positions. Panelists included designated panelists and, per custom, all speakers during a session that featured a panel discussion without designated panelists. If a session leader held more than one role in a given session, each role was counted separately. Likewise, if a session leader held the same role multiple times throughout the conference, each appearance also was counted separately, because these occurrences represented separate opportunities for a leadership role. The gender of each session leader was verified by an Internet search and independently confirmed by a second reviewer.

Sessions included for analysis were categorized based on their structure: scientific sessions, plenary sessions, panels, and miscellaneous. Sessions were also categorized based on their predominant topic: adult cardiac, congenital cardiac, thoracic, and mixed. Technical courses and sessions that required admission tickets separate from the main programming were excluded.

We requested organizational membership data from 2015 to 2019 and collected organizational leadership data from archived programs, which included program planning committee chairs and executive board members. All data have been reported as aggregates, so that individual organizations cannot be identified based on the size of their annual meetings or

**Gender Representation Among Leadership at Cardiothoracic Surgery Organizational Annual Meetings**



**FIGURE 1.** Women composed 13.1% (480 of 3662) of total session leaders at 4 cardiothoracic surgery organizations’ annual meetings from 2015 to 2019. The percentage of women holding session leadership roles trended positively, from 9.6% (56 of 581) in 2015 to 15.9% (169 of 1060) in 2019 ( $P = .001$ ). After organizing sessions by specialty topic, adult cardiac sessions had the lowest proportion of total female session leaders (6.9%; 81 of 1172), followed by congenital cardiac sessions (10.8%; 47 of 437), and finally by general thoracic sessions, which had the highest proportion of total female session leaders (23.2%; 155 of 668).

membership. This project was deemed exempt by the Institutional Review Board at the University of Southern California.

**Statistical Analyses**

The primary outcome measure was the proportion of total female session leaders at the organizational annual meetings from 2015 to 2019. Secondary outcome measures included: the proportion of female session leaders organized by position and by session topic, the proportion of all male sessions, and the proportion of unique session leaders. Unique total session leaders were reported for 2015 and 2019 separately and combined as one group. Subgroup analyses were performed comparing national organizations with regional organizations. Descriptive analyses performed included the Cochran–Armitage trend test for linear trends of proportions.  $P$  values  $\leq .05$  were considered significant. Finally, we examined the relationship between the gender composition of organizational leadership and female representation in session leadership.

**RESULTS**

**Aggregate Results**

We reviewed and analyzed 20 annual meetings for the AATS, STS, WTSA, and STSA from 2015 to 2019 (Table 1). A total of 679 sessions were examined, in which 480 out of 3662 total session leaders (13.1%) were women (Figure 2). The proportion of total female session leaders trended significantly from 9.6% (56 of 581) in 2015 to 15.9% (169 of 1060) in 2019 ( $P = .001$ ) (Figure 3). In terms of type of session leaders, there were statistically significant, positive trends in the proportions of female moderators (from 13.5% [31 of 229] in 2015 to 19.4% [79 of 408] in 2019;  $P = .03$ ) and invited discussants (from 5.5% [12 of 217] in 2015 to 13.3% [32 of 241] in 2019;  $P = .05$ ). Although the proportion of female panelists increased over time, this trend was not statistically significant (9.6% [13 of 135] in 2015 vs 14.11% [58 of 411] in 2019;  $P = .24$ ).

Among specialty topic sessions, women were represented in the following distribution: adult cardiac, 6.9% (81 of 1172); congenital cardiac, 10.8% (47 of 437); and thoracic, 23.2% (155 of 668). The proportion of female session leaders did not change significantly over time for adult cardiac sessions (5.2% [9 of 172] in 2015 vs 7.8% [30 of 386] in 2019;  $P = .12$ ) or for congenital cardiac sessions (5.9% [5 of 85] in 2015 vs 13.4% [13 of 97] in 2019;  $P = .11$ ). The proportion of female thoracic session leaders showed a statistically significant positive trend, from 20.6% (21 of 102) in 2015 to 29.2% (58 of 199) in 2019 ( $P = .02$ ) (Figure 4). Adult cardiac sessions had the highest proportion of all-male–led sessions (70.4%; 145 of 206), followed closely by congenital cardiac sessions (69.0%; 60 of 87). Thoracic sessions had the lowest proportion of all-male–led sessions (38.5%; 55 of 143). The proportion of all-male–led sessions did not decrease significantly over time for any specialty (adult cardiac: 75.9% [22 of 29] in 2015 vs 69.1% [47 of 68] in 2019,  $P = .28$ ; congenital cardiac: 77.8% [14 of 18] in 2015 vs 61.9% [13 of 21] in 2019,  $P = .15$ ; thoracic: 32.0% [8 of 25] in 2015 vs 39.0% [16 of 41] in 2019,  $P = .66$ ). Significantly more than one-half of the sessions (57.4%, 390 of 679) featured all-male session leadership, and the proportion of sessions with all-male leadership did not significantly decrease over time (61.8% [68 of 110] in 2015 vs 55.2% [111 of 201] in 2019;  $P = .16$ ) (Figure 5). The majority of sessions that did not have all-male leadership still had a male predominance.

Data on 18 of the 20 program planning committees were available. Four of the program planning committees

**TABLE 1. Female session leaders by position and session category at national and regional cardiothoracic surgery organizational annual meetings from 2015 to 2019**

| Position/category                           | 2015       | 2016       | 2017       | 2018       | 2019        | Total       | <i>P</i> for trend |
|---|------------|------------|------------|------------|-------------|-------------|--------------------|
| Total moderators, n                         | 229        | 229        | 241        | 251        | 408         | 1358        |                    |
| Female moderators, n (%)                    | 31 (13.54) | 31 (13.54) | 38 (15.77) | 38 (15.14) | 79 (19.36)  | 217 (15.98) | .03                |
| Total panelists, n                          | 135        | 181        | 212        | 245        | 411         | 1184        |                    |
| Female panelists, n (%)                     | 13 (9.63)  | 20 (11.05) | 31 (14.62) | 25 (10.20) | 58 (14.11)  | 147 (12.42) | .24                |
| Total invited discussants, n                | 217        | 221        | 206        | 235        | 241         | 1120        |                    |
| Female invited discussants, n (%)           | 12 (5.53)  | 26 (11.76) | 25 (12.14) | 21 (8.94)  | 32 (13.28)  | 116 (10.36) | .05                |
| Total session leaders, n                    | 581        | 631        | 659        | 731        | 1060        | 3662        |                    |
| Female session leaders, n (%)               | 56 (9.64)  | 77 (12.20) | 94 (14.26) | 84 (11.49) | 169 (15.94) | 480 (13.11) | .001               |
| Total sessions, n                           | 110        | 118        | 125        | 125        | 201         | 679         |                    |
| All-male led sessions, n (%)                | 68 (61.82) | 73 (61.86) | 69 (55.20) | 69 (55.20) | 111 (55.22) | 390 (57.44) | .16                |
| Total adult cardiac sessions, n             | 29         | 36         | 35         | 38         | 68          | 206         |                    |
| All-male led adult cardiac sessions, n (%)  | 22 (75.86) | 28 (77.78) | 24 (68.57) | 24 (63.16) | 47 (69.12)  | 145 (70.39) | .28                |
| Total adult cardiac session leaders, n      | 172        | 187        | 197        | 230        | 386         | 1172        |                    |
| Female adult cardiac session leaders, n (%) | 9 (5.23)   | 9 (4.81)   | 14 (7.11)  | 19 (8.26)  | 30 (7.77)   | 81 (6.91)   | .12                |
| Total congenital sessions, n                | 18         | 17         | 17         | 14         | 21          | 87          |                    |
| All-male–led congenital sessions, n (%)     | 14 (77.78) | 13 (76.47) | 12 (70.59) | 8 (57.14)  | 13 (61.90)  | 60 (68.97)  | .15                |
| Total congenital session leaders, n         | 85         | 74         | 93         | 88         | 97          | 437         |                    |
| Female congenital session leaders, n (%)    | 5 (5.88)   | 6 (8.11)   | 14 (15.05) | 9 (10.23)  | 13 (13.40)  | 47 (10.76)  | .11                |
| Total thoracic sessions, n                  | 25         | 24         | 24         | 29         | 41          | 143         |                    |
| All-male–led thoracic sessions, n (%)       | 8 (32.00)  | 11 (45.83) | 7 (29.17)  | 13 (44.83) | 16 (39.02)  | 55 (38.46)  | .66                |
| Total thoracic session leaders, n           | 102        | 106        | 127        | 134        | 199         | 668         |                    |
| Female thoracic session leaders, n (%)      | 21 (20.59) | 16 (15.09) | 31 (24.41) | 29 (21.64) | 58 (29.15)  | 155 (23.20) | .02                |
| Total mixed sessions, n                     | 38         | 41         | 49         | 44         | 71          | 243         |                    |
| All-male–led mixed sessions, n (%)          | 24 (63.16) | 21 (51.22) | 26 (53.06) | 24 (54.55) | 35 (49.30)  | 130 (53.50) | .29                |
| Total mixed session leaders, n              | 222        | 264        | 242        | 279        | 378         | 1385        |                    |
| Female mixed session leaders, n (%)         | 21 (9.46)  | 46 (17.42) | 35 (14.46) | 27 (9.68)  | 68 (17.99)  | 197 (14.22) | .13                |

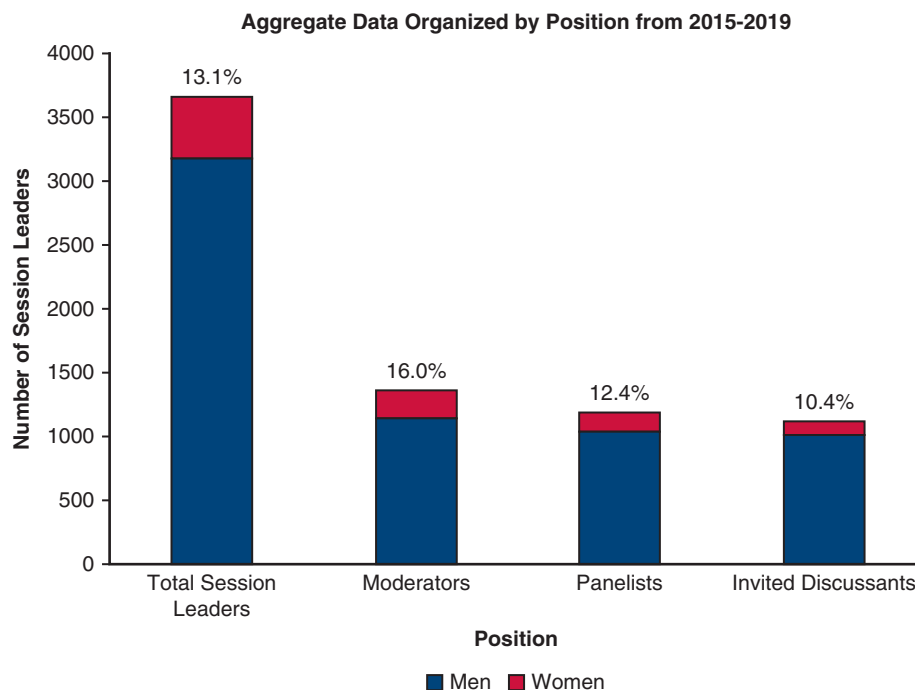
Female session leaders are reported for 4 cardiothoracic surgery organizations' annual meetings over 5 y. The data are organized by position and session specialty for each year and overall. In summary, women composed 13.1% (480 of 3662) of total session leaders, and this proportion trended positively ( $P = .001$ ). Other categories that trended positively for women from 2015 to 2019 included proportions of moderators ( $P = .03$ ), invited discussants ( $P = .05$ ), and session leaders in general thoracic sessions ( $P = .02$ ).

included female chairs ( $n = 4$  of 18 available listings; 22.2%). These 4 program planning committees planned annual meetings that included 11.2% (69 of 616) female session leaders. The 14 program planning committees that were led by men planned similarly distributed annual meetings, with 400 women filling 2930 of the available session leader roles (13.7%). Overall, women occupied 11.1% (28 of 252) of available seats on the executive boards of all organizations from 2015 to 2019. Although this proportion improved from 7.4% (4 of 54) in 2015 to 15.4% (8 of 52) in 2019, the trend was not statistically significant

( $P = .07$ ). Of note, only 9 of the 28 seats (32.1%) held by women were unique individuals. Comparatively, the remaining 224 executive seats from 2015 to 2019 were held by men; 208 of these men were identified, and 16 were pictured without a caption. Of the 208 identified, 38.5% (80 of 208) were unique individuals.

#### Unique Individuals as Session Leaders

In 2015, 76.9% (43 of 56) of the total female session leaders were unique, and this decreased to 49.7% (84 of 169) in 2019. Furthermore, when 2015 and 2019 were



**FIGURE 2.** Female session leaders by position at national and regional cardiothoracic surgery organizational annual meetings from 2015 to 2019. The gender distribution of session leadership was evaluated at 4 cardiothoracic surgery organizations' annual meetings from 2015 to 2019. The number of session leaders at annual meetings from 2015 to 2019 were totaled and then grouped by position. There were a total of 3662 session leaders, 480 (13.1%) of whom were women; 16.0% (217 of 1358) of moderators, 12.4% (147 of 1184) of panelists, and 10.4% (116 of 1120) of invited discussants were women.

combined, the proportion of unique female session leaders dropped further to 43.6% (98 of 225). Comparatively, 60.6% (318 of 525) and 51.6% (547 of 1060) of the total male session leaders were unique in 2015 and 2019, respectively, and this dropped to 43.0% (699 of 1641) when 2015 and 2019 were combined.

### National Versus Regional Results

The STSA and WTSA regional meetings included 710 total session leaders, 124 (17.5%) of whom were women, compared with the AATS and STS national meetings, which included 356 women out of 2952 total session leaders (12.1%) (Table 2). The regional meetings included a significantly higher proportion of female session leaders overall ( $P = .0001$ ), but although this number increased over time, the trend was not statistically significant (11.4% [16 of 140] in 2015 vs 21.5% [26 of 121] in 2019;  $P = .11$ ). The national meetings significantly improved on their lower starting point of 9.1% (40 of 441) in 2015 to 15.2% (143 of 939) in 2019 ( $P = .001$ ) (Figure 3). Almost one-half (46.3%; 74 of 160) of the sessions at regional meetings were all-male led, which was significantly lower than the 60.9% (316 of 519) of all-male-led sessions seen at national meetings ( $P = .001$ ). The proportion of all-male sessions decreased over time for both the regional (61.3% [19 of 31] in 2015 vs 45.5% [15 of 33] in 2019;  $P = .22$ ) and the national meetings (62% [49 of 79] in 2015 vs 57.1% [96 of

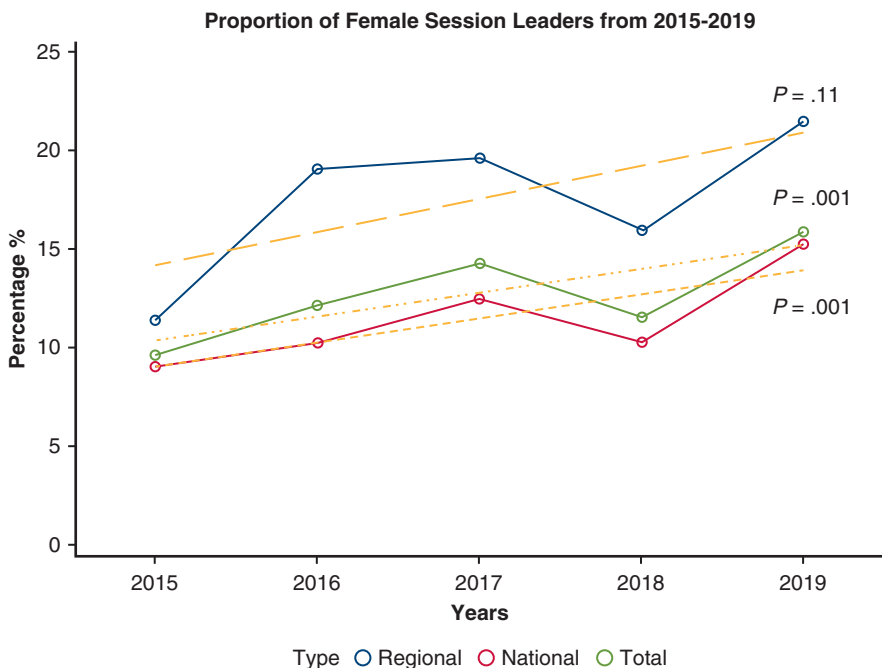
168] in 2019;  $P = .18$ ), but neither trend was statistically significant (Figure 5).

Membership data were obtained for both national organizations for 2015 and 2017 and was requested but not obtained for either regional organization. In 2015, 7.7% (535 of 6936) of AATS and STS members were women, and 9.7% (40 of 441) of session leaders at national meetings were women. In 2017, 6.5% of members were women (449 of 6858) and 12.5% (62 of 496) of session leaders at national meetings were women.

The program planning committees that included female chairs were evenly split, with 50% (2 of 4) planning regional meetings and 50% (2 of 4) planning national meetings. Women occupied 13.3% (15 of 113) of available seats on the executive boards for regional organizations, which was greater than the 9.4% (13 of 139) of seats filled by women for national organizations. Although both regional (13.0% [3 of 23] in 2015 to 19.1% [4 of 21] in 2019;  $P = .20$ ) and national organizations (3.2% [1 of 31] in 2015 to 12.9% [4 of 31] in 2019;  $P = .21$ ) included more women in leadership over time, neither trend was statistically significant.

### DISCUSSION

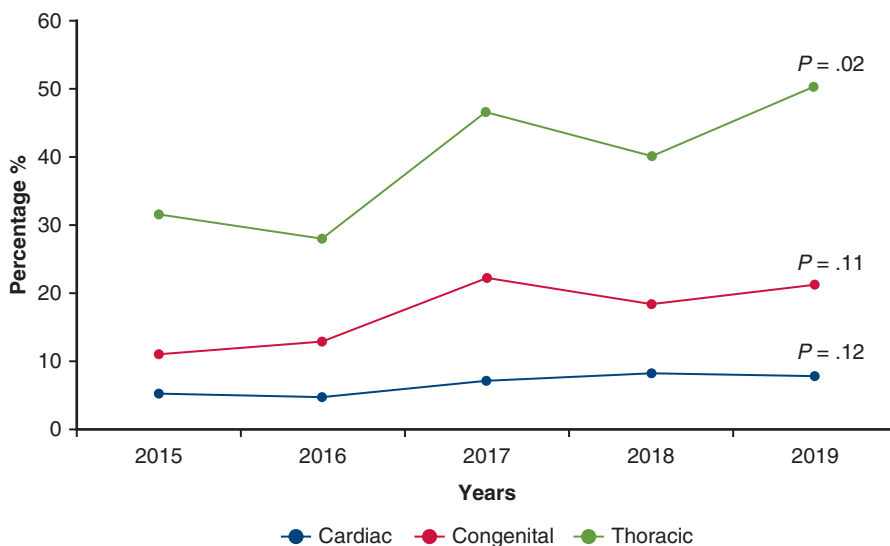
This study suggests that women fill significantly fewer peer-selected leadership roles than men at cardiothoracic surgery organizational annual meetings. Encouragingly,



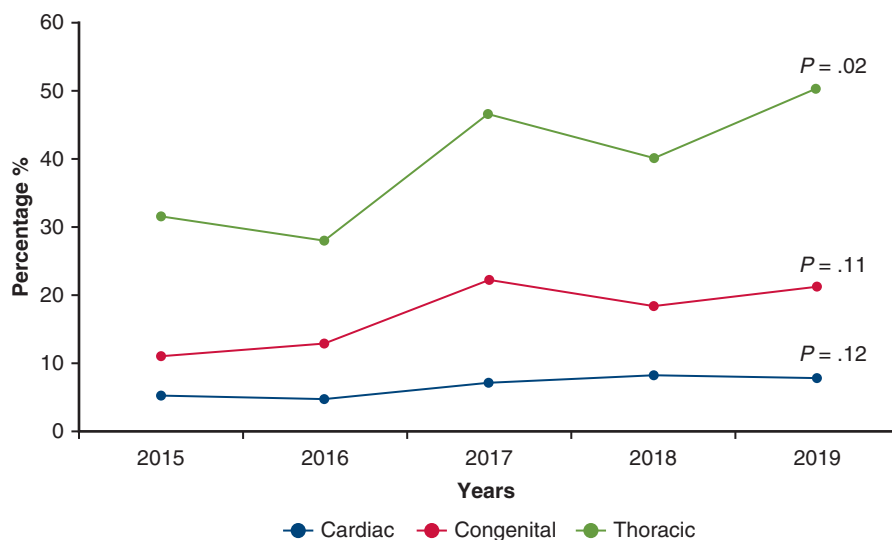
**FIGURE 3.** Trends in the proportion of female session leaders at national versus regional cardiothoracic surgery organizational annual meetings from 2015 to 2019. The gender distribution of session leadership was evaluated at 4 cardiothoracic surgery organizations’ annual meetings from 2015 to 2019. A subgroup analysis was performed comparing the 2 national organizations with the 2 regional organizations. The proportion of total female session leaders trended positively, from 9.6% (56 of 581) in 2015 to 15.9% (169 of 1060) in 2019 ( $P = .001$ ). The regional meetings included a significantly higher proportion of female session leaders overall, and although this number increased over time, the trend was not statistically significant (from 11.4% [16 of 140] in 2015 to 21.5% [26 of 121] in 2019;  $P = .11$ ). The national meetings significantly improved on their lower starting point of 9.1% (40 of 441) in 2015 to 15.2% (143 of 939) in 2019 ( $P = .001$ ).

the proportion of female session leaders at cardiothoracic surgery meetings is above the proportion of women certified by the ABTS and the proportion of female AATS and STS members; however, given the vast underrepresentation of

women in cardiothoracic surgery overall, using the current percentage of women in the specialty as a gauge for appropriate representation at annual meetings is a suboptimal strategy. Scientific research authorship can provide an



**FIGURE 4.** Trends in the proportion of female session leaders organized by session topic at cardiothoracic surgery organizational annual meetings from 2015 to 2019. The gender distribution of session leadership was evaluated at 4 cardiothoracic surgery organizations’ annual meetings from 2015 to 2019. Sessions were categorized based on their predominant topic: adult cardiac, congenital cardiac, thoracic, and mixed. The proportion of female session leaders did not change significantly over time for adult cardiac sessions (5.2% [9 of 172] in 2015 vs 7.8% [30 of 386] in 2019;  $P = .12$ ) or for congenital cardiac sessions (5.9% [5 of 85] in 2015 vs 13.4% [13 of 97] in 2019;  $P = .11$ ). The proportion of female thoracic session leaders showed a statistically significant, positive trend, from 20.6% (21 of 102) in 2015 to 29.2% (58 of 199) in 2019 ( $P = .02$ ).



**FIGURE 5.** Trends in the proportion of all-male-led sessions at national versus regional cardiothoracic surgery organizational annual meetings from 2015 to 2019. The gender distribution of session leadership was evaluated at 4 cardiothoracic surgery organizations’ annual meetings from 2015 to 2019. A subgroup analysis was performed comparing the 2 national organizations with the 2 regional organizations. The overall proportion of sessions with all-male leadership did not significantly decrease over time (61.8% [68 of 110] in 2015 vs 55.2% [111 of 201] in 2019;  $P = .16$ ). The regional meetings had significantly fewer all-male-led sessions overall, and although the proportion of all-male sessions trended downward for both regional meetings (61.3% [19 of 31] in 2015 vs 45.5% [15 of 33] in 2019;  $P = .22$ ) and national meetings (62.0% [49 of 79] in 2015 vs 57.1% [96 of 168] in 2019;  $P = .18$ ), the trends were not statistically significant.

estimate of eligibility for session leadership roles.<sup>1</sup> Luc and colleagues<sup>8</sup> found that among the top articles published in the *Annals of Thoracic Surgery*, women accounted for 16% of last authors in 2015 and 20% in 2017. These percentages are higher than the 9.64% and 14.26% of female session leaders seen in our study in 2015 and 2017, respectively. This relative deficit considered together with evidence that female-authored articles achieve equal impact as male-authored articles based on Altmetric scores suggests that highly qualified women are being overlooked.<sup>8</sup>

In juxtaposition to gender representation trends seen in surgery, women now outnumber men in medical school,

composing 50.5% of the student body in 2019, and near parity has been present for nearly 20 years, making it difficult to argue that a relative lack of women in medicine accounts for the discrepancies seen in surgery.<sup>9,10</sup> Furthermore, a 2017 survey administered to Harvard medical students found that women and men expressed similar rates of intent to pursue surgery (34 of 153 women [22%]; 29 of 107 men [27%];  $P = .38$ ).<sup>11</sup> Despite an adequate number of women in medical schools and equal initial interest in surgery as their male counterparts, fewer women enter the field. This suggests some deterrence along the way, and in fact, among surveyed students, significantly more women

**TABLE 2. Female session leaders by position and session category at national versus regional cardiothoracic surgery organizational annual meetings from 2015 to 2019**

| Position/category                 | National    | Regional    | P value |
|-----------------------------------|-------------|-------------|---------|
| Total moderators, n               | 1026        | 332         |         |
| Female moderators, n (%)          | 138 (13.45) | 79 (23.80)  | <.0001  |
| Total panelists, n                | 1134        | 50          |         |
| Female panelists, n (%)           | 140 (12.35) | 7 (14.00)   | .73     |
| Total invited discussants, n      | 792         | 328         |         |
| Female invited discussants, n (%) | 78 (9.85)   | 38 (11.59)  | .39     |
| Total session leaders, n          | 2952        | 710         |         |
| Female session leaders, n (%)     | 356 (12.06) | 124 (17.46) | .0001   |
| Total sessions, n                 | 519         | 160         |         |
| All-male-led sessions, n (%)      | 316 (60.89) | 74 (46.25)  | .001    |

The gender distribution of session leadership was evaluated at 4 cardiothoracic surgery organizations’ annual meetings from 2015 to 2019. A subgroup analysis was performed comparing the 2 national organizations with the 2 regional organizations. The regional organizations had a higher proportion of total female session leaders ( $P = .0001$ ) and female moderators ( $P < .0001$ ) and had a lower proportion of all-male-led sessions ( $P = .001$ ).

than men perceived gender-based discouragement to pursuing a surgical career (72 of 99 women [72.7%] vs 1 of 65 men [1.5%];  $P < .0001$ ). Unfortunately, this discouragement is not entirely unfounded. In 2017, only 12% of professors, 21% of associate professors, and 29% of assistant professors of surgery were women, and cardiothoracic surgery had the lowest fraction of female full professors.<sup>12</sup> Furthermore, only 21 chairs of surgery were women in 2019, and among the cardiothoracic surgery organizations included in this analysis, the 2 regional organizations have combined for 3 female presidents, and the 2 national organizations have elected 1 female president posthumously and 1 president-elect.<sup>13</sup> Importantly, participation at academic meetings is a metric used by appointment and promotion committees, making these engagements critical stepping stones to developing female surgeons' careers.<sup>1,2,7</sup>

Studies from other fields have suggested that the lower visibility of women at cardiothoracic surgery meetings may contribute to harmful messages that dissuade women from entering the field. The Stanford VMware Leadership Lab, which works with companies to develop strategies to attract diverse applicants, found that women were less engaged during information sessions when companies presented cultures in which women were not well represented, when presentation slides featured primarily images of men in active roles, and when information sessions were led by men.<sup>14</sup> Selecting more women for peer-invited roles at cardiothoracic surgery meetings is an important step toward reversing a negative cultural message and attracting female applicants, and studies suggest that inclusivity benefits everyone. The Leadership Lab found that not only women, but also men, asked twice as many questions and were far more likely to stay at sessions that included women experts and less stereotypic messages.<sup>14</sup>

It appears that the number of women in leadership roles directly affects the composition of peer-selected roles at meetings. Although female involvement on planning committees did not appear to increase overall female session leadership in our study, this could have been related to the small sample size, with only 4 planning committees including women. Interestingly, the vast majority of women on the planning committees and executive boards were thoracic surgeons, which was the subspecialty with the highest proportion of female session leaders. Notably, higher proportions of women on planning committees and in society leadership roles have been correlated with increased female moderators, female session speakers, and decreased male-only panels across several other studies.<sup>2,7,14</sup>

Involving women in program planning appears to be a successful strategy for increasing female leadership; however, some are still hesitant to embrace inclusivity. Some argue that perhaps men simply make better leaders than

women; however, evidence refutes this. The *Harvard Business Review* reported that managers, particularly male managers, rate women equal to or higher than their male counterparts in many leadership competencies, including taking initiative, acting with resilience, practicing self-development, driving for results, and displaying high integrity and honesty.<sup>15</sup>

General surgery may provide a useful framework for improving gender representation. In 2013, the ACS had nearly 64,000 Fellows, 7.2% of whom were women, and the female membership increased to 9.7% in 2018. From 2014 to 2019, the ACS invited 28% and 32% female panelists and moderators, respectively, to its annual meetings, which was more reflective of its female medical student (2013, 35.2%; 2018, 43.8%) and resident membership (2013, 34.6%; 2018, 39.6%). Even though the national organizations in this study reported comparable proportions of female members to the ACS, cardiothoracic surgery's proportions of female panelists (12.4%; 140 of 1134) and moderators (13.5%; 138 of 1026) at national annual meetings were much lower than those seen at general surgery conferences.

In addition, female representation is likely overstated in this study, as evidenced by our analysis of unique individuals. In 2015, 76.9% (43 of 56) of total female session leaders were unique; however, this decreased to 49.7% (84 of 169) in 2019. Although increasing the total number of female session leaders over time certainly represents progress, it is somewhat artificial, as many of the additional roles in 2019 were filled by the same women. Furthermore, when 2015 and 2019 were combined, the proportion of unique women holding session leadership roles decreased to 43.6% (98 of 225), suggesting that the same group of women are appearing at different meetings not only in the same year, but also from year to year. This creates a false sense of diversity and has been a problem for men as well.

Historically, there is a lag time between when a group diversifies and when that diversity is reflected in the group's leadership. This creates a conundrum here, as female mentorship for female trainees has proven critically important to attracting more women to the field.<sup>2</sup> In this sense, creating a meeting program that reflects cardiothoracic surgery's goal demographics rather than its current demographics would be a much more timely strategy to diversify the field than allowing history to run its course, particularly because our peers control session leadership invitations. An appropriate goal demographic may be at least matching the proportion of women in cardiothoracic surgery residencies, but ideally it would be matching the proportion of women enrolled in medical school.

According to studies in other fields, filling more of these positions with women may be as simple as spreading the awareness that a gender discrepancy exists. For example, award recipients in the American Academy of Physical



Medicine and Rehabilitation over the past 48 years have overwhelmingly been men (84.1%), but 1 year after publication of data describing this disparity, 5 of 8 (62.5%) of their award winners were women.<sup>7,16</sup> This speaks to a possible lack of awareness of gender inequity among male leaders who are in a position to enact change. This evidence suggests that our study holds value simply in reporting the gender representation seen at cardiothoracic surgery meetings.

Although we have previously discussed how inclusivity can lead to increased recruitment of female residents and promote the careers of female cardiothoracic surgeons, there are also tangible benefits to promoting women. The University of California, Davis published a study in 2017 revealing that of the 400 largest public companies headquartered in California, the 25 firms with the highest percentage of women executives and board members enjoyed median returns on assets and equity in 2015 that were at least 74% higher than that seen by the overall group.<sup>17</sup> And within medicine, female physicians have been linked to lower 30-day mortality and readmission rates after accounting for potential physician and patient confounders, such as training and severity of illness, respectively.<sup>18</sup>

Our study has several limitations. First, our results do not account for other demographic information that may contribute to disparity, such as ethnicity, age, years in practice, or institution. In an ever-diversifying climate, future research should investigate additional demographic variables. Second, the specifics of each planning committee's selection processes were unavailable. It is possible that regardless of gender, not all qualified individuals were considered equally owing to personal connections. Third, membership data for the regional organizations and the gender distribution of meeting attendees were not available. Comparing the proportion of female session leaders to these percentages as was done with national membership data would strengthen this study.

In conclusion, this study highlights the gender representation seen in session leadership roles at cardiothoracic surgery organizational annual meetings. The gender discrepancies seen in our study were more pronounced and the improvements were more modest than previously reported in general surgery literature.<sup>2</sup> Acknowledging the issue has proven to be an instrumental step toward correcting it, but this should be reinforced with deliberate and consistent inclusive practices. The AATS recognized the importance of this topic by accepting this abstract as a plenary session presentation for its 2020 annual meeting. This demonstrates a commitment to diversifying the future of cardiothoracic surgery and sets a precedent for other organizations. The details of successful planning committees were not included in the reviewed articles, but *Nature* emphasized that the most inclusive meetings had firm policies that compelled diversity and repeated the effort

yearly.<sup>1</sup> The following list includes action items that all cardiothoracic surgery organizations should adopt:

1. Publicly report organization membership demographics
2. Publicly report session leader and meeting attendee demographics
3. Ensure diversity on program planning committees and leadership boards to encourage inclusion for invited roles
4. Implement objective selection criteria for session leaders to minimize the influence of personal connections
5. Continue to develop and encourage leadership programs for underrepresented members
6. All metrics should be reassessed periodically to ensure appropriate growth.

In conclusion, when present gender inclusivity can enrich culture, diversify recruitment, increase profit, and deliver quality. In this sense, welcoming women benefits everyone.

### Webcast

You can watch a Webcast of this AATS meeting presentation by going to: <https://aats.blob.core.windows.net/media/20AM/Presentations/Unconscious%20Bias%20in%20Leadership%20at%20Na.mp4>.



### Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

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**Key Words:** gender representation, cardiothoracic surgery organizations

## Discussion

### Presenter: Dr Elizabeth A. David



**Dr Rosemary F. Kelly** (*Minneapolis, Minn*). I'd like to thank the AATS, Dr Rosengart, and Dr Keshavjee for the opportunity to discuss this paper today. I'd also like to thank Dr David for providing me with the manuscript well in advance. In this time of global crisis and healthcare change, there's a profound need for exceptional leadership—and inclusivity is clearly part of that solution. The authors present a retrospective analysis of the cardiothoracic leadership in regional and national meetings, which highlights a persistent unconscious bias.

While undergraduate and medical schools have clearly achieved gender equity, the same achievement remains elusive for all surgical specialties. In review of women in academic medicine published in the *Annals of Surgery* in 2011, the authors found that despite an influx of women into academic medicine over the past 3 decades, there has not been equality for men and women faculty in terms of rank attainment, salary, leadership roles, and treatment by colleagues.

In 2017, only 12% of professors in surgical specialties were female, with the lowest number in CT surgery. As an academic surgical society, this is extremely concerning, as we are failing to develop and retain talented women surgeons. The authors are to be commended for their study, since the cure for an unconscious bias is to first recognize it. I applaud the program committee for selecting this topic as a plenary session presentation.

Although this is a descriptive study with its own inherent limitations, it is a critical first step in understanding the current state of our specialty and provides a platform for focused efforts necessary for improvement. Using session leaders at organizational meetings as the indicator of specialty leadership, the authors found that for the past 5 years, there's been a significant improvement in these roles to 16%. But this remains low, and when comparing the regional and national subspecialty trends, it is significant that there is true change only in thoracic surgery. The percentage of women on boards of directors and councils remained low and statistically unchanged from 2015 to 2019. These findings force a difficult conversation to address bias and to change the status quo. As we look to the future, women in cardiothoracic surgery and academic leadership are essential for our success. Men and women need to engage in the solutions.

I believe it will require dedicated leadership and attention to the bias to make substantial and sustainable change in this culture. I have a few questions.

As a subspecialty, thoracic surgeons did show the most significant improvement in the number of women session leaders over the study period and the lowest percentage of all-male session leaders. Was the number of unique session leaders for the subspecialty unchanged and did the program planning committees and organizational boards also have more women thoracic surgeons compared to cardiac or congenital specialties?



**Dr Elizabeth A. David** (*Los Angeles, Calif*). Thank you, Dr Kelly, for your comments and feedback on the presentation. I think we are in agreement on a lot of these points. For our unique session leader analysis, we did not break it down by specialty. I did not mention this in the presentation, but we did include a lot of mixed sessions, things that would fall into

educational categories and some of the critical care sessions. I suspect that if we had included those sessions, the numbers actually probably would have been even worse, meaning that we would have seen fewer and fewer unique session leaders.

Regarding your question on the program committees, we had data on 18 out of the 20 program committees. Only 4 of those committees were led by a woman. Looking at the committees across the board, we found that if they were led by a woman or a man, it didn't really make any difference in terms of the proportion of session leadership. But we did look at trends in the percentage of women on boards of directors and councils over this time and we found an increasing trend toward women being represented on those boards, but it also did not correlate with female session leadership.

For your final question about how I feel about this as a thoracic surgeon, I think it's really related to the quote that I included at the end: "You can't be what you can't see." In thoracic surgery, there are more of us, and it is a self-fulfilling idea where we are seeing more women at the podium, on the board of directors, on the council, in the leadership, and we're seeing that we can do it. We're seeing that we can do it, and we can balance family, and we can balance the different career pressures that we face as women. And it also gives us more role models and more sponsors. And to why it's been faster in thoracic than in cardiac or congenital, I don't really have a great explanation for that. But I hope that these data will help.

**Dr Kelly.** The proportion of women as session leaders and moderators was significantly greater at regional meetings compared with national meetings. Were these also unique individuals? And in review of the regional organizations, were there any policies or leadership strategies that were present that encourage engagement of women surgeons?

**Dr David.** I think there are 2 factors at play here. The regional meetings are smaller. They're intended to be smaller. So it's a smaller scale, sometimes a more welcoming, less intimidating environment than the larger meetings. And so I think leadership and membership feel a little bit more freedom and flexibility in those meetings to give younger members and more junior members an opportunity to lead and be seen.

My other hypothesis about this is that we were actually hoping to get really granular data on the demographics of the membership and the demographics of specialty practices. That was very difficult, and some of the organizations actually said "we really can't provide you with that because it doesn't exist." And you know, there were a couple of organizations who actually don't even track gender of the members right now. And in that case, it's just not on anyone's radar to be really paying attention. Again, I hope that by raising some awareness and realizing that we need

to recognize some of this, that alone will be enough to mitigate some of it.

**Dr Kelly.** Thank you. I think the same is true for our minority members. It's hard to track that data.

**Dr David.** Yes.

**Dr Kelly.** It's long been recognized that drawing women into the STEM fields requires a conscious dedicated effort on many fronts. Studies have also shown that medical students have the same degree of inherent interest in surgical specialties regardless of gender. To accelerate diversity in our specialty, we need to far exceed the percentage of senior women in cardiothoracic surgery. What strategies would you suggest to design programs that reflect all demographics rather than our current demographics?

**Dr David.** Thank you for asking this I. I think there are some really great programs that are already in existence that we need to continue to invest in. There are existing leadership academies and summits that are offered by some of our organizations, and these are key. I think we need to continue to focus on creating environments that allow individuals to develop. It's critical that when we offer a new role to an individual who hasn't previously fulfilled that role, they need to have direct mentorship and feel empowered to ask questions that help them have success in that role. I think some could argue that has traditionally not been the culture of the world of CT surgery. I think this is a place where we could all use a little bit of a cultural shift.

I also think that being very deliberate with our peer-selected invitations is very critical. Just a few weeks ago, I was involved in a planning session for an upcoming meeting. We planned the content as you normally would; we planned the content and went through and suggested a list of potential speakers, moderators, etc. And we went back a second time with that list and said, okay. Well, these people are always on the podium. So they're coming off the list, we're going to get new people on the list. Then we went through the new people and we said, "Alright, who is the person who can make sure that this person is going to be prepared for this role?" So that took extra time and it was an extra step, but hopefully that is something that we all consider doing in the future to improve our inclusivity in the field.

**Dr Kelly.** What practices would you suggest to promote inclusivity and greater awareness of gender bias for cardiothoracic surgery as a specialty? Would you endorse policies that compel diversity in organizational leadership or meeting participation?

**Dr David.** I don't feel that there is a need for policies to compel diversity. I think there gets to an issue with people being worried about sacrificing quality when they're compelled to include people. I think that's an issue that we should stay far away from. But I do think we should follow some of the other scientific fields and business fields in terms of modeling our productivity and celebrating the

positives of being more inclusive and more diverse. I would say we have a lot to learn from the business world in that standpoint.

As individual surgeons, there is a lot we can do to shape our field, such as paying attention in sessions and in meetings about who is not there. Looking around on Zoom or when you're in a boardroom, are you the only person who looks like you? And if you are, who can you invite to the table, suggest for a speaking or leadership role, who also looks like you? I think that's really critical for our field as we move forward into the future.

**Dr Kelly.** Thank you, and I want to again thank the Association and the authors for the opportunity to review this paper and to discuss it here today. Thank you.



**Dr Shaf Keshavjee.** Thank you, Dr Kelly. Dr David, I have a question for you. If we're going to show you a different profile in 2050, what do you think we could do differently now with our medical students to attract more diversity into cardiothoracic surgery?

**Dr David.** I think we need to show them that they can do it. And I think the way you do that is by putting someone in front of them or connecting them with somebody who is doing it. Unfortunately, what it means is that for the women who are leaders now in our field, we have to spend a certain amount of time actively engaging and supporting those medical students and residents and showing them that whatever it is they want to balance in their life, whether it's career/family, career/research, etc, we need to find a mentor for them. We know that there's a big dropoff in medical students expressing an interest in a surgical career and then those who follow through with it. So we're clearly missing something, and I think those one-on-one individual relationships can be hugely important. I think the Women in Thoracic Surgery organization is a hugely valuable organization for female trainees to participate in. So I think those are some of the big things.

**Dr Keshavjee.** I would argue that it doesn't always have to be women mentoring women either. I believe that is what you've seen in thoracic surgery—a lot of very good mentors who I think were aware of these concepts early on.

**Dr David.** I agree with you completely, and I know a lot of our members and leaders have daughters, and I think if you mentor your medical students the way you would want someone to mentor your daughter, that will also be a recipe for success.



**Dr Todd K. Rosengart** (*Houston, Tex*). Dr David, thanks for that great presentation. The trend toward more trainees versus the proportion of board-certified is obviously a hopeful sign. So I guess I'll ask you how hopeful you are. Do you think that portends an improvement in the number of leaders and discussants and the like? Or are there overarching problems, despite the increasing proportion that we're going to be seeing?

**Dr David.** I think it's twofold. I think we will see the number of board-certified women increase over the next 5 to 10 years, because we're seeing it even now. But I think we still have the issue of that big hurdle between associate professor and full professor that we really need to work toward. I think all of us, men and women, a lot of times will face some sort of mid-career crisis, and I think women are more susceptible to leaving the field of surgery, leaving the field of academic medicine, when they reach those points—and so that's why we see that big drop from associate professor to professor.

I think that is a real area of concern that needs attention. Even now in the COVID era, we're already seeing a dropoff in the number of academic submissions from women. Fewer women have been interviewed in this era about the way that their practice has been impacted and there's all sorts of theories related to "Well, women are having so take more of the role at home right now, in terms of handling children who are at home, etc." So, I think we are making improvements, but there's still a lot to be done.