

Leadership diversity in prosthodontics: Recommendations for the representation of women speakers at scientific prosthodontic meetings

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ABSTRACT

STATEMENT OF PROBLEM

Leadership platforms in the professions include invitations to speak at the meetings of major organizations. However, the percentage of women speakers at prosthodontic meetings is lower than that of women prosthodontists overall. Recommendations or reporting requirements to address this deficiency are lacking.

PURPOSE

The purpose of this observational study was to determine the probability of the number of women speakers at any scientific meetings of 6 different prosthodontic organizations over the past decade occurring by chance alone and to make recommendations for scientific program committees and organizations regarding the number of women speakers at future meetings.

MATERIAL AND METHODS

The number of men and women speakers at the 2009-2018 annual meetings of the Academy of Prosthodontics (AP), American Academy of Fixed Prosthodontics (AAFP), American College of Prosthodontics (ACP), American Prosthodontic Society (APS), Greater New York Academy of Prosthodontics (GNYAP), and Pacific Coast Society for Prosthodontics (PCSP) was recorded. The chi-square test was used to determine differences in the percentage of women speakers over time and between organizations. The BINOM.DIST function was used to calculate the probability of selecting the exact number of women speakers at each meeting ($\alpha=.05$).

RESULTS

The mean percentage of women speakers across all organizations and all years was 10.80%. The percentage ranged from 0.00% (AAFP 2013; ACP 2013; APS 2012, 2015; GNYAP 2009, 2014; and PCSP 2009, 2010, 2011) to 42.86% (AP 2013). No change in women speaker presence was observed over the time frame investigated. The AP had significantly more women speakers than the other organizations. Of the 60 meetings

included, 25 meetings had a statistically significantly low number of women speakers, and 1 meeting had a statistically significantly high number of women speakers.

CONCLUSIONS

The number of women speakers at the scientific meetings of the organizations analyzed was significantly low and has not changed significantly over the years from 2009 to 2018. There were significantly more women speakers at the scientific meetings of the Academy of Prosthodontics than in the 5 other major prosthodontic organizations over the years 2009 to 2018. A recommendation is made that prosthodontic organizations include more women speakers on scientific programs. Specifically, a minimum of 25% of speakers should be women (rolling 3-year average) or 25% of podium time should be for women speakers (rolling 3-year average).

CLINICAL IMPLICATIONS

Increasing the low number of women speakers at the scientific meetings of prosthodontic organizations will be facilitated by adherence to reporting requirements aimed at ensuring that the number of women speakers is at least equivalent to the percentage of women prosthodontists (currently approximately 25% in the United States).

Role models for underrepresented minorities (URMs) in leadership in science may have a significant impact through different leadership roles, including officer positions within

organizations; academic positions such as department chair, program director, or dean; and key opinion leader (KOL) of activities. In the last group, a KOL routinely garners national and international exposure through speaking opportunities where the speaker's presence showcases her or him as an expert clinically, academically, administratively, educationally, or scholarly.^{1,2} This exposure not only leads to additional career-enhancing activities such as collaborations and further opportunities to speak but also allows others from the same underrepresented minority group to visualize their own potential to become a leader.³

Despite the number of women prosthodontic residents and, consequently, the number of women prosthodontists increasing in recent years to be currently approximately 25%⁴ (L. Carradine-Poinsett and J. McDaniel, Personal communication, February 28, 2019), Piasecki et al⁵ determined that the number of women invited to speak at prosthodontics meetings has not increased over the past decade and is routinely less than 25%. Similar observations have been noted in medicine and other science, technology, engineering, and mathematics (STEM) fields.^{6, 7, 8, 9, 10, 11, 12} In mathematics, by knowing the approximate number of women mathematicians and analyzing the number of speakers at mathematics meetings who are women, Martin¹³ was able to statistically calculate the probability of the number of women speakers at any given meeting happening by chance alone. In doing so, he showed the number of meetings where the probability of such a low number of women speakers at meetings in mathematics was disconcertingly low and that to yield such a low number, bias against women speakers was likely involved.¹³ The reasons for the bias against including women speakers in a scientific program in prosthodontics have been previously described and include the lack of women in leadership positions who are able to promote the advancement of other women, as well as erroneous assumptions about the work ethic of women, desire or lack thereof for leadership positions, and the scientific acumen of women and, as a result, the ability of women to produce high-quality scientific research.^{5,14,15}

The purpose of this observational study was to determine the probability that the number of women speakers at any scientific meeting of 6 different prosthodontic organizations over the past decade occurred by chance alone and to make recommendations for

scientific program committees and organizations regarding the number of women speakers at future meetings. The null hypotheses tested were that the distribution of women and men speakers across comparison groups “year” and “organization” would be independent.

MATERIAL AND METHODS

The scientific programs of the Academy of Prosthodontics (AP), American Academy of Fixed Prosthodontics (AAFP), American College of Prosthodontists (ACP), American Prosthodontic Society (APS), Greater New York Academy of Prosthodontics (GNYAP), and Pacific Coast Society for Prosthodontics (PCSP) for the last decade (2009-2018) were collated from a variety of sources ([Table 1](#)). These organizations were chosen because their meetings cover at least 2 days, typically have speakers who are nationally or internationally known, their presentation content covers the broad spectrum of prosthodontics, and the meeting locations are across the continental United States.

Table 1. Source of data for each organization, inclusion criteria, and exclusion criteria

Organization	Source	Excluded Speakers
AP	www.academyofprosthodontics.org	Reserve speaker
AAFP	www.fixedprosthodontics.org	Poster program participants and award winners
ACP	2009: Past-President Charles Goodacre 2010-2013: Adam Reshan (Director, Membership Service & Academic Relations, ACP) 2014: Past-President Jonathan Wiens 2015-2018: www.prosthodontics.org	Corporate fora speakers ABP preparation course speakers Award competition speakers Breakout session moderators Workshop presenters

APS	www.prostho.org	Following year's meeting preview speaker Graduate student competition participants
GNYP	President-Elect (2018-2019) James Hudson	Award winners who were not presenters Reserve speaker
PCSP	President-Elect (2018-2019) Mathew Kattadiyil	Graduate student competition participants Reserve speaker

To be included in descriptive data and statistical analyses, speakers had to be part of the core scientific program. This maintained the ability to compare the various organizations to one another as some annual meetings included workshops that were not included in the annual meetings of other organizations. Program source and exclusion criteria for each organization are presented in [Table 1](#). For all organizations, moderators and speakers presenting general meeting information, including preview of the program for the following year, award acceptance, and opening and closing remarks, were excluded.

Speaker gender was identified by using previous programs from the respective annual meetings, and the number of male and female speakers in the core scientific program of each annual meeting was recorded. Gender was determined by speakers' first name or, in the case of organizations that included photographs of their speakers, by the speakers' photograph. For those speakers whose gender could not be identified by their first name or photograph, gender was determined based on biographical information retrieved from a Google search.

To test the null hypotheses that the distribution of women and men speakers across comparison groups “year” and “organization” was independent, the chi-square test was used ($\alpha=.05$). Analysis was performed by using a statistical software program (IBM SPSS Statistics version 25.0; IBM Corp).

The gender distribution data of each meeting for bias (underrepresentation of women) were entered in a spreadsheet (Microsoft Office Professional Plus 2010, Excel, version 16.0.4849.1000; Microsoft Corp) and analyzed by using statistical methods. The null hypothesis was that the speakers were selected independently from a pool of prosthodontists. According to the current gender distribution provided by the American College of Prosthodontists, the percentage of ACP members who are women is approximately 25%. To calculate the probability mass function, the gender distribution data were entered into the spreadsheet, and the BINOM.DIST function was used to calculate the probability of selecting the exact number of women speakers in each meeting ($\alpha=.05$).

RESULTS

The number of men and women speakers, the percentage of women speakers, and the mean number of women speakers from 2009 to 2018 at the scientific programs of the 6 organizations were analyzed. The mean number of women speakers across all organizations and all years was 10.80%. The range of percentage of women speakers at the meetings ranged from 0.00% (AAFP 2013; ACP 2013; APS 2012, 2015; GNYAP 2009, 2014; and PCSP 2009, 2010, 2011) to 42.86% (AP 2013).

The chi-square test revealed that the distribution of gender over the years analyzed (2009-2018) was independent of the comparison groups, and the null hypothesis was accepted ($P=.571$), indicating no significant change in the number of women speakers during this period. When comparing organizations, a chi-square $P<.001$ indicated strong evidence that the distribution of women speakers between at least 2 of the organizations was different. Further multiple comparisons revealed that the AP had included significantly more women speakers than the other organizations. Therefore, the null hypothesis was rejected. The Bonferroni correction was considered during the multiple comparisons.

The probability mass function of each meeting is plotted in [Figure 1](#), where a blue cell indicates women were underrepresented ($P < .05$), pink indicates women speakers were overrepresented ($P < .05$), and black indicates no bias toward women or men speakers ($P \geq .05$). For 25 of the 60 meetings, women speakers were underrepresented. For 1 of the 60 meetings, women speakers were overrepresented. For these 26 meetings, the distribution cannot be explained purely by chance or would be highly unlikely.

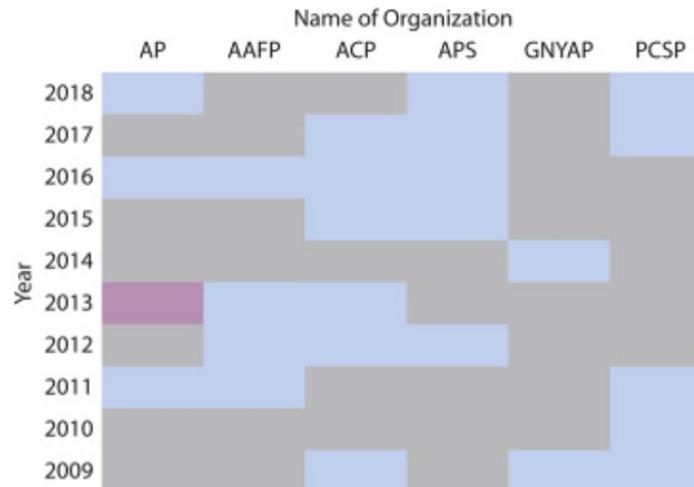


Figure 1. Probability that women were significantly ($P < .05$) underrepresented (*blue*) or overrepresented (*pink*) at each scientific meeting during years 2009 to 2018 for organizations analyzed. *Black* indicates that women were neither overrepresented or underrepresented ($P > .05$).

DISCUSSION

Based on the results of this study, the null hypothesis comparing the number of men and women speakers was rejected. Limitations of this study include that the recommendations made are based on a US-derived (American College of Prosthodontists) percentage of women. Other countries likely have a different percentage. Recommendations are made with an implementation date of 2022, and it is likely that the percentage of prosthodontists who are women in the United States will have changed. Therefore, the recommendations will need to be revised accordingly in the future. Another limitation is that not all

prosthodontists are members of the ACP, meaning that the 25% number used for statistical analysis and to make recommendations may not be completely accurate. Nevertheless, this number represents the best available estimate. Additionally, not all speakers at the prosthodontic meetings were prosthodontists. The percentage of women in these other groups (general dentists, periodontists, oral and maxillofacial surgeons, dental technicians) is expected to differ from that of prosthodontists.

Women and URMs, through their presence on the podium, inspire those who identify with them. This benefit is in addition to those afforded to a speaker himself or herself such as recognition as an expert, enhanced potential for collaboration, research funding, publications, and future invitations. Previous work has described the significant control of the scientific program committee of an organization in choosing the speaker program, as well as the final judgment of program speaker acceptability by the governing body of an organization, such as the executive council or board of councilors.⁵ These bodies typically serve as the only checkpoints, and within this system, the scientific program committee chair is particularly influential as speakers to be selected based on the preferences and biases of the chair. The question arises “Who chooses the scientific program committee chair?” In some organizations, the role is concurrent with the role of an officer in the organization. For example, in the Academy of Prosthodontics, the role of the scientific program committee chair is a specific duty of the serving vice president. In other organizations, the scientific program committee chair is chosen by the president or by the organization’s governing body, such as in the Pacific Coast Society for Prosthodontics and the American Academy for Fixed Prosthodontics.

The results of this study demonstrate a disappointing situation and confirm the findings of Piasecki et al.,⁵ who reported that only 11.2% of women speakers served on the scientific programs of the same 6 organizations when a narrower time frame was analyzed (Piasecki et al reviewed the years 2009, 2014-2018, whereas this study reviews 2009-2018). While the Academy of Prosthodontics was significantly better at including women speakers than other organizations, of the 60 meetings evaluated, the percentage of women speakers was significantly lower in 25 meetings ($P<.05$), and the outcome is highly unlikely to have occurred by chance alone. The follow-on conclusion is that these

results could only have occurred as a result of bias, intentional (explicit bias), or unintentional (implicit bias), and previous work has discussed the most common reasons for such bias.^{5.13} Observational data such as those presented in this article will not, in and of themselves, lead to needed change. So, how might the problem of the low number of women speakers be remedied? The authors propose the following guidelines:

1. On a rolling 3-year basis, the percentage of women speakers on a scientific program should be, at a minimum, the percentage of women in “the general population.” Here, the general population would be prosthodontists, and based on current data, the “minimum women speaker percentage” (MWSP) should be 25%.

2. In lieu of meeting the MWSP, an alternative option for the scientific program committee would be to calculate and publish the percentage of scientific speaker podium time (excluding moderators, discussers, award recipients, welcome addresses) dedicated to women speakers. Again, based on current data, the “minimum time percentage for women speakers” (MTPWS) should be 25%.

3. The scientific program committee should include that all online and printed materials attest to the MWSP or that the MTPWS has been met. Should both the MWSP and MTPWS not be met, the scientific program committee should provide a written rationale for this failure. To give organizations time to meet these guidelines, attestation should be voluntary until January 1, 2022.

These guidelines will give an organization sufficient flexibility in its program structure; will ensure that over any 3-year period, women, either in number or podium presence as speaker, have a degree of opportunity to represent the number of women prosthodontists; and will implement a reporting requirement policy. The use of these guidelines and MWSP and MTPWS reporting is voluntary, and although objections may be raised to the reporting requirement, why a compliant organization would hesitate to embrace this concept of fair representation is difficult to understand. In the years 2009 to 2018, the Academy of Prosthodontics met the MWSP 25% threshold in 2012, 2013, and 2015. None of the other organizations met the MWSP 25% threshold in any of the years between 2009 and 2018. This indicates that there is a long way to go. Talking about change is one thing, making change is another. Precedent indicates that self-reporting in the proposed

format would align well with the 3 principles proposed by Ayal et al¹⁶ to promote ethical behavior: specifically, reminding, where the desired behavior is revisited; visibility, in the form of public attestation of compliance; and, finally, self-engagement, which helps maintain an organization's positive self-perception—one way to ensure change in an otherwise unaware, reluctant, or skeptical environment.

In this article, the troubling issue of the small number of women scientific speakers at 6 prosthodontic organizations has been discussed, and a proposal for remedying this situation presented. Issues pertaining to URMs, however, remain unaddressed. Future research is needed to address the degree to which URMs are represented on the scientific speaker podium.

CONCLUSIONS

Based on the findings of this observational study, the following conclusions were drawn:

1. The number of women speakers at the scientific meetings of the organizations analyzed was significantly low and has not changed significantly over the years 2009 to 2018.
2. A recommendation is made that prosthodontic organizations include more women speakers on scientific programs. Specifically, a minimum of 25% of speakers be women (rolling 3-year average) or 25% of podium time be for women speakers (rolling 3-year average).

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