

Are Papers Written by Women Authors Cited Less Frequently?*

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Abstract

Dion, Sumner and Mitchell (2018) find that a published article is more likely to cite at least one female-authored paper if that article is itself authored by women. To complement their work, we study the number of times that an article in their data set is cited given that it has at least one female author. We find that articles with at least one female author are cited no more or less often than male-authored articles once we control for the publishing journal and the number of authors. The importance of controlling for author count in our model suggests that spurious correlation and/or self-citation might explain at least some of the gender differences found by Dion, Sumner and Mitchell (2018).

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Dion, Sumner and Mitchell (2018) demonstrate that a published article is more likely to cite a female-authored paper if that article is itself authored by women.¹ They also show that articles in *Political Analysis* are substantially less likely to cite female-authored papers when compared to articles in the discipline’s pre-eminent general interest journal, *American Political Science Review*.² This difference is not peculiar to political science as a discipline: articles in *Econometrica* are also less likely than articles in *American Political Science Review* to cite a female-authored paper.³

Some of the potential explanations for these results are extremely concerning from the perspective of achieving gender equality in the political methodology community. For example, it may be that women are not as well-networked in the profession as male counterparts, and thus have greater difficulty gaining attention for their work. Or, perhaps authors simply take the work of women authors less seriously. These possibilities represent what Dion, Sumner and Mitchell (2018, p. 3) call the “Matilda effect.” Either possibility is worrisome.

To complement the findings of Dion, Sumner and Mitchell (2018), we study the difference in citation rates between male and female-authored papers. That is, we are interested in:

- a. $(\text{citation count}|\text{at least one female author}) - (\text{citation count}|\text{only male author(s)})$, and
- b. $\Pr(\text{paper cited}|\text{at least one female author}) - \Pr(\text{paper cited}|\text{only male author(s)})$.

By contrast, Dion, Sumner and Mitchell (2018) study the probability that an article’s reference list contains at least one paper authored only by women as a function of the gender composition of the citing article’s authors.⁴ We argue that our dependent variables speak

¹This is the result in Table 3 of Dion, Sumner and Mitchell (2018). In Appendix Table A8, they also show that a published article is more likely to cite a paper with at least one female author (including mixed-gender author teams) if that article is itself authored by at least one woman.

²This is the result in Table 3; Appendix Table A8 also shows that articles in *Political Analysis* are also less likely than articles in *American Political Science Review* to cite papers with at least one female author (including mixed-gender author teams).

³*Econometrica* articles are also less likely than those in *American Political Science Review* to cite a paper with at least one woman author (including mixed-gender author teams).

⁴Dion, Sumner and Mitchell (2018) also include mixed-gender teams in the coding of their dependent variable, but only in a supplementary analysis; see Appendix Table A8 in their paper.

more directly to diversity in the methods community because citation counts are an increasingly important metric for assessing scholarly impact, e.g., when evaluating a tenure case (Fowler and Aksnes, 2007; Fischer, Ritchie and Hanspach, 2012; Cameron, White and Gray, 2016; Marini, 2017). If women systematically receive fewer citations to their papers than men, this could directly harm these women’s career prospects and pose a barrier to diversifying the methods field. For the same reason, we choose to code our key independent variable (“female author”) such that both women-only author teams and mixed-gender author teams are classified as 1, while male-only author teams are classified as 0. Our choice focuses on citations to all female authors, not just those who write alone or with other women, and increases the proportion of “treated” cases in the data set (see Table 1 in Dion, Sumner and Mitchell (2018)).

We collected citation data from Crossref (www.crossref.org) for all the publications in the Dion, Sumner and Mitchell (2018) data set using the `rcrossref` package of Chamberlain et al. (2017).⁵ The resulting citation count is our dependent variable. We were able to collect citation data for 1907 of the 1939 publications in the data set.⁶ Papers in this data set had been cited between 0 and 984 times, with a mean of 28.92 citations per paper. As reported by Dion, Sumner and Mitchell (2018), the data set contains all articles published between the years 2007 and 2016 in five prominent journals, including three methodological journals (*Political Analysis*, *Econometrica*, and *Sociological Methods and Research*), a general interest political science journal (*American Political Science Review*), and a political science journal focusing on gender (*Politics and Gender*).

A regression analysis of the citation data is shown in Table 1. Models 1 and 2 use OLS regression to predict the number of citations using whether at least one author is a female,

⁵The citation data was collected on April 5, 2018, and citation counts therefore are current as of this date.

⁶One article was missing author gender information, and therefore the total sample size for our analysis is 1906.

the publishing journal, and the number of authors (model 2 only).⁷ Model 3 uses OLS to predict whether the paper has been cited more than five times ($= 1$ if so, $= 0$ if not);⁸ this model tries to directly assess $\Pr(\text{paper cited})$ using five citations as a cutoff for “not being cited.”

The combined evidence of Table 1 indicates that female authors are *not* at a systematic disadvantage when it comes to being cited, holding the publishing journal and the number of authors constant. Model 1 in Table 1 seems to indicate that articles with female authors receive about five *more* citations on average than those with only male authors, *ceteris paribus*. This relationship is sensible: for nearly any fixed probability that a woman is a paper author, a greater number of co-authors implies a higher probability that at least one author is female.⁹ At the same time, previous research has found that the number of co-authors on a paper is associated with a greater number of citations to that paper—a pattern that holds across multiple fields (Wuchty, Jones and Uzzi, 2007; Franceschet and Costantini, 2010; Abramo and D’Angelo, 2015). This increase in citations may be due in part to the fact that as the number of authors increases, so does the network of scholars who might know and cite those authors (Leimu and Koricheva, 2005, p. 30). We thus have reason to suspect spurious correlation between our “female author” variable and the number of citations; the potential back door pathway leads through the number of authors of the paper. Once author count is included as a variable in the regression (in Model 2), this relationship becomes statistically indistinguishable from zero and substantively small. The findings of Model 3 (using a binary dependent variable for citations) are substantively similar to those of Model

⁷The number of authors varies between 1 and 5; articles with more than five authors are classified as having five authors. We also only use gender information from the first five authors in an article. These choices are consistent with the coding in the original data set, which only codes the gender of the first five authors.

⁸612 articles in the data set have been cited five times or fewer.

⁹If the probability of any author being a woman is p , then the probability that at least one author on a paper is a man is $1 - (1 - p)^n$ where n is the number of authors. This quantity is strictly increasing in n for $p \in (0, 1)$.

2. Our overall conclusion is that there is no apparent relationship between author gender and citation count in this data set once author count is held constant.

The importance of the author count variable suggests that confounding might explain at least some of the gender discrepancies found in Dion, Sumner and Mitchell (2018). Women are underrepresented as solo authors in general (West et al., 2013), tend to collaborate more on average than men (Kumar and Ratnavelu, 2016), and tend to have a greater number of co-authors (Bozeman and Gaughan, 2011).¹⁰ However, in the Dion, Sumner and Mitchell (2018) data set, articles with *only* women as authors have on average 0.8 fewer authors (with a standard error = 0.05) compared to articles with male authors or mixed-gender author teams. Again, this is sensible: for nearly any fixed probability that an author is female, a greater number of co-authors implies a lower probability of an all-female author team.¹¹ Moreover, it is plausible that there is a positive association between the the number of authors of an article and the number of papers cited by that article (Corbyn, 2010; Davis, 2010); citing more papers presumably means a greater chance of citing at least one paper authored by women. Consequently, there is a possible back-door causal pathway between the probability that all authors on a published article are female and the probability that the article cites another paper with only women authors.

It is also possible that papers with female authors cite women more often because all authors (including women) often cite *themselves* (Fowler and Aksnes, 2007). Even if women cite themselves less often than men (King et al., 2017), a positive propensity for authors to self-cite could explain why a paper with only female authors would be more likely to cite another paper with only female authors.

Although we find that female-authored papers are not any more or less likely to be cited

¹⁰However, McDowell, Singell and Stater (2006) finds that women and men are equally likely to co-author.

¹¹If the probability of any author being a woman is p , then the probability that at least one author on a paper is a woman is $1 - p^n$ where n is the number of authors. This quantity is strictly increasing in n for $p \in (0, 1)$.

Table 1: Regression analysis of citations counts for published papers in the Dion, Sumner and Mitchell (2018) data set

	<i>Dependent variable:</i>		
	citation count		citations > 5
	(1)	(2)	(3)
female author	5.370 (2.958)	1.313 (2.990)	0.014 (0.022)
author count		9.049 (1.376)	0.067 (0.010)
Am. Pol. Sci. Rev.	69.692 (5.074)	55.206 (5.480)	0.839 (0.041)
Econometrica	71.008 (4.917)	52.957 (5.584)	0.834 (0.041)
Political Analysis	66.663 (5.413)	49.252 (5.972)	0.715 (0.044)
Politics and Gender	39.734 (6.181)	30.767 (6.264)	0.422 (0.046)
Soc. Methods and Res.	55.682 (5.652)	38.717 (6.156)	0.609 (0.046)
Observations	1,906	1,906	1,906
R ²	0.303	0.318	0.774
Adjusted R ²	0.297	0.312	0.772

Results are coefficients from OLS regression (standard errors in parentheses). All models include year fixed effects (coefficients omitted from table). Constant is not included in any model.

on average once we control for the journal and number of authors, our results do not imply that there is no gender representation problem in the political methodology community. Both *Political Analysis* and *Econometrica* have a substantially lower proportion of articles with at least one female author than *Sociological Research and Methods*, with the latter journal having over 9 percentage points more articles with a female author compared to the former two in this data set. Given the very high citation rates of *Political Analysis* and *Econometrica*, both of which are broadly comparable¹² to *American Political Science Review* in impact factor, our results suggest that boosting the representation of women in citations could be achieved by increasing the diversity of the methods community through active recruitment and mentoring of, and co-authorship with, people from underrepresented groups (including women) who have an interest in methodology.

¹²The 2016 impact factors for these journals are: *Econometrica*: 3.379; *American Political Science Review*: 3.316; *Political Analysis*: 3.361 (Thomson Reuters, 2016).

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