Trends and comparison of female first authorship in five high impact medical journals: 1994-2014

Journal:	*BMJ*
Manuscript ID:	BMJ.2015.027629
Article Type:	Research
BMJ Journal:	BMJ
Date Submitted by the Author:	23-Jun-2015
Complete List of Authors:	Filardo, Giovanni; Baylor Research Institute, Epidemiology da Graca, Briget; Baylor Health Care System, Institute for Health Care Research and Improvement Sass, Danielle; Baylor Health Care System, Institute for Health Care Research and Improvement Pollock, Benjamin; Baylor Scott & White Health, Office of the CQO, Department of Epidemiology Smith, Emma; Yale University, Martinez, Melissa; University of New Mexico School of Medicine,
Keywords:	women, research, publication, medical journals

Trends and comparison of female first authorship in five high impact medical journals: 1994-2014

Giovanni Filardo, Briget da Graca, Danielle M. Sass, Benjamin D. Pollock, Emma B. Smith, Melissa Ashley-Marie Martinez

Department of Epidemiology, Office of the Chief Quality Officer, Baylor Scott & White Health, Dallas, TX 75206
- Giovanni Filardo, director of epidemiology
- Briget da Graca, senior medical writer
- Danielle Sass, supervisor of epidemiology research
- Benjamin D. Pollock, epidemiology intern

Yale University, New Haven, CT 06520
- Emma B. Smith, student

University of New Mexico School of Medicine, Albuquerque, NM 87131
- Melissa Ashley-Marie Martinez, student

Correspondence to:
Giovanni Filardo, PhD, MPH
Department of Epidemiology
Office of the Chief Quality Officer, Baylor Scott & White Health
8080 North Central Expressway, Suite 900
Dallas, TX 75206
Phone: 214-265-3633
Fax: 214-265-3628
e-mail: giovanfi@baylorhealth.edu

Abstract

Objective: We examined changes in representation of women among first authors of original research published in high impact general medical journals from 1994-2014, and investigated differences between journals.

Design: Observational study

Study sample: All original research articles published in *New England Journal of Medicine (NEJM), Lancet, Journal of the American Medical Association (JAMA), Archives of Internal Medicine (Archives), and Annals of Internal Medicine (Annals),* for one issue every alternate month from February 1994 to June 2014.

Main Exposures: Time and journal of publication.

Main Outcome Measures: We assessed prevalence of female first authorship and its adjusted association with time of publication and journal using a multivariable logistic regression that also accounted for number of listed authors and study type (experimental versus non-experimental), and for the interactions between journal and time of publication, and journal and study type.

Results: First-author gender was determined for 3260 of the 3329 articles; 33.1% were women. Following adjustment, female first authorship increased significantly from ~25% in February 1994 to ~38% in June 2014 (p<0.0001), but was significantly less likely in *NEJM* than *JAMA* (adjusted odds ratio [aOR]: 1.68; 95% confidence interval [CI]: 1.27, 2.22), *Archives* (aOR: 1.52; 95%CI: 1.18, 1.95), *Annals* (aOR: 1.48; 95%CI: 1.12, 1.96), or *Lancet* (aOR: 1.36; 95%CI: 1.02, 1.81).

Conclusions: Representation of women among first authors of original research in high-impact medical journals increased significantly from 1994 to 2014, but differed significantly between journals even after differences in study type and total numbers of authors were accounted for.

What this Paper Adds

Section 1: What is already known on this subject

- Two previous studies, one in the United States and one in the United Kingdom, showed that the proportion of women among first authors in high impact medical journals increased from 1970 to 2004, but that at the end of this period they still only accounted for 29.3% of the U.S.-affiliated first authors with MD degrees and 36.7% of the U.K.-affiliated first authors respectively.
- No previous studies compared the representation of women among first authors across similarly influential general medical journals.

Section 2: What this study adds

- This study provides an updated, rigorous examination of women's representation among first authors of original research papers published in high impact general medical journals, covering the period 1994-2014.
- The results show:
    1. Overall, women have made meaningful gains in first authorship of high impact original research, accounting for almost 40% of first authors in 2014; and
    2. After accounting for differences between journals in the types of research published (experimental versus non-experimental studies) and numbers of listed authors, first authors in the *New England Journal of Medicine* were significantly less likely to be women than in any of the other high-impact general medical journals considered (*The Lancet, Journal of the American Medical Association, Archives of Medicine*, and *Annals of Internal Medicine)*.

Introduction

From 2005 to 2013, almost as many women as men graduated medical school in the United States, [1] and in 2013, women accounted for 32.6% of the active physicians (ranging, by specialty, from 4.6% of orthopedic surgeons to 60.4% of pediatricians) and 46.1% of residents and fellows (ranging from 9.5% in interventional cardiology to 82.6% in obstetrics/gynecology).[2] Representation in the higher ranks of academic medicine, however, remains low, with women accounting for only 21% of full professors, 22% of tenured professors, 15% of departmental chairs, and 16% of deans.[3] Given the importance of publication in decisions regarding tenure and promotion in academia,[4] the extent to which the increasing numbers of women entering the medical profession are publishing in high impact journals provides some insight into the degree to which the gender gap can be expected to close at the higher academic ranks in the future.

Two previous studies, one in the United States and one in the United Kingdom, looked at changes in proportions of women vs. men among first authors with affiliations in those countries and, in the case of the U.S. study, with MD degrees, who published original research papers in high impact journals in key medical specialties from 1970 to 2004. [5 6] They found that, by 2004, women had made substantial gains in closing the “gender gap” in authorship, but still accounted for only 29.3%[5] and 36.7%[6] respectively of the first authors. In the present study, we examine the frequency of women vs. men, irrespective of their degrees and affiliations, as first authors of original research articles in 5 major medical journals from 1994 to 2014, looking at both changes over time and differences between journals.

Methods

We assessed prevalence of female first authorship of original research articles published in high impact general and internal medicine journals for the period 1994 to 2014. We examined changes over time as well as differences between journals. Since only published data were collected, ethics approval was deemed unnecessary.

Data Collection

Inclusion and exclusion criteria: We selected the 5 journals with the highest 2012 Journal Citation impact factors in the category "Medicine, General & Internal" for which the publication format enabled us to determine, from either the table of contents or the full-text of the article, the number of authors, their first and last names, credentials, and affiliations, as well as the article type. Data were collected for original research articles (including meta-analyses and systematic reviews) published in these 5 journals from February 1994 to June 2014.

The 5 journals were: *New England Journal of Medicine (NEJM), Journal of the American Medical Association (JAMA), The Lancet, Annals of Internal Medicine (Annals)*, and *Archives of Internal Medicine/JAMA-Internal Medicine (Archives)*. To ensure a representative sample of all the original research articles published during the study period and to ensure that the sample was robust to short-term variations in the prevalence of women among first authors, data were collected for issues published in even-numbered months (February, April, June, August, October, December) for each year; if more than one issue was published per month, this was restricted to the second issue of each of those months. In the event that the second issue did not include any original research publications, data were collected from the first issue published that month.

Variables of interest: For each original research article, we collected data on: time of publication (year and month), journal, gender of the first author (female, male, unknown), total number of authors, and study type (experimental or non-experimental).

Gender of the first author was determined by inspection of the first name. If it was unclear from the name, institutional websites, social media accounts that listed their publications (e.g., LinkedIn), and Internet search engines (e.g. Google) were used to find photographs and/or biographical paragraphs. Any first authors whose genders were not clearly identifiable

after exhausting these sources were marked as "unknown" and the article was excluded from the analysis.

Total number of authors was defined as the count of the named authors. If a group author (e.g. "The EPILOG Investigators"[7]) was listed at the end of a list of named authors, the group was not included in the total count; however, if a group author was listed without any preceding named authors, and the names of the members of that group or its writing committee were detailed elsewhere in the article (eg. acknowledgements section), those names were tallied for the total author count.

Study type was classified as experimental (randomized controlled trials, non-randomized trials, and meta-analyses) or non-experimental (descriptive, cohort, case-control, and cross-sectional studies).

Data quality and cross-check: All data were collected by 2 trained abstractors using a standardized data collection tool. Both abstractors collected data for all years, but alternated months so that one collected data for the February, June, and October issues, and the other for the April, August, and December issues. Cross-checks to assess data quality and reliability were performed with each duplicating the other's data collection for one month in each year for the *NEJM* and *Lancet* articles (n=153). This revealed a very low rate of discrepancies needing correction in the exposure of interest, gender of the first author (2.0%). Study type was reviewed for all articles, and discrepancies resolved through discussion between the abstractors, with other members of the study team (GF and DS) resolving disputes when they could not reach resolution. The final correction rate on this variable was 4.4%.

Statistical analysis

First author gender, study type, and total number of authors were tabulated by journal (Table 1). Raw percentages of female first authors were computed by time of publication (5-year intervals) and presented by journal (Table 2), and stratified by study type (Table 3).

To model the association between gender and 1) time of publication and 2) journal, a logistic regression model was used. Specifically, this model was adjusted for: 1) time of publication (incremental publication month starting from February 1994 [month 1] to June 2014 [month 245]) – to avoid assuming a linear association with the outcome of interest and to avoid the bias inherent with categorization, this variable was modeled as a continuous covariate with a 5-knot restricted cubic spline[8]; 2) total number of listed authors –modeled using restricted cubic splines[8]; 3) study type (experimental versus non-experimental); and interaction terms between journal and time of publication and between journal and study type. Since women remain underrepresented in the higher ranks of academic medicine,[3] the adjustment for total number of listed authors and study type was intended to account for the possibility that they might be less likely to lead a large research team, or to have been funded for large randomized controlled clinical trials that some of these high impact journals might preferentially publish. Estimates from this model were used to calculate adjusted odds ratios, 95% confidence intervals, and p-values to describe the associations of interest. Adjusted plots of the association between time of publication and first author gender stratified by journal were also generated.

All analyses were performed using SAS 9.4 (Cary, NC).

Results

Data were collected for 3329 articles. Of these, gender of the first author could not be determined for 69 (2.1%) (range among journals: 1.1% [*Archives*] to 3.9% [*Lancet*]). These were excluded, leaving 3260 articles in the final analyses. In total, across the full 20 year period and all 5 journals, 1080 (33.1%) of these articles had female first authors. Table 1 shows first author gender, study type, and total number of authors by journal while Tables 2 and 3 show percentages of female first authors by time of publication (5-year intervals) and journal for all studies and stratified by study type. These raw results show substantial increases in female first authorship during the study period, across all study types and 4 of the 5 included journals. The

largest gains from the 1994-1998 to the 2009-2014 period, all ≥25 percentage points, were in non-experimental studies published in *Annals*, and experimental studies published in *JAMA* and *Lancet*. *NEJM* appeared to follow a different pattern from the other journals.

Similar results were seen following adjustment. Overall, the adjusted probability of an article having a female first author significantly increased between February 1994 and June 2014 ($p<0.0001$), going from approximately 25% to approximately 38% (Figure 1). This significant increase was not consistent across journals – female first authors were significantly less likely to publish in *NEJM* compared to *JAMA*, *Archives*, *Annals*, and *Lancet* (Table 4 and Figure 1).

Discussion

Our results show continued narrowing of the gender gap in first authorship in high impact peer-reviewed medical journals described in the previous studies examining this topic.[5 6] In total, in the 5 journals we examined, the representation of women among the first authors increased from 26.8% (1994-1998) to 37.9% (2009-2014). This gain persisted when experimental and non-experimental studies were examined separately, but it was not consistent across the journals. NEJM was the anomaly: while it had a similar proportion of female first authors in the early years of the study period, this did not increase to the extent seen in the other journals and, in recent years, has declined. Adjustment for study type and number of authors, which could serve as markers for large randomized controlled trials for which women, being still underrepresented in the higher ranks of academic medicine,[1] may be less likely to serve as the principal investigator and/or first author, did not mitigate this difference.

While the previous studies examining the representation of women did not specifically look at differences between the journals included in their samples, their journal-level results reported for 2004 for those journals that overlap with our sample confirm this finding: only 14.1% of US-affiliated first authors with MDs were female in papers published in *NEJM*, compared to

26.5% in *JAMA* and 31.5% in *Annals*, and to 43.3% of British-affiliated first authors in *Lancet*.[5 6] Our adjusted analysis suggests that the difference is explained by neither differences in type of study nor size of the research team/author list between studies published in *NEJM* vs. the other journals, and review of the journals' respective descriptions of their review processes contained in their Information for Authors[9-13] does not indicate substantial differences in use of processes such as double-blind review, or in who holds the final decision-making power regarding acceptance, that have been suggested as impacting representation of female authors.[14-16] One possibility is that female first authors are less likely to submit their manuscripts to *NEJM*, but, without access to the data on journal submissions as well as publications, this could not be investigated. Both *JAMA* and the *Middle European Journal of Medicine* have undertaken acceptance rate studies with their submission data previously, with neither finding significant differences based on the gender of the corresponding[17] or first author,[18] but to our knowledge no studies of submission patterns between journals have been conducted.

Our study used methods similar to those reported previously in studies examining gender and authorship,[5 6 19-22] but some misclassification may have occurred. The low rate of discrepancy between the abstractors (2.0%) provides reassurance that such misclassification should be rare; more importantly, it would be non-differential. Our results are based on a large sample of original research articles published over the 20-year study period, gathered through the uniform application across journals and years of a sampling methodology that selected one issue every other month for each journal. This methodology was designed to ensure a sample that is both representative of all the original research articles and robust to short-term variations (as short as every 2 months) in the percentages of female first authors. As such, our results provide a more accurate picture of the changes over time than would be afforded by a sample composed, for example, of all original research articles published in the included journals in a single year per decade.[5 6] Furthermore, we adjusted for study-type and number of authors to account for the possibility that, even within the defined group of high-impact, general medical

peer-reviewed journals, there might be differences with respect to the type, size, and source of study that is prioritized for publication.

Overall, our results confirm that the representation of women among first authors of original research published in high-impact general medical journals has significantly increased over the past 20 years. However, our findings also reveal significant differences between journals in the probability of the first author of a published original research article being female.

Funding:

This work was funded in part by the Bradley Family Endowment to the Baylor Health Care System Foundation. The funder played no role in this study, and the research team operated independently.

Contributions of the authors:.

Filardo (study guarantor): study concept, study design, data analysis, data interpretation, drafting the manuscript

da Graca: literature search, study design, data interpretation, drafting the manuscript

Sass: data collection, data management, revising the manuscript

Pollock: data analysis, figures and tables, drafting the manuscript

Smith: data collection, revising the manuscript

Martinez: data collection, revising the manuscript

Transparency declaration:

I, Dr. Giovanni Filardo, affirm that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned) have been explained.

Data sharing: The study data set is available from the corresponding author on request.

BMJ License Statement

The Corresponding Author has the right to grant on behalf of all authors and does grant on behalf of all authors, a worldwide licence to the Publishers and its licensees in perpetuity, in all forms, formats and media (whether known now or created in the future), to i) publish, reproduce, distribute, display and store the Contribution, ii) translate the Contribution into other languages, create adaptations, reprints, include within collections and create summaries, extracts and/or, abstracts of the Contribution, iii) create any other derivative work(s) based on the Contribution, iv) to exploit all subsidiary rights in the Contribution, v) the inclusion of electronic links from the Contribution to third party material where-ever it may be located; and, vi) licence any third party to do any or all of the above.

Competing Interests Statement

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: all authors had financial support from Bradley Family Endowment to the Baylor Health Care System Foundation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

References

1. Association of American Medical colleges. The State of Women in Academic Medicine: The Pipeline and Pathways to Leadership, 2013-2014. Table 1: Medical Students, Selected Years, 1965-2013. https://www.aamc.org/members/gwims/statistics/. Accessed May 11, 2015.

2. Association of American Medical Colleges. Physician Specialty Data Book 2014. https://members.aamc.org/eweb/upload/14-086%20Specialty%20Databook%202014_711.pdf. Accessed May 11, 215.

3. Association of American Medical colleges. The State of Women in Academic Medicine: The Pipeline and Pathways to Leadership, 2013-2014. . https://www.aamc.org/members/gwims/statistics/. Accessed May 11, 2015.

4. Reed DA, Enders F, Lindor R, McClees M, Lindor KD. Gender differences in academic productivity and leadership appointments of physicians throughout academic careers. *Acad Med* 2011;86(1):43-7.

5. Jagsi R, Guancial EA, Worobey CC, Henault LE, Chang Y, Starr R, et al. The "gender gap" in authorship of academic medical literature--a 35-year perspective. *N Engl J Med* 2006;355(3):281-7.

6. Sidhu R, Rajashekhar P, Lavin VL, Parry J, Attwood J, Holdcroft A, et al. The gender imbalance in academic medicine: a study of female authorship in the United Kingdom. *J R Soc Med* 2009;102(8):337-42.

7. Investigators E. Platelet glycoprotein IIb/IIIa receptor blockade and low-dose heparin during percutaneous coronary revascularization. *N Engl J Med* 1997;336(24):1689-96.

8. Harrell FE, Jr. *Regression modeling strategies: with application to linear models, logistic regression, and survival analysis*. New York: Springer-Verlag, 2001.

9. JAMA-Internal Medicine. JAMA Internal Medicine Instructions For Authors. http://archinte.jamanetwork.com/public/instructionsForAuthors.aspx#SecEditorialReviewandPublication. Accessed May 11, 2015.

10. JAMA. JAMA Instructions For Authors. http://jama.jamanetwork.com/public/instructionsforauthors.aspx#EditorialReviewandPublication. Accessed May 11, 2015.

11. Campion EW, Curfman GD, Drazen JM. Tracking the peer-review process. *N Engl J Med* 2000;343(20):1485-6.

12. How The Lancet handles your paper. 2015; http://www.thelancet.com/lancet/information-for-authors/how-the-lancet-handles-your-paper. Accessed May 11, 2015.

13. Annals of Internal Medicine. Information for Authors. http://annals.org/public/authorsinfo.aspx#internal-review-by-editors-and-peer-review. Accessed May 11, 2015.

14. Budden AE, Tregenza T, Aarssen LW, Koricheva J, Leimu R, Lortie CJ. Double-blind review favours increased representation of female authors. *Trends Ecol Evol* 2008;23(1):4-6.

15. Kaatz A, Gutierrez B, Carnes M. Threats to objectivity in peer review: the case of gender. *Trends Pharmacol Sci* 2014;35(8):371-3.

16. Tregenza T. Gender bias in the refereeing process? *TRENDS in Ecol. & Evol.* 2002;17(8):349-50.

17. Gilbert JR, Williams ES, Lundberg GD. Is there gender bias in JAMA's peer review process? *JAMA* 1994;272(2):139-42.

18. Heckenberg A, Druml C. Gender aspects in medical publication - the Wiener klinische Wochenschrift. *Wien Klin Wochenschr* 2010;122(5-6):141-5.

19. Bergeron JL, Wilken R, Miller ME, Shapiro NL, Bhattacharyya N. Measurable progress in female authorship in otolaryngology. *Otolaryngol Head Neck Surg* 2012;147(1):40-3.

20. Dotson B. Women as authors in the pharmacy literature: 1989-2009. *Am J Health Syst Pharm* 2011;68(18):1736-9.

21. Long MT, Leszczynski A, Thompson KD, Wasan SK, Calderwood AH. Female authorship in major academic gastroenterology journals: a look over 20 years. *Gastrointest Endosc* 2015.

22. Tinjum BE, Getto L, Tiedemann J, Marri M, Brodowy M, Bollinger M, et al. Female authorship in emergency medicine parallels women practicing academic emergency medicine. *J Emerg Med* 2011;41(6):723-7.

Figure Legends

Figure 1. Adjusted association between female first author and time of publication by journal (February 1994 - June 2014)*

* The model was adjusted by: 1) time of publication; 2) total number of listed authors; 3) study type (experimental versus non-experimental); and interaction terms between journal and month and journal and study type. The adjusted p-value for the association between time of publication and female first authorship was < 0.0001.

Annals = Annals of Internal Medicine; Archives = Archives of Internal Medicine/JAMA-Internal Medicine; JAMA = Journal of the American Medical Association; NEJM = New England Journal of Medicine

Table 1. First author gender, study type, and total number of authors by journal of publication (February 1994 - June 2014)

	First author gender	Study type	Total authors (mean±SD)	Total articles
Annals	Female = 33.8%	Experimental = 43.0% Non-experimental = 57.0%	7.5 ± 4.5	533
Archives	Female = 36.1%	Experimental = 22.1% Non-experimental = 77.9%	6.1 ± 3.4	1,230
JAMA	Female = 37.4%	Experimental = 21.1% Non-experimental = 72.9%	8.4 ± 6.1	494
Lancet	Female = 31.0%	Experimental = 42.7% Non-experimental = 57.3%	8.8 ± 5.9	468
NEJM	Female = 23.6%	Experimental = 50.1% Non-experimental = 49.9%	10.9 ± 7.4	535
All	Female = 33.1%	Experimental = 33.8% Non-experimental = 66.2%	7.8 ± 5.5	3,260

Annals = Annals of Internal Medicine; Archives = Archives of Internal Medicine/JAMA-Internal Medicine; JAMA = Journal of the American Medical Association; NEJM = New England Journal of Medicine; SD = standard deviation

Table 2. Percentages of female first authors by year of publication and journal

	1994-1998* *n=804*	*1999-2003* *n=836*	*2004-2008* *n=815*	*2009-2014*** *n=743*	**Total** **n=3,198**
Annals, number of articles	*151*	*113*	*125*	*144*	**533**
Female first author	*25.2%*	*37.2%*	*28.0%*	*45.1%*	**33.8%**
Archives, number of articles	*288*	*338*	*363*	*241*	**1,230**
Female first author	*29.5%*	*33.1%*	*40.2%*	*41.9%*	**36.1%**
JAMA, number of articles	*123*	*133*	*121*	*117*	**494**
Female first author	*29.3%*	*34.6%*	*42.1%*	*44.4%*	**37.4%**
Lancet, number of articles	*126*	*125*	*102*	*115*	**468**
Female first author	*23.8%*	*29.6%*	*37.3%*	*34.8%*	**31.0%**
NEJM, number of articles	*147*	*139*	*115*	*134*	**535**
Female first author	*23.8%*	*23.0%*	*27.8%*	*20.1%*	**23.6%**
All, number of articles	*835*	*848*	*826*	*751*	**3,260**
Female first author	*26.8%*	*31.7%*	*36.6%*	*37.9%*	**33.1%**

*February; **June;

Annals = Annals of Internal Medicine; Archives = Archives of Internal Medicine/JAMA-Internal Medicine; JAMA = Journal of the American Medical Association; NEJM = New England Journal of Medicine

Table 3. Percentages of female first authors by year of publication, journal, and study type

	1994-1998*	*1999-2003*	*2004-2008*	*2009-2014**	**Total**
Non-experimental studies					
Annals, number of articles	*90*	*83*	*60*	*71*	**304**
Female first author	*25.6%*	*39.8%*	*31.7%*	*50.7%*	**36.5%**
Archives, number of articles	*224*	*251*	*300*	*183*	**958**
Female first author	*33.5%*	*37.1%*	*39.7%*	*41.5%*	**37.9%**
JAMA, number of articles	*103*	*92*	*84*	*81*	**360**
Female first author	*33.0%*	*37.0%*	*45.2%*	*45.7%*	**39.7%**
Lancet, number of articles	*93*	*75*	*55*	*45*	**268**
Female first author	*26.9%*	*38.7%*	*38.2%*	*31.1%*	**33.2%**
NEJM, number of articles	*88*	*79*	*40*	*60*	**267**
Female first author	*28.4%*	*27.8%*	*37.5%*	*25.0%*	**28.8%**
All non-experimental, n	*598*	*580*	*539*	*440*	**2,157**
Female first author	*30.4%*	*36.4%*	*39.3%*	*40.4%*	**36.3%**
Experimental studies					
Annals, number of articles	*61*	*30*	*65*	*73*	**229**
Female first author	*24.6%*	*30.0%*	*24.6%*	*39.7%*	**30.1%**
Archives, number of articles	*64*	*87*	*63*	*58*	**272**
Female first author	*15.6%*	*21.8%*	*42.9%*	*43.1%*	**29.8%**
JAMA, number of articles	*20*	*41*	*37*	*36*	**134**
Female first author	*10.0%*	*14.6%*	*37.8%*	*41.7%*	**31.3%**
Lancet, number of articles	*33*	*50*	*47*	*70*	**200**
Female first author	*15.2%*	*16.0%*	*36.2%*	*37.1%*	**28.0%**
NEJM, number of articles	*59*	*60*	*75*	*74*	**268**
Female first author	*16.9%*	*16.7%*	*22.7%*	*16.2%*	**18.3%**
All experimental, n	*237*	*268*	*287*	*311*	**1,103**
Female first author	*17.7%*	*21.6%*	*31.4%*	*34.4%*	**26.9%**

*February; **June;

Annals = Annals of Internal Medicine; Archives = Archives of Internal Medicine/JAMA-Internal Medicine; JAMA = Journal of the American Medical Association; NEJM = New England Journal of Medicine

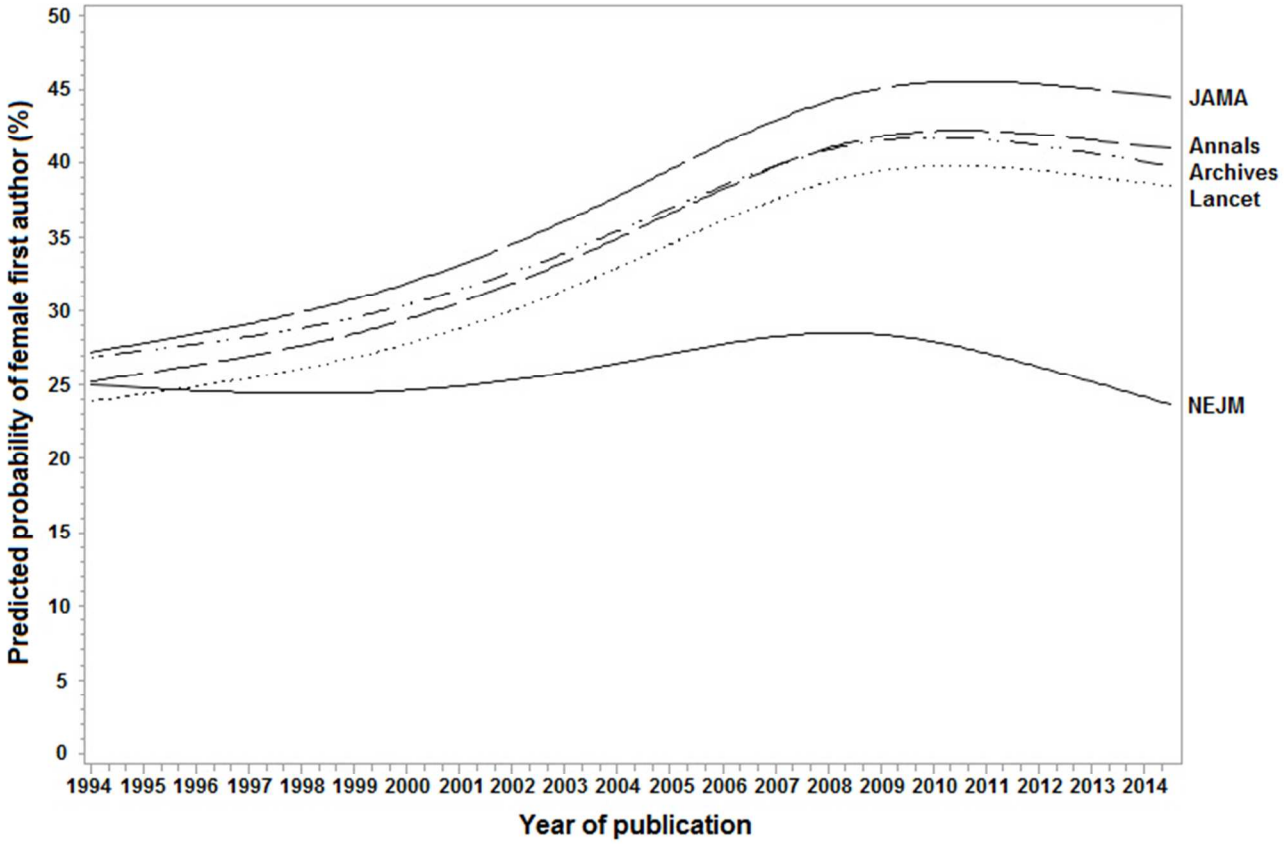
Table 4: Adjusted* odds ratios for female first authorship by journal

	Odds Ratio vs. *NEJM*** (95% CI)	*p-value*
Annals	1.48 (1.12, 1.96)	*0.006*
Archives	1.52 (1.18, 1.95)	*0.001*
JAMA	1.68 (1.27, 2.22)	*0.0003*
Lancet	1.36 (1.02, 1.81)	*0.036*

* model was adjusted by: 1) time of publication; 2) total number of listed authors; 3) study type (experimental versus non-experimental); and interaction terms between journal and month and journal and study type.
** *NEJM* = reference group

Annals = Annals of Internal Medicine; Archives = Archives of Internal Medicine/JAMA-Internal Medicine; JAMA = Journal of the American Medical Association; NEJM = New England Journal of Medicine

Figure 1. Adjusted association between female first author and time of publication by journal (February 1994 - June 2014)*



* The model was adjusted by: 1) time of publication; 2) total number of listed authors; 3) study type (experimental versus non-experimental); and interaction terms between journal and month and journal and study type. The adjusted p-value for the association between time of publication and female first authorship was < 0.0001.

Annals = *Annals of Internal Medicine*; Archives = *Archives of Internal Medicine/JAMA-Internal Medicine*; JAMA = *Journal of the American Medical Association*; NEJM = *New England Journal of Medicine*