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Original Contribution

Gender and Editorial Authorship in High-Impact Epidemiology Journals

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Women comprise about half of senior epidemiologists, but little is known about whether they are also viewed as leaders (i.e., authorities) in the field. We believe editorial roles are markers of leadership in a field. Our objective was to describe the distribution of gender across authorship of editorials published in 5 high-impact epidemiology journals over the past 8 years. We included editorials and commentaries published in *American Journal of Epidemiology*, *European Journal of Epidemiology*, *Epidemiology*, *International Journal of Epidemiology*, and *Journal of Clinical Epidemiology* between 2010 and 2017. We classified genders of all authors as woman, man, or unknown and computed the proportions of women editorial authors over all journals and according to position (e.g., first author). Only 31% (682/2,228) of all editorial authors and 36% (524/1,477) of unique editorial authors (i.e., counting each editorial author name only once) were women. We identified 1,180 editorials; 594 had sole authors, 24% (141/594) of whom were women, and 586 had 2 or more authors, 31% (184/586) of which had women as first authors. If women are underrepresented as editorial authors across epidemiology journals (e.g., as a marker of epidemiology leadership), the situation merits immediate correction.

authority; editorial authorship; equality; gender; leadership

Representation of women among all scientists, and their leadership (authority) within their fields, has attracted interest and research (1–6). Even if a field has achieved a balance of men and women in terms of participation and seniority, it might not have accorded leadership roles equally. We believe that achieving "equality" includes achieving leadership in a field.

Epidemiology comprises at least as many women scientists as men, indicating similar participation in the field by the genders (5, 7–9). Although we do not know whether the distribution according to gender is balanced across junior and senior levels, we believe women achieved similar seniority to men in the field, at least in the United States and by 2010. Current membership among 4 international epidemiologic societies is approximately 54% women (5). Since the 1980s, more women than men have enrolled in and graduated from master's and doctoral programs in epidemiology and public health in the United States (7, 8). Between 2010 and 2017, women held 53% of all faculty positions and 47%–50% of tenured positions among the epidemiology departments of schools in the Association of Schools and Programs in Public Health (ASPPH) (5, 9).

Leadership is different from participation, however. Schisterman et al. (5), using an online survey and publicly available data, found that women had not achieved leadership in epidemiology departments, societies, and journals. Specifically, in terms of editorial leadership, they found that all editors-in-chief at 6 epidemiology journals (including the 5 journals we examined) were men and that women made up 36% of editorial board members (5). Although we are less certain about faculty leadership from the study, due to the potential for nonresponse bias in their survey (only 41% of queried departments responded), it appears that men are department chairs more often than women (5). Based on data from other fields (3, 4, 10), we might also expect to find disparities in gender composition between participation and leadership in epidemiology.

We assume that author gender can be used as a marker of participation and leadership. According to this perspective, we believe the gender of authors of epidemiologic research articles represents participation in the field, and the gender of authors of editorials represents leadership. While research article authorship is self-ascribed and typically follows contributions to the research, "editorial authorship" (by which we mean authorship of editorials by any person and which we differentiate from membership on editorial boards (i.e., "editorial leadership")) is often commissioned by the journals (11, 12). Editors-in-chief or senior editors might typically invite editorials from their associate editors and editorial board members,

and they might also extend invitations to experts outside the journal (11, 12). Our objective was to describe the distribution of gender across editorial authorship in 5 high-impact epidemiology journals over the past 8 years.

METHODS

Search methods

In this study, we defined "editorials" as articles classified as "editorials" or "commentaries" by the journals, and we excluded letter-type articles (e.g., comments on previously published works, letters to the editor, or responses to comments). We selected the top 5 most "highly cited" (i.e., having the highest Web of Science journal impact factor in 2017) general epidemiology journals that 1) had "epidemiology" in the journal name, and 2) published on average 10 or more editorials per year (13). Eligible reports were editorials with at least 1 named author that were published in one of the 5 journals between January 1, 2010, and December 31, 2017, inclusive. Working independently, 2 authors hand-searched each issue of the journals to identify eligible editorials; we resolved all discrepancies through discussion.

Data extraction and classification of gender

We downloaded the citation information (digital object identifier (DOI), journal name, year of publication, and the names of all listed editorial authors in order of appearance) for all included editorials from PubMed and imported the data into a Microsoft Access (version 1807; Microsoft Corporation, Redmond, Washington) database. For editorials that were not retrievable on PubMed, one study author manually entered the citation information.

One of the authors classified authors' gender as "man," "woman," or "unknown" using the algorithm presented in the Appendix. Briefly, we used 1) personal or a colleague's knowledge of the editorial author's gender, 2) a strong association of the name with a specific gender, 3) ≥90% likelihood that the author's gender is man or woman using the genderize.io program (14), and 4) a Web search for an image or reference to gender. To verify our classification, we used the Web again to confirm the genders of all names classified using the genderize.io program and a 10% random sample of names classified using strong association with gender. We assessed an author's "gender," not "sex," because we believe an author's name, descriptive pronoun, or photographic appearance is a social rather than biological description.

Analysis

The primary outcome of our study was the proportion of unique women editorial authors (i.e., each editorial author name was counted only once) across all journals and years. We assessed whether this proportion differed from 50% using the bounds of the estimate's 95% confidence interval. Secondary outcomes were the proportion of women among 1) all listed editorial authors (i.e., the same person could be counted more than 1 time), 2) sole authors, and 3) first authors for editorials with ≥2 authors. We calculated the proportions of editorials with at least 1 woman author and the proportions of women and men who authored more than 1 editorial. As exploratory analyses, we estimated the relative odds of having a sole-authored editorial for women compared with men. We also estimated the proportions of first and last editorial author pairs among editorials with 2 authors that were "woman-woman," "woman-man," "man-woman," or "man-man," because these were examined in a recent analysis of authorship among journal articles in the epidemiologic literature (5). We performed all analyses using Stata, version 13 (StataCorp LLC, College Station, Texas) (15).

RESULTS

The 5 journals meeting our eligibility criteria were *American Journal of Epidemiology*, *European Journal of Epidemiology*, *Epidemiology*, *International Journal of Epidemiology*, and *Journal of Clinical Epidemiology*. We identified 1,180 editorials published in them between 2010 and 2017. One half (50%) of the editorials had a sole author, and 50% had multiple authors (31% had 2 authors, and 19% had 3 or more authors). The number of editorial authors varied by journal. Altogether, there were 2,228 editorial author names (682 classified as women, 1,546 as men, 0 unknown), corresponding to 1,477 unique authors (524 women, 953 men, 0 unknown).

We classified the gender of all 1,477 unique authors based on a strong association of the name with a specific gender for 72% (1,064/1,477), personal knowledge or asking a colleague for 7% (108/1,477), the genderize.io program for 11% (168/1,477), and a Web search for 9% (137/1,477). The sensitivity of genderize.io was 94% for men (95/101) and 94% (63/67) for women, and the sensitivity of assigning gender to a name with a strong association with a specific gender was 99% for men and 97% for women.

We found that 40% (95% CI: 37, 43) (475/1,180) of all editorials included at least 1 woman author. When we looked at authors and not editorials, however, we found that 31% (95% CI: 29, 33) (682/2,228) of all editorial authors and 36% (95% CI: 33, 38) (524/1,477) of all unique editorial authors were women (Table 1). The proportions of women editorial authors varied by journal (Tables 1 and 2). We additionally looked at the proportions of women among editorial authors over time, and the proportions do not appear to change over the 8 years that we examined in our study. It is possible that other factors are involved—for example, that the period of time we examined is too brief to capture an improvement in women's editorial authorship.

Fewer than one-fourth of sole-authored editorials (24%; 141/594) were by women, and fewer than one-third of multi-authored editorials had a woman as first author (31%; 184/586) (Table 2). Among unique editorial authors, 24% (123/524) of women were sole authors, and 38% (359/953) of men were sole authors. Thus, the odds of being a sole woman editorial author is half the odds of being a sole man editorial author (0.51; 95% CI: 0.40, 0.65).

We found that generalizing across the 5 journals about whether the number of editorials per author differs by gender was difficult because of variations in approach by the journals. Among the 1,477 unique editorial authors, for example, 73/524 (14%, 95% CI: 11, 17) of women had more than 1

Table 1. Women Editorial Authors According to Journal Among High-Impact Epidemiology Journals, 2010–2017

Journal	No. of Women Authors	No. of Authors	Proportion of Women Authors
Unique authors[a]			
Overall	524	1,477	36
All named authors[b]			
Overall	682	2,228	31
American Journal of Epidemiology	169	457	37
European Journal of Epidemiology	41	151	27
Epidemiology	86	307	28
International Journal of Epidemiology	207	728	28
Journal of Clinical Epidemiology	179	585	31

[a] Unique authors: each named author counted 1 time.
[b] All named authors: named authors counted each time they occurred.

editorial, compared with 179/953 (19%, 95% CI: 16, 21) of men. Two authors (both men) appeared 99 and 100 times each (almost always together as co-editors-in-chief of *Journal of Clinical Epidemiology*). Dropping the 2 authors who appeared most increases the proportions of women editorial authors for *Journal of Clinical Epidemiology* in all positions, but it does not increase the proportions of women editorial authors overall or in any other journals.

For all editorials with 2 authors, we found the gender combinations of first and last author were not equally prevalent (Table 3). The most common combination was a man as both first and last author, comprising 55% (200/363) of editorials, whereas a woman-woman combination contributed only 13% (47/363) of editorials.

DISCUSSION

Although women represent about half of tenured faculty in epidemiology (2, 5, 7), it appears that they have not yet achieved equality in the field's leadership (5). The findings from our study heighten existing concern about women's editorial leadership. Women were editorial authors 31% of the time in 5 major journals during 2010–2017. Furthermore, women were sole editorial authors in 24% of papers and the lead editorial author when there were 2 or more authors in 31%. Although we saw no evidence that the women were editorial authors repeatedly, we have no way to gauge whether women editorial writers were added as "token" authors.

One possible reason for underrepresentation of women editorial authors might be that women are not asked to write editorials as often as men. Fewer invitations could be the result of a possible bias, unconscious or conscious, that predisposes editors or invited authors to offer editorial authorships and coauthorships to men instead of women (5, 6, 16, 17). For example, all 5 journals we examined had men as editors-in-chief. Other studies of editorial authorship in top medical journals have found lower proportions of first authorship by women in journals where the editors-in-chief are men as compared with

Table 2. Women Editorial Authors According to Author Position in High-Impact Epidemiology Journals, 2010–2017

Journal	No. of Women Authors	No. of Authors	Proportion of Women Authors
Sole authors[a]			
Overall	141	594	24
American Journal of Epidemiology	38	128	30
European Journal of Epidemiology	7	42	17
Epidemiology	19	94	20
International Journal of Epidemiology	66	281	24
Journal of Clinical Epidemiology	11	49	23
First authors[b]			
Overall	184	586	31
American Journal of Epidemiology	51	118	43
European Journal of Epidemiology	13	38	34
Epidemiology	29	82	35
International Journal of Epidemiology	58	170	34
Journal of Clinical Epidemiology	33	178	19

[a] Sole authors: authors of sole-authored editorials.
[b] First authors: authors of multiauthored editorials among all multiauthored editorials.

Table 3. Number of Gender Pairings for First and Last Author Among Editorials With 2 Named Authors, High-Impact Epidemiology Journals, 2010–2017

Journal	No.	Gender of First Author and Gender of Second Author							
		Woman-Woman		Woman-Man		Man-Woman		Man-Man	
		No.	%	No.	%	No.	%	No.	%
Overall	363	47	13	59	16	57	16	200	55
American Journal of Epidemiology	80	12	15	20	25	15	19	33	41
European Journal of Epidemiology	17	2	12	3	18	3	18	9	53
Epidemiology	56	9	16	11	20	10	18	26	46
International Journal of Epidemiology	108	19	18	20	19	18	17	51	47
Journal of Clinical Epidemiology	102	5	5	5	5	11	11	81	79

where they are women (6), even when the field is dominated by women (e.g., pediatrics) (16). Furthermore, because editorial board members tend to write more editorials than authors who are not board members (3–6), underrepresentation of women among the editorial boards of the 5 epidemiology journals (5) might be a factor.

We cannot be positive that tenured women are considered "senior" and thus invited to write editorials (e.g., they might not be department chairs). Moreover, we do not know whether the editorial authors we included represent the pool of senior women. While seniority might influence editorial authorship, it can also change over time, and we believed it would have been impractical to determine authors' academic standing at the time of each publication. It is also possible that peer reviewers who are men are more likely than women to propose that the articles they review be accompanied by an editorial and be willing to write it.

Another potential reason for underrepresentation of women editorial authors might be that women decline offers to write editorials more often than men. Alternatively, women might have been invited as often as men to be sole authors but might have elected to have a coauthor and be second author more often when they were invited to author an editorial. We observed, for example, that women were less likely than men (31% versus 69%) to be first authors when they share authorship. This finding is consistent with other biomedical studies (16, 18).

There might be unmeasured factors in our study that influenced the representation of the genders in editorial authorship. The editorial authors and epidemiology journals that we examined were from the United States and around the world, whereas our assumed equal representation among senior epidemiologists is derived from data collected primarily in the United States. Thus, it is possible that instead of an underrepresentation of the senior women epidemiologists, our estimate might reflect a truly lower proportion of senior women participating in epidemiology, as well as leading as authorities, worldwide.

All editorial authors' genders were assigned by a study author and not derived from self-report, which would have been ideal. Although we acknowledge that some individuals self-identify as neither man nor woman, we only considered representation of binary gender. We know from other studies that our methods were likely to misclassify some authors (19–21). We examined our methods of assigning gender, and we found 98% sensitivity for a name's association with a specific gender and 94% for genderize.io; both methods misclassified men and women equally. Given this level of misclassification, however, we would not expect our estimates to change if all originally assigned genders were updated using Web verification.

We also examined editorials and commentaries as one category in our study; we did not separate the various subtypes. However, editorials and commentaries might have different pools of authors. For example, editorials might be likely to be written most often by editors and editorial board members, whereas commentaries might be likely to be invited from the field's leaders. Additionally, some editorials and commentaries are submitted, and these cannot always be differentiated from those that are invited. We examined editorials and commentaries in general epidemiology journals, and the situation might be different in specialty epidemiology journals (where women might be more commonly editorial authors). Previous research, however, suggests that women authors are underrepresented as editorial authors even in journals from fields where they outnumber men (16).

All of us should be aware of and work to eliminate underrepresentation of women in epidemiology leadership roles, generally. Although disparities in epidemiology leadership are part of a larger issue, we can work on each component of the larger issue separately (e.g., editorial leadership, faculty leadership). For example, to increase editorial leadership by women, the epidemiologic community and journal editors should strive to include more women in editorial roles (2–5). Furthermore, if editorial authors are able and inclined to invite coauthors, they should consider both women and men. Additionally, women should be encouraged to be proactive when leadership opportunities arise; older women should provide visible role models and guidance (1, 3). Moreover, we would all benefit from implicit bias training to better understand how to address our own personal biases, which could influence the participation of women in leadership roles (3, 6, 18). It is not uncommon for studies of gender disparities to be met with scrutiny and skepticism, but it is difficult to dismiss evidence that has mounted over time (1–7, 10, 16–18). It is not necessary to understand all the underlying reasons for disparities before working for effective change. We must act now.

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(Appendix follows)

APPENDIX. ALGORITHM USED TO ASCERTAIN AUTHOR GENDER FOR EDITORIAL CONTRIBUTIONS TO HIGH-IMPACT EPIDEMIOLOGY JOURNALS

We used the following methods, in sequential order, to assign a gender to each editorial author's name.

1. Editorial authors who were known to the investigator(s).
2. Names typically affiliated with a single gender (e.g., Stephanie for a woman or Stephen for a man).
3. We searched a Web-based database (https://genderize.io/, accessed May 14, 2018) for names unknown to investigators and without a strong gender association, using the following steps:
   a. We opened a Web browser.
   b. In the search bar we entered the following address with the name specified: https://api.genderize.io/?name=*name* (e.g., https://api.genderize.io/?name=philip).
   c. The browser displayed the name, associated gender, the probability of being that gender, and the count upon which it based that probability (e.g., {"name":"Philip","gender":"male", "probability":1, "count":1097}).
   d. We recorded the associated gender if the probability was ≥0.90.
4. We used the Web (e.g., using an author's affiliation from one of their included editorials in our sample) to search for an image or reference to the author's gender.

We assigned a value of "unknown" to the gender of all editorial authors for whom a gender could not be classified using methods 1–4.